GRAVER WATER SYSTEMS
675 CENTRAL AVE. - SUITE 3
NEW PROVIDENCE NJ, 07974

OPERATION MANUAL

POWDEX CONDENSATE FILTERS

San Juan Generating Station
Waterflow, NM

VOLUME 3
I&C EQUIPMENT LITERATURE

DATE: JULY, 2012
CUSTOMER ORDER NO. 01032363
GRAVER JOB NO. 13486
GRAVER DOCUMENT NUMBER: 13486-T-A-3000-003 Rev A

I&C

EQUIPMENT

LITERATURE

Customer Order #
01032363

San Juan Generating

Station

Waterflow, NM

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13486-T-A-3000-003
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I&C EQUIPMENT LITERATURE

MANUFACTURER	COMPONENT	RELEASE/ITEM (TAG NUMBER)
ACOPIAN:	Power Supply A24MT550-L	900E/0039
ACROMAG:	Signal Isolator Cat. No. 270i-20MA-DIN-NCR	900E/0045
ANDERSON-GREENWOOD	Three Valve Manifold Cat. No. M4THPS-4-XP	010E/0002 011E/0002 011E/0005 011E/0006 031E/0003
	Two Valve Manifold Cat. No. M4TPHPS-4XP	010E/0006
BUSSMANN:	Fuse Holder Cat. No. S-8301-10	900E/0042
	Fast Acting Fuse Cat. No. AGC-1/8	900E/0043
	Fast Acting Ferrule Fuse Cat. No. AGC-3/4	900E/0044
	Low Voltage, Branch Rated Fuse Cat. No. KTK-R-7	900E/0048
	Fuse Holder Cat. No. BC6033s	900E/0050
CONBRACO - APOLLO	½" Full Port Manual Ball Valve Cat. No. 77-103-01	011E/0021 031E/0016
	1" Full Port Manual Ball Valve Cat. No. 77-105-01	011E/0022 031E/0017
DREXELBROOKS:	Level Transmitter Cat. No. 409-1030-F04-00	031E/0004 (LE-5580, LIT-5580) 031E/0005 (LE-5581, LIT-5581)
FEDERAL:	Alarm Horn Cat. No. 350	
GENERAL ELECTRIC:	Terminal Block CR151-B2,B6	011E/0012 011E/0013

MANUFACTURER	COMPONENT	RELEASE/ITEM (TAG NUMBER)
		011E/0018 031E/0009 031E/0013 900E/0046
INVENSYS-FOXBORO	Differential Pressure Transmitter Cat. No. IDP10-T22D01F-M1-L1	010E/0001 (PDIT-5500) 010E/0004 (PDIT-5521, PDIT 5421)
	Differential Pressure Transmitter Cat. No. IDP10-T22C01F-M1-L1	011E/0001 (FIT-5520, FIT-5540) 031E/0001 (FIT-5582)
	Differential Pressure Transmitter Cat. No. IDP10-T22E01F-M1-L1	011E/0006 (PDIT-5523, PDIT-5543)
	Temperature Indicating Transmitter Cat. No. RTT20-T1SNQFD-L3-M1	010E/0003 (TIT-5501)
	Temperature Element Cat. No. TT-2CC407000	010E/0004 (TE-5501/TW-5501)
	Gage Pressure Transmitter Cat. No. IGP20-T22D01F-M1-L1	010E/0005 (PIT-5595)
N-TRON	Industrial Ethernet Switch Cat. No. 305FX - SC	0900E/0029
NUMATICS	Air Filter Regulator w/ gauge Cat. No. P42B-08G	011E/0020
SQUARE D	Distribution Panel for Plug In Circuit Breakers Cat. No. Q0116L125G	900E/0036
	Cicuit Breaker Distribution Panel Cover Cat. No. QOC16US	900E/0037
	Circuit Breaker, Plug In Type Cat. No. Q0115-5237	900E/0038
	Molded case disconnect switch Cat. No. Q02000NS	900E/0048

Gold Box

SINGLE OUTPUT

LINEAR REGULATED
AC-DC

SERIES A (High Performance)

- Shipped Within 3 Days
- All Models U.L. Recognized
- CE
- Five Year Warranty

Series A power supplies offer unusually high performance—many models have regulation of ±0.005%. Electronic current limiting and provision for remote voltage sensing are standard features; overvoltage protection is available as a built-in option. Rugged extruded aluminum cases include threaded mounting holes on bottom, back, and side, permitting mounting in any position.

SERIES A: HIGH PERFORMANCE POWER SUPPLIES

STANDARD FEATURES

- Provision for remote sensing and/or external output adjustment
- Short circuit proof with automatic recovery (electronic current limiting)
- Can be mounted on any of three surfaces (case sizes H8, H11 and H16; two surfaces)

SPECIFICATIONS

Input Voltage: 105-125 VAC, 50-400 Hz, single phase.

Output Specifications: See pages 48 and 49. Series A supplies have model numbers beginning with the letter A.

Remote Voltage Adjustment/Sensing: Provision for sensing the output voltage across the load, so that drops in the load line are compensated, is a standard feature. This feature also permits the use of an externally located potentiometer to adjust output voltage.

Polarity: Output is floating; either positive or negative terminal may be grounded or floated up to 300 volts above ground.

Temperature Coefficient: 0.015%/°C (Typical).

Ambient Operating Temperature: –20 to +71°C.

Storage Temperature: –55 to +85°C.

Response Time: Less than 20 microseconds.

OPTIONS

Under/Overvoltage Alarm Contacts: To control a horn or light, or to signal your PLC. Available on models with nominal outputs of 5 Vdc to 125 Vdc. SPDT contacts switch if the power supply's output deviates by

1.0 volt or more: 5 volt models.
2.0 volts or more: 6 to 48 volt models.
3.0 volts or more: 50 to 125 volt models.

Contact ratings: 120 VAC, 8A / 60 Vdc, 1A. (To comply with SELV requirements, limit switched voltage to 60Vdc/42 VAC.) To order, add suffix "L" to model number and $35.00 to price. Models with this option are not yet UL Recognized/CE certified.

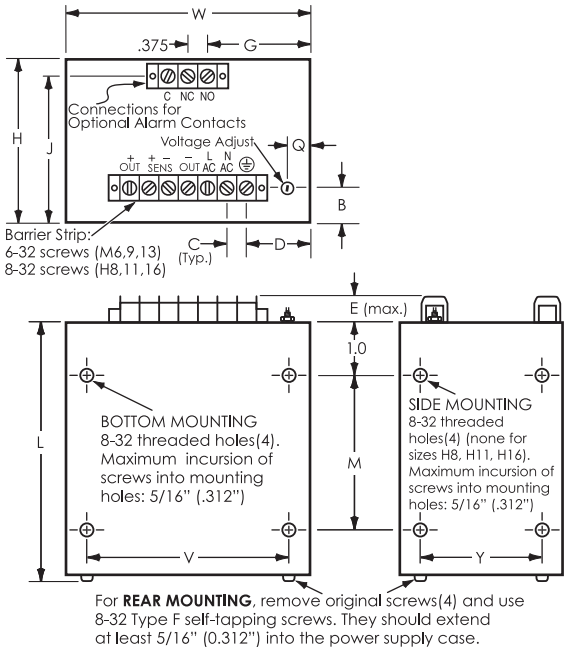
Overvoltage Protection: An internal preset overvoltage protector is available. To order, add prefix "V" to the model number, and increase standard price as follows:

Outputs of	1.5-70V	75-150V
All case sizes except H16	$25.00	$35.00
Case size H16	75.00	85.00

Terminal Strip Cover: Clips on. To order, add suffix "M" to model number and $5.00 to price.

230 Volt Input: All models can be alternately furnished for operation on inputs of 210-250 VAC, 50-400 Hz. To order, add suffix "–230" to model number and $25.00 to price. (For models in case sizes H8, H11 and H16, add $40.00.) The "–230" option requires two additional days.

Mounting: Threaded mounting holes permit mounting to a chassis, cabinet wall or bracket. To mount from the power supply side of the mounting surface or for DIN rail mounting, see accessory Mounting Kits on page 91.



Case Size	L	W	H	M	V	Y	Q	B	E	C	D	G	J	Approx. Weight
M6	6.59	5.12	3.44	4.0	4.5	3.0	.5	.75	.58	.375	1.44	2.19	3.09	4 lb. 4 oz.
M9	9.25	5.12	3.44	6.0	4.5	3.0	.5	.75	.58	.375	1.44	2.19	3.09	7 lb. 4 oz.
M13	13.25	5.12	3.44	10.0	4.5	3.0	.5	.75	.58	.375	1.44	2.19	3.09	11 lb.
H8	8.75	7.37	5.12	6.0	6.75	4.56	1.12	1.25	.78	.562	2.25	3.57	4.72	15 lb. 8 oz.
H11	11.25	7.37	5.12	8.0	6.75	4.56	1.12	1.25	.78	.562	2.25	3.57	4.72	18 lb. 4 oz.
H16	16.00	7.37	5.12	11.0	6.75	4.56	1.12	1.25	.78	.562	2.25	3.57	4.72	26 lb.

Gold Box

SINGLE OUTPUT

LINEAR REGULATED
AC-DC

SERIES B (General Purpose)

- Shipped Within 3 Days
- All Models U.L. Recognized
- CE
- Five Year Warranty

Series B power supplies are ideal for powering digital circuitry, test sets, instrument bridges, and process control transmitters. Many models have regulation of ±0.1% or better. All components are generously derated to insure a long and trouble-free life, and they use the same rugged construction as the Series A line. Overvoltage protection and other options are available.

SERIES B: GENERAL PURPOSE POWER SUPPLIES

STANDARD FEATURES

- Short circuit proof (electronic current limiting)
- May be mounted on any of three surfaces
- Completely serviceable

SPECIFICATIONS

Input Voltage: 105-125 VAC, 50-400 Hz, single phase.

Output Specifications: See pages 48 and 49. Series B supplies have model numbers beginning with the letter B.

Remote Voltage Adjustment/Sensing: Available as an option. See below.

Polarity: Output is floating; either positive or negative terminal may be grounded or floated up to 300 volts above ground.

Temperature Coefficient: 0.02%/°C (Typical).

Ambient Operating Temperature: 0 to +71°C.

Storage Temperature: –55 to +85°C.

OPTIONS

Under/Overvoltage Alarm Contacts: To control a horn or light, or to signal your PLC. Available on models with nominal outputs of 5 Vdc to 125 Vdc. SPDT contacts switch if the power supply's output deviates by

1.0 volt or more: 5 volt models.
2.0 volts or more: 6 to 48 volt models.
3.0 volts or more: 50 to 125 volt models.

Contact ratings: 120 VAC, 8A / 60 Vdc, 1A. (To comply with SELV requirements, limit switched voltage to 60Vdc/42 VAC.) To order, add suffix "L" to model number and $35.00 to price. Models with this option are not yet UL Recognized/CE certified.

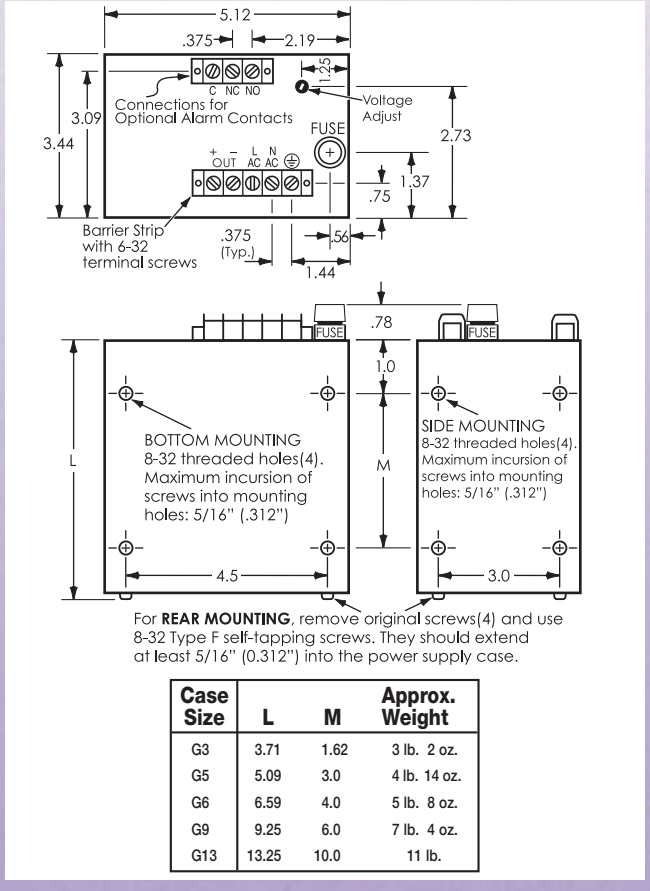
Overvoltage Protection: An internal preset overvoltage protector is available. To order, add prefix "V" to the model number, and add $25.00 to the standard price of models with outputs of 1.5 to 70 volts; $35.00, for 75 to 200 volt outputs.

Remote Voltage Sensing: Provision for sensing the output voltage across the load, so that drops in the load lines are compensated, is available on all models. (This option also permits the use of an externally located potentiometer to adjust output voltage.) To order, add prefix "R" to the model number. No increase in price.

Terminal Strip Cover: Clips on. To order, add suffix "M" to model number and $5.00 to price.

230 Volt Input: All models can be alternately furnished for operation on inputs of 210-250 VAC, 50-400 Hz. To order, add suffix "–230" to model number and $25.00 to price. The "–230" option requires two additional days.

Mounting: Threaded mounting holes permit mounting to a chassis, cabinet wall or bracket. To mount from the power supply side of the mounting surface or for DIN rail mounting, see accessory Mounting Kits on page 91.



Case Size	L	M	Approx. Weight
G3	3.71	1.62	3 lb. 2 oz.
G5	5.09	3.0	4 lb. 14 oz.
G6	6.59	4.0	5 lb. 8 oz.
G9	9.25	6.0	7 lb. 4 oz.
G13	13.25	10.0	11 lb.

SERIES A & B

Nominal Output Voltage	Adjust ±V	Output Current Amps. at 40°C	55°C	71°C	Regulation Load ± %*	Line ± %*	Ripple mV RMS	($) Price	Model	Case Size
1.5	.5	6.0	4.3	3.5	.005	.005	.250	$245	A1.5MT600	M6
1.5	.5	9.0	7.2	5.5	.005	.005	.250	$280	A1.5MT900	M9
1.5	.5	12.0	10.0	8.0	.005	.005	.250	$335	A1.5MT1200	M13
1.5	.5	22.0	18.5	15.5	.005	.005	.250	$415	A1.5H2200	H11
1.5	.5	32.0	27.0	22.5	.005	.005	.250	$495	A1.5H3200	H16
2	.5	6.0	4.3	3.5	.005	.005	.250	$245	A2MT600	M6
2	.5	12.0	10.0	8.0	.005	.005	.250	$335	A2MT1200	M13
3	.5	.500	.500	.500	.2	.1	1	$115	B3G50	G3
3	.5	1.2	1.1	1.0	.2	.1	1	$140	B3G120	G3
3	.5	2.1	2.1	2.0	.5	.1	1	$160	B3G210	G5
3	.5	4.0	3.5	3.0	.5	.1	1.5	$200	B3G400	G6
3	.5	6.0	4.3	3.5	.005	.005	.250	$245	A3MT600	M6
3	.5	9.0	7.2	5.5	.005	.005	.250	$280	A3MT900	M9
3	.5	12.0	10.0	8.0	.005	.005	.250	$335	A3MT1200	M13
3	.5	17.0	14.5	12.0	.005	.005	.250	$370	A3H1700	H8
3	.5	20.0	16.5	13.5	.005	.005	.250	$415	A3H2000	H11
3	.5	30.0	25.0	20.0	.005	.005	.250	$495	A3H3000	H16
3.3	.5	.500	.500	.500	.2	.1	1	$115	B3.3G50	G3
3.3	.5	1.2	1.1	1.0	.2	.1	1	$140	B3.3G120	G3
3.3	.5	2.1	2.1	2.0	.5	.1	1	$160	B3.3G210	G5
3.3	.5	4.0	3.5	3.0	.5	.1	1.5	$200	B3.3G400	G6
3.3	.5	6.0	4.3	3.5	.005	.005	.250	$245	A3.3MT600	M6
3.3	.5	7.0	5.9	4.9	.5	.1	1.5	$250	B3.3G700	G9
3.3	.5	9.0	7.2	5.5	.005	.005	.250	$285	A3.3MT900	M9
3.3	.5	12.0	10.0	8.0	.005	.005	.250	$335	A3.3MT1200	M13
3.3	.5	17.0	14.5	12.0	.005	.005	.250	$370	A3.3H1700	H8
3.3	.5	22.0	18.5	15.5	.005	.005	.250	$415	A3.3H2200	H11
3.3	.5	32.0	27.0	22.5	.005	.005	.250	$495	A3.3H3200	H16
5	.5	.500	.500	.500	.1	.1	1	$115	B5G50	G3
5	.5	1.2	1.1	1.0	.1	.1	1	$140	B5G120	G3
5	.5	1.7	1.5	1.3	.2	.1	1.5	$150	B5G170	G3
5	.5	2.1	2.1	2.0	.2	.1	1.5	$160	B5G210	G5
5	.5	4.0	3.5	3.0	.3	.1	1.5	$190	B5G400	G6
5	.5	5.0	4.4	3.0	.4	.1	1.5	$205	B5G500	G6
5	.5	5.1	3.6	2.6	.005	.005	.250	$230	A5MT510	M6
5	.5	6.0	4.3	3.5	.005	.005	.250	$250	A5MT600	M6
5	.5	8.0	7.0	5.0	.4	.1	1.5	$255	B5G800	G9
5	.5	9.0	7.2	5.5	.005	.005	.250	$285	A5MT900	M9
5	.5	10.0	9.0	7.0	.4	.1	1.5	$290	B5G1000	G13
5	.5	12.0	10.0	8.0	.005	.005	.250	$335	A5MT1200	M13
5	.5	17.0	14.5	12.0	.005	.005	.250	$370	A5H1700	H8
5	.5	22.0	18.5	15.0	.005	.005	.250	$415	A5H2200	H11
5	.5	32.0	27.0	22.0	.005	.005	.250	$495	A5H3200	H16
6	1	.500	.500	.500	.1	.1	1	$115	B6G50	G3
6	.5	1.2	1.1	1.0	.1	.1	1	$140	B6G120	G3
6	.5	1.7	1.5	1.3	.2	.1	1.5	$150	B6G170	G3
6	.5	3.2	3.1	3.0	.3	.1	1.5	$185	B6G320	G6
6	.5	4.9	3.5	2.5	.005	.005	.250	$205	A6MT490	M6
6	.5	6.0	4.5	3.5	.005	.005	.250	$240	A6MT600	M6
6	.5	8.5	7.5	5.2	.005	.005	.250	$285	A6MT850	M9
6	.5	11.0	9.3	7.5	.005	.005	.250	$335	A6MT1100	M13
6	.5	16.0	13.6	11.2	.005	.005	.250	$375	A6H1600	H8
6	.5	21.0	17.0	14.0	.005	.005	.250	$420	A6H2100	H11
6	.5	28.0	23.0	19.0	.005	.005	.250	$495	A6H2800	H16
7	1	.500	.500	.500	.1	.05	1	$120	B7G50	G3
7	1	1.0	1.0	1.0	.1	.1	1	$150	B7G100	G3
7	.5	2.0	2.0	2.0	.2	.1	1.5	$170	B7G200	G5
7	.5	3.0	2.7	2.5	.3	.1	1.5	$195	B7G300	G6
7	.5	5.0	4.0	3.0	.005	.005	.250	$240	A7MT500	M6
7	.5	6.5	5.2	4.0	.4	.1	1.0	$250	B7G650	G9
7	.5	8.0	6.5	5.0	.005	.005	.250	$290	A7MT800	M9
7	.5	10.0	8.0	7.0	.4	.1	1.5	$300	B7G1000	G13
7	.5	10.0	8.8	7.0	.005	.005	.250	$335	A7MT1000	M13
8	1	.500	.500	.500	.1	.05	1	$120	B8G50	G3
8	1	1.0	1.0	1.0	.1	.1	1	$150	B8G100	G3
8	.5	2.0	2.0	2.0	.2	.1	1.5	$170	B8G200	G5
8	.5	3.0	2.7	2.5	.2	.1	1.5	$195	B8G300	G6
8	.5	5.0	4.0	3.5	.005	.005	.250	$240	A8MT500	M6
8	.5	6.5	5.2	4.0	.3	.1	1.5	$260	B8G650	G9
8	.5	8.0	6.5	5.0	.005	.005	.250	$290	A8MT800	M9
8	.5	10.0	8.0	7.0	.4	.1	1.5	$300	B8G1000	G13
8	.5	10.5	8.8	7.0	.005	.005	.250	$335	A8MT1050	M13
8	.5	20.0	16.8	13.5	.005	.005	.250	$440	A8H2000	H11
8	.5	28.0	23.0	19.0	.005	.005	.250	$495	A8H2800	H16
9	1	.500	.500	.500	.1	.05	1	$120	B9G50	G3
9	1	1.0	1.0	1.0	.1	.1	1	$150	B9G100	G3
9	.5	2.0	2.0	2.0	.2	.1	1.5	$170	B9G200	G5
9	.5	3.0	2.7	2.5	.2	.1	1.5	$195	B9G300	G6
9	.5	6.5	5.2	4.0	.3	.1	1.5	$260	B9G650	G9
9	.5	10.0	8.3	7.0	.005	.005	.250	$335	A9MT1000	M13

*or 2 mv, whichever is greater

Nominal Output Voltage	Adjust ±V	Output Current Amps. at 40°C	55°C	71°C	Regulation Load ± %*	Line ± %*	Ripple mV RMS	($) Price	Model	Case Size
10	1	.500	.500	.500	.1	.05	1	$115	B10G50	G3
10	1	1.0	1.0	1.0	.1	.1	1	$140	B10G100	G3
10	.5	2.0	2.0	2.0	.2	.1	1.5	$170	B10G200	G5
10	.5	3.0	2.7	2.5	.2	.1	1.5	$195	B10G300	G6
10	.5	4.5	3.6	2.7	.005	.005	.250	$240	A10MT450	M6
10	.5	6.0	5.0	4.0	.3	.1	1.5	$260	B10G600	G9
10	.5	7.5	6.0	4.5	.005	.005	.250	$295	A10MT750	M9
10	.5	10.0	8.3	7.0	.4	.1	1.5	$300	B10G1000	G13
10	.5	10.0	8.3	7.0	.005	.005	.250	$335	A10MT1000	M13
10	.5	14.0	11.9	9.8	.005	.005	.250	$390	A10H1400	H8
10	.5	18.0	15.0	12.0	.005	.005	.250	$440	A10H1800	H11
10	.5	25.0	20.0	16.5	.005	.005	.250	$495	A10H2500	H16
12	1	.500	.500	.500	.1	.05	1	$115	B12G50	G3
12	1	1.0	1.0	1.0	.1	.1	1	$140	B12G100	G3
12	.5	2.0	1.7	1.5	.2	.1	1.5	$165	B12G200	G5
12	.5	3.0	2.7	2.5	.2	.1	1.5	$190	B12G300	G6
12	.5	3.8	3.3	2.6	.2	.1	1.5	$200	B12G380	G6
12	.5	4.0	3.3	2.6	.005	.005	.250	$235	A12MT400	M6
12	.5	6.5	5.3	4.0	.3	.1	1.5	$260	B12G650	G9
12	.5	6.5	5.3	4.0	.005	.005	.250	$290	A12MT650	M9
12	.5	9.0	7.5	6.0	.4	.1	1.5	$300	B12G900	G13
12	.5	9.0	7.5	6.0	.005	.005	.250	$335	A12MT900	M13
12	.5	13.0	11.0	9.1	.005	.005	.250	$390	A12H1300	H8
12	.5	17.0	14.3	11.5	.005	.005	.250	$440	A12H1700	H11
12	.5	21.0	17.5	14.5	.005	.005	.250	$495	A12H2100	H16
13	1	.500	.500	.500	.1	.05	1	$130	B13G50	G3
13	1	1.5	1.4	1.3	.1	.1	1.5	$165	B13G150	G3
13	.5	2.0	2.0	2.0	.2	.1	1.5	$185	B13G200	G5
13	.5	3.0	2.7	2.5	.2	.1	1.5	$205	B13G300	G6
13	.5	3.5	3.0	2.5	.005	.005	.250	$240	A13MT350	M6
13	.5	5.0	4.5	4.0	.2	.1	1.5	$255	B13G500	G9
13	.5	8.0	7.5	7.0	.3	.1	1.5	$300	B13G800	G13
13	.5	8.0	7.5	7.0	.005	.005	.250	$335	A13MT800	M13
14	1	.500	.500	.500	.1	.05	1	$130	B14G50	G3
14	1	1.5	1.4	1.3	.1	.1	1.5	$165	B14G150	G3
14	.5	2.0	2.0	2.0	.2	.1	1.5	$185	B14G200	G5
14	.5	3.0	2.7	2.5	.2	.1	1.5	$205	B14G300	G6
14	.5	3.0	2.7	2.5	.005	.005	.250	$235	A14MT300	M6
14	.5	5.0	4.5	4.0	.2	.1	1.5	$250	B14G500	G9
14	.5	7.0	6.5	6.0	.3	.1	1.5	$300	B14G700	G13
14	.5	8.0	7.5	7.0	.005	.005	.250	$335	A14MT800	M13
15	1	.750	.750	.750	.1	.1	1	$135	B15G75	G3
15	1	1.0	1.0	1.0	.1	.1	1	$140	B15G100	G3
15	1	1.5	1.4	1.3	.1	.1	1.5	$155	B15G150	G3
15	.5	2.0	1.7	1.5	.1	.1	1.5	$170	B15G200	G5
15	.5	3.0	2.8	2.5	.1	.1	1.5	$195	B15G300	G6
15	.5	3.0	2.8	2.5	.005	.005	.250	$215	A15MT300	M6
15	.5	4.2	3.8	3.0	.15	.1	1.5	$235	B15G420	G9
15	.5	5.5	4.7	4.0	.005	.005	.250	$290	A15MT550	M9
15	.5	6.0	5.0	4.0	.2	.1	1.5	$280	B15G600	G9
15	.5	7.0	6.0	5.0	.2	.1	1.5	$300	B15G700	G13
15	.5	8.0	6.5	5.5	.005	.005	.250	$335	A15MT800	M13
15	.5	11.5	9.7	8.0	.005	.005	.250	$390	A15H1150	H8
15	.5	15.0	12.8	10.5	.005	.005	.250	$435	A15H1500	H11
15	.5	19.0	16.3	13.5	.005	.005	.250	$495	A15H1900	H16
16	1	.300	.300	.300	.05	.05	1	$100	B16G30	G3
16	.5	1.0	1.0	1.0	.1	.1	1	$150	B16G100	G3
16	.5	3.0	2.5	2.0	.15	.1	1	$230	B16G300	G9
16	.5	5.0	5.0	5.0	.2	.1	1.5	$290	B16G500	G9
16	.5	6.5	6.0	5.5	.005	.005	.250	$335	A16MT650	M13
18	1	.300	.300	.300	.05	.05	1	$100	B18G30	G3
18	1	.750	.750	.750	.1	.1	1	$135	B18G75	G3
18	.5	1.1	1.1	1.0	.1	.1	1	$150	B18G110	G5
18	.5	2.1	2.0	1.8	.1	.1	1	$185	B18G210	G5
18	.5	2.1	2.1	2.0	.005	.005	.250	$205	A18MT210	M6
18	.5	3.0	2.8	2.5	.15	.1	1	$230	B18G300	G9
18	.5	4.5	4.0	3.5	.005	.005	.250	$280	A18MT450	M9
18	.5	6.5	6.0	5.5	.005	.005	.250	$335	A18MT650	M13
18	.5	14.0	12.0	10.0	.005	.005	.250	$440	A18H1400	H11
18	.5	18.0	15.5	13.0	.005	.005	.250	$495	A18H1800	H16
20	1	.300	.300	.300	.05	.05	1	$100	B20G30	G3
20	1	.750	.750	.750	.1	.05	1	$135	B20G75	G3
20	1	1.1	1.1	1.0	.1	.1	1	$150	B20G110	G5
20	.5	1.7	1.7	1.5	.1	.1	1.5	$165	B20G170	G5
20	.5	2.0	2.0	2.0	.005	.005	.250	$215	A20MT200	M6
20	.5	2.7	2.0	1.2	.15	.1	1.5	$230	B20G270	G6
20	.5	4.0	3.5	3.0	.005	.005	.250	$280	A20MT400	M9
20	.5	5.0	5.0	5.0	.15	.1	1.5	$295	B20G500	G13
20	.5	6.0	5.5	5.0	.005	.005	.250	$335	A20MT600	M13
20	.5	9.5	8.0	6.6	.005	.005	.250	$390	A20H950	H8
20	.5	13.0	11.3	9.5	.005	.005	.250	$440	A20H1300	H11
20	.5	16.0	14.0	12.0	.005	.005	.250	$495	A20H1600	H16

*or 2 mv, whichever is greater

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SERIES A & B

Nominal Output Voltage	Adjust ±V	Output Current Amps. at 40°C	55°C	71°C	Regulation Load ± %	Line ± %	Ripple mV RMS	($) Price	Model	Case Size
24	1	.300	.300	.300	.05	.05	1	$100	B24G30	G3
24	1	.750	.750	.750	.1	.05	1	$140	B24G75	G3
24	1	1.1	1.1	1.0	.1	.1	1.5	$155	B24G110	G5
24	.5	1.7	1.7	1.5	.1	.1	1.5	$170	B24G170	G5
24	.5	2.1	2.0	2.0	.1	.1	1.5	$190	B24G210	G5
24	.5	2.1	2.0	2.0	.005	.005	.250	$225	A24MT210	M6
24	.5	3.5	3.0	2.5	.15	.1	1.5	$245	B24G350	G9
24	.5	3.5	3.0	2.5	.005	.005	.250	$290	A24MT350	M9
24	.5	5.0	5.0	5.0	.15	.1	1.5	$300	B24G500	G13
24	.5	5.5	5.0	4.5	.005	.005	.250	$335	A24MT550	M13
24	.5	8.5	7.2	5.9	.005	.005	.250	$390	A24H850	H8
24	.5	12.0	10.5	9.0	.005	.005	.250	$440	A24H1200	H11
24	.5	15.0	13.0	11.0	.005	.005	.250	$495	A24H1500	H16
25	1	.300	.300	.300	.05	.05	1	$120	B25G30	G3
25	1	.750	.750	.750	.1	.05	1	$145	B25G75	G3
25	1	1.1	1.1	1.1	.1	.1	1.5	$165	B25G110	G5
25	.5	1.7	1.7	1.5	.1	.1	1.5	$195	B25G170	G5
25	.5	2.1	2.1	2.0	.1	.1	1.5	$200	B25G210	G5
25	.5	3.5	3.0	2.5	.15	.1	1.5	$250	B25G350	G9
25	.5	5.0	5.0	5.0	.15	.1	1.5	$310	B25G500	G13
28	1	.300	.300	.300	.05	.05	1	$120	B28G30	G3
28	1	.500	.500	.500	.05	.05	1	$135	B28G50	G3
28	1	.800	.800	.800	.1	.05	1	$145	B28G80	G5
28	1	1.1	1.1	1.0	.1	.05	1	$160	B28G110	G5
28	.5	1.8	1.6	1.5	.1	.1	1.5	$190	B28G180	G5
28	.5	2.1	2.1	2.0	.1	.1	1.5	$200	B28G210	G5
28	.5	2.1	2.1	2.0	.005	.005	.250	$230	A28MT210	M6
28	.5	3.0	2.7	2.5	.15	.1	1.5	$240	B28G300	G9
28	.5	3.0	2.7	2.5	.005	.005	.250	$270	A28MT300	M9
28	.5	5.0	5.0	5.0	.15	.1	1.5	$300	B28G500	G13
28	.5	5.0	5.0	5.0	.005	.005	.250	$335	A28MT500	M13
28	.5	8.0	6.8	5.6	.005	.005	.250	$390	A28H800	H8
28	.5	11.0	9.5	8.0	.005	.005	.250	$440	A28H1100	H11
28	.5	14.0	12.0	10.0	.005	.005	.250	$495	A28H1400	H16
30	1	.300	.300	.300	.05	.05	1	$120	B30GT30	G3
30	1	.500	.500	.500	.05	.05	1	$140	B30GT50	G3
30	1	1.1	1.1	1.0	.1	.1	1	$170	B30GT110	G5
30	.5	1.7	1.6	1.5	.1	.1	1.5	$190	B30GT170	G5
30	.5	2.1	2.1	2.0	.1	.1	1.5	$205	B30G210	G6
30	.5	2.1	2.1	2.0	.005	.005	.250	$235	A30MT210	M6
30	.5	3.0	2.7	2.5	.005	.005	.250	$275	A30MT300	M9
30	.5	5.0	5.0	5.0	.15	.1	1.5	$305	B30GT500	G13
30	.5	5.0	5.0	5.0	.005	.005	.250	$335	A30MT500	M13
30	.5	7.5	6.3	5.2	.005	.005	.250	$395	A30H750	H8
30	.5	10.0	9.0	8.0	.005	.005	.250	$450	A30H1000	H11
30	.5	14.0	12.0	10.0	.005	.005	.250	$510	A30H1400	H16
32	1	.300	.300	.300	.05	.05	1	$120	B32GT30	G3
32	1	.500	.500	.500	.05	.05	1	$140	B32GT50	G3
32	1	1.0	1.0	1.0	.1	.1	1	$170	B32GT100	G5
32	1	1.5	1.5	1.5	.1	.1	1.5	$200	B32GT150	G5
32	.5	1.8	1.6	1.3	.005	.005	.250	$245	A32MT180	M6
32	.5	2.5	2.1	1.7	.005	.005	.250	$290	A32MT250	M9
32	.5	9.0	7.5	6.0	.005	.005	.250	$465	A32HT900	H11
34	1	.300	.300	.300	.05	.05	1	$120	B34GT30	G3
34	1	.800	.800	.800	.1	.1	1	$170	B34GT80	G5
34	1	1.5	1.5	1.5	.1	.1	1.5	$205	B34GT150	G5
35	1	.100	.100	.100	.05	.05	1	$110	B35GT10	G3
35	1	.300	.300	.300	.05	.05	1	$120	B35GT30	G3
35	1	.500	.500	.500	.05	.05	1	$145	B35GT50	G3
35	1	.600	.600	.600	.1	.05	1	$160	B35GT60	G3
35	1	.800	.800	.800	.1	.1	1.5	$170	B35GT80	G5
36	1	.100	.100	.100	.05	.05	1	$110	B36GT10	G3
36	1	.500	.500	.500	.05	.05	1	$145	B36GT50	G3
36	1	.800	.750	.700	.1	.05	1	$170	B36GT80	G5
36	.5	1.3	1.3	1.3	.1	.1	1.5	$190	B36GT130	G6
36	.5	1.3	1.3	1.3	.005	.005	.250	$240	A36MT130	M6
36	.5	2.3	2.0	1.8	.1	.1	1.5	$270	B36GT230	G9
36	.5	2.3	2.0	1.8	.005	.005	.250	$290	A36MT230	M9
36	.5	4.0	3.2	2.5	.005	.005	.250	$345	A36MT400	M13
36	.5	8.0	6.6	5.3	.005	.005	.250	$465	A36HT800	H11
36	.5	11.0	9.1	7.2	.005	.005	.250	$565	A36HT1100	H16
40	1	.200	.200	.200	.05	.05	1	$130	B40GT20	G3
40	1	.400	.400	.400	.05	.05	1	$155	B40GT40	G3
40	1	.500	.500	.500	.1	.05	1	$170	B40GT50	G5
40	1	1.0	1.0	1.0	.1	.1	1.5	$195	B40GT100	G6
45	1	.200	.200	.200	.05	.05	1	$130	B45GT20	G3
45	1	.400	.400	.400	.05	.05	1	$165	B45GT40	G3

Nominal Output Voltage	Adjust ±V	Output Current Amps. at 40°C	55°C	71°C	Regulation Load ± %	Line ± %	Ripple mV RMS	($) Price	Model	Case Size
48	1	.200	.200	.200	.05	.05	1	$130	B48GT20	G3
48	1	.400	.400	.400	.05	.05	1	$170	B48GT40	G3
48	1	.600	.600	.600	.1	.1	1	$205	B48GT60	G5
48	1	1.1	1.0	.600	.1	.1	1.5	$230	B48GT110	G6
48	1	1.2	1.0	.800	.005	.005	.250	$255	A48MT120	M6
48	1	1.8	1.6	1.2	.005	.005	.250	$295	A48MT180	M9
48	1	3.0	2.6	2.1	.005	.005	.250	$345	A48MT300	M13
48	1	6.0	5.0	4.0	.005	.005	.250	$465	A48HT600	H11
48	1	8.5	7.2	5.5	.005	.005	.250	$565	A48HT850	H16
50	1	.400	.400	.400	.05	.05	1	$185	B50GT40	G3
50	1	.500	.500	.500	.05	.05	1	$215	B50GT50	G5
50	1	1.0	.800	.700	.005	.005	.250	$270	A50MT100	M6
50	1	1.5	1.3	1.0	.005	.005	.250	$310	A50MT150	M9
50	1	2.7	2.3	1.8	.005	.005	.250	$360	A50MT270	M13
50	1	6.0	5.0	4.0	.005	.005	.250	$475	A50HT600	H11
50	1	8.0	6.6	5.2	.005	.005	.250	$565	A50HT800	H16
55	1	.500	.500	.500	.05	.05	1	$225	B55GT50	G5
60	1	.200	.200	.200	.05	.05	1	$155	B60GT20	G3
60	1	.300	.300	.300	.05	.05	1	$190	B60GT30	G3
60	1	.400	.400	.400	.05	.05	1	$225	B60GT40	G5
60	1	.850	.720	.600	.005	.005	.250	$275	A60MT85	M6
60	1	1.2	1.0	.800	.005	.005	.250	$310	A60MT120	M9
60	1	2.5	2.1	1.7	.005	.005	.250	$360	A60MT250	M13
60	1	5.0	4.1	3.3	.005	.005	.250	$480	A60HT500	H11
60	1	7.0	5.8	4.6	.005	.005	.250	$570	A60HT700	H16
65	1	.300	.300	.300	.05	.05	1	$190	B65GT30	G3
70	1	.100	.100	.100	.05	.05	1	$145	B70GT10	G3
70	1	.300	.300	.300	.05	.05	1	$190	B70GT30	G3
75	1	.050	.050	.050	.05	.05	1	$130	B75GT05	G3
75	1	.200	.200	.200	.05	.05	1	$185	B75GT20	G3
75	1	.600	.500	.400	.005	.005	.250	$275	A75MT60	M6
75	1	1.0	.830	.660	.005	.005	.250	$325	A75MT100	M9
75	1	2.0	1.8	1.5	.005	.005	.250	$360	A75MT200	M13
75	1	4.0	3.3	2.6	.01	.01	1	$480	A75HT400	H11
75	1	5.6	4.6	3.6	.01	.01	1	$575	A75HT560	H16
80	1	.100	.100	.100	.05	.05	1	$160	B80GT10	G3
80	1	.200	.200	.200	.05	.05	1	$190	B80GT20	G3
85	1	.200	.200	.200	.05	.05	1	$190	B85GT20	G3
90	1	.200	.200	.200	.05	.05	1	$190	B90GT20	G3
90	1	.500	.400	.300	.005	.005	.250	$275	A90MT50	M6
90	1	.800	.700	.600	.005	.005	.250	$325	A90MT80	M9
90	1	1.5	1.3	1.0	.005	.005	.250	$360	A90MT150	M13
90	1	3.3	2.7	2.1	.01	.01	1	$490	A90HT330	H11
90	1	4.4	3.6	2.9	.01	.01	1	$580	A90HT440	H16
95	1	.200	.200	.200	.05	.05	1	$195	B95GT20	G3
100	1	.100	.100	.100	.05	.05	1	$180	B100GT10	G3
100	1	.200	.200	.200	.05	.05	1	$195	B100GT20	G3
100	1	.460	.460	.340	.1	.1	1.5	$240	B100GT46	G6
100	1	.650	.650	.650	.1	.1	1.5	$270	B100G65	G6
100	1	.700	.600	.500	.005	.005	.250	$310	A100M70	M6
100	1	1.3	1.2	1.0	.005	.005	.250	$360	A100MT130	M13
100	1	3.0	2.5	2.0	.01	.01	1	$490	A100HT300	H11
100	1	4.0	3.3	2.6	.01	.01	1	$580	A100HT400	H16
110	1	.200	.200	.200	.05	.05	1	$200	B110GT20	G3
120	1	.100	.100	.100	.05	.05	1	$185	B120GT10	G3
120	1	.200	.200	.200	.05	.05	1	$200	B120GT20	G3
120	1	.400	.400	.300	.1	.1	1.5	$235	B120GT40	G6
120	1	.550	.550	.550	.1	.1	1.5	$280	B120G55	G6
120	1	.600	.500	.400	.005	.005	.250	$330	A120M60	M6
120	1	1.2	1.1	1.0	.005	.005	.250	$360	A120MT120	M13
120	1	2.5	2.0	1.6	.01	.01	1	$500	A120HT250	H11
120	1	3.5	2.9	2.3	.01	.01	1	$590	A120HT350	H16
125	1	.200	.200	.200	.05	.05	1	$230	B125GT20	G3
125	1	.400	.400	.300	.1	.1	1.5	$245	B125GT40	G6
125	1	.500	.400	.300	.005	.005	.250	$340	A125MT50	M6
125	1	.550	.550	.550	.1	.1	1.5	$290	B125G55	G6
125	1	1.2	1.1	1.0	.005	.005	.250	$370	A125MT120	M13
125	1	2.5	2.0	1.6	.01	.01	1	$510	A125HT250	H11
125	1	3.5	2.9	2.3	.01	.01	1	$595	A125HT350	H16
130	1	.200	.200	.200	.05	.05	1	$235	B130GT20	G3
135	1	.200	.200	.200	.05	.05	1	$235	B135GT20	G3
140	1	.200	.200	.200	.05	.05	1	$235	B140GT20	G3
150	1	.100	.100	.100	.05	.05	1	$190	B150GT10	G3
150	1	.200	.200	.200	.05	.05	1	$230	B150GT20	G3
150	1	.320	.320	.250	.1	.1	1.5	$250	B150GT32	G6
150	1	.420	.420	.420	.1	.1	1.5	$270	B150GT42	G9
150	1	1.0	.900	.800	.005	.005	.250	$390	A150MT100	M13
150	1	3.0	2.5	2.0	.01	.01	1	$605	A150HT300	H16
200	1	.100	.100	.100	.1	.05	1.5	$230	B200GT10	G3

Isolated Transmitters

270i Isolators DC Current Input

The 270i accepts a process current input and provides an isolated 4 to 20mA process current output signal. Power is received from the input signal current.

These isolators use transformer isolation to effectively break the electrical path between the transmitted signal and the receiving device. This eliminates ground loops, reduces noise, and helps protect against transients for more accurate and reliable measurements.

This product is also extremely easy to install. All units are factory calibrated for loads up to 600 ohms to eliminate any need for load trim adjustments.

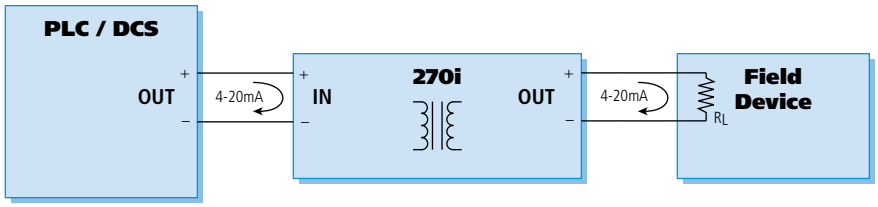
Input Range
- 4 to 20mA DC

Output Range
- 4 to 20mA DC

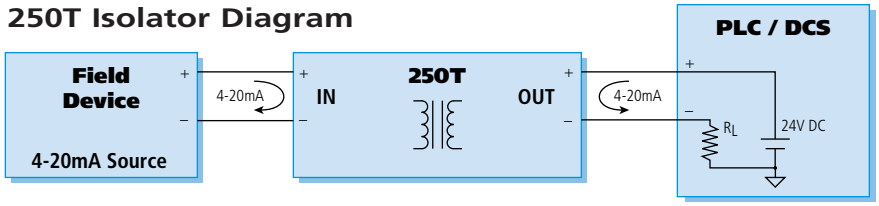
Power Requirement
- 12 to 50V DC @ 20mA (loop-powered), power is derived from the input signal current. Loop-burden: 10.8V@250 ohm output load.

Approvals
CSA: C22.2 No. 142
Class I; Division 1; Groups A, B, C, D
Class I; Division 2; Groups A, B, C, D
Class II; Division 1; Groups E, F, G

270i Isolator Diagram



250T Isolator Diagram



For more information about the 250T Transmitter, refer to Page 144.

Special Features
- Excellent accuracy and stability ensure reliable measurements in harsh industrial environments.
- 1500V AC peak isolation (250V AC or 354V DC continuous) prevents ground loops.
- RFI and EMI resistance minimize the effects of environmental noise.
- Calibration is independent of the load to eliminate load compensation adjustments
- Zero and span adjustment enable precise calibration.
- Compact, 1-inch wide housing uses less space for easier installation in control panels.
- Input current sense resistor simplifies field diagnostics

Performance

Input

Input Range
4 to 20mA input. Power is derived from the input signal loop. Input current should be limited to less than 50mA to prevent damage to the isolator. In the event of an open output circuit, the input loop voltage drop is limited to 20V, nominal. Isolator has reverse polarity protection.

Zero and span
Zero and span trim adjustments utilize 22-turn potentiometers accessible from front of the unit.

Input voltage drop
The voltage drop is a function of the input current and load resistance and is calculated as follows:

Input Voltage Drop = 5.4V DC + (0.0216A x R_{LOAD}

Example (R_{LOAD} = 250 ohms):
Input Voltage Drop =
5.4V DC + (0.0216A x 250 ohms) = 10.8V DC.

Current sense resistor
A built-in 10 ohm (±0.1%) resistor can monitor input current to the isolator. Wiring to the isolator's input terminals determines if this resistor is included in the current loop. Use of this resistor provides a test signal of 40 to 200mV, representing 4 to 20mA.

Continued on the next page.

Performance (continued)

Output

Output Range
4-20mA DC output.

A. For RLOAD from 50 to 600 ohms, connect RLOAD between Output (+) and Output (-) terminals.

B. For RLOAD from 0 to 50 ohms, connect RLOAD between Output (S) and Output (-) terminals. For optimum performance at low values of RLOAD, the isolator has a built-in pad resistor of 50 ohms.

1. Input Voltage Drop (input sense resistor not used):
VDROP = 5.4V DC + (0.0216A x (RLOAD + 50 ohms))

2. Input Voltage Drop (input sense resistor used)
VDROP = 5.6V DC + (0.0216A x (RLOAD + 50 ohms))

Accuracy
±0.1% of output span. Error includes the combined effects of isolator repeatability, hysteresis, terminal point linearity and adjustment resolution.

Load resistance effect
Less than ±-0.1% of output span as load resistance is changed over entire range. Allows use of isolator, within resistance load range, without the need to recalibrate the isolator for a particular load.

Output ripple
Less than ±0.1% of the maximum output span.

Bandwidth
-3dB at 3Hz, typical.

Response time
For a step input, the output reaches 98% of output span in 180mS, typical.

Environmental

Ambient temperature range
Operating: -13 to 185°F (-25 to 85°C).
Storage: -40 to 185°F (-40 to 85°C).

Ambient temperature effect
Less than ±0.006% of output span per °F (±0.01% per °C) over the ambient temperature range for reference test conditions. This specification includes the combined effects of zero and span over temperature.

Isolation
The input and output circuits are isolated from each other for common-mode voltages up to 250V AC, or 354V DC off ground, on a continuous basis (will withstand 1500V AC dielectric strength test for one minute without breakdown).

Noise rejection
Common mode: 110dB at 60Hz, typical.

RFI resistance
Less than ±0.5%, of output span effect.

EMI resistance
Less than ±0.25% of output span effect.

Surge withstand capability (SWC)
Input/Output terminations rated per ANSI/IEEE C37.90-1978. Unit is tested to a standardized test waveform that is representative of surges (high frequency transient electrical interference), observed in actual installations.

Ordering Information

Select one option from each column. Example: 270i-20MA-DIN-NCR

Base	Input	Mounting		Approval
270i	-20MA	-DIN	-N4	-NCR
		-ST	-N12	-AQ1
		-SM	-XP	

Input Options

-20MA: 4.0 to 20.0mA DC

Mounting Options

Mountings
-DIN: DIN rail G or T mount

-ST: SNAPTRACK mount

-SM: Surface-mount

External housings
-N4: NEMA 4, water-tight, holds two

-N12: NEMA 12, oil-tight, holds two

-XP: Explosion-proof NEMA 4, holds one

Approval Options

-NCR: No certification/approval required.

-DT1†: CSA approval, Div. 2 hazardous locations: Class I; Div. 2; Groups A, B, C, D.

Ordering Notes

* Unit requires factory calibration. Append "-C" to end of model number. Specify ranges on order.

† Units are shipped separately from any optional enclosures (i.e. units are not installed in any external housing).

Accessories

Power supplies
See Power Supplies on Page 199.

DIN RAIL 3.0
DIN RAIL 16.7
DIN rail strip, Type T, 3 inches (75mm) or 16.7 inches (425mm)

20RM-16-DIN
19" rack-mount kit with DIN rail.
Holds sixteen 270i isolators.

Acromag®

User's Manual: Series 270I
Model 270I Process Current Loop-Powered Isolator

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IMPORTANT SAFETY CONSIDERATIONS

It is very important for the user to consider the possible adverse effects of power, wiring, component, sensor, or software failures in designing any type of control or monitoring system. This is especially important where economic property loss or human life is involved. It is important that the user employ satisfactory overall system design. It is agreed between the Buyer and Acromag, that this is the Buyer's responsibility.

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8500-288-B94C002

INTRODUCTION:

These instructions cover the model types listed in Table 1 below. Supplementary sheets are attached for units with special options or features.

Table 1:

A. Model Number Format:
270I-Input-Mounting-Certification[1]

B. Typical Model Number: 270I-20MA-DIN-NCR[1]

Series	-Input	-Mounting	-Certification
270I	20MA	-DIN	-NCR[2]
		-SM	
		-ST	
		-N4	
		-N12	
		-XP	

Notes (Table 1):

1. All units are factory calibrated for 4 to 20mA (no "-C" needed).
2. Consult the factory for current information on agency (e.g. Canadian Standards Association, etc.) approvals.

DESCRIPTION:

This two-wire, loop-powered isolator accepts a 4 to 20mA input signal and provides an isolated 4 to 20mA output signal. It is designed to break the galvanic path between a transmitted signal source and the receiving device. The isolator is highly effective in eliminating unreliable or inaccurate signal transfer by providing total current-to-current signal isolation. The isolator is RFI-protected, operates over a wide temperature range, and features excellent temperature coefficients, which minimize the effects from harsh plant environments. See Drawing 4501-105 for a simplified schematic.

Key 270I Features:

- √ Transformer Isolation
- √ Signal Loop Powered
- √ 0-600Ω Load Range
- √ High Accuracy
- √ No Load Trimming Required
- √ Wide Temperature Range
- √ Input Current Sense Resistor
- √ Versatile Mounting Configuration

Power to operate the unit is derived from the input signal current--no external power supply is required. When a signal isolation device is installed, it is important to consider the voltage drop or additional line resistance that will be placed in the system. Any additional load tends to reduce the line or drive potential and may exceed the source rating. The effect of voltage drop within the system must be calculated to ensure that drive capability is not exceeded. Total maximum voltage drop in the input current loop is the sum of the isolator's fixed voltage drop, plus the voltage required to drive the output load. The output load resistance range is from 0 to 600 ohms.

Placing a resistor across the output terminals will provide a voltage output proportional to the loop current, such as; 1 to 5V DC (4 to 20mA) for a 250 ohm load.. A unique feature of this isolator is that once it is calibrated, it does not have to be recalibrated for different loads (up to 600 ohms). That is, calibration is independant of the load. The isolator is calibrated at the factory with a 250 ohm load and the need for a load trim adjustment is not required for other load values.

To facilitate field indication of the current going into the isolator, the user has the option to wire the input to include a built-in 10Ω resistor (±0.1%, ±25ppm/^{O}C) in the current loop. This provides a test signal of 40 to 200mV that is directly proportional to the 4 to 20mA input signal. The only penalty is the increased fixed voltage drop that results (200mV). Again, the use of this resistor is optional.

These field mounted loop-powered isolators are designed to utilize one of a number of customer-specified mounting configurations. The isolator is available for DIN-rail mounting, surface mounting, 3-inch SNAPTRACK^{TM} plastic rail mounting, or in various housings. These housings include NEMA 4, 12, and explosion-proof enclosures. The model number of the unit specifies the mounting/enclosure type (refer to Table 1).

Input wiring is inserted in the top of the unit, while output wiring is inserted in the bottom, or field side of the unit. Screws to secure the wiring are located on the front panel. Connectors are screw-clamp type and accept wire size up to #14 AWG.

SPECIFICATIONS:

Function: This loop powered isolator accepts a 4 to 20mA input signal, provides input-to-output circuit isolation, and produces a 4 to 20mA output for loads from 0 to 600 ohms. Zero and span trim adjustments utilize 22-turn potentiometers accessible from the front of the unit. The isolator has various mounting and enclosure options available.

MODEL/SERIES: 270I- (Color coded with a Red label)

INPUT:- 20MA: 4 to 20mA input. Power to operate the loop-isolator is derived from the input signal loop. Input current should be limited to less than 50mA to prevent damage to the isolator. In the event of an open output circuit, the input loop voltage drop is limited to 20V, nominal. Isolator has reverse polarity protection.

Input Voltage Drop: The input voltage drop is a function of the input current as follows:

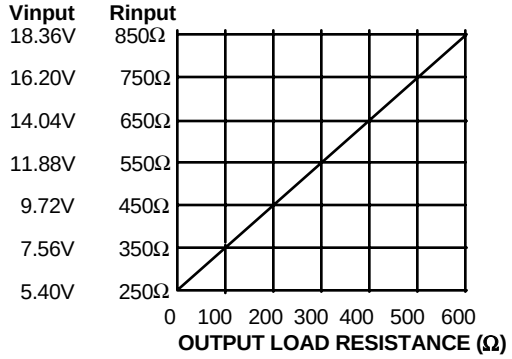


Figure 1: Input Burden vs. Output Load (21.6mA Loop Current)

Equation (Refer to Figure 1):
Input Voltage Drop = 5.4V DC + (0.0216A x R-load)

Example (R-load = 250 ohms):
Input Voltage Drop = 5.4V DC + (0.0216A x 250Ω) = 10.8V DC.

Current Sense Resistor: A built-in 10 ohm (±0.1%) resistor is available to monitor the input current to the isolator. The wiring to the isolator's input terminals determines if this resistor is included in the current loop or not. The use of this resistor provides a test signal of 40mV to 200mV, representing 4 to 20mA. See Drawing 4501-106 for wiring details. Note that the use of this resistor will increase the Input Voltage Drop by 200mV (10 ohms x 20mA).

Input V-Drop = 5.4VDC +(0.0216A xR-load), no sense resistor.
Input V-Drop = 5.6VDC +(0.0216A xR-load), w/ sense resistor.

Isolation: The input and output circuits are isolated from each other for common-mode voltages up to 250V AC, or 354V DC off ground, on a continuous basis (will withstand 1500V AC dielectric strength test for one minute without breakdown). This complies with the test requirements outlined in ANSI/ISA-S82.01-1988 for the voltage rating specified.

Output: 4-20mA DC output into 0 to 600 ohms.
A. For R-load from 50 to 600 ohms: Connect R-load between the Output(+) and Output(-) terminals.
B. For R-load from 0 to 50 ohms: Connect R-load between the Output(S) and Output(-) terminals. For optimum performance at low values of R-load, the isolator has a built-in pad resistor of 50 ohms.

1. Input Voltage Drop (with the input sense resistor not used):
   Input Voltage Drop = 5.4VDC +[0.0216A x (R-load + 50Ω)]
2. Input Voltage Drop (with the input sense resistor used):
   Input Voltage Drop = 5.6VDC +[0.0216A x (R-load + 50Ω)]

Reference Test Conditions: Input/Output current: 4 to 20mA; output load 250 ohms; 77^{O}F (25^{O}C) ambient.

Accuracy: Better than ±0.1% of output span. This error includes the combined effects of isolator repeatability, hysteresis, terminal point linearity, and adjustment resolution.

Ambient Temperature Range: -13^{O}F to 185^{O}F (-25^{O}C to 85^{O}C).

Ambient Temperature Effect: Less than ±0.006% of output span per ^{O}F (± 0.01% per ^{O}C) over the ambient temperature range for reference test conditions (Specification includes the combined effects of zero and span over temperature).

Load Resistance Effect: Less than ± 0.1% of output span as load resistance is changed over entire range. Allows use of isolator, within resistance load range, without the need to recalibrate the isolator for a particular load.

Output Ripple: Less than ±0.1% of the maximum output span.

Bandwidth: -3 dB at 3 Hz, typical.

Response Time: For a step input, the output reaches 98% of output span within 80mS, typical.

Noise Rejection:
Common Mode: Better than 110dB at 60 Hz, typical.

RFI Resistance: Less than ± 0.5% of output span with RFI field strengths of up to 10V/meter at frequencies of 27MHz, 151MHz, and 467MHz.

EMI Resistance: Less than ±0.25% of output span effect with switching solenoids or commutator motors.

Surge Withstand Capability (SWC): Input/Output terminations rated per ANSI/IEEE C37.90-1978. Unit is tested to a standardized test waveform that is representative of surges (high frequency transient electrical interference), observed in actual installations.

Construction (Basic Isolator):
Circuit Board: Military grade FR-4 epoxy glass circuit board.
Circuit Board Coating: Fungus resistant acrylic conformal coat.
Terminals: Compression type, wire size 14 AWG maximum.
Mounting Position: Position insensitive.
Case: Self-extinguishing NYLON Type 6.6 polyamide black thermo-plastic UL94- V-2, General Purpose, NEMA Type 1 enclosure

MOUNTING: A wide variety of mounting options and enclosures are available to meet the needs of the installation. The available models are listed below. The isolator is shipped as a complete assembly.

-DIN: General Purpose Housing, DIN Rail-Mount - "G" & "T" rails. "G" Rail (32mm), Type EN50035; "T" Rail (35mm), Type EN50022. Refer to Drawing 4501-107 for outline and clearance dimensions. Shipping Weight: 1 pound (0.45 Kg) packed.

-SM: General Purpose Housing, Surface-Mount. Refer to Drawing 4501-108 for outline and clearance dimensions. Shipping Weight: 1 pound (0.45 Kg) packed.

-ST: General Purpose Housing, SNAPTRACK™. Refer to Drawing 4501-108 for outline and clearance dimensions. Shipping Weight: 1 pound (0.45 Kg) packed. SNAPTRACK™ is a registered trademark of Reed Devices, Inc.

NEMA 4 and 12 Enclosures: Option types listed below. Refer to Drawing 4501-109 for outline and clearance dimensions. Isolator is mounted within enclosure at the factory. These enclosures may accommodate a second Series 270I isolator with the Surface-Mount option (-SM option, ordered separately). Conduit mounting holes and fittings are customer supplied.

-N4: **Water-Tight Enclosure, NEMA 4.** Enclosure material and finish: 0.075 and 0.060 inch thick steel with gray hammertone enamel finish inside and out. Shipping weight: 6 pounds (2.7 Kg) packed.

-N12: **Oil-Tight Enclosure, NEMA 12**. Enclosure material and finish: 0.075 and 0.060 inch thick steel with gray hammertone enamel finish inside and out. Shipping weight: 6 pounds (2.7 Kg) packed.

Explosion Proof, Water-Tight Enclosures: Option type listed below. Refer to Drawing 4501-110 (no display window) for outline and clearance dimensions. Enclosure Materials: Body and cover - Copper-free aluminum (less than 0.4%), Gasket - Neoprene. Finish: Corro-free epoxy powder coat, color gray. Hub size: 0.75 inch (Quantity 2). Housing meets Class I - Groups B, C, & D, Class II - Groups E, F, & G, Class III, and NEMA 4 (water-tight) requirements. Isolator is mounted within enclosure at the factory.

-XP: Explosion Proof, Water-Tight Enclosure (No Window). Shipping weight: 5 pounds (2.3Kg) packed.

CERTIFICATION: Consult the factory for current information on the availability of agency (e.g. Canadian Standards Association, Factory Mutual, etc.) approvals.

-NCR: No Certification Required.

INSTALLATION:

The isolator is packaged in a general purpose plastic housing and optionally mounted within a variety of protective enclosures. The isolator should be located in an area that is protected from dust, moisture, and corrosive atmospheres. The enclosure type determines the protection afforded in a particular environment and location, make sure that this is not compromised. Maximum operating ambient temperatures should be within -13 ^{O}F to 185^{O}F (-25 ^{O}C to 85^{O}C) for satisfactory performance. If unit is factory calibrated, it is ready for installation. Connect as shown in Connection Drawing 4501-106. To verify calibration, refer to the "CALIBRATION" section.

Mounting: Mount isolator assembly - refer to appropriate outline drawing for mounting and clearance dimensions. Determine which configuration is utilized and consult the proper mounting instructions listed below.

1. **DIN Rail Mounting**: Use suitable fastening hardware to secure the DIN rail to the designated mounting surface. An isolator ordered with the DIN Rail mounting option (-DIN) can be mounted to either the "T" or "G" Rail. Installation of the isolator to the rail depends on the type of DIN rail used (see Drawing 4501-107). Units can be mounted side-by-side on 1.0-inch centers, if required.
2. **Surface Mounting**: Secure the isolator to the designated mounting surface using two 6-32 screws. Note that the mounting bracket has screw slots to facilitate mounting. Units can be mounted side-by-side on 1.0-inch centers, if required.

3. **SNAPTRACK™ Mounting**: Secure the SNAPTRACK™ mounting channel to the designated mounting surface using suitable fastening hardware. To install the unit in the mounting channel, place the bottom end of the mounting bracket between the rails and press the top (notched end) firmly until the bracket "snaps" into place. To remove the isolator, insert a screwdriver into the upper arm of the connector, twist to release the unit from the track and tip the unit out. Units can be mounted side-by-side on 1.0-inch centers, if required.

4. **NEMA 4 & 12 Enclosure Mounting**: Secure the enclosure assembly to the designated mounting surface using appropriate hardware. The isolator is secured within this enclosure using two screws. Note: It is recommended that the isolator be removed from the enclosure during the process of drilling holes, installing fittings, and mounting the enclosure.

   Note: It is recommended that the isolator be removed from the enclosure during the process of mounting the enclosure. To remove the unit from the enclosure, remove two screws securing it to the bottom of the enclosure. After the enclosure is installed, install the isolator into the enclosure. Position the unit at an angle that permits all wiring to be routed unobstructed through both ports. If the isolator has the display option, make sure the orientation of the display allows for easy reading once installed. Secure the isolator assembly to the enclosure using two screws.

Electrical Connections:

The wire size used to connect the unit to the control system is not critical. All terminal strips can accommodate wire from 14-26 AWG. Strip back wire insulation 1/4-inch on each lead before installing into the terminal block. Input wiring may be shielded or unshielded twisted pair. Output wires should be twisted pair. Since common mode voltages can exist on signal wiring, adequate wire insulation should be used and proper wiring practices followed. It is recommended that input wiring be separated from output signal wiring for safety, as well as for low noise pickup.

1. **Input:** Connect input per connection diagram. Observe proper polarity. Note: Input/Output circuits are isolated from each other allowing the output circuit to operate with common mode voltages up to 250V AC or 354V DC off ground on a continuous basis. The power to operate this loop-isolator is derived from the input signal. For a 250 ohm load, the input voltage drop with 20mA output is 10.8VDC (5.4VDC + (0.0216 x R-load)). Determine the input voltage requirements for your load. Make sure your input source is capable of handling the required voltage drop.

2. **Output:** Make output circuit connections to the loop-isolator as shown in the Connection Drawing 4501-106. The
   4-20mA DC output signal can be used with a resistor load from 0 to 600 ohms. For resistance loads from 50 to 600 ohms, connect R-load between the Output(+) and Output(-) terminals. For resistance loads from 0 to 50 ohms, connect R-load between the Output(S) and Output(-) terminals. The Output(S) terminal has a built-in padding resistor of 50 ohms.

3. **Grounding:** The isolator in the General Purpose Housing is plastic and does not require an earth ground connection. If the isolator is mounted in a metal housing, a ground wire connection is required. Connect the ground terminal (Green Screw) to a suitable earth ground using suitable wire per applicable codes.

CALIBRATION:

All units are calibrated and checked for proper performance at the factory before they are shipped. The calibration example below is provided for reference.

Isolator - Adjustment Procedure:

Connect the isolator as shown in Connection Drawing 4501-106. The input current source must be adjustable over the entire input range of the unit and settable to an accuracy of 0.05% or better, for proper results.

The Zero and Span adjustments are accessible on the front panel of the isolator (see Drawing 4501-106 for their location). The screwdriver blade, used to adjust the potentiometers, should not be more than 0.1 inch (2.54mm) wide.

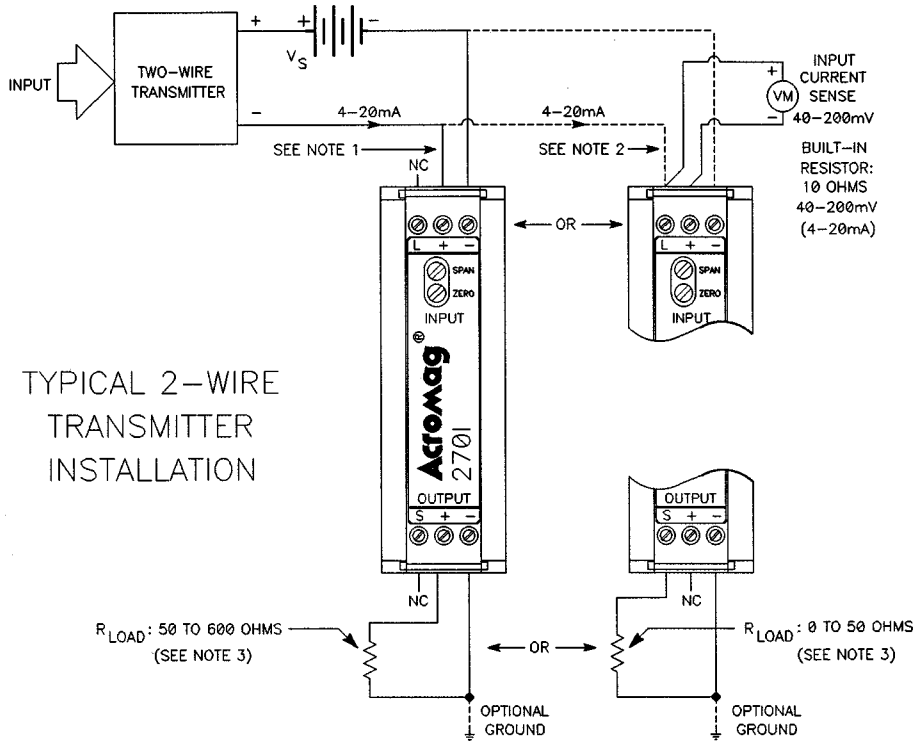
Isolator - Calibration Example:

MODEL : 270I-20MA-DIN-NCR
Output : 4-20mA
Input : 4-20mA

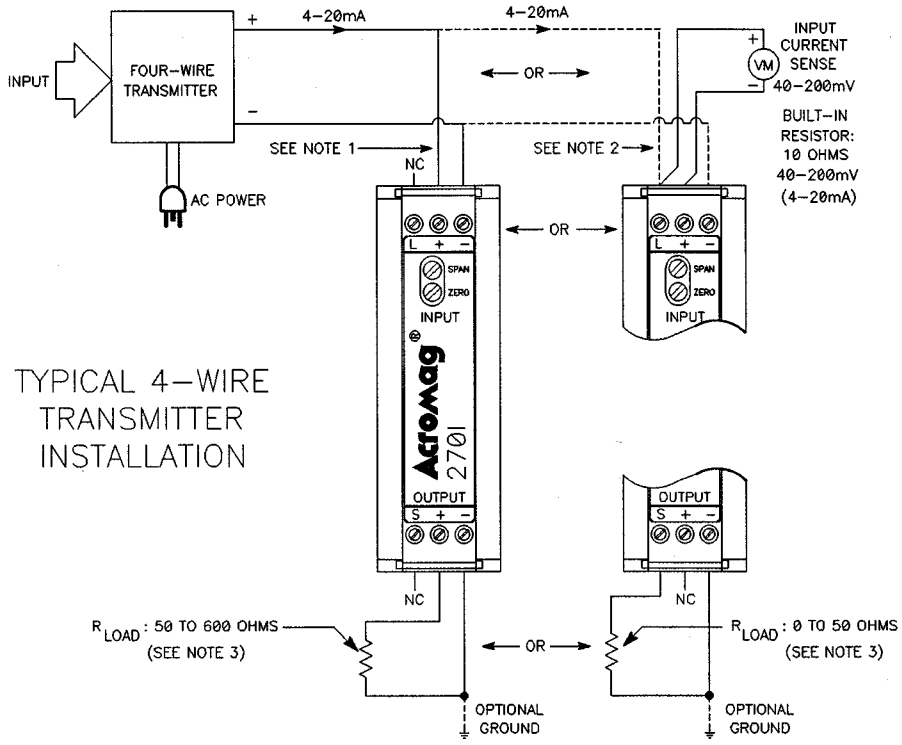
1. Set the input source to 4.000mA. Adjust the Zero (Z) pot until the output reads 4.000mA DC.
2. Set the input source to 20.000mA. Adjust the Span (S) pot until the output reads 20.000mA DC.
3. Repeat steps 1 and 2 until the readings converge. The instrument is now calibrated. Several mid-point values should also be checked to verify proper operation of the isolator.

GENERAL MAINTENANCE:

The isolator contains solid-state components and requires no maintenance, except for periodic cleaning and calibration verification. When a failure is suspected, a convenient method for identifying a faulty isolator is to exchange it with a known good unit. It is highly recommended that a non-functioning isolator be returned to Acromag for repair, since Acromag used tested and burned-in parts, and in some cases, parts that have been selected for characteristics beyond that specified by the manufacturer. Further, Acromag has automated test equipment that thoroughly checks the performance of each isolator.



TYPICAL 2-WIRE TRANSMITTER INSTALLATION



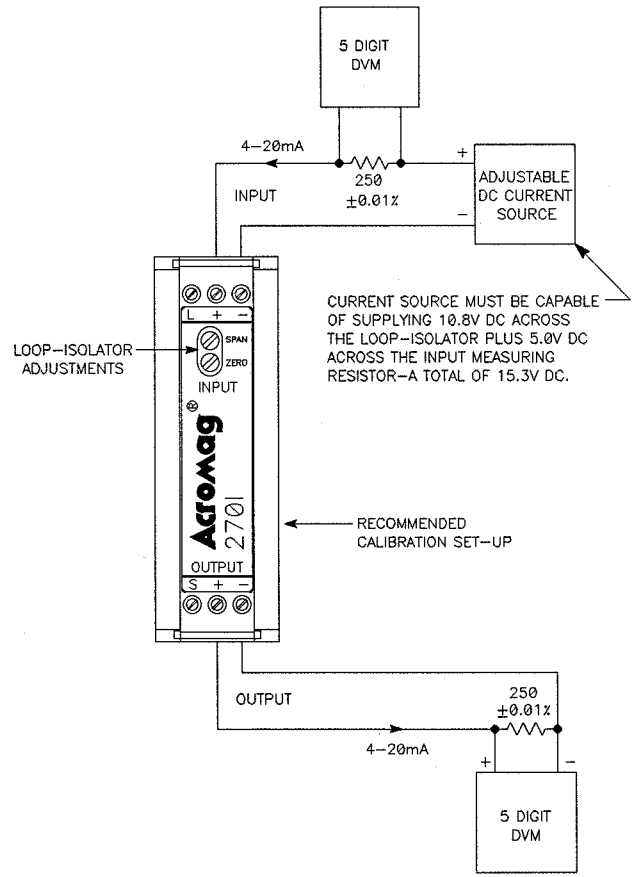
TYPICAL 4-WIRE TRANSMITTER INSTALLATION

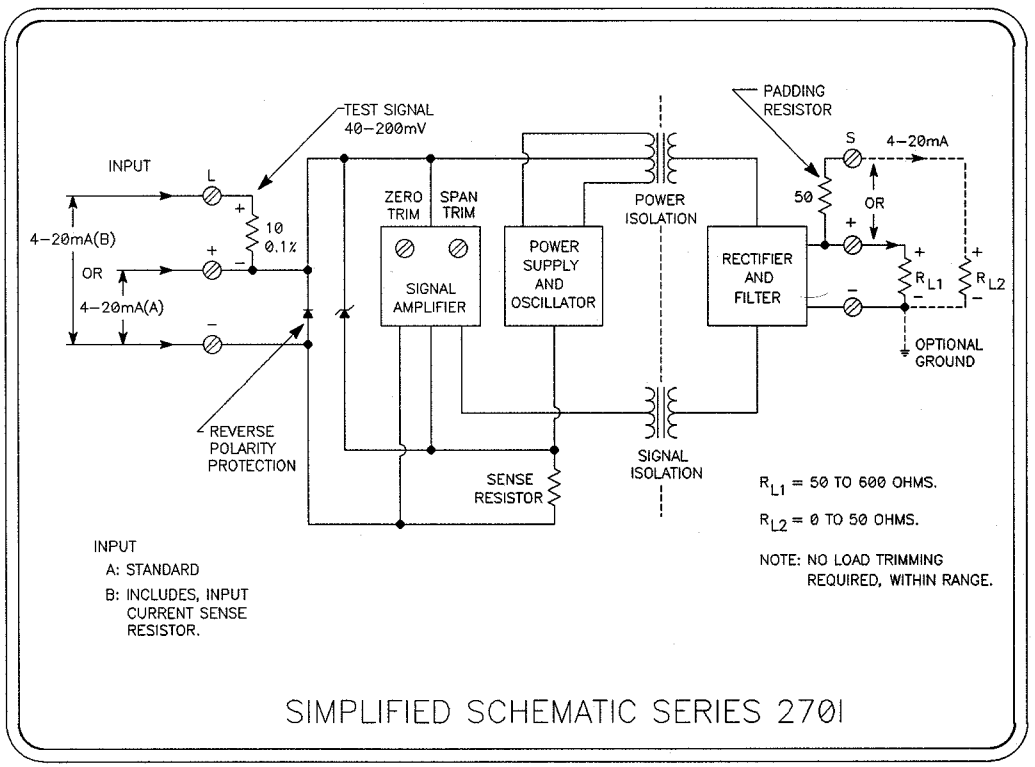
NOTES:

1. INPUT SENSE RESISTOR NOT USED (INPUT (+), INPUT (-)).
   A. R-LOAD: 0 TO 50 OHMS.
      INPUT VOLTAGE DROP = 5.4V DC +(0.0216A x (R-LOAD + 50 OHMS)).
   B. R-LOAD: 50 TO 600 OHMS.
      INPUT VOLTAGE DROP = 5.4V DC + (0.0216A x R-LOAD).
2. INPUT SENSE RESISTOR USED (INPUT (S), INPUT (-)).
   A. R-LOAD: 0 TO 50 OHMS.
      INPUT VOLTAGE DROP = 5.6V DC + (0.0216A x (R-LOAD + 50 OHMS)).
   B. R-LOAD: 50 TO 600 OHMS.
      INPUT VOLTAGE DROP = 5.6V DC + (0.0216A x R-LOAD).
3. ISOLATOR DOES NOT REQUIRE TRIMMING FOR A SPECIFIC LOAD RESISTANCE.

LOOP ISOLATOR CONNECTIONS

Acromag WIXOM, MICH.						
	28 FEB 91	-	—	TAV	KC	KC
	DATE	REV	ECN	DR	ENG	CLP
TITLE: LOOP-ISOLATOR CONNECTIONS						
D	SERIES: 2701	1 OF 1	DWG NO. 4501-106			REV: G

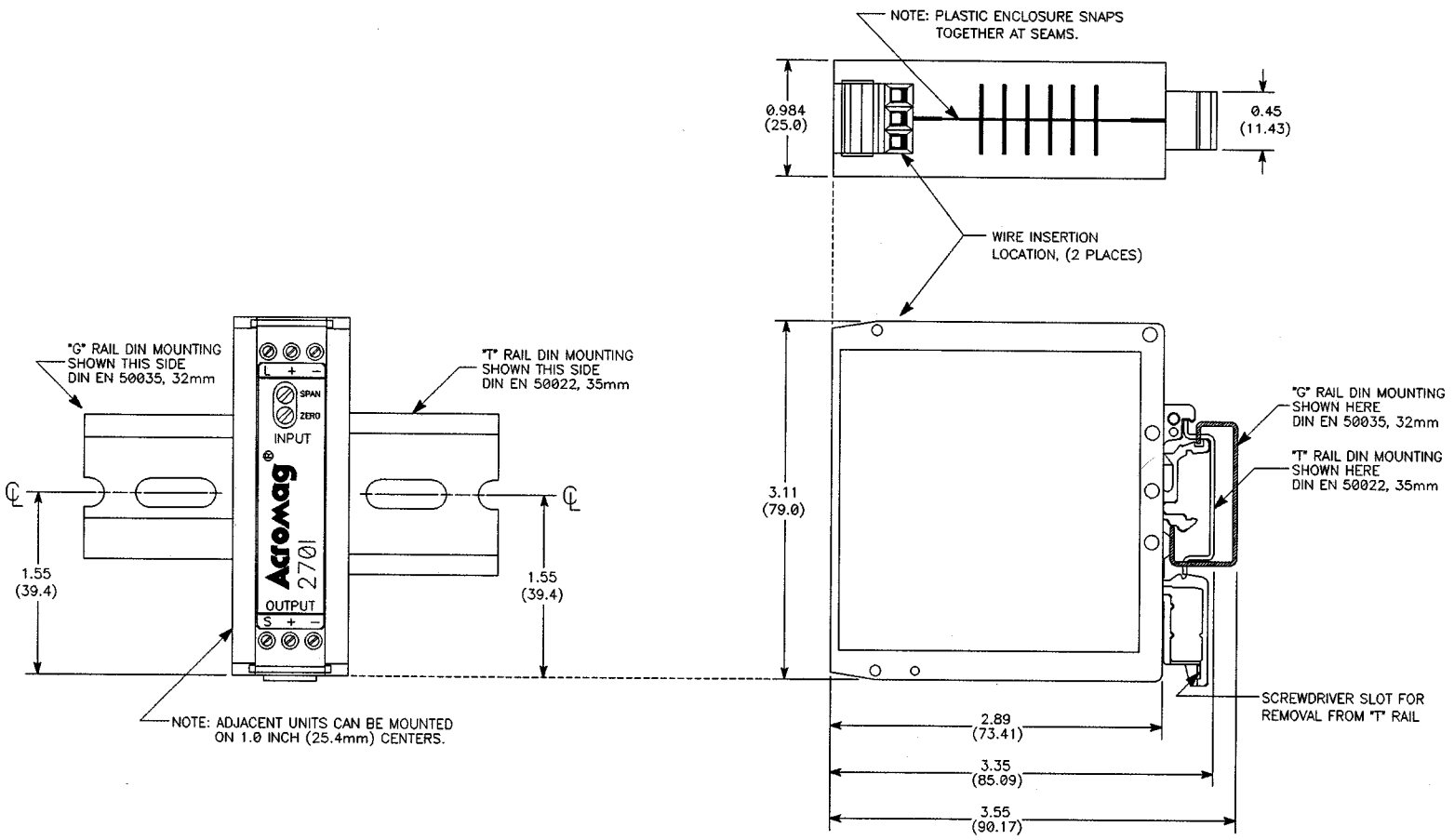




SIMPLIFIED SCHEMATIC SERIES 2701

LOOP–ISOLATOR CALIBRATION CONNECTIONS

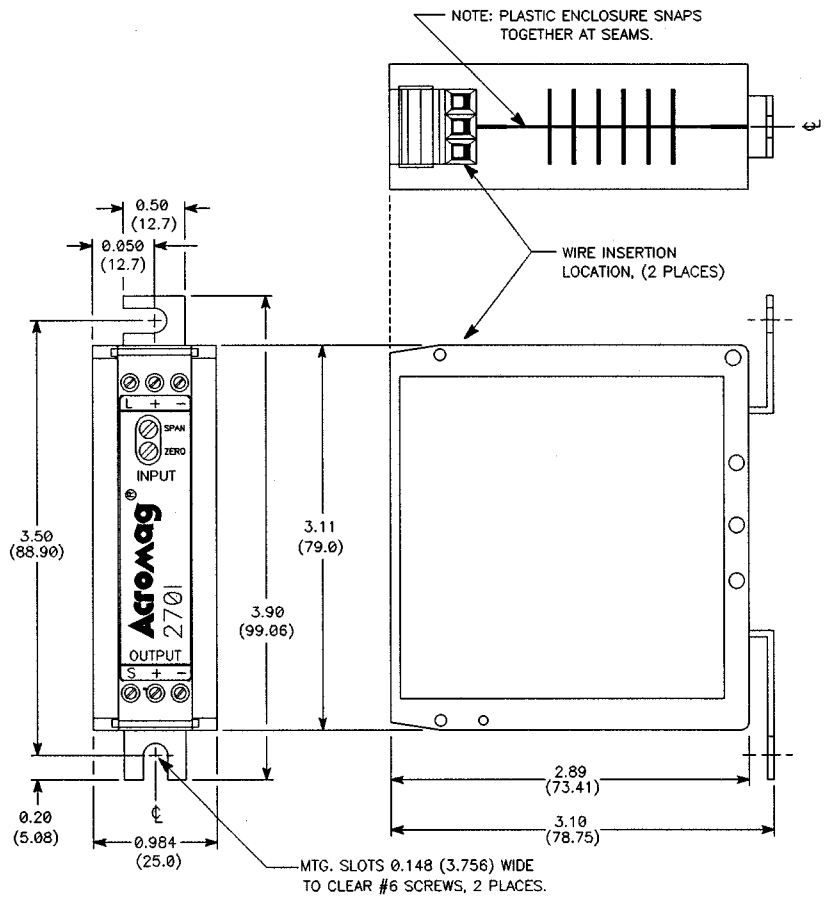
Acromag WIXOM, MICH.						
	28 FEB 91	–	———	TAV	KG	KG
	DATE	REV	ECN	DR	ENG	CLP
TITLE: ISOLATOR CALIBRATION CONNECTIONS						
D	SERIES: 2701	1 or 1	DWG NO. 4501–105		REV: A	



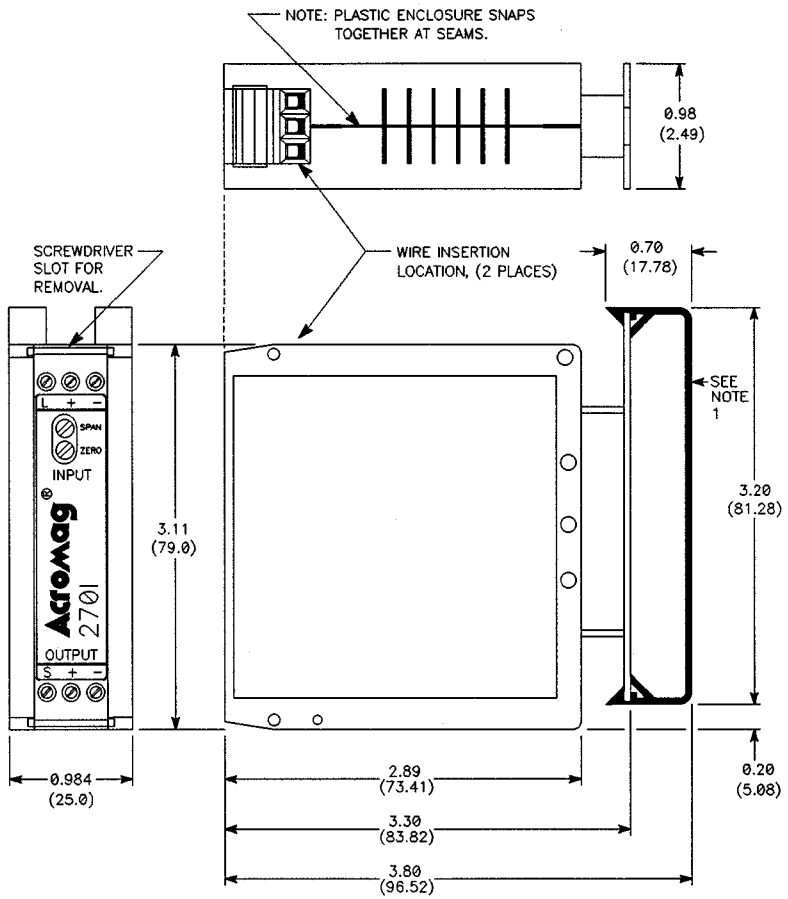
ENCLOSURE DIMENSIONS
DIN RAIL MOUNTING
(−DIN OPTION)

NOTE: ALL DIMENSIONS ARE IN INCHES (MILLIMETERS).

Acromag WIXOM, MICH.							
	29 AUG 90	−	−	TAV	KG	KG
	DATE	REV	ECN	DR	ENG	CLP
TITLE: HOUSING: DIN RAIL MOUNT						
D	SERIES 2701	1 OF 1	DWG NO. 4501-107			



ENCLOSURE DIMENSIONS
SURFACE MOUNTING
–SM OPTION

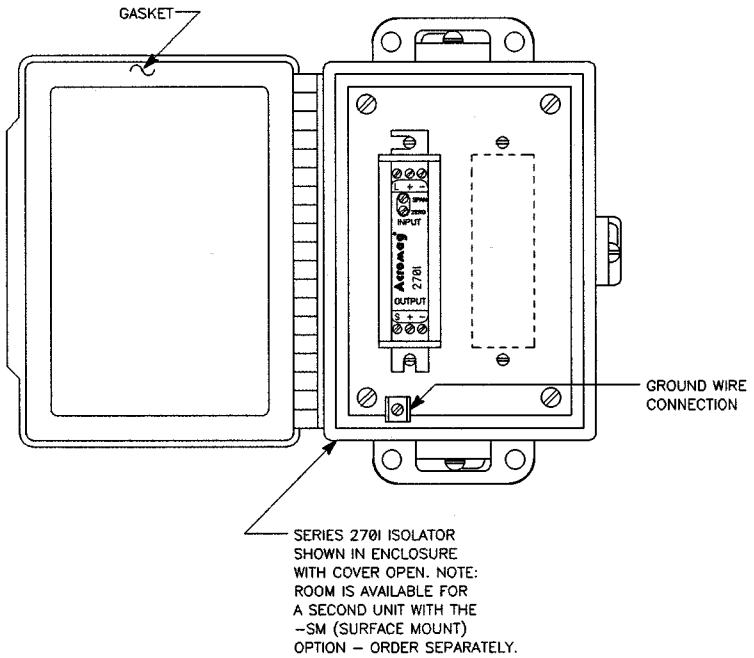


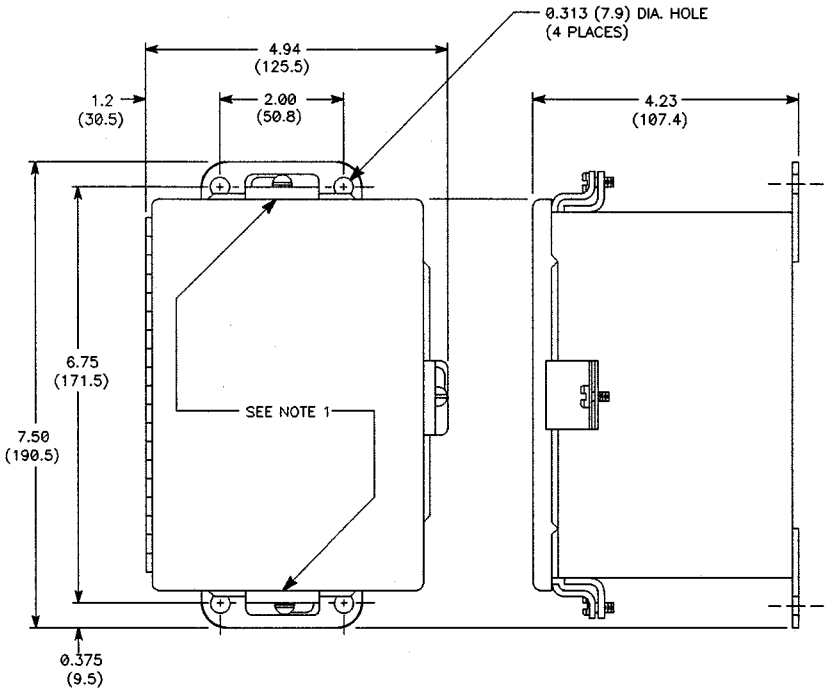
ENCLOSURE DIMENSIONS
SNAPTRACK MOUNTING
–ST OPTION

NOTE 1: PLASTIC RAIL RATED TO 122°F (50°C).

NOTE: ALL DIMENSIONS ARE IN INCHES (MILLIMETERS).

Acromag WIXOM, MICH.	28 OCT 91	A	10021	TAV	KG	KG
	29 AUG 90	–	——	TAV	KG	KG
	DATE	REV	ECN	DR	ENG	CLP
TITLE: HOUSING: –SM, –ST OPTION						
D	SERIES 2701	1 or 1	DWG NO. 4501-108	A	REV





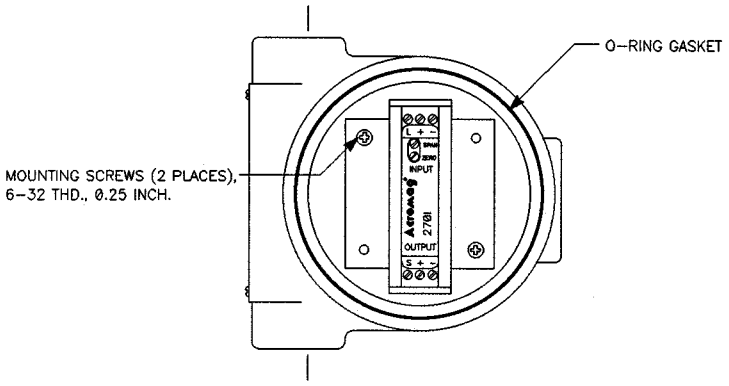
NOTES:

1. THESE SPECIFIC CLAMPS ON NEMA 4 ENCLOSURES ONLY.
2. CONDUIT MOUNTING HOLES AND FITTINGS ARE CUSTOMER SUPPLIED.

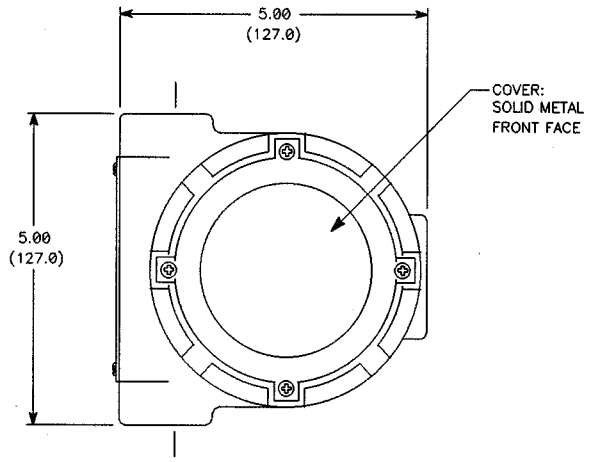
–N4 & –N12 OPTION ENCLOSURE DIMENSIONS

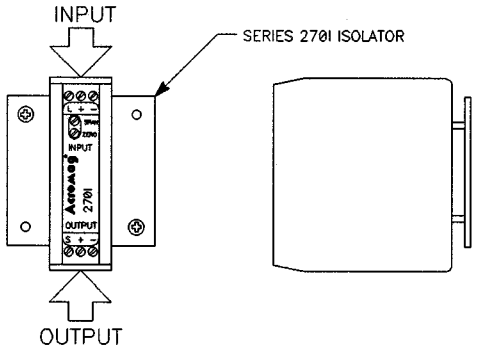
NOTE: ALL DIMENSIONS ARE IN INCHES (MILLIMETERS).

Acromag WIXOM, MICH.							
29 AUG 90	–			TAV	KG	KG
DATE	REV	ECN		DR	ENG	CLP
TITLE: ENCLOSURE: –N4 & –N12 OPTION						
SIZE: D	SERIES: 270I		1 OF 1	DWG NO. 4501-109		REV: J

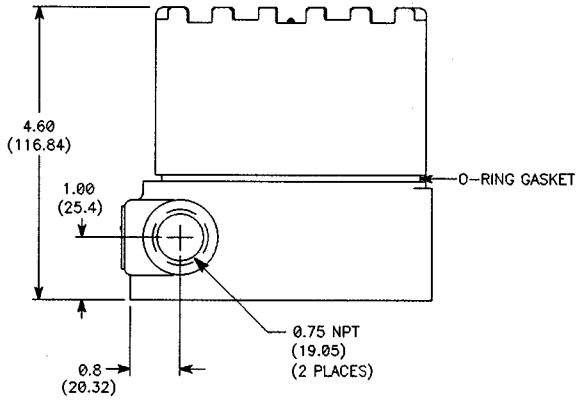


SERIES 2701 ISOLATOR
SHOWN INSTALLED IN ENCLOSURE
WITH COVER REMOVED.





SERIES 2701 ISOLATOR
SHOWN REMOVED FROM
ENCLOSURE.



ENCLOSURE DIMENSIONS
-XP OPTION

NOTE: ALL DIMENSIONS ARE IN INCHES (MILLIMETERS).

Acromag WIXOM, MICH.							
28 AUG 98	--			TAV	KG	KG
DATE	REV	ECN		DR	ENG	CLP
TITLE: ENCLOSURE, -XP OPTION						
SIZE: D	SERIES: 2701	1 OF 1	DWG NO. 4501-110			REV: C

ANDERSON GREENWOOD
INSTRUMENTATION PRODUCTS

Anderson Greenwood is the industry leader in instrument valve technology and the original innovator of the 3-valve manifold. Our capabilities include over 50 years of research, design and manufacture of instrumentation products. Our products are designed to be maintenance free, and are offered with numerous configurations, materials, end connections and special requirements.

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Notes

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2. Bonnet Lock is a patent held by Anderson Greenwood.
3. Delrin®, Kel-F®, Teflon® and Velcro® are all registered trademarks of E.I. Du Pont de Nemours and Company.
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10. Viton® is a registered trademark of DuPont Performance Elastomers.

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Bonnet Technology

Soft-Seated Bonnet Assembly

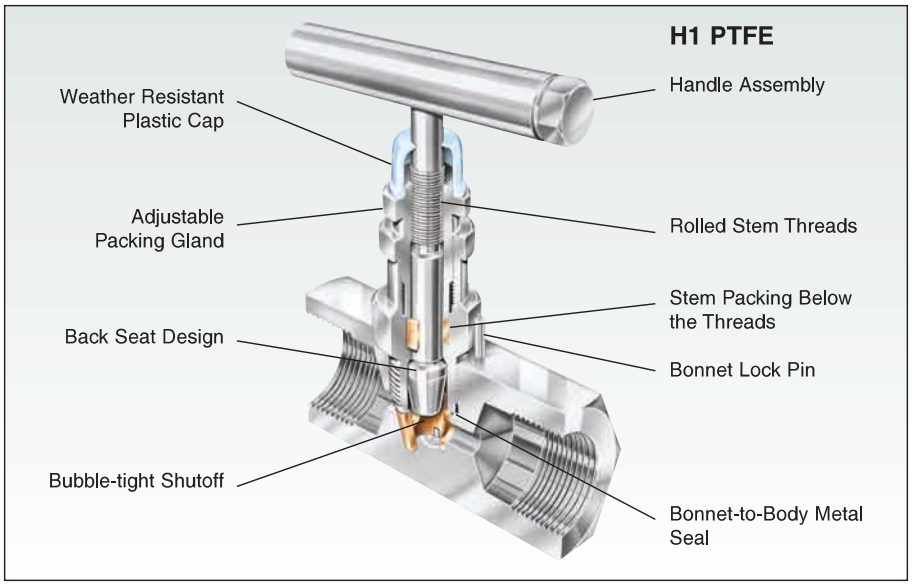
The soft-seated bonnet assembly has a one-piece rotating stem and plug. The stem threads are rolled and lubricated to prevent galling and reduce operating torque. Available with a patented PTFE packing gland, which is adjustable in service, or with a Viton® O-ring and PTFE back-up ring. A protective dust cap is fitted to contain stem lubricant and prevent the influx of contaminants. The standard hand valves have either 3/16-inch [4.8 mm] or 1/4-inch [6.4 mm] diameter orifice size. All bonnets are assembled with a bonnet locking pin to prevent accidental removal while in service.

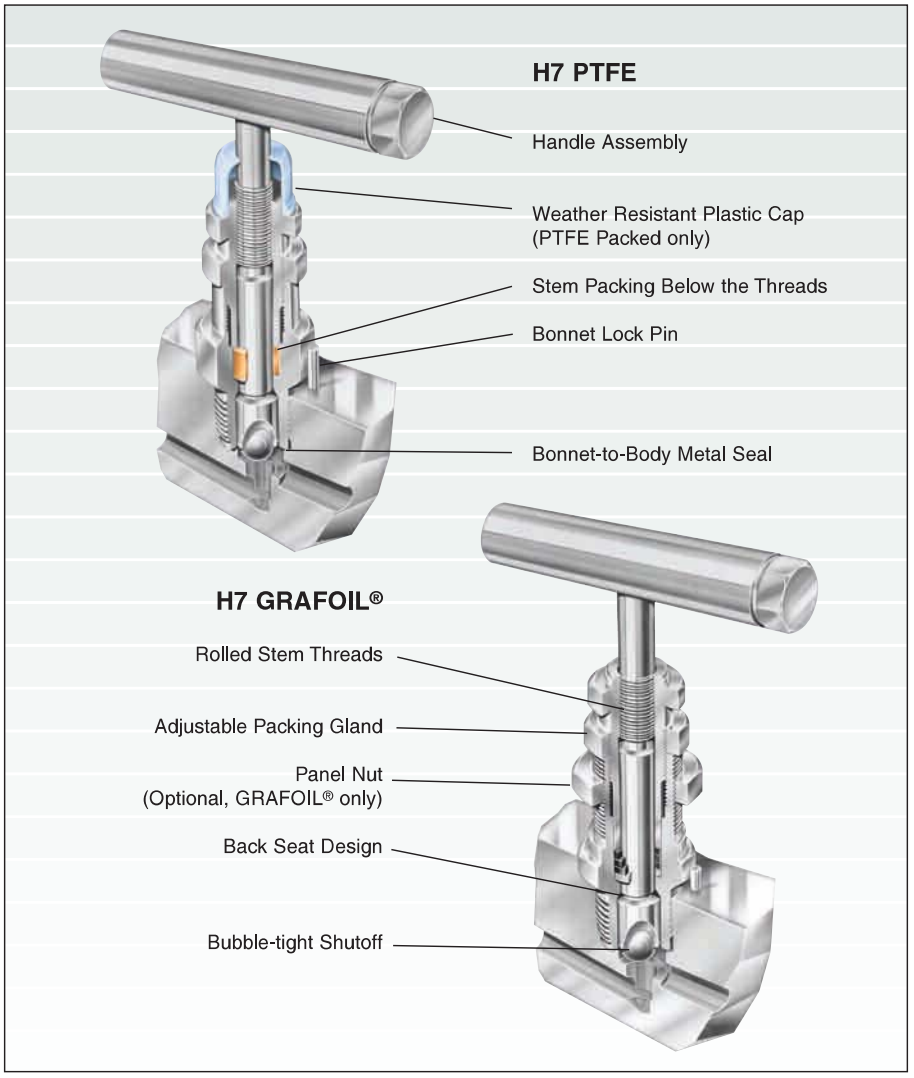
Metal-Seated Bonnet Assembly

The metal-seated bonnet assembly has a rotating stem with free swivel ball-type seat for long service life. The stem threads are rolled and lubricated to prevent galling and reduce operating torque. The stem seal is a patented PTFE packing gland which is adjustable in service. A protective dust cap is fitted to contain stem lubricant and prevent the influx of contaminants. The specially hardened ball seat is ideal for both gas and liquid service. All bonnets are assembled with a bonnet locking pin to prevent accidental removal while in service.

The 10,000 psig [689 barg] bonnet assembly uses a strengthened stem and bonnet. The stem seal is a patented PTFE packing gland which is adjustable in service. A protective dust cap is fitted to contain stem lubricant and prevent the influx of contaminants. This bonnet is also fitted with a larger size T-bar handle.

The high-temperature bonnet assemblies utilizes a similarly designed stem and bonnet, and incorporates adjustable GRAFOIL® O-rings and back-up pressure rings to ensure a leak-free stem seal.





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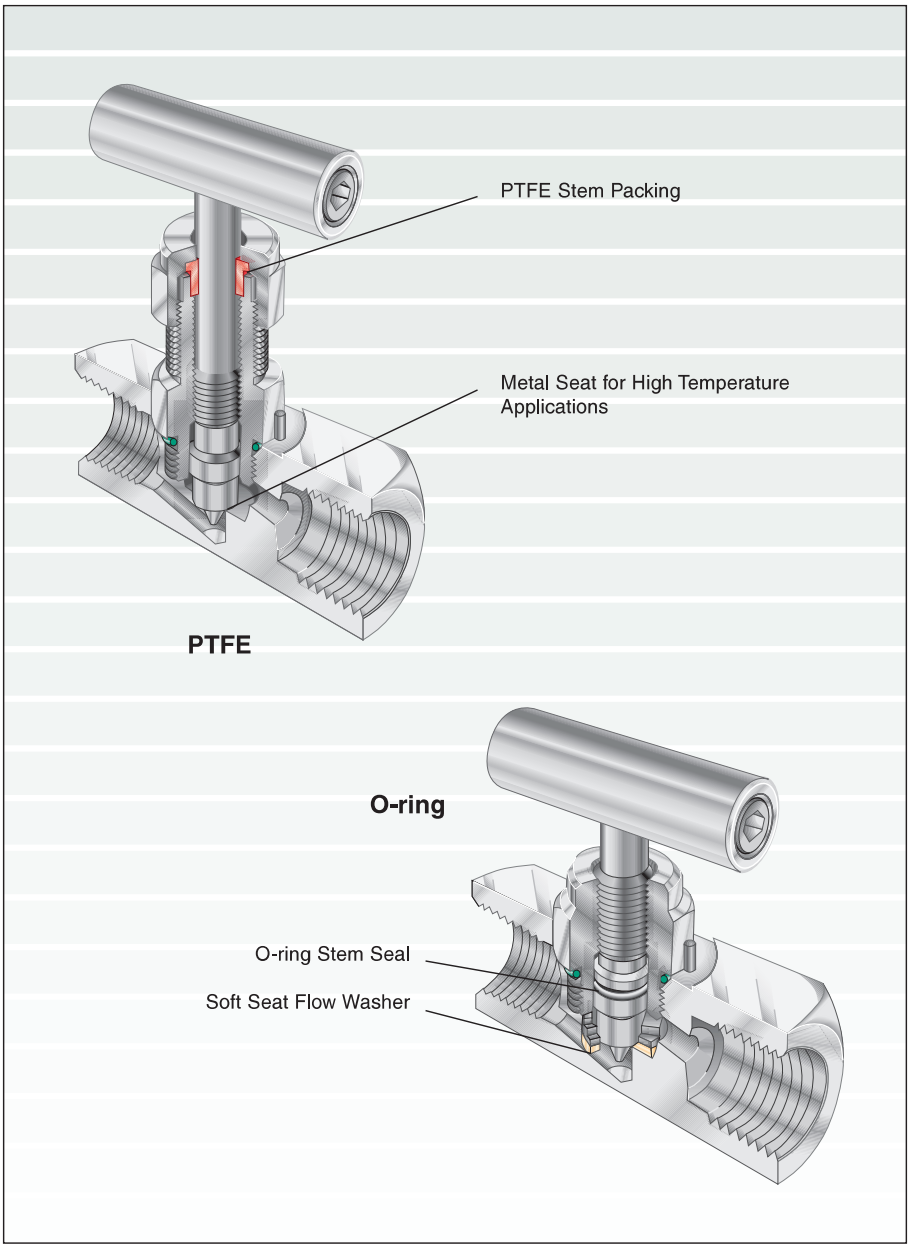
Bonnet Technology, continued



Mini-Valve Bonnet Assembly

The mini-valve bonnet assembly has a compact design with a one-piece rotating stem which is 'V' tipped with a shoulder for use as a metal or soft seated valve. The stem threads are rolled and lubricated to prevent galling and reduce operating torque.

The mini-valve bonnet comes in three designs. An adjustable PTFE stem packed bonnet is suitable for panel mounting via external bonnet threads. The O-ring bonnet assemblies use a Viton® O-ring seal below the stem thread.

A GRAFOIL® packed bonnet suitable for temperatures of up to 500°F [260°C] is available for SS valves only.

Arctic Lube

The low temperature rating for standard Anderson Greenwood carbon steel and 316 stainless steel instrumentation products is -20°F [-28°C] (standard products - standard lubrication). Our –AL (Arctic Lube) option extends the lower temperature limit to -70°F [-57°C] on all stainless steel models.

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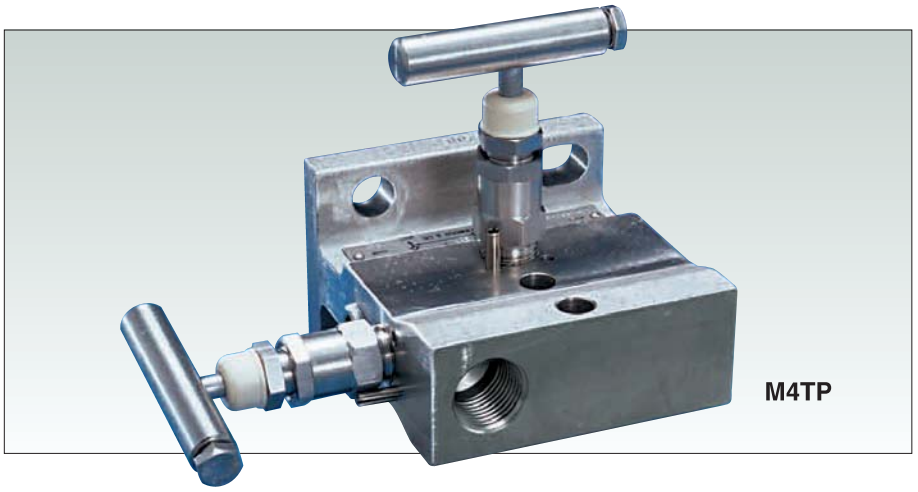
Static Pressure Manifolds – M4AP and M4TP Manifolds

Product Overview

The M4AP and M4TP are block and bleed, static pressure manifolds. They are designed for use with DP-style pressure transmitters.

The manifold's two valves have free-swiveling, ball-ended stems or soft seats. The block valve isolates the instrument from the process and is open during normal operation. When the block valve is closed, the bleed valve can be opened to vent pressure from the transmitter.

The M4AP permits the transmitter's futbol flange to connect the process signal line to the manifold directly, with either a 1/2-inch pipe or tubing connection. The M4TP has a 1/2-inch NPT inlet connection. A 1/4-inch NPT purge connection is available. The 1/4-inch NPT vent port may be used for testing calibration. They may be mounted using the AGCO Mount option for ease of assembly and maintenance.



Features and Benefits

- **Cost savings** when manifolding the instruments. This eliminates several parts used in conventional methods of 'piping up' resulting in cost reduction of 20-30 percent.
- **Compact design** requires minimum space for operation and installation.
- **Fewer leak points** reduce leakage by having fewer parts to assemble.
- **Free-swiveling ball end stem (metal seat)** assures bubble-tight valve closure without seat galling.
- **The AGCO Mount provides easy instrument removal.** Direct bolting to the manifold allows the instrument to be removed independently of the piping. This facilitates repairs, service, and calibration.
- **Immediate installation** with AGCO Mount's manifold, steam block, bracket, and all associated piping can be installed without the instrument at the time of plant construction.
- **Secure mounting** is provided by the AGCO Mount. Instrument piping stability is enhanced when directly supported by the pipe stand through the manifold.
- **All valve threading is isolated.** Packing is below stem threads, body-to-bonnet seal is below the threads eliminating process fluid corrosion.
- **Less instrument damage** with the AGCO Mount. The instrument can be safely warehoused until final 'loop' checkout, reducing the chances of damage during construction.

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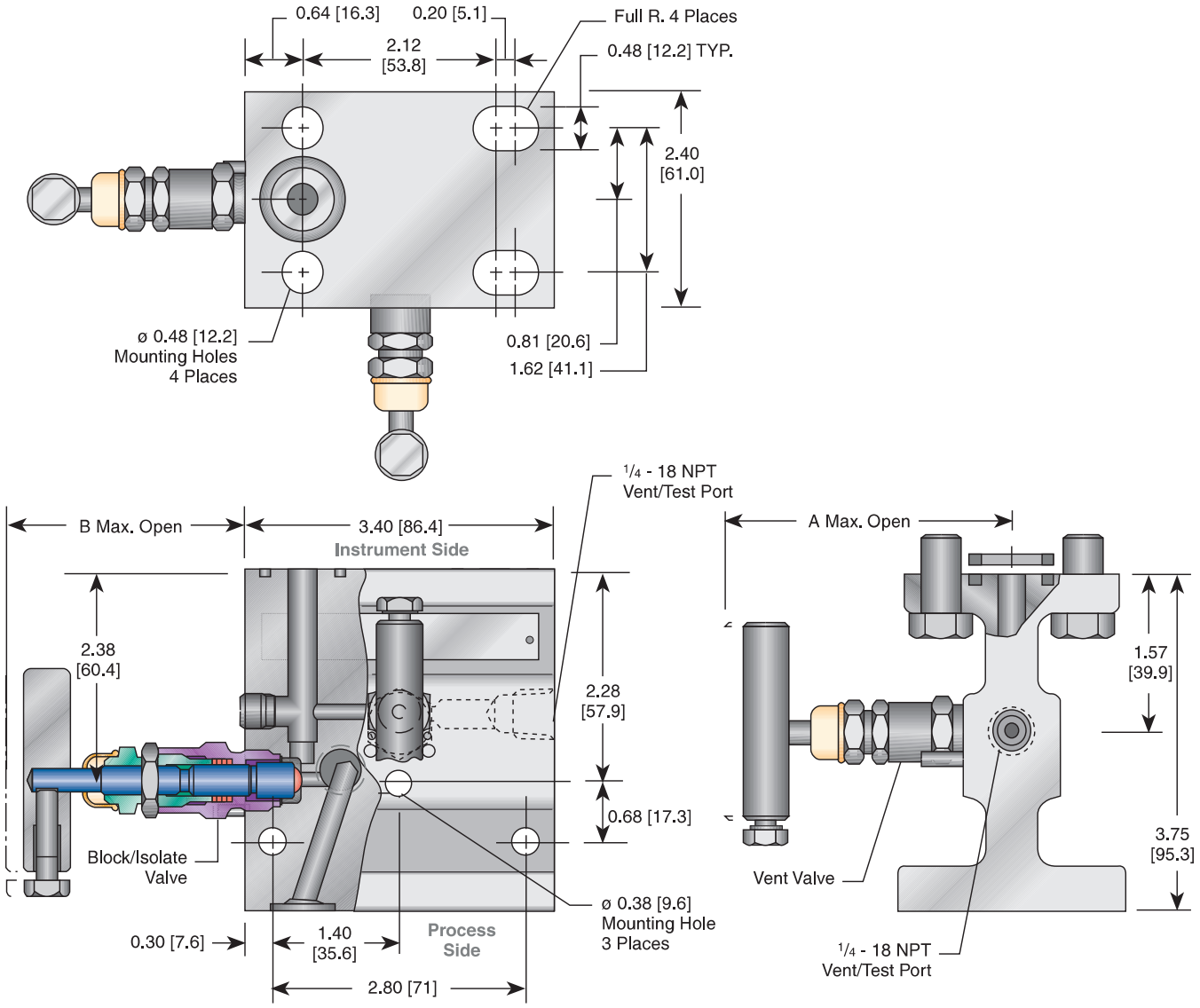
Static Pressure Manifolds – M4AP Specifications

Metal Seat (Soft Seat available) Dimensions, inches [mm]



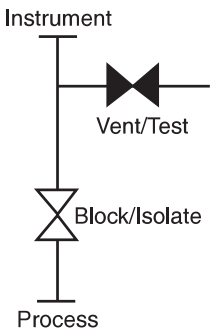
Dimensions, inches [mm]

Packing	A	B
Teflon®	3.14 [79.8]	2.60 [66.0]
GRAFOIL® Low Emissions Graphite	3.79 [96.3]	3.25 [82.6]

Note

1. Approximate valve weight: 4.4 lb [2.0 kg].
   Metal seat:
   0.156-inch [4 mm] diameter orifice.
   Valve C_V 0.36 maximum.

   Soft seat:
   0.187-inch [4.8 mm] diameter orifice.
   Valve C_V 0.83 maximum.



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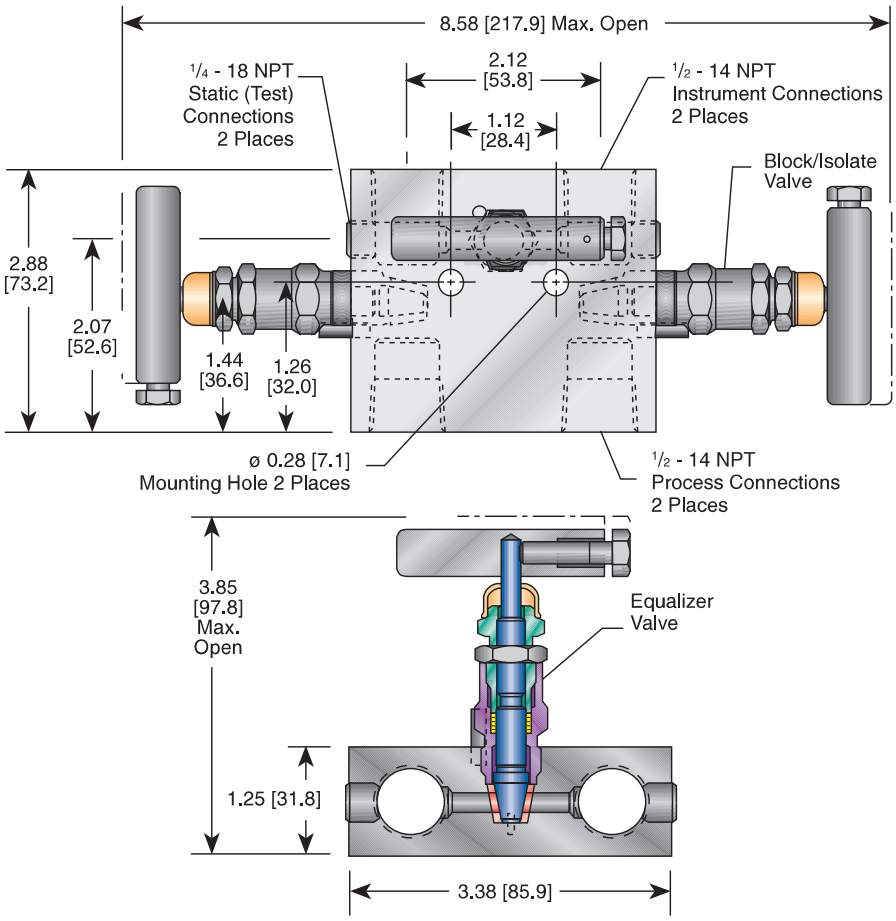
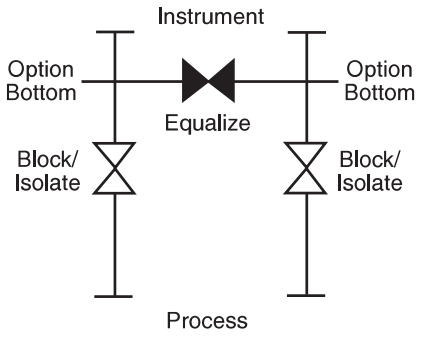
Differential Pressure Manifolds – M1 Specifications

Soft Seat Dimensions, inches [mm]





Standard Materials

Valve[1]	Body and Bonnet	Stem	Packing	Seat
CS[2]	A108 CS	A581-303	Teflon® or Viton® O-ring w/Teflon® backup	Delrin®[4]
SS	A479-316	A276-316	Teflon® or Viton® O-ring w/Teflon® backup	Delrin®[4]
SG[3]	A479-316	Monel® 400	Teflon®	Delrin®[4]
SG3[5]	Hastelloy® C276	Hastelloy® C276	Teflon®	Delrin®[4]

Seat	Pressure and Temperature Ratings	
Delrin® and PCTFE[4]	6000 psig @ 200°F	[414 barg @ 93°C]
PEEK	6000 psig @ 200°F 2000 psig @ 400°F	[414 barg @ 93°C] [138 barg @ 204°C]
Teflon®	1000 psig @ 150°F 200 psig @ 500°F	[69 barg @ 66°C] [14 barg @ 260°C]

Notes

1. Approximate valve weight: 4.0 lb [1.8 kg]. 0.187-inch [4.8 mm] diameter orifice. Valve C_V 0.83 maximum.
2. CS parts are zinc cobalt plated to prevent corrosion.
3. SG (Sour Gas) meets the requirements of NACE MR0175/ISO 15156-3 Corrigendum 2 (for Chloride conditions ≤ 50 mg/l [ppm]) and NACE MR0103-2005.
4. PCTFE (Polychlorotrifluoroethylene is exact equivalent of Kel-F®), PEEK, and Teflon® are also available.
5. SG3 (Sour Gas) meets the requirements of NACE MR0175/ISO 15156-3 Corrigendum 2 (for Chloride conditions > 50 mg/l [ppm]).

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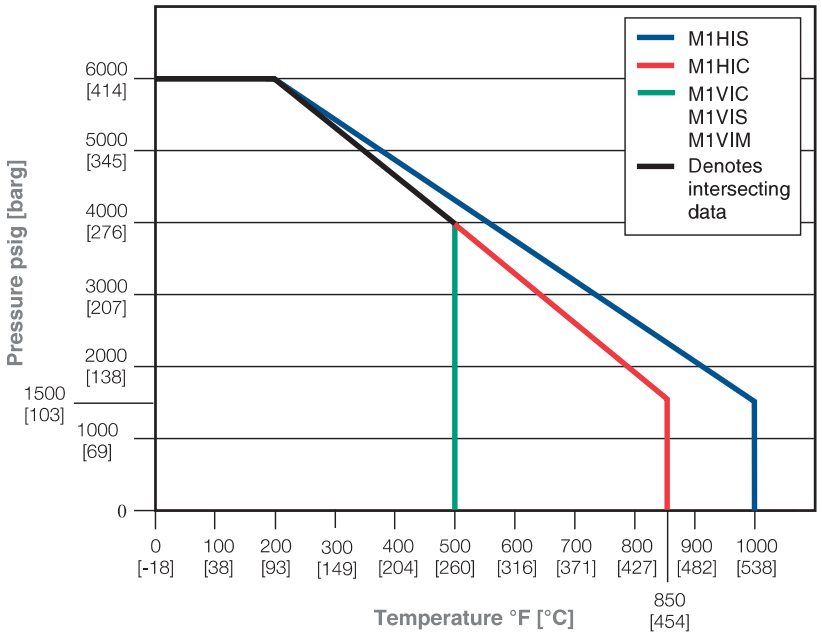
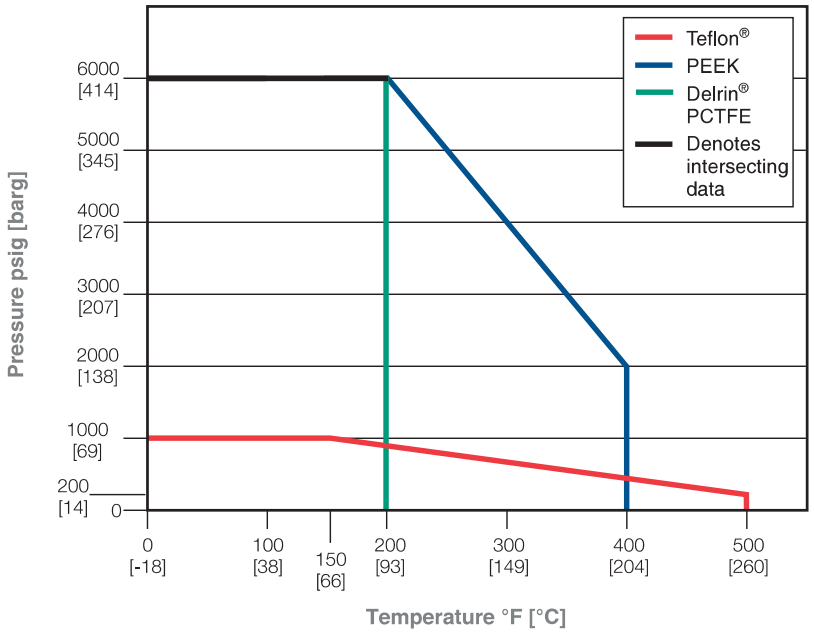
Differential Pressure Manifolds – M1 Specifications

Pressure vs. Temperature – Metal Seat



Pressure vs. Temperature – Soft Seat



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Differential Pressure Manifolds – M1 Specifications

Ordering Information Metal Seat; 3/16-inch [4.8 mm] Diameter Orifice

M1 H I S – 4 – SG

Packing

V – Teflon®
H – GRAFOIL®
E – Low Emissions Graphite

Seat

I – Integral (body material)

Body Material[1]

C – CS, A108 (Teflon® packed)
CS, A105 (GRAFOIL® and Low Emissions Graphite packed)
S – SS, A479-316
M – Monel®
W – 316L SS
J – Hastelloy®

Connection

4 – 1/2-inch FNPT

Options

AL – Arctic Lubricant (low temperature service -70°F) - not available for CS valves
AM – AGCO Mount Kit for 2-inch pipe stand mounting of manifold (page 80)
BC – Accessory Bracket - mount conduit with -AM
BL – Bonnet Lock Device (page 154)
BP – Accessory Bracket - mount purge meters with -AM
CL – Cleaned for chlorine service
HD – Hydrostatic testing (100 percent) (MSS SP-61)
MS – Monel® Stem
OC – Cleaned for oxygen service
PHB – Phenolic Black Handle
SG – (Sour Gas) meets the requirements of NACE MR0175/ISO 15156-3 Corrigendum 2 (for Chloride conditions ≤ 50 mg/l [ppm]) and NACE MR0103-2005 (SS valves only) (not available for O-ring packed valves)
SG3 – (Sour Gas) meets the requirements of NACE MR0175/ISO 15156-3 Corrigendum 2 (for Chloride conditions > 50 mg/l [ppm])
ST – Stellite Ball Ended Stem
SP – Special Requirements - please specify

Note

1. Call factory for optional materials.

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Differential Pressure Manifolds – M1 Specifications

Notes

1. Polychlorotrifluoroethylene is the exact equivalent of Kel-F®.
2. Call factory for optional materials.

Ordering Information Soft Seat Replaceable, Roddable; 3/16-inch [4.8 mm] Diameter Orifice

M1 V D S – 4 – SG

Packing

V – Teflon®
R – O-ring (Viton®)

Seat

D – Delrin®
V – Teflon®
E – PEEK
K – PCTFE[1]

Body Material[2]

C – A108 CS
S – A479-316 SS
W – 316L SS
J – Hastelloy®

Connection

4 – 1/2-inch FNPT

Options

AL – Arctic Lubricant (low temperature service -70°F) - not available for CS valves
AM – AGCO Mount Kit for 2-inch pipe stand mounting of manifold (page 80)
BC – Accessory Bracket - mount conduit with AM
BL – Bonnet Lock Device (page 154)
BP – Accessory Bracket - mount purge meters with AM
CL – Cleaned for chlorine service
HD – Hydrostatic testing (100 percent) (MSS SP-61)
MS – Monel® Stem
OC – Cleaned for oxygen service
PHB – Phenolic Black Handle
SG – (Sour Gas) meets the requirements of NACE MR0175/ISO 15156-3 Corrigendum 2 (for Chloride conditions ≤ 50 mg/l [ppm]) and NACE MR0103-2005 (SS valves only) (not available for O-ring packed valves)
SG3 – (Sour Gas) meets the requirements of NACE MR0175/ISO 15156-3 Corrigendum 2 (for Chloride conditions > 50 mg/l [ppm])
ST – Stellite Ball Ended Stem
SP – Special Requirements - please specify

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Differential Pressure Manifolds – M1 ASME B31.1 or B31.3 Specifications Meets MSS SP-105[5]

Ordering Information – Power Industry Applications

M1HP S – 4 – XP – AM

Valve Type

M1HP

Body Material[1]

C – CS, A105
S – SS, A479-316
W – 316L SS
J – Hastelloy®

Connection

4 – 1/2-inch FNPT x 1/2-inch FNPT x 1/2-inch FNPT
3TC4 – 3/8-inch Tube Stub x 1/2-inch FNPT x 1/2-inch FNPT[2]
3TB4 – 3/8-inch Tube S.W. x 1/2-inch FNPT x 1/2-inch FNPT
4TC4 – 1/2-inch Tube Stub x 1/2-inch FNPT x 1/2-inch FNPT[3]
4TB4 – 1/2-inch Tube S.W. x 1/2-inch FNPT x 1/2-inch FNPT
4B – 1/2-inch FSW x 1/2-inch FSW

Options

AM – AGCO Mount Kit for 2-inch pipe stand mounting of manifold (page 80)
SP – Special Requirements - please specify

Notes

1. All Manifolds come standard with GRAFOIL® packing, integral seats, bonnet locks, and are subjected to hydrostatic testing.
2. Tube Stubs are 6-inch long x 0.065-inch wall.
3. Tube Stubs are 6-inch long x 0.095-inch wall.
4. Manifold ratings:

   SST
   6000 psig @ 100°F [414 barg @ 38°C]
   3030 psig @ 1000°F [209 barg @ 538°C]

   STL
   6170 psig @ 100°F [425 barg @ 38°C]
   3430 psig @ 800°F [236 barg @ 427°C]
5. See page 156 for Code Requirements.

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ANDERSON GREENWOOD
INSTRUMENTATION PRODUCTS

Anderson Greenwood is the industry leader in instrument valve technology and the original innovator of the 3-valve manifold. Our capabilities include over 50 years of research, design and manufacture of instrumentation products. Our products are designed to be maintenance free, and are offered with numerous configurations, materials, end connections and special requirements.

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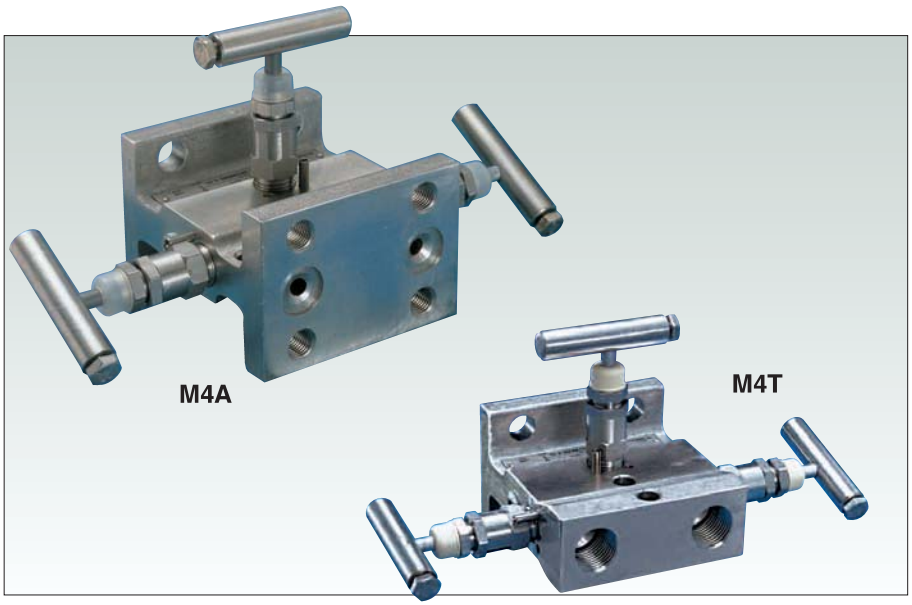
Differential Pressure Manifolds - M4A and M4T 3-Valve Manifolds



Product Overview

Our M4 Manifold is a three-valve unit designed for mounting on differential pressure transmitters having 2 1/8-inch [54 mm] center-to-center connections.

For direct or remote mounting, the M4A permits the transmitter's futbol flanges to connect the process signal lines to the manifold directly, with either 1/2-inch pipe or tubing connections. It contains two main block valves and an equalizing valve.

For close or remote mounting, the M4T Manifold is used in applications where direct coupling to orifice flanges is not desired. On the instrument side, the M4T bolts directly to the transmitter. On the process side, two 1/2-inch NPT or AGCO-Tube connections are provided for piping or tubing into the flange taps.

General Mounting Techniques

The M4A mounts either directly at the orifice flange union or to a 2-inch pipe stand using the AGCO Mount kit.

The M4T is designed for remote mounting on a 2-inch pipe stand and using the AGCO Mount kit.

Features and Benefits

- **Cost savings/less labor** results when unitizing the manifolding. It eliminates numerous parts used in conventional methods of 'piping up.' Results in cost reduction of 20-30 percent.
- **Stem backout prevention** eliminates stem blowout, or accidental removal while in operation.
- **Bonnet-to-body seal** is metal-to-metal in constant compression below the bonnet threads. This prevents bonnet thread process corrosion, eliminates tensile breakage of bonnet, and creates a reliable seal point.
- **Roddability** of soft seated valves means impulse lines can be cleaned without using purge. Simplifies maintenance and helps ensure measurement accuracy.
- **Field-replaceable soft seats** allow replacement of seat inserts without removing the valve from the line.
- **Stem finish** is burnished to a 16 RMS mirror finish in the packing area. Enables smooth stem operation and extended packing life.
- **Rolled threads** provide additional thread strength because the stem and bonnet threads are rolled, not cut.
- **Fugitive emissions.** To meet low fugitive emissions requirements, special Graphite sealed bonnets are available.
- **Fewer parts** means fewer leak points which mean fewer fugitive emissions.
- **Manifold mounts directly to the pipe stand.** The AGCO Mount supports the transmitter and allows loop installation to be completed without the transmitter. Instrument removal for service or repair does not disturb installation.
- **Teflon®, GRAFOIL®, or Graphite packing** adjusts easily. Decreases downtime and increases valve life.
- **Integral hard back seat** protects against stem blowout and forms a secondary seal.
- **Protective bonnet cap** (Teflon® packed only) increases valve life by protecting against atmospheric contamination; reduces possibility of thread galling by containment of stem lubricant.

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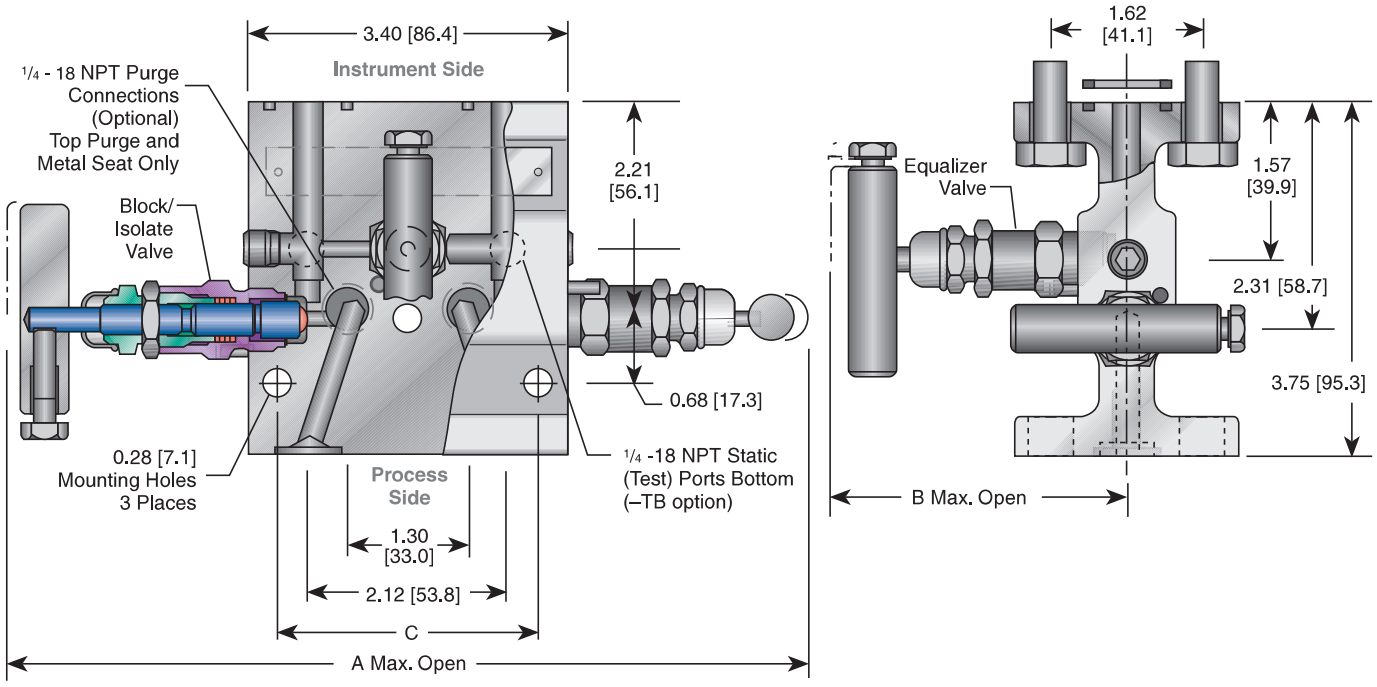
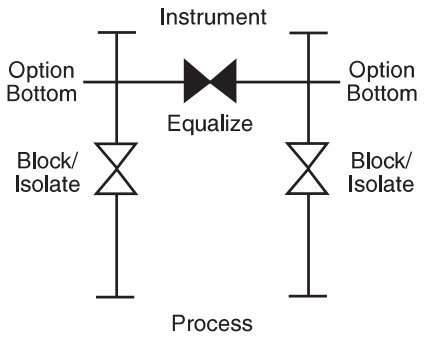
Differential Pressure Manifolds – M4A and M4T Specifications

M4A Metal Seat (Soft Seat available) Dimensions, inches [mm]





Dimensions, inches [mm]

Valve[1]	A		B		C	
Soft Seat – Teflon® Packed	8.60	[218]	3.20	[81]	1.06	[27]
Metal Seat – Teflon® Packed	8.60	[218]	3.20	[81]	2.80	[71]
Metal Seat – GRAFOIL® Packed	9.90	[251]	3.85	[98]	2.80	[71]

Note

1. Approximate valve weight: 4.7 lb [2.1 kg].
   Metal Seat:
   0.156-inch [4.0 mm] diameter orifice.
   Valve C_V 0.36 maximum.
   Soft Seat:
   0.187-inch [4.8 mm] diameter orifice.
   Valve C_V 0.83 maximum.

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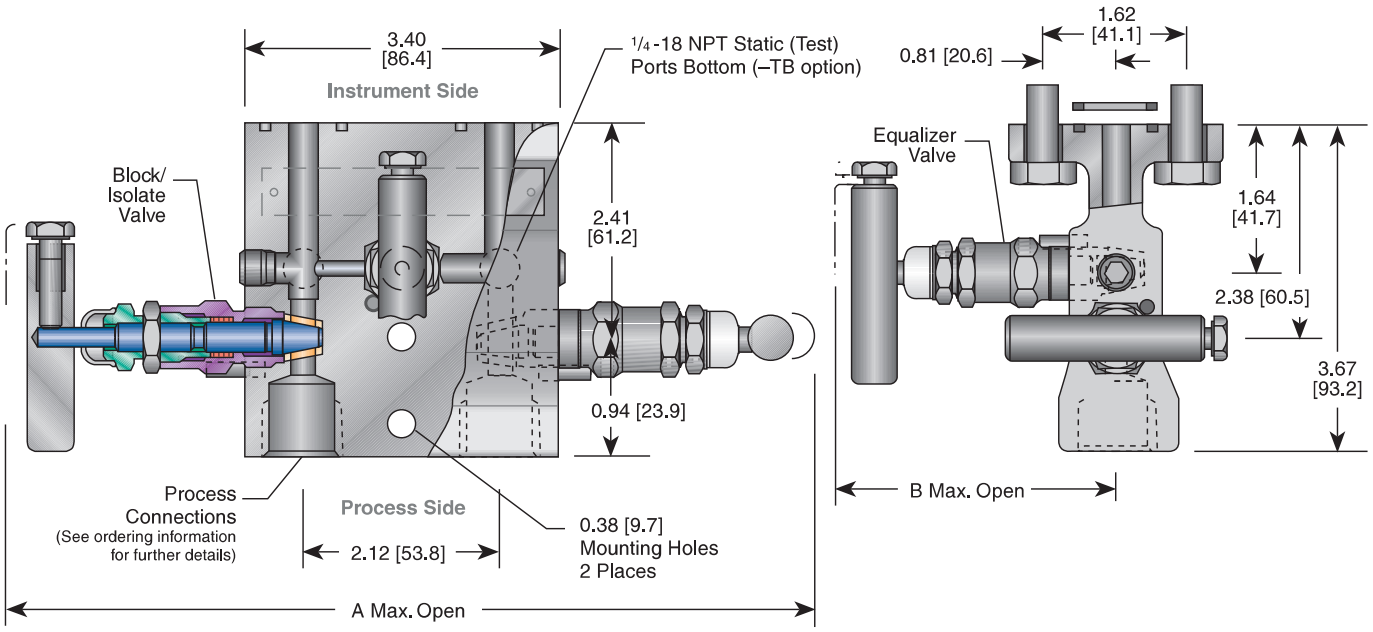
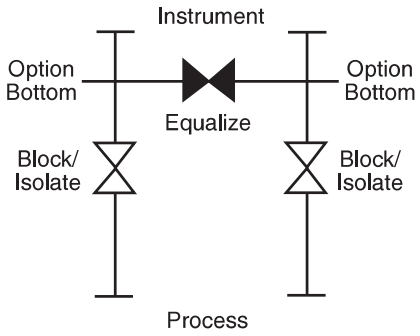
Differential Pressure Manifolds – M4A and M4T Specifications

M4T Soft Seat (Metal Seat available) Dimensions, inches [mm]



Dimensions, inches [mm]

Valve[1]	A		B	
Soft Seat – Teflon® Packed	8.60	[218]	3.20	[81]
Metal Seat – Teflon® Packed	8.60	[218]	3.20	[81]
Metal Seat – GRAFOIL® Packed	9.90	[251]	3.85	[98]



Note

1. Approximate valve weight: 4.5 lb [2.0 kg].
   Metal Seat:
   0.187-inch [4.8 mm] diameter orifice.
   Valve C_V 0.36 maximum.
   Soft Seat:
   0.187-inch [4.8 mm] diameter orifice.
   Valve C_V 0.83 maximum.

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Differential Pressure Manifolds – M4A and M4T Specifications

Notes

1. Instrument mounting kit furnished with the M4 includes (4) A193-B7 bolts and (2) Teflon® or GRAFOIL® flange gaskets to match bonnet packing.
2. CS parts are zinc cobalt to prevent corrosion.
3. SG (Sour Gas) meets the requirements of NACE MR0175/ISO 15156-3 Corrigendum 2 (for Chloride conditions ≤ 50 mg/l [ppm]) and NACE MR0103-2005.
4. SG3 (Sour Gas) meets the requirements of NACE MR0175/ISO 15156-3 Corrigendum 2 (for Chloride conditions > 50 mg/l [ppm]).
5. 316 SS bolts lower pressure ratings to a maximum of 4500 psi [310 barg]. Consult factory for full rating with 316 SS bolts.

Standard Materials

Metal Seat

Valve	Body[1]	Bonnet	Stem	Ball
CS[2]	A576-10L18	A108 CS	A581-303	17-4 PH
CS[2]	A576-10L18	A105 CS	A581-303	17-4 PH
SS	A479-316	A479-316	A276-316	316 SS
SG[3]	A479-316	A479-316	Monel® 400	Monel® K500
Monel®	Monel® 400	Monel® R405	Monel® 400	Monel® K500
Hastelloy®	Hastelloy® C276	Hastelloy® C276	Hastelloy® C276	Elgiloy®
SG3[4]	Hastelloy® C276	Hastelloy® C276	Hastelloy® C276	Elgiloy®

Soft Seat

Valve	Body	Bonnet	Stem	Seat
CS[2]	A576-10L18	A108 CS	A581-303	Delrin®
SS	A479-316	A479-316	A276-316	Delrin®
SG[3]	A479-316	A479-316	Monel® 400	Delrin®
SG3[4]	Hastelloy® C276	Hastelloy® C276	Hastelloy® C276	Delrin®

Pressure and Temperature Ratings

Metal Seat

Valve	Packing	Ratings[5]	
CS[2]	Teflon®	6000 psig @ 200°F 4000 psig @ 500°F	[414 barg @ 93°C] [276 barg @ 260°C]
CS[2]	GRAFOIL® Graphite	6000 psig @ 200°F 4000 psig @ 600°F	[414 barg @ 93°C] [276 barg @ 316°C]
SS	Teflon®	6000 psig @ 200°F 4000 psig @ 500°F	[414 barg @ 93°C] [276 barg @ 260°C]
SS	Graphite GRAFOIL®	6000 psig @ 200°F 1500 psig @ 1000°F	[414 barg @ 93°C] [103 barg @ 538°C]
SG[3] or SG3[4]	Teflon®	6000 psig @ 200°F 4000 psig @ 500°F	[414 barg @ 93°C] [276 barg @ 260°C]
SG[3] or SG3[4]	GRAFOIL®	6000 psig @ 200°F 1500 psig @ 1000°F	[414 barg @ 93°C] [103 barg @ 538°C]
Monel®	Teflon®	5300 psig @ 200°F 4200 psig @ 500°F	[360 barg @ 93°C] [290 barg @ 260°C]
Hastelloy®	Teflon®	6000 psig @ 200°F 4000 psig @ 500°F	[414 barg @ 93°C] [276 barg @ 260°C]

Soft Seat

Valve	Packing	Ratings[5]	
CS[2] SS	Teflon® Viton® O-ring with Teflon® back up ring	6000 psig @ 200°F	[414 barg @ 93°C]
SG[3] or SG3[4]	Teflon®	6000 psig @ 200°F	[414 barg @ 93°C]

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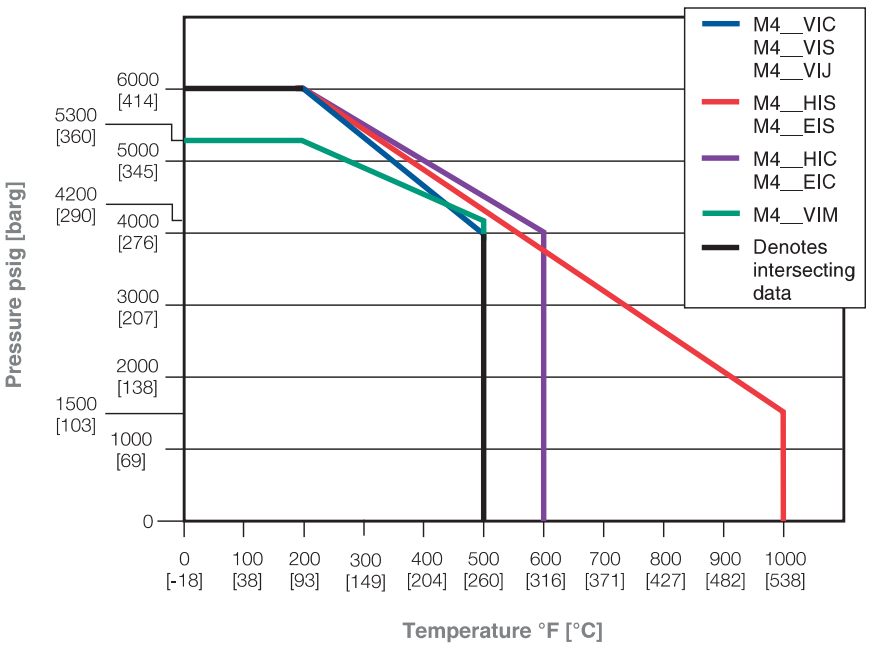
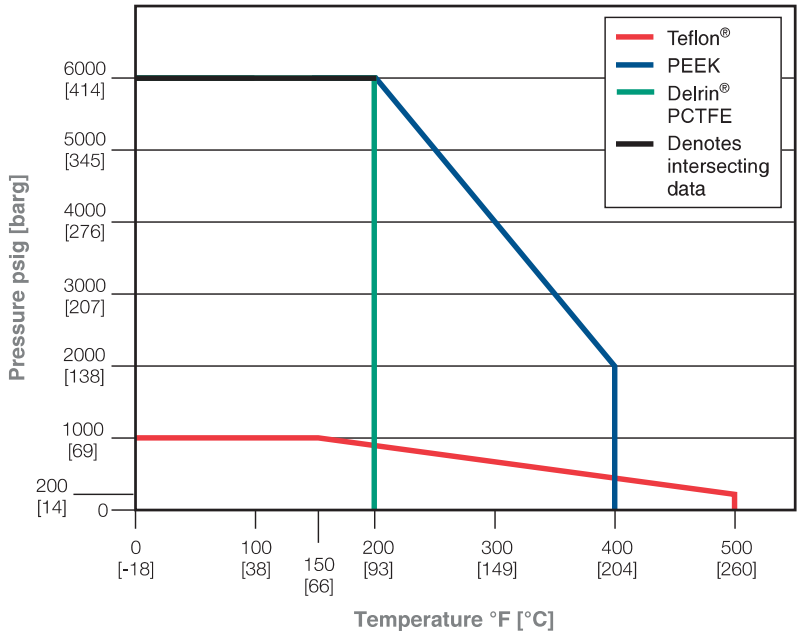
Differential Pressure Manifolds – M4A and M4T Specifications

Pressure vs. Temperature – Metal Seat



Pressure vs. Temperature – Soft Seat



Note

1. 316 SS bolts lower pressure ratings to a maximum of 4500 psi [310 barg]. Consult factory for full rating with 316 SS bolts.

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Differential Pressure Manifolds – M4A and M4T Specifications

Notes

1. 316 SS bolts lower pressure ratings to a maximum of 4500 psi [310 barg]. Consult factory for full rating with 316 SS bolts.
2. Integral tube fitting design, refer to page 75.
3. CS parts are zinc cobalt plated to prevent corrosion.

Ordering Information – Soft Seat

M4T V D S – 4 – SG

Valve Type

M4A – 3-Valve Manifold, Flange x Flange
M4T – 3-Valve Manifold, FNPT x Flange

Bonnet Packing

V – Teflon®
R – O-ring (Viton®)

Seat

D – Delrin®
E – PEEK
K – PCTFE
V – Teflon®

Body Material

C – CS[3], A576-10L18
S – SS, A479-316
W – SS, A479-316L
J – Hastelloy®

Process Connections (M4T only)

4 – 1/2-inch FNPT
AT[2] – Integral Single Ferrule Tube Fittings - 4AT 1/2-inch, 316 SS
ATD[2] – Integral Dual Ferrule Tube Fittings - 4ATD 1/2-inch, 316 SS

Options

AL – Arctic Lubricant (low temperature service -70°F) - not available for CS valves
AM – AGCO Mount Kit for 2-inch pipe stand mounting of manifold (page 80)
BC – Accessory Bracket - mount conduit with -AM
BL – Bonnet Lock Device (page 154)
BP – Accessory Bracket - mount purge meters with -AM
CL – Cleaned for chlorine service
HD – Hydrostatic testing (100 percent) (MSS SP-61)
MS – Monel® Stem standard on Monel® and SG valves)
OC – Cleaned for oxygen service
PHB – Phenolic Black Handle
R3V – Add for use with Rosemount® Model 3051C (SS 18-8 Bolts)
SB – Steam Block (CS)
SSA[1] – SS Flange Bolt (grade 18-8) - maximum pressure rating 4500 psi [310 barg]
SSB – 316 SS Flange Bolt (B8M Class 2) - will provide full pressure rating
SSC[1] – 316 Flange Bolt (B8M) - maximum pressure rating 4500 psi [310 barg]
SG – (Sour Gas) meets the requirements of NACE MR0175/ISO 15156-3 Corrigendum 2 (for Chloride conditions ≤ 50 mg/l [ppm]) and NACE MR0103-2005 (SS valves only) (not available for O-ring packed valves)
SG3 – (Sour Gas) meets the requirements of NACE MR0175/ISO 15156-3 Corrigendum 2 (for Chloride conditions > 50 mg/l [ppm])
TB – Test Ports - bottom of manifold (1/4-inch FNPT) (option not available for M4A with -AM)
SP – Special Requirements - please specify

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Differential Pressure Manifolds – M4A and M4T Specifications

Ordering Information – Metal Seat

M4T V I S – 4 – SG

Valve Type

M4A – 3-Valve Manifold, Flange x Flange
M4T – 3-Valve Manifold, FNPT x Flange

Bonnet Packing

V – Teflon®
H – GRAFOIL®
E – Low Emissions Graphite (except M45A)

Seat

I – Integral (body material)

Body Material

C – CS, A576-10L18
S – SS, A479-316
M – Monel® 400 (M4A and M4T only)
W – SS, A479-316L
J – Hastelloy®

Process Connections (M4T only)

4 – 1/2-inch FNPT
AT[2] – Integral Single Ferrule Tube Fittings - 4AT 1/2-inch, 316 SS
ATD[2] – Integral Dual Ferrule Tube Fittings - 4ATD 1/2-inch, 316 SS

Options

AL – Arctic Lubricant (low temperature service -70°F) - not available for CS valves
AM – AGCO Mount Kit for 2-inch pipe stand mounting of manifold (page 80)
BC – Accessory Bracket - mount conduit with -AM
BL – Bonnet Lock Device (page 154)
BP – Accessory Bracket - mount purge meters with -AM
CL – Cleaned for chlorine service
HD – Hydrostatic testing (100 percent) (MSS SP-61)
LP – Street Elbows and Top Purge Ports
MS – Monel® Stem (standard on Monel® and SG valves)
OC – Cleaned for oxygen service
PB – Bottom Purge Ports (1/4-inch FNPT) (Metal Seat only) (option not available with -SB or M4A with -AM)
PHB – Phenolic Black Handle
PT – Top Purge Ports (1/4-inch FNPT) (Metal Seat only) (if elbows are required, specify -LP, not -PT)
R3V – Add for use with Rosemount® Model 3051C (SS 18-8 Bolts)
SB – Steam Block (CS)
SSA2 – SS Flange Bolt (grade 18-8) - maximum pressure rating 4500 psi [310 barg]
SSB – 316 SS Flange Bolt (B8M Class 2) - will provide full pressure rating
SSC2 – 316 Flange Bolt (B8M) - maximum pressure rating 4500 psi [310 barg]
SG – (Sour Gas) meets the requirements of NACE MR0175/ISO 15156-3 Corrigendum 2 (for Chloride conditions ≤ 50 mg/l [ppm]) and NACE MR0103-2005 (SS valves only) (not available for O-ring packed valves)
SG3 – (Sour Gas) meets the requirements of NACE MR0175/ISO 15156-3 Corrigendum 2 (for Chloride conditions > 50 mg/l [ppm])
ST – Stellite Ball Ended Stem
TB – Test Ports - bottom of manifold (1/4-inch FNPT) (option not available for M4A with -AM)
TR68 – Add for use with Rosemount® models 1151DP 6, 7, 8 and 1151HP 6, 7, 8 and any DP transmitter with bolt spacing between 2.125-inch [54 mm] and 2.281-inch [58 mm] (Metal Seat only)
SP – Special Requirements - please specify

Notes

1. Integral tube fitting design, refer to page 75.
2. 316 SS bolts lower pressure ratings to a maximum of 4500 psi [310 barg]. Consult factory for full rating with 316 SS bolts.

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Differential Pressure Manifolds – M4A and M4T ASME B31.1 or B31.3 Meets MSS SP-105[4]

Ordering Information – Power Industry Applications[2]

M4THP S – 4 –XP – SG

Valve Type

M4AHP – 3-Valve Manifold, Flange x Flange
M4THP – 3-Valve Manifold, FNPT x Flange

Body Material

S – SS, A479-316[3]

Connections (Process x Instrument x Vent)

4 – 1/2-inch FNPT x Flange x 1/4-inch FNPT
4AT – 1/2-inch AGCO Tube x Flange x 1/4-inch FNPT
4B – 1/2-inch Pipe S.W. x Flange x 1/4-inch FNPT
4TB – 1/2-inch Tube S.W. x Flange x 1/4-inch FNPT

Options

AM – AGCO Mount Kit for 2-inch pipe stand mounting of manifold (table, page 80)
SSA[6] – SS Flange Bolt (grade 18-8) - maximum pressure rating 4500 psi [310 barg]
SSB – 316 SS Flange Bolt (B8M Class 2) - will provide full pressure rating
SSC[6] – 316 Flange Bolt (B8M) - maximum pressure rating 4500 psi [310 barg]
TB – Test Ports - bottom of manifold (1/4-inch FNPT) (option not available for M4A with -AM)
SP – Special Requirements - please specify

Notes

1. Integral tube fitting design, refer to page 75.
2. All Manifolds come standard with GRAFOIL® packing, integral seats, bonnet locks, and are subjected to hydrostatic testing.
3. Manifold ratings:

   SST
   6000 psig @ 100°F [414 barg @ 38°C]
   3030 psig @ 1000°F [236 barg @ 538°C]
4. See page 156 for Code Requirements.
5. Test bottom ports standard.
6. 316 SS bolts lower pressure ratings to a maximum of 4500 psi [310 barg]. Consult factory for full rating with 316 SS bolts.

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ANDERSON GREENWOOD
INSTRUMENTATION PRODUCTS

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Notes

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Bonnet Technology

Soft-Seated Bonnet Assembly

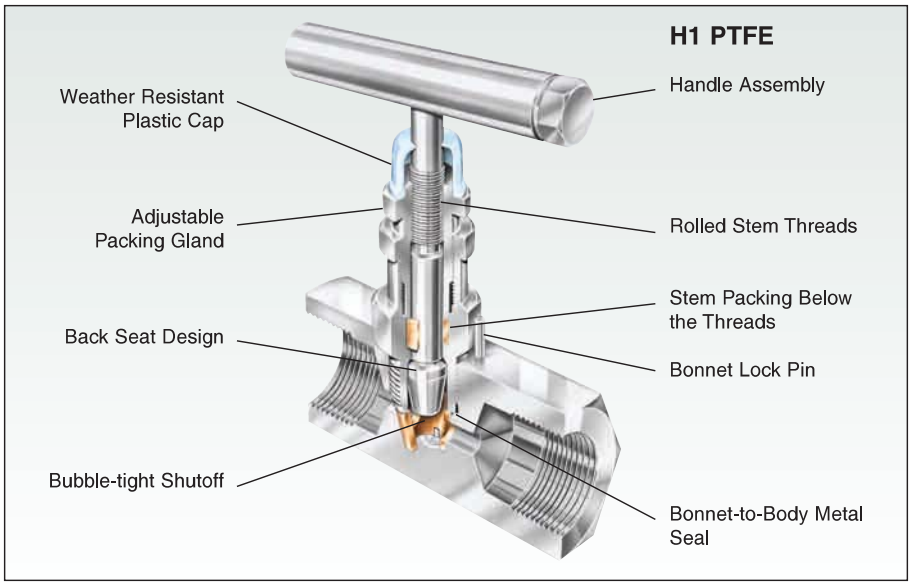
The soft-seated bonnet assembly has a one-piece rotating stem and plug. The stem threads are rolled and lubricated to prevent galling and reduce operating torque. Available with a patented PTFE packing gland, which is adjustable in service, or with a Viton® O-ring and PTFE back-up ring. A protective dust cap is fitted to contain stem lubricant and prevent the influx of contaminants. The standard hand valves have either 3/16-inch [4.8 mm] or 1/4-inch [6.4 mm] diameter orifice size. All bonnets are assembled with a bonnet locking pin to prevent accidental removal while in service.

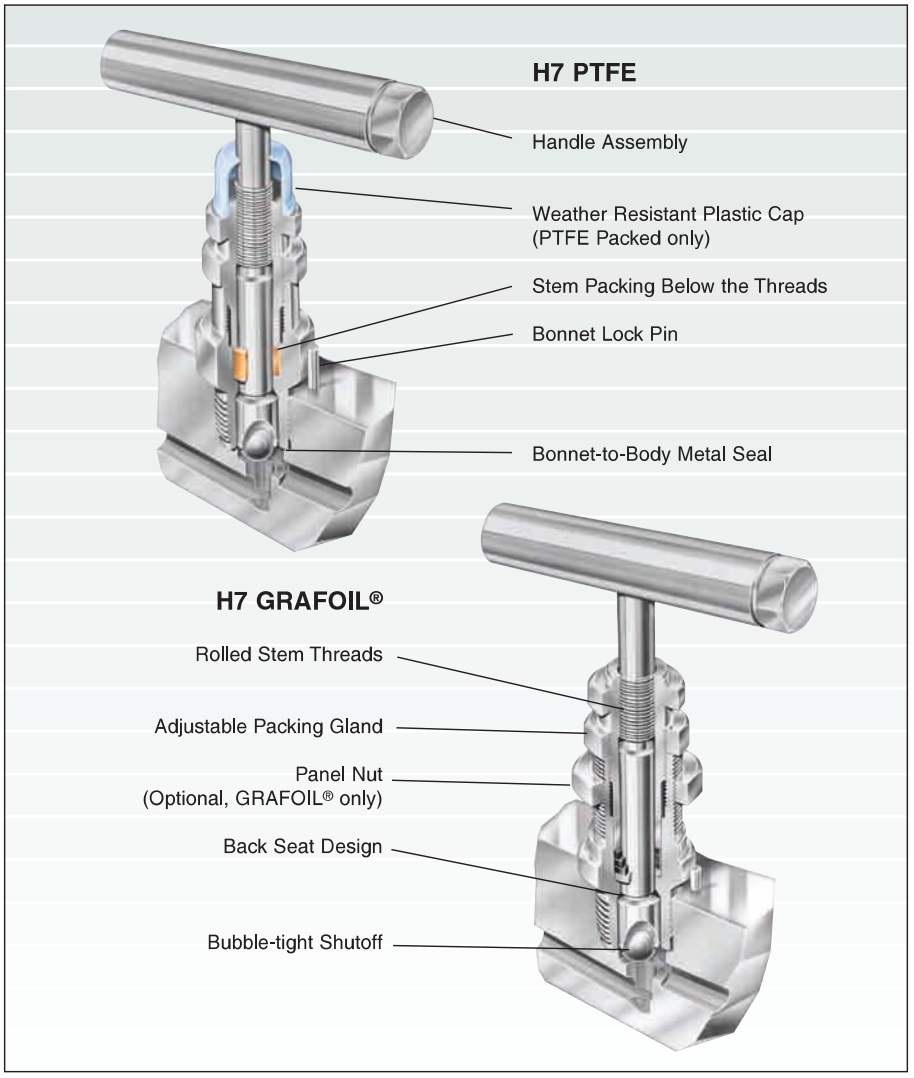
Metal-Seated Bonnet Assembly

The metal-seated bonnet assembly has a rotating stem with free swivel ball-type seat for long service life. The stem threads are rolled and lubricated to prevent galling and reduce operating torque. The stem seal is a patented PTFE packing gland which is adjustable in service. A protective dust cap is fitted to contain stem lubricant and prevent the influx of contaminants. The specially hardened ball seat is ideal for both gas and liquid service. All bonnets are assembled with a bonnet locking pin to prevent accidental removal while in service.

The 10,000 psig [689 barg] bonnet assembly uses a strengthened stem and bonnet. The stem seal is a patented PTFE packing gland which is adjustable in service. A protective dust cap is fitted to contain stem lubricant and prevent the influx of contaminants. This bonnet is also fitted with a larger size T-bar handle.

The high-temperature bonnet assemblies utilizes a similarly designed stem and bonnet, and incorporates adjustable GRAFOIL® O-rings and back-up pressure rings to ensure a leak-free stem seal.





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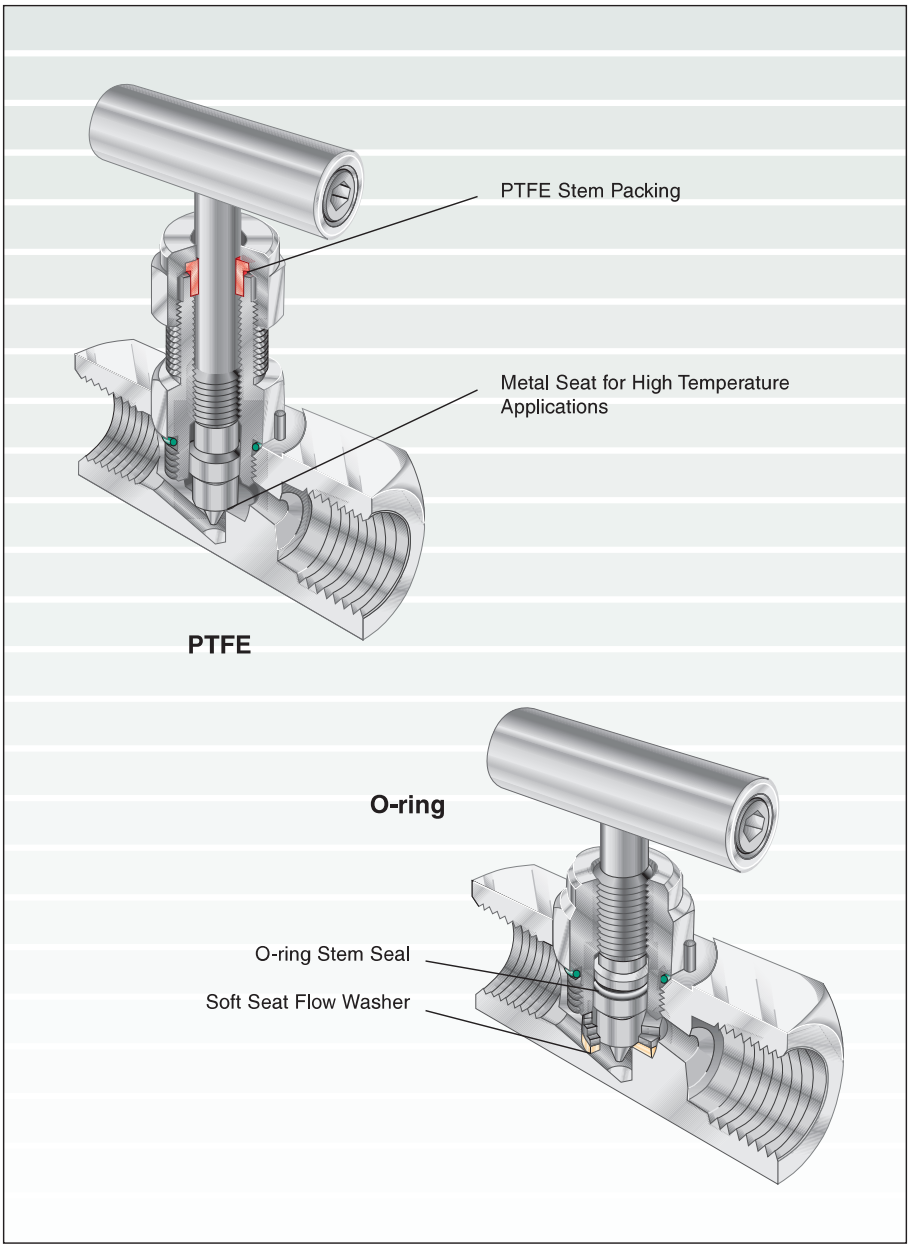
Bonnet Technology, continued



Mini-Valve Bonnet Assembly

The mini-valve bonnet assembly has a compact design with a one-piece rotating stem which is 'V' tipped with a shoulder for use as a metal or soft seated valve. The stem threads are rolled and lubricated to prevent galling and reduce operating torque.

The mini-valve bonnet comes in three designs. An adjustable PTFE stem packed bonnet is suitable for panel mounting via external bonnet threads. The O-ring bonnet assemblies use a Viton® O-ring seal below the stem thread.

A GRAFOIL® packed bonnet suitable for temperatures of up to 500°F [260°C] is available for SS valves only.

Arctic Lube

The low temperature rating for standard Anderson Greenwood carbon steel and 316 stainless steel instrumentation products is -20°F [-28°C] (standard products - standard lubrication). Our –AL (Arctic Lube) option extends the lower temperature limit to -70°F [-57°C] on all stainless steel models.

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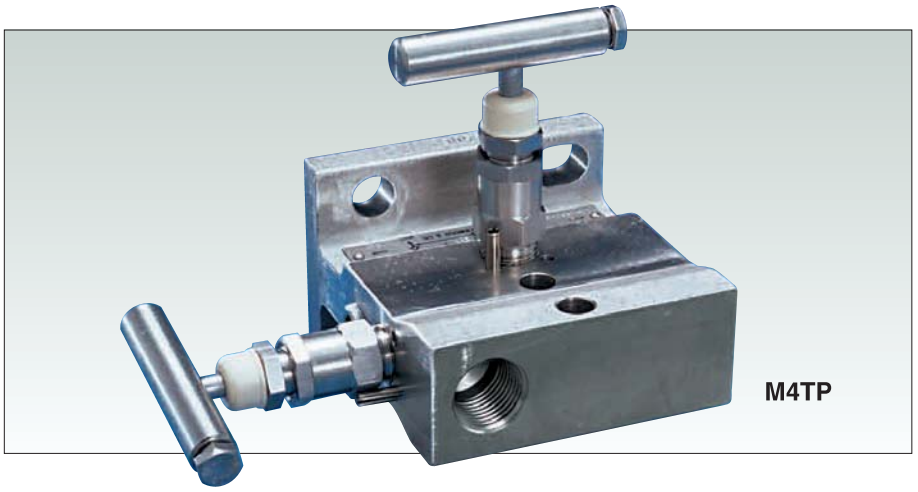
Static Pressure Manifolds – M4AP and M4TP Manifolds

Product Overview

The M4AP and M4TP are block and bleed, static pressure manifolds. They are designed for use with DP-style pressure transmitters.

The manifold's two valves have free-swiveling, ball-ended stems or soft seats. The block valve isolates the instrument from the process and is open during normal operation. When the block valve is closed, the bleed valve can be opened to vent pressure from the transmitter.

The M4AP permits the transmitter's futbol flange to connect the process signal line to the manifold directly, with either a 1/2-inch pipe or tubing connection. The M4TP has a 1/2-inch NPT inlet connection. A 1/4-inch NPT purge connection is available. The 1/4-inch NPT vent port may be used for testing calibration. They may be mounted using the AGCO Mount option for ease of assembly and maintenance.



Features and Benefits

- **Cost savings** when manifolding the instruments. This eliminates several parts used in conventional methods of 'piping up' resulting in cost reduction of 20-30 percent.
- **Compact design** requires minimum space for operation and installation.
- **Fewer leak points** reduce leakage by having fewer parts to assemble.
- **Free-swiveling ball end stem (metal seat)** assures bubble-tight valve closure without seat galling.
- **The AGCO Mount provides easy instrument removal.** Direct bolting to the manifold allows the instrument to be removed independently of the piping. This facilitates repairs, service, and calibration.
- **Immediate installation** with AGCO Mount's manifold, steam block, bracket, and all associated piping can be installed without the instrument at the time of plant construction.
- **Secure mounting** is provided by the AGCO Mount. Instrument piping stability is enhanced when directly supported by the pipe stand through the manifold.
- **All valve threading is isolated.** Packing is below stem threads, body-to-bonnet seal is below the threads eliminating process fluid corrosion.
- **Less instrument damage** with the AGCO Mount. The instrument can be safely warehoused until final 'loop' checkout, reducing the chances of damage during construction.

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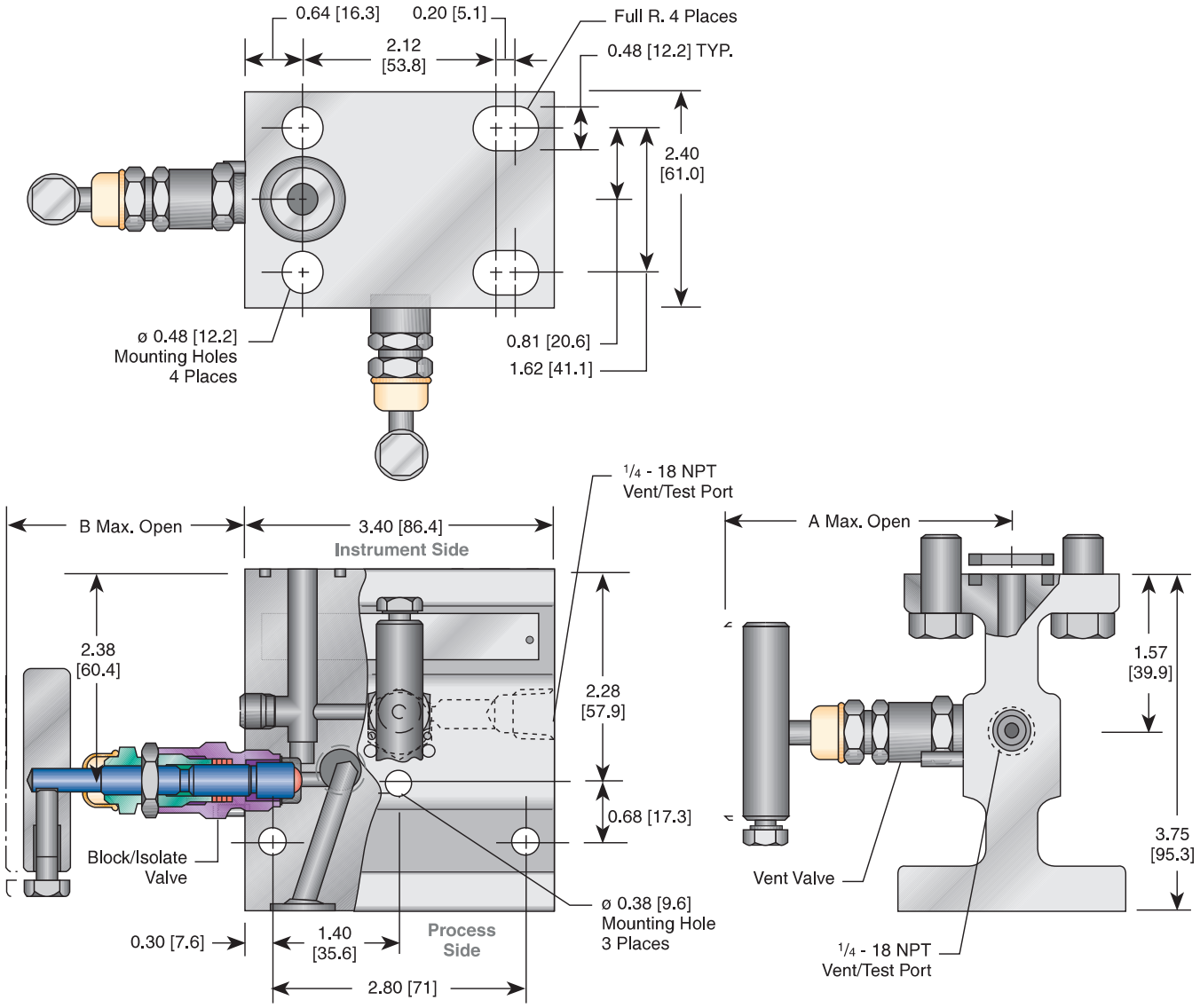
Static Pressure Manifolds – M4AP Specifications

Metal Seat (Soft Seat available) Dimensions, inches [mm]



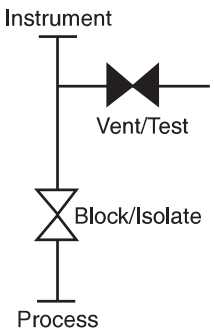
Dimensions, inches [mm]

Packing	A	B
Teflon®	3.14 [79.8]	2.60 [66.0]
GRAFOIL® Low Emissions Graphite	3.79 [96.3]	3.25 [82.6]

Note

1. Approximate valve weight: 4.4 lb [2.0 kg].
   Metal seat:
   0.156-inch [4 mm] diameter orifice.
   Valve C_V 0.36 maximum.

   Soft seat:
   0.187-inch [4.8 mm] diameter orifice.
   Valve C_V 0.83 maximum.



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COOPER Bussmann

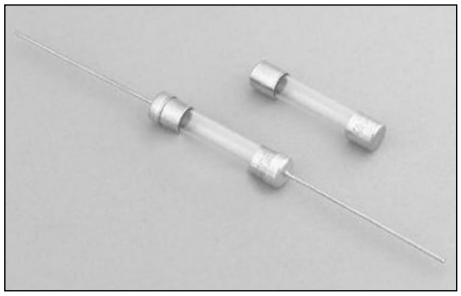
1/4" x 1-1/4" Fuses

AGC Series, Fast Acting, Glass Tube

Description

- Fast-acting, glass tube
- Optional axial leads available
- 1/4 x 1-1/4 (6.3mm x 32mm) physical size
- Glass tube, nickel-plated brass endcap construction
- UL Listed product meets standard 248-14

RoHS 2002/95/EC



ELECTRICAL CHARACTERISTICS	
% of Amp Rating	**Opening Time**
100%	None
135%	60 Minutes Maximum
200%	120 Seconds Maximum

Agency Information

- UL Listed Card: AGC 1/500-10
- UL Recognition Card: AGC 11-45
- CSA Component Acceptance Card (Class No. 1422 30)
- CSA Certification Card (Class No. 1422 01)

Environmental Data

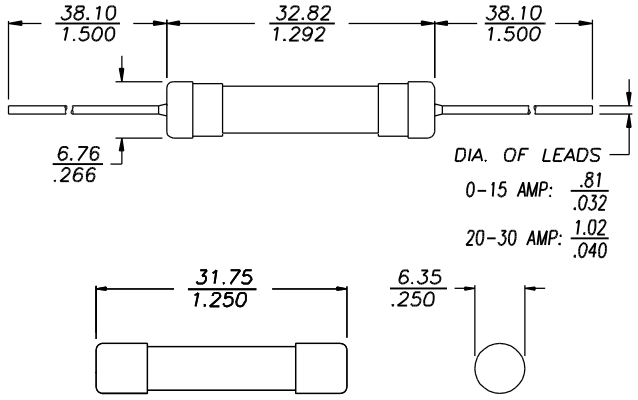
- Shock: 1/100A thru 3/4A – MIL-STD-202, Method 213, Test Condition I; 1A thru 30A – MIL-STD-202, Method 207, (HI Shock)
- Vibration: 1/100A thru 30A – MIL-STD-202, Method 204, Test Condition A (Except 5g, 500HZ)

Ordering

- Specify packaging, product, and option code

Dimensions (mm/in)

Drawing Not to Scale



SPECIFICATIONS

Product Code	Voltage Rating AC	AC Interrupting Rating 250V	125V	32V	Typical DC Cold Resistance** (ohms)	Typical Melting I²t† AC	Typical Voltage Drop‡
AGC-1/20	250V	35A	10000A	-	4.500	0.00773	0.67
AGC-1/16	250V	35A	10000A	-	29.000	0.000181	10.41
AGC-1/10	250V	35A	10000A	-	12.565	0.000787	6.00
AGC-1/8	250V	35A	10000A	-	6.800	0.00131	4.67
AGC-3/16	250V	35A	10000A	-	4.900	0.00637	4.12
AGC-2/10	250V	35A	10000A	-	3.360	0.00435	4.51
AGC-1/4	250V	35A	10000A	-	2.300	0.0148	0.89
AGC-3/10	250V	35A	10000A	-	1.670	0.0208	2.88
AGC-3/8	250V	35A	10000A	-	1.203	0.0321	4.59
AGC-1/2	250V	35A	10000A	-	0.615	0.269	0.59
AGC-3/4	250V	35A	10000A	-	0.312	0.815	0.37
AGC-1	250V	35A	10000A	-	0.190	1.615	0.31
AGC-1-1/4	250V	100A	10000A	-	0.145	0.018	0.35
AGC-1-1/2	250V	100A	10000A	-	0.115	0.0149	0.27
AGC-2	250V	100A	10000A	-	0.078	0.00509	0.28
AGC-2-1/4	250V	100A	10000A	-	0.067	0.00588	0.26
AGC-2-1/2	250V	100A	10000A	-	0.057	0.00879	0.31
AGC-3	250V	100A	10000A	-	0.045	0.0167	0.25
AGC-4	250V	200A	10000A	-	0.030	0.0305	0.22
AGC-5	250V	200A	10000A	-	0.024	0.045	0.23
AGC-6	250V	200A	10000A	-	0.020	0.071	0.23
AGC-7	250V	200A	10000A	-	0.017	0.105	0.23
AGC-7-1/2	250V	200A	10000A	-	0.0146	-	-
AGC-8	250V	200A	10000A	-	0.014	0.152	0.19
AGC-9	250V	200A	10000A	-	0.012	0.21	0.18
AGC-10	250V	200A	10000A	-	0.008	0.492	0.20
AGC-12	32V	-	-	1000A	0.0070	-	-
AGC-14	32V	-	-	1000A	0.0062	-	-
AGC-15	32V	-	-	1000A	0.006	0.566	0.14
AGC-20	32V	-	-	1000A	0.004	1.438	0.12
AGC-25	32V	-	-	1000A	0.003	2.109	0.11
AGC-30	32V	-	-	1000A	0.002	3.807	0.12
AGC-35	32V	-	-	70A	0.0014	-	-
AGC-40	32V	-	-	80A	0.0019	-	-

** DC Cold Resistance (Measured at ≤10% of rated current)

† Typical Melting I²t (A²Sec) (I²t was measured at listed interrupting rating and rated voltage.)

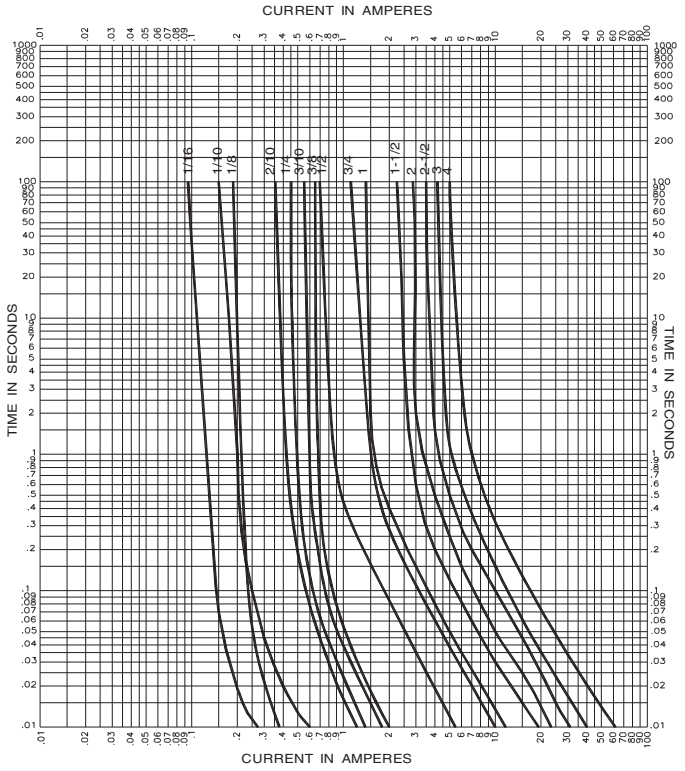
‡ Typical Voltage Drop (Voltage drop was measured at 25°C ambient temperature at rated current)

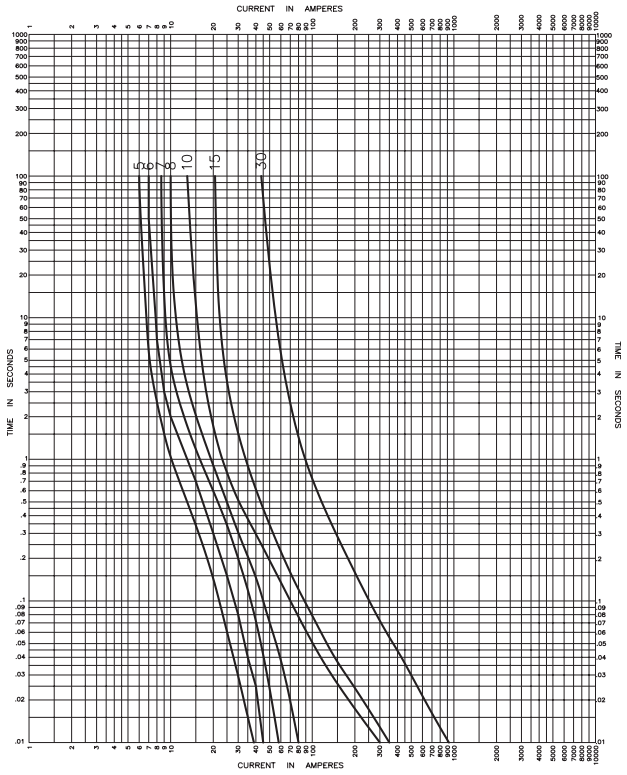
COOPER Bussmann

1/4" x 1-1/4" Fuses

AGC Series, Fast Acting, Glass Tube

TIME CURRENT CURVE





PACKAGING CODE	
Packaging Code	**Description**
BK	100 pieces of fuses packed into a cardboard carton with flaps folded
BK1	1,000 pieces of fuses packed into a cardboard carton with flaps folded
BK8	8,000 pieces of fuses packed into a cardboard carton with flaps folded

OPTION CODE	
Option Code	**Description**
B	Board Washable - Hermetically sealed to withstand aqueous cleaning
V	Axial leads - copper tinned wire with nickel plated brass overcaps
-R	RoHS compliant version

COOPER Bussmann

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www.cooperbussmann.com

OC-2543 3/07

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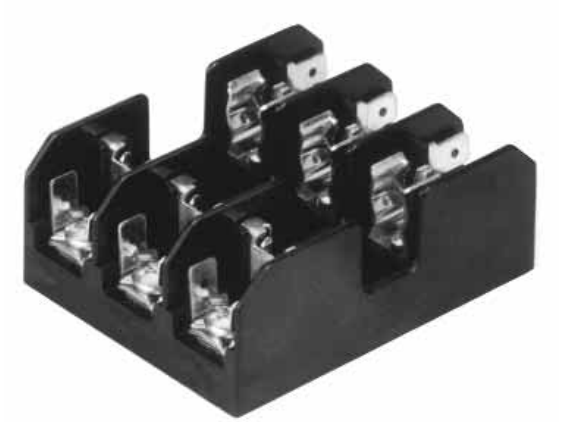
1 Jalan Kilang Timor
#06-01 Pacific Tech Centre
Singapore 159303
Tel: +65 278 6151
Fax: +65 270 4160

Class CC Fuseblocks
600 Volt, 30 Amps

BC
Series



Catalog Symbol: BC Series

Class CC Fuseblocks

For use with Class CC Fuses (Bussmann LP-CC, KTK-R, and FRQ-R)

Ampere Rating: 1/10 to 30A

Voltage Rating: 600V

Withstand Rating: 200,000A RMS Sym.

Agency Information:

UL Listed, UL 512, Guide IZLT, File E14853

CSA Certified, C22.2 No. 39, Class 6225-01, File 47235

UL Flammability: 94VO

Materials: Base - Thermoplastic

Clips - Bright tin-plated bronze

DIN-RAIL Adapters: DRA-1 and DRA-2

Catalog Data

		Terminal Type				
Amps	Poles	Screw	Screw with Quick Connect*	Pressure Plate	Pressure Plate w/ Quick Connect*	Box Lug
1/10	1	BC6031S	BC6031SQ	BC6031P	BC6031PQ	BC6031B
to	2	BC6032S	BC6032SQ	BC6032P	BC6032PQ	BC6032B
30	3	BC6033S	BC6033SQ	BC6033P	BC6033PQ	BC6033B

Wire Range CU Only

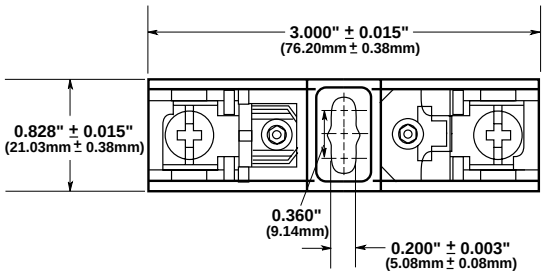
#10-#14 #10-#14 #10-#14 #10-#14 #6-#14

* QUICK CONNECT RATED FOR 20A MAXIMUM.

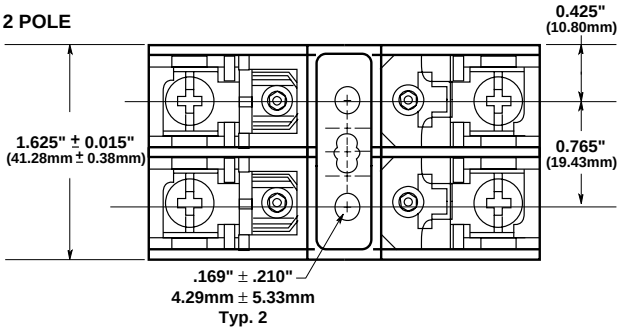
CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000 Vac, 75-1500 Vdc). Refer to Data Sheet: 8002 or contact Bussmann Application Engineering at 636-527-1270 for more information.

Dimensional Data

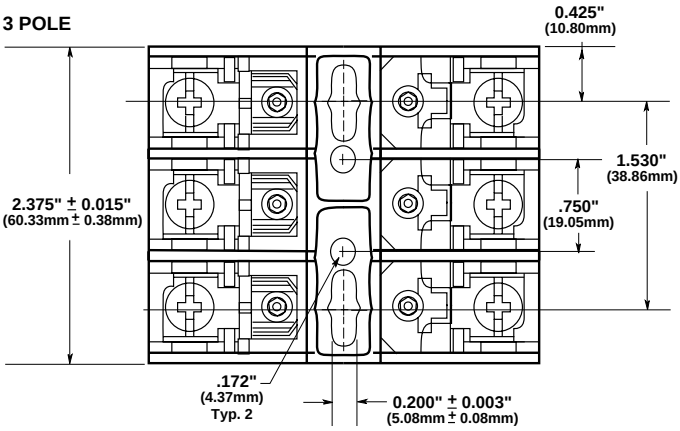
1 POLE



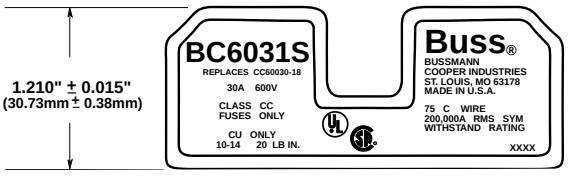
2 POLE



3 POLE



FUSEBLOCK LABEL (EXAMPLE SHOWN)



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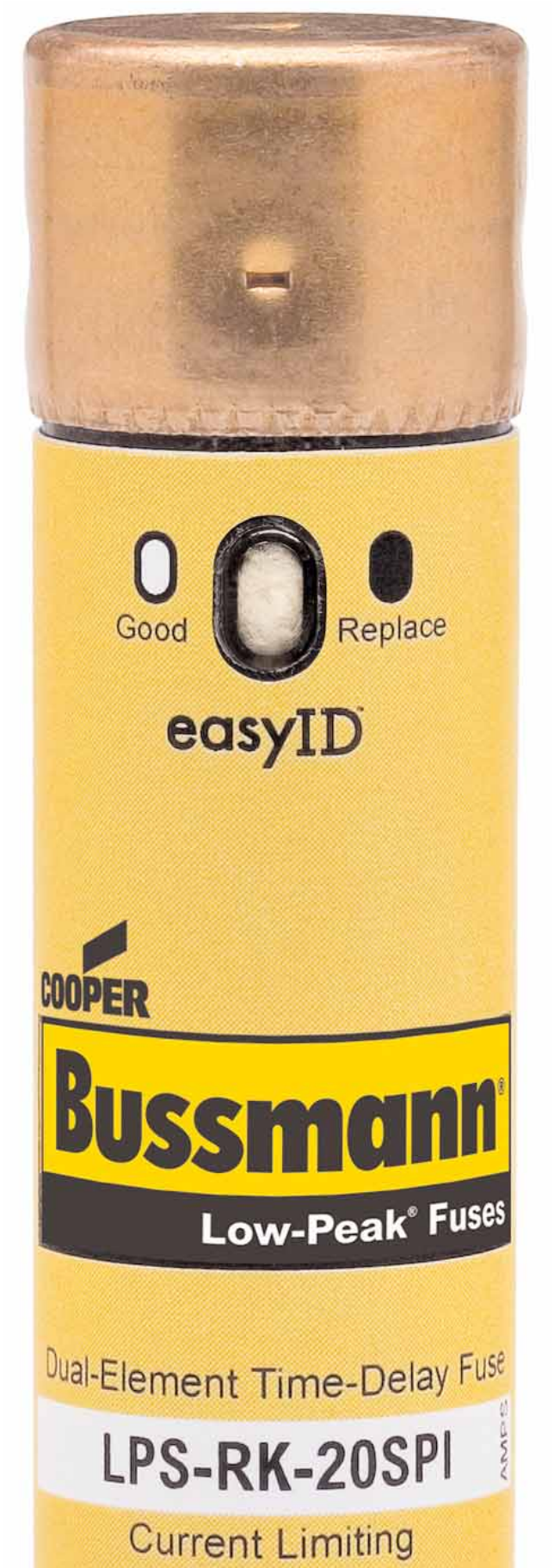
Low Voltage, Branch Circuit Rated Fuses



		Page
Fuse Holder & Block Selection Guide		**12-14**
Class Fuse Dimensions		**15-16**
Fuses By Fuse Class		

Class	Fuses	Volts	
CC	LP-CC	600V	17
	FNQ-R	600V	18
	KTK-R	600V	19
CF	TCF* & TCFH_N *Class J performance	600V	20-21
G	SC	600/480V	22
J	LPJ-_SP	600V	23
	LPJ-_SPI Indicator	600V	23
	JKS	600V	24
K5 & H	NON	250V	25
	NOS	600V	25
L	KRP-C_SP	600V	26-27
	KRP-CL	600V	27
	KLU	600V	28
	KTU	600V	28
RK1	LPN-RK_SP	250V	29-31
	LPN-RK_SPI Indicator	250V	29-31
	LPS-RK_SP	600V	29-31
	LPS-RK_SPI Indicator	600V	29-31
	KTN-R	250V	32
	KWS-R	600V	33
RK5	DLN-R	250V	34
	DLS-R	600V	34
	FRN-R	250V	35
	FRS-R	600V	36
	PVS-R	600V	37
T	JJN	300V	38
	JJS	600V	39
Plug Fuses	W, SL, TL, S, T, P, TC Series & MB Edison Base Circuit Breakers, SA	125V	40-42

RED indicates NEW information

Holders & Blocks For Branch Circuit Rated Fuses

Class	Fuses	Volts	Page
CC	LP-CC	600V	17
	FNQ-R	600V	18
	KTK-R	600V	19

Holders

- OPM-NG-SC3 3-pole, panel/DIN rail mount 252
- OPM-1038R 3-pole, panel/DIN rail mount 251
- OPM-1038RSW 3-pole w/ switch, panel/DIN rail mount . . 250
- CHCC_D 1 to 3-pole, DIN rail mount 257
- HPF-RR, front panel mount 286
- HPS-RR, front panel mount 286

Blocks

- BC Series, panel mount 274

Disconnects

- CDF30J3 fusible disconnect switches. 330
- FD400J3 fusible disconnect switches 340

OPM-NG-SC3

OPM-1038R & OPM-1038RSW

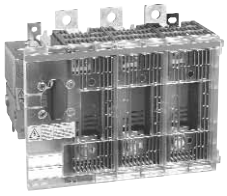
CHCC_D

HPF-RR

HPS-RR

BC Series

CFD30J3


FD400J3

EFJ30X-3PB6

Class	Fuses	Volts	Page
G	SC	600/480V	22

Holders

- HP Series front panel accessible, front panel mount 286

Blocks

- BG Series, panel/DIN rail with adapters 274
- G Series, panel/DIN rail with adapters 274

HP Series

BG & G Series

Class	Fuses	Volts	Page
K5 & H	NON	250V	25
	NOS	600V	25

Blocks

- Modular Type Fuse Blocks 250/600V, panel mount 275
- H250 Series 1 to 3-pole 250V, panel mount 260
- H600 Series 1 to 3-pole 600V, panel mount 263

Modular Type

H250 Series

H600 Series

Holders & Blocks For Branch Circuit Rated Fuses

Class	Fuses	Volts	Page
L	KRP-C_SP	600V	26
	KRP-CL	600V	27
	KLU	600V	28
	KTU	600V	28

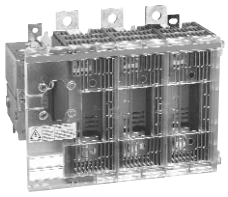
Blocks

- 51215 1-pole, panel mount*
- 51235 3-pole, panel mount*

*Call our customer satisfaction team at 636-527-3877 for more information.

Disconnects

- FD800L3 fusible disconnect switches 340



FD400J3

51215

51235

Class	Fuses	Volts	Page
RK1	LPN-RK_SP	250V	29
	LPS-RK_SP	600V	29
	KTN-R	250V	32
	KWS-R	600V	33

Blocks

- R250 Series 1- to 3-pole 250V, panel mount 260
- R600 Series 1- to 3-pole 600V, panel mount 263

R250 Series

R600 Series

Class	Fuses	Volts	Page
RK5	DLN-R	250V	34
	DLS-R	600V	34
	FRN-R	250V	35
	FRS-R	600V	36

Blocks

- R250 Series 1- to 3-pole 250V, panel mount 260
- R600 Series 1- to 3-pole 600V, panel mount 263

R250 Series

R600 Series

Class	Fuses	Volts	Page
T	JJN	300V	38
	JJS	600V	39

Blocks

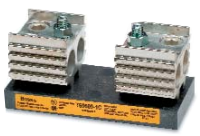
- BH Series modular-style, panel mount (<60A) 275
- T300 Series 1 to 4-pole 300V, panel mount 269
- T600 Series 1 to 3-pole 600V, panel mount 271

Disconnects

- CDF30J3 fusible disconnect switches. 330
- FD400J3 fusible disconnect switches 340

BH Series

T300 Series



T600 Series

Holders & Blocks For Branch Circuit Rated Fuses

Class	Fuses	Volts	Page
J, CF	TCF*	600V	20
	LPJ-SP	600V	23
	JKS	600V	24

*Class J performance

Holders

- TCFH CUBEFuse™ holder, panel/DIN rail mount 20-21
- CH Series Class J modular 1- to 3-pole, panel/DIN rail mount 254
- Safety J™ Series modular holders, panel/DIN rail mount 255

Blocks

- Modular Type Fuse Blocks 600V, panel mount 275
- J600 Series, panel mount 266
- JP Series pyramid blocks, panel mount 267
- BH Series modular-style open blocks, panel mount 275

Disconnects

Disconnects

- CDF30J3 fusible disconnect switches. 330
- FD400J3 fusible disconnect switches 340

TCFH

CH Series

Safety J™ Series

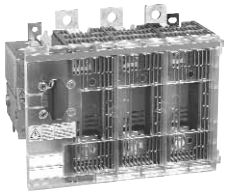
Modular Type

J600 Series

JP Series

BH Series

CFD30J3


FD400J3

EFJ30X-3PB6

Class	Fuses	Volts	Page
Plug Fuses	W, SL, TL, S, T, P and TC Series	125V	40-41

Box Cover Units

- Standard electrical box mounting 276

Fuse Only

With Grounded Outlet

With Switch

Fuse Reducers For Class R Fuses 250V

Equipment Fuse Clip Amps	Desired Fuse (Case) Amp Size	Catalog No. (Pairs) 250V
60	30	NO.263-R
100	30	NO.213-R
	60	NO.216-R
200	60	NO.226-R
	100	NO.2621-R
400	100	NO.2641-R
	200	NO.242-R
600	100	NO.2661-R
	200	NO.2662-R
	400	NO.2664-R*

*Single reducer only (pair not required).

Fuse Reducers For Class R Fuses 600V

Equipment Fuse Clip Amps	Desired Fuse (Case) Amp Size	Catalog No. (Pairs) 600V
60	30	NO.663-R
100	30	NO.216-R
	60	NO.616-R
200	60	NO.626-R
	100	NO.2621-R
400	100	NO.2641-R
	200	NO.642-R
600	100	NO.2661-R
	200	NO.2662-R
	400	NO.2664-R*

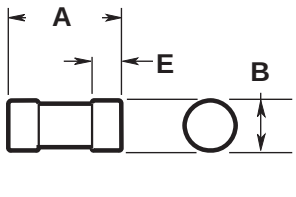
*Single reducer only (pair not required).

Branch Circuit Rated Fuse Dimensions

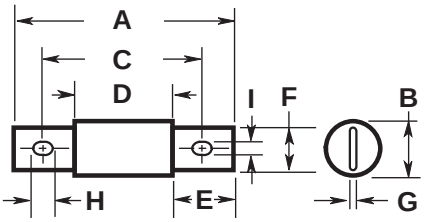
Class J Dimensions - in (mm)

Low-Peak® and Limitron® Fuses
LPJ & JKS — 600V

Amp Range	A	B	C	D	E	F	G	H	I
1-30	2.25 (57.2)	0.81 (20.6)	—	—	0.50 (12.7)	—	—	—	—
35-60	2.38 (60.3)	1.06 (27.0)	—	—	0.63 (15.9)	—	—	—	—
65-100	4.63 (117.5)	1.13 (28.6)	3.63 (92.1)	2.63 (66.7)	1.00 (25.4)	0.75 (28.6)	0.13 (3.2)	0.41 (10.4)	0.28 (7.1)
110-200	5.75 (146.1)	1.63 (41.4)	4.38 (111.1)	3.00 (76.2)	1.38 (34.9)	1.13 (28.6)	0.19 (4.8)	0.38 (9.5)	0.28 (7.1)
225-400	7.12 (181.0)	2.11 (53.6)	5.25 (133.3)	3.26 (82.8)	1.87 (47.6)	1.62 (41.2)	0.25 (6.4)	0.56 (14.2)	0.40 (10.3)
450-600	8.00 (203.2)	2.60 (66.0)	6.00 (152.4)	3.31 (84.0)	2.12 (54.0)	2.00 (50.8)	0.53 (13.5)	0.72 (18.3)	0.53 (13.5)

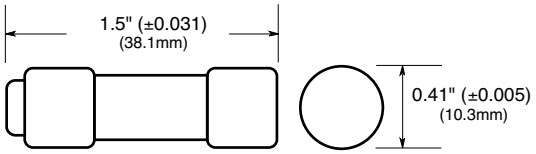


1A to 60A



65A to 600A

Class CC Dimensions - in (mm)

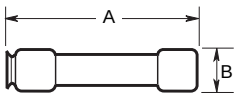


Class RK1 & RK5 Dimensions - in (mm)

Basic dimensions are same as Class H (formerly NEC) One-Time (NON & NOS) and Superlag Renewable RES & REN fuses.
NOTE: These fuses can be used to replace existing Class H, RK1 and RK5 fuses relating to dimensional compatibility.

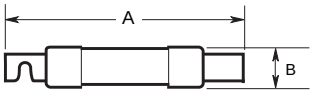
Ferrule Styles

Amp Range	250V A	250V B	600V A	600V B
1/10-30	2 (50.8)	0.56 (14.3)	5.0 (127.0)	0.81 (20.6)
35-60	3 (76.2)	0.81 (20.6)	5.5 (139.7)	1.06 (27.0)



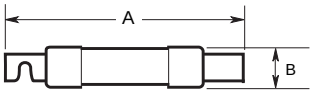
Fusetron® — (FRN-R & FRS-R)& Limitron® — (KTN-R & KTS-R)

Amp Range	250V A	250V B	600V A	600V B
70-100	5.88 (149.2)	1.06 (26.9)	7.88 (200.0)	1.34 (34.0)
110-200	7.13 (181.0)	1.56 (39.6)	9.63 (244.5)	1.84 (46.7)
225-400	8.63 (219.1)	2.38 (60.5)	11.63 (295.3)	2.59 (65.8)
450-600	10.38 (263.5)	2.88 (73.2)	13.38 (339.7)	3.13 (79.5)



Low-Peak® — (LPN-RK & LPS-RK)

Amp Range	250V A	250V B	600V A	600V B
70-100	5.88 (149.2)	1.16 (29.5)	7.88 (200.0)	1.16 (29.5)
110-200	7.13 (181.0)	1.66 (42.2)	9.63 (244.5)	1.66 (42.2)
225-400	8.63 (219.1)	2.38 (60.5)	11.63 (295.3)	2.38 (60.5)
450-600	10.38 (263.5)	2.88 (73.2)	13.38 (339.7)	2.88 (73.2)



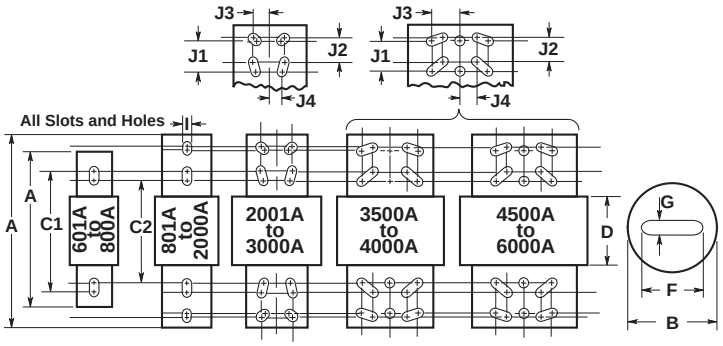
Branch Circuit Rated Fuse Dimensions

Class L Dimensions - in (mm)

Low-Peak® and Limitron® Fuses

Amp Range	A	B	C1	C2	D	F	G	I	J1	J2	J3	J4
601-800	8.63 (219.1)	2.40 (61.0)	6.75 (171.5)	5.75 (146.1)	3.75 (95.3)	2.00 (50.8)	0.38 (9.5)	0.63 (15.9)	—	—	—	—
801-1200	10.75 (273.1)	2.40 (61.0)	6.75 (171.5)	5.75 (146.1)	3.75 (95.3)	2.00 (50.8)	0.38 (9.5)	0.63 (15.9)	—	—	—	—
1350-1600	10.75 (273.1)	3.00 (76.2)	6.75 (171.5)	5.75 (146.1)	3.75 (95.3)	2.38 (60.3)	0.44 (11.1)	0.63 (15.9)	—	—	—	—
1800-2000	10.75 (273.1)	3.50 (88.9)	6.75 (171.5)	5.75 (146.1)	3.75 (95.3)	2.75 (69.9)	0.50 (12.7)	0.63 (15.9)	—	—	—	—
2001-2500	10.75 (273.1)	4.80 (122.0)	6.75 (171.5)	5.75 (146.1)	3.75 (95.3)	3.50 (88.9)	0.75 (19.1)	0.63 (15.9)	1.75 (44.5)	1.38 (34.9)	0.88 (22.2)	0.81 (20.6)
3000	10.75 (273.1)	5.00 (127.0)	6.75 (171.5)	5.75 (146.1)	3.75 (95.3)	4.00 (101.6)	0.75 (19.1)	0.63 (15.9)	1.75 (44.5)	1.38 (34.9)	0.88 (22.2)	0.81 (20.6)
3500-4000	10.75 (273.1)	5.75 (146.1)	6.75 (171.5)	5.75 (146.1)	3.75 (95.3)	4.75 (120.7)	0.75 (19.1)	0.63 (15.9)	1.75 (44.5)	1.38 (34.9)	1.63 (41.3)	0.88 (22.2)
4500-5000	10.75 (273.1)	6.25 (158.8)	6.75 (171.5)	5.75 (146.1)	3.75 (95.3)	5.25 (133.4)	1.00 (25.4)	0.63 (15.9)	1.75 (44.5)	1.38 (34.9)	1.63 (41.3)	0.88 (22.2)
6000	10.75 (273.1)	7.13 (181.0)	6.75 (171.5)	5.75 (146.1)	3.75 (95.3)	5.75 (146.1)	1.00 (25.4)	0.63 (15.9)	1.75 (44.5)	1.38 (34.9)	1.63 (41.3)	0.88 (22.2)

NOTE: KRP-CL (150A to 600A) fuses have same dimensions as 601-800A case size. KTU (200-600A) have same dimensions, except tube 3" length x 2" diameter (76.2 x 50.8mm); terminal 1⅜" width x 1¼" thick (41.3 x 31.8mm).



Class T Dimensions - in (mm)

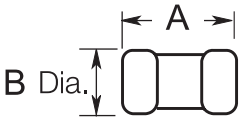
T-Tron® Fuses

JJN — 300V

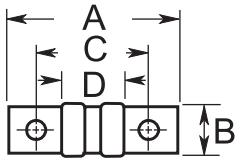
Amp Range	A	B	C	D
1-30	0.88 (22.2)	0.41 (10.3)	—	—
35-60	0.88 (22.2)	0.56 (14.3)	—	—
70-100	2.16 (54.8)	0.75 (19.1)	1.56 (39.7)	0.84 (21.4)
110-200	2.44 (61.9)	0.88 (22.2)	1.69 (42.9)	0.84(21.4)
225-400	2.75 (69.9)	1.00 (25.4)	1.84 (46.8)	0.86 (21.8)
450-600	3.06 (77.8)	1.25 (31.8)	2.03 (51.6)	0.88 (22.2)
601-800	3.38 (85.7)	1.75 (44.5)	2.22 (56.4)	0.89 (22.6)
801-1200	4.00 (101.6)	2.00 (50.8)	2.53 (64.3)	1.08 (27.4)

JJS — 600V

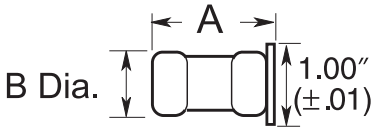
Amp Range	A	B	C	D
1-30	1.50 (14.3)	0.56 (38.1)	—	—
35-60	1.56 (20.6)	0.81 (39.7)	—	—
70-100	2.95 (19.1)	0.75 (75.0)	2..36 (59.9)	1.64 (41.7)
110-200	3.25 (22.2)	0.88 (82.6)	2.50 (63.5)	1.66 (42.1)
225-400	3.63 (25.4)	1.00 (92.1)	2.72 (69.1)	1.73 (44.1)
450-600	3.98 (31.8)	1.25 (101.2)	2.96 (75.0)	1.78 (45.2)
601-800	4.33 (44.5)	1.75 (109.9)	3.17 (80.6)	1.88 (47.6)



JJN 1A to 60A
JJS 1A to 30A



JJN 70A to 1200A
JJS 70A to 800A



JJS 35A to 60A

Low-Peak® Time-delay, Rejection-Type Fuses

LP-CC Class CC

Specifications

Description: Time-delay, current-limiting, rejection-type fuse – 12 seconds (minimum) at 200% rated amps.

Dimensions: 13/32" x 1 1/2" (10.3 x 38.1mm).

Ratings:

Volts — 600Vac (or less)
— 300Vdc (1/2-2 8/10A & 20-30A)
— 150Vdc (3-15A)

Amps — 1/2-30A

IR — 200kA RMS Sym.
— 20kA DC

Agency Information: CE, Std. 248-4, Class CC, UL Listed, Guide JDDZ, File E4273, CSA Certified; Class 1422-02, File 53787.

Features and Benefits

- Time delay coupled with Class CC current-limiting response provides close sizing on small motor and relay circuits, and maximum component short-circuit current rating protection.
- 200kA interrupting rating provides high ratings for control circuit locations.
- Class CC rejection feature, with appropriate fuse block, prevents inserting lesser-rated supplementary fuses.
- Inventory consolidation of 13/32 x 1 1/2 inch supplementary fuses reduces SKU investment and minimizes potential for misapplying fuse.
- Selective coordination ratio of 2:1 (within Low-Peak fuse family) prevents electrical shutdowns from extending beyond the failed circuit.

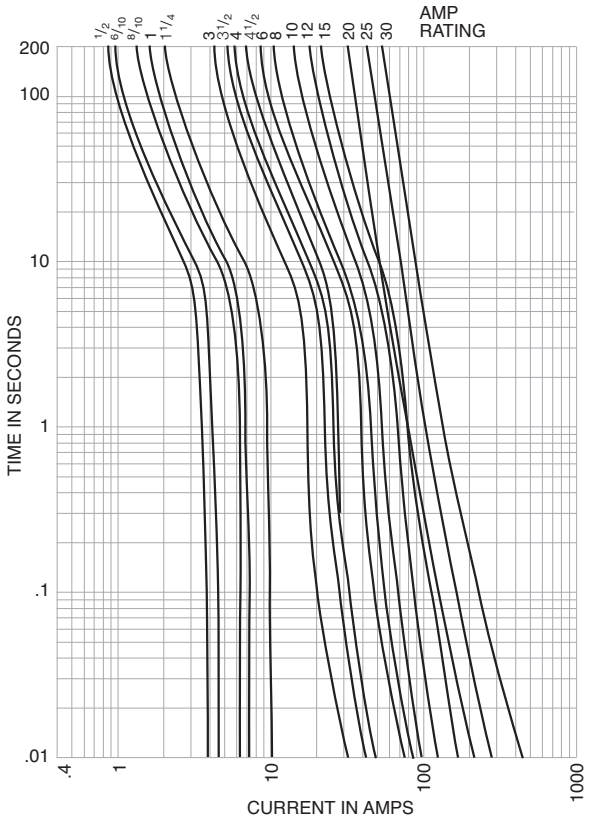
Typical Applications

- Specialized Circuits
- Industrial Control
- Isolated, In-Line Fuse Holder

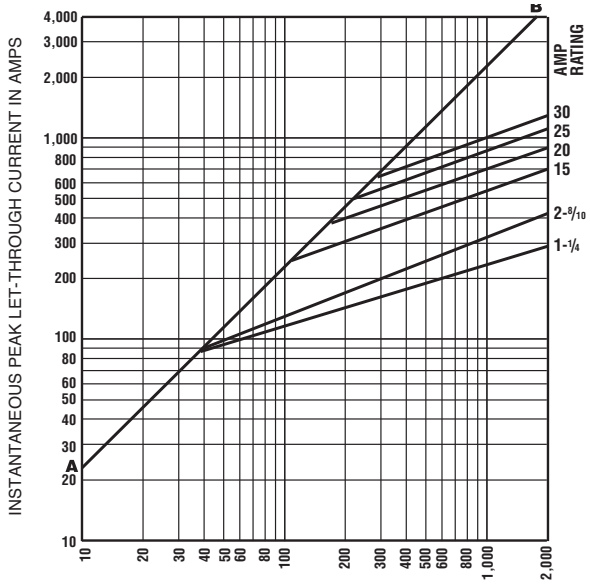
Catalog Numbers (Amps)

LP-CC-1/2	LP-CC-2-1/2	LP-CC-7 1/2
LP-CC-9/10	LP-CC-2-9/10	LP-CC-8
LP-CC-9/10	LP-CC-3	LP-CC-9
LP-CC-1	LP-CC-3-9/10	LP-CC-10
LP-CC-1-1/8	LP-CC-3-1/2	LP-CC-12
LP-CC-1-1/4	LP-CC-4	LP-CC-15
LP-CC-1-1/10	LP-CC-4-1/2	LP-CC-20
LP-CC-1-1/2	LP-CC-5	LP-CC-25
LP-CC-1-9/10	LP-CC-5-9/10	LP-CC-30
LP-CC-1-8/10	LP-CC-6	
LP-CC-2	LP-CC-6-1/4	
LP-CC-2-1/4	LP-CC-7	

Time Current Characteristics—Average Melt



Current Limitation Curves



Recommended Fuse Holders & Blocks For Class CC Fuses

• See page 12

Data Sheet: 1023

CC-Tron® Rejection-type Fuses

FNQ-R Class CC

Specifications

Description: Time-delay, branch circuit, rejection-type fuse.

Dimensions: 13/32" x 1 1/2" (10.3 x 38.1mm).

Ratings:

Volts — 600Vac (or less); 300Vdc (15-20A)

Amps — 1/4-30A

IR — 200kA RMS Sym.; 20kA DC

Agency Information: CE, Std. 248-4, Class CC, UL Listed, Guide JDDZ, File E4273 CSA Certified, Class 1422-01, File 53787.

Features and Benefits

- Time delay compatible with inrush characteristic of small control transformers.
- Current limitation at Class CC levels provides maximum component short-circuit current rating protection.
- 200kA interrupting rating provides high ratings for control circuit locations.
- Class CC rejection feature, with appropriate fuse block, prevents inserting lesser-rated supplementary fuses.

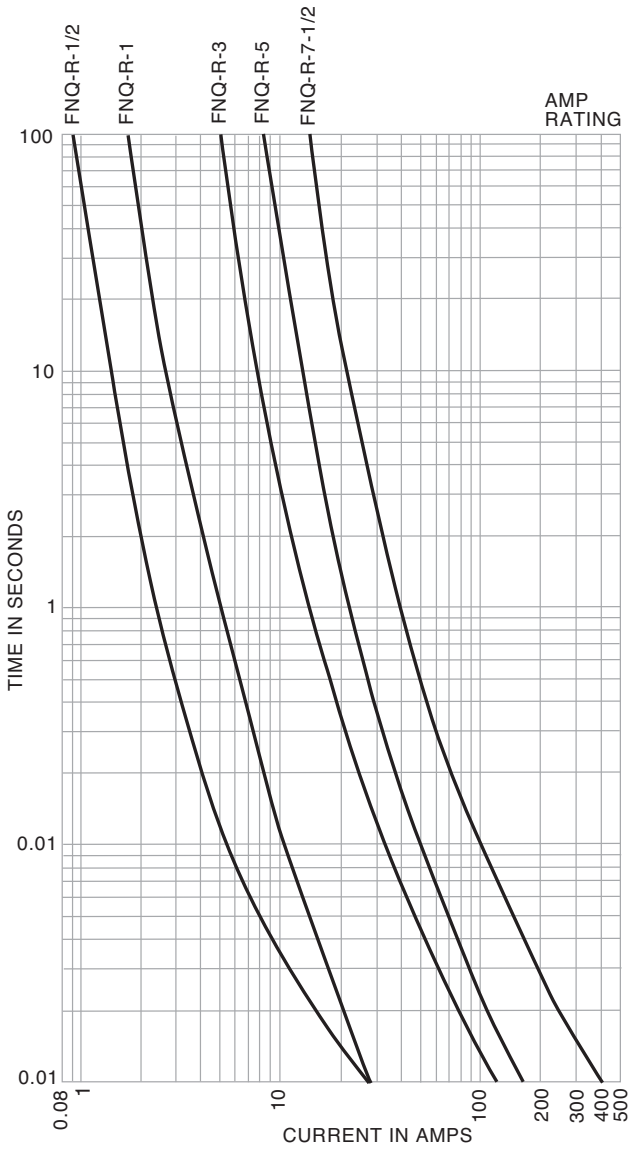
Typical Applications

- Line Protection, Small Control Transformers
- Industrial Control
- Isolated, In-Line Fuse Holders

Catalog Numbers (Amps)

FNQ-R-1/4	FNQ-R-1-5/10	FNQ-R-6
FNQ-R-3/10	FNQ-R-1-8/10	FNQ-R-6-1/4
FNQ-R-4/10	FNQ-R-2	FNQ-R-7
FNQ-R-1/2	FNQ-R-2-1/4	FNQ-R-7-1/2
FNQ-R-5/10	FNQ-R-2-1/2	FNQ-R-8
FNQ-R-3/4	FNQ-R-2-8/10	FNQ-R-9
FNQ-R-8/10	FQN-R-3	FNQ-R-10
FNQ-R-1	FNQ-R-3-2/10	FNQ-R-12
FNQ-R-1-1/8	FNQ-R-3-1/2	FNQ-R-15
FNQ-R-1-1/4	FNQ-R-4	FNQ-R-17-1/2
FNQ-R-1-3/10	FNQ-R-4-1/2	FNQ-R-20
FNQ-R-1-4/10	FNQ-R-5	FNQ-R-25
FNQ-R-1-1/2	FNQ-R-5-5/10	FNQ-R-30

Time-Current Characteristic Curves—Average Melt



For superior electrical protection, Cooper Bussmann recommends upgrading FNQ-R fuse applications to Low-Peak LP-CC fuses See page 17.

Recommended Fuse Holders & Blocks For Class CC 600V Fuses

• See page 12

Data Sheet: 1014

Limitron® Rejection-type Fuses

KTK-R Class CC

Specifications

Description: Fast-acting, branch circuit, rejection-type fuse.

Dimensions: 13/32" x 1 1/2" (10.3 x 38.1mm).

Ratings:

Volts — 600Vac (or less)

Amps — 1/10-30A

IR — 200kA RMS Sym.

Agency Information: CE, Std. 248-4, Class CC, UL Listed, Guide JDDZ, File E4273 CSA Certified, File 53787, Class 1422-02.

Features and Benefits

- Current limitation at Class CC levels provides maximum component short-circuit current protection.
- 200kA interrupting rating provides high ratings for control circuit locations.
- Class CC rejection feature, with appropriate fuse block, prevents inserting lesser-rated supplementary fuses.

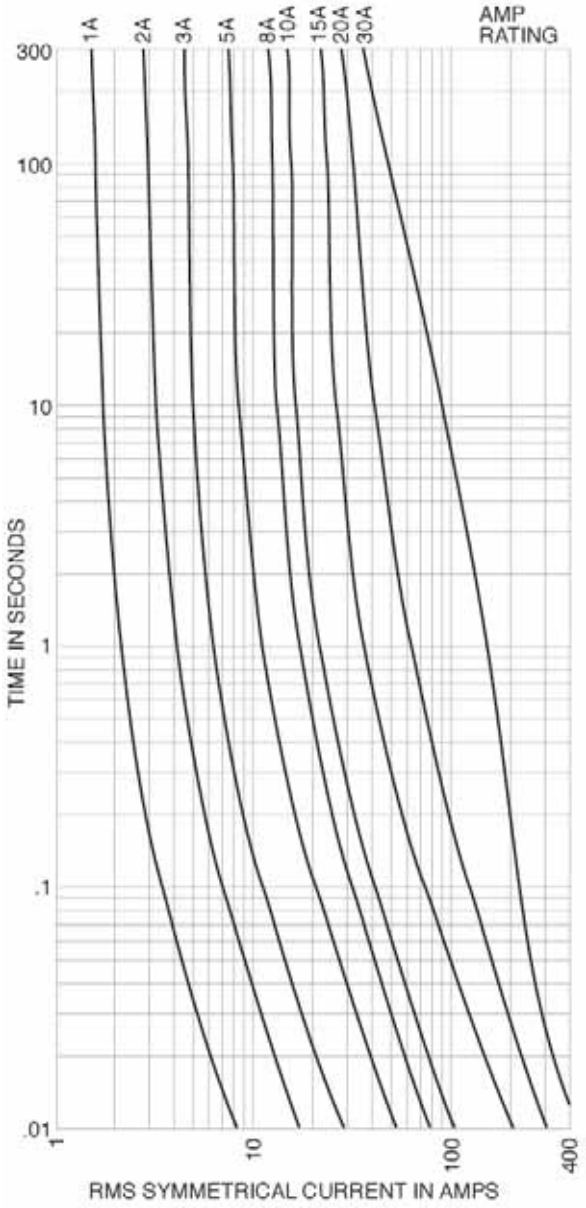
Typical Applications

- Specialized Circuits
- Industrial Control
- Isolated, In-Line Fuse Holders (street lighting)

Catalog Numbers (Amps)

KTK-R-1/10	KTK-R-1	KTK-R-7
KTK-R-1/8	KTK-R-1-1/2	KTK-R-8
KTK-R-2/10	KTK-R-2	KTK-R-9
KTK-R-1/4	KTK-R-2-1/2	KTK-R-10
KTK-R-3/10	KTK-R-3	KTK-R-12
KTK-R-4/10	KTK-R-3-1/2	KTK-R-15
KTK-R-1/2	KTK-R-4	KTK-R-20
KTK-R-6/10	KTK-R-5	KTK-R-25
KTK-R-3/4	KTK-R-6	KTK-R-30

Time-Current Characteristic Curves—Average Melt



For superior electrical protection, Cooper Bussmann recommends upgrading KTK-R fuse applications to Low-Peak LP-CC fuses See page 17.

Recommended Fuse Holders & Blocks For Class CC Fuses

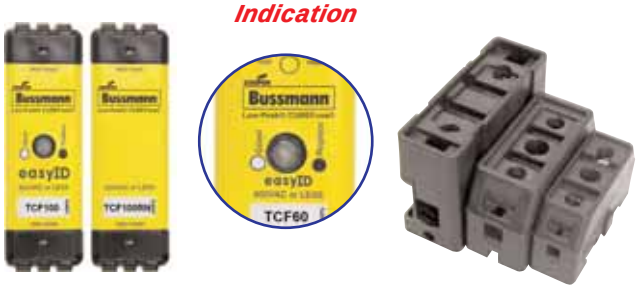
• See page 12

Data Sheet: 1015

CUBEFuse® Finger-safe Fuse and Fuse Holder System

TCF & TCF_RN (fuse) Class CF
TCFH_N (holder)

Available With Indication



Specifications

Description: Finger-safe fuse and fuse holder system; dual-element, time-delay fuse; 10 seconds minimum operating time at 500% rated amps.

Dimensions: See Dimensions illustration.

Poles: 1-pole (gangable)

Ratings:

Volts — 600Vac (or less)
— 300Vdc (or less)
Amps — 1-100A
IR — 300kA RMS Sym. (UL)
— 200kA RMS Sym. (CSA)
— 100kA DC (UL & CSA)

Agency Information: CE, UL Listed Guide JFHR, File E4273, CSA Certified Fuse: Class 1422- 02, File 53787, UL Listed Fuse holder: Guide IZND, File E214079, CSA Certified Fuse holder: Class 6225-01, File 47235.

Features and Benefits

- Separate overload and short-circuit elements provide time delay for sizing of high inrush loads linked with Class J current limitation.
- Selective coordination ratio of 2:1 (within Low-Peak fuse family) prevents electrical shutdowns from extending beyond the failed circuit.
- Smallest footprint of any Class CC, J, T or RK fuse provides substantial space savings and installation flexibility.
- IEC 60529 and finger-safe rating provides enhanced workplace safety.

Typical Applications

- Electrical Panelboards
- Machinery Disconnects
- Industrial Control
- Required Finger-Safe Systems

Data Sheet: 9000 (fuses) and 9007 (holders)

Fuse Catalog Numbers Indicating (Amps)

TCF6	TCF25	TCF50	TCF100
TCF10	TCF30	TCF60	
TCF15	TCF35	TCF70	
TCF17-½	TCF40	TCF80	
TCF20	TCF45	TCF90	

Fuse Catalog Numbers Non-Indicating (Amps)

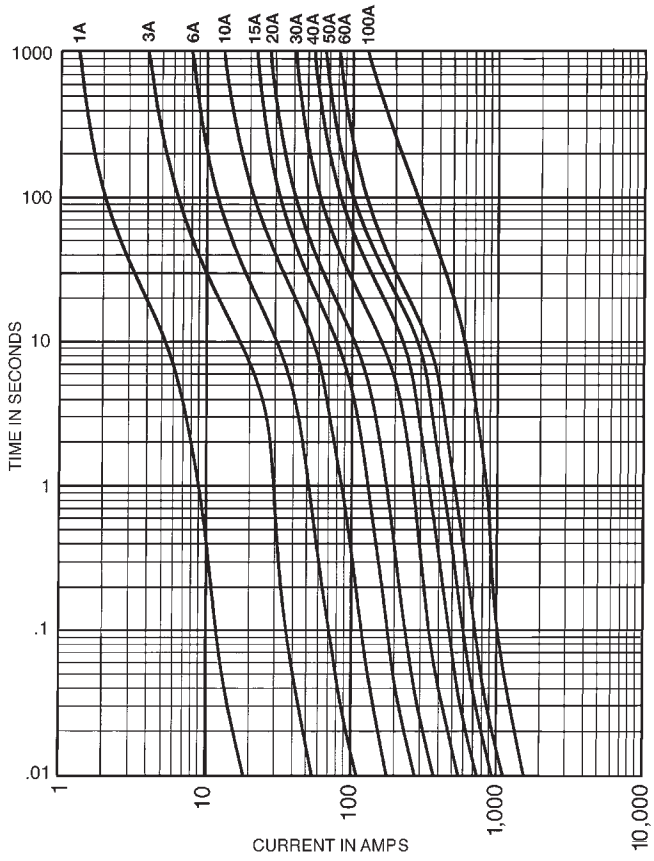
TCF1RN	TCF17-½RN	TCF40RN	TCF80RN
TCF3RN	TCF20RN	TCF45RN	TCF90RN
TCF6RN	TCF25RN	TCF50RN	TCF100RN
TCF10RN	TCF30RN	TCF60RN	
TCF15RN	TCF35RN	TCF70RN	

Fuse Holder Catalog Numbers

Catalog Numbers	Amp Range	Wire Range* Single Wire	Dual Wire
TCFH30N	1-30	14 to 8 AWG Cu	18 to 10 AWG
TCFH60N	1-60	14 to 4 AWG Cu	10 to 6 AWG Cu
TCFH100N	1-100	10 to 1 AWG Cu	6 AWG Cu

*75°C minimum Cu wire only.

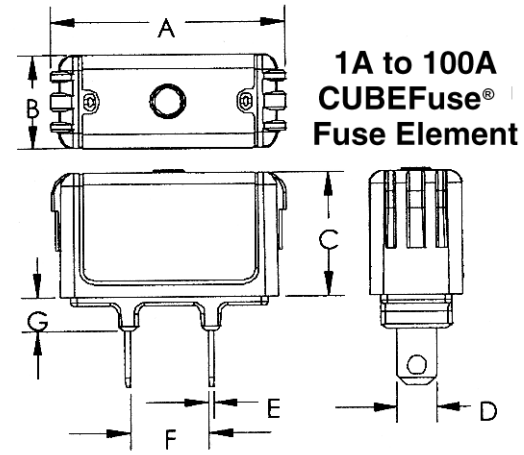
Time-Current Characteristic Curves–Average Melt



For product data sheets, visit www.cooperbussmann.com/datasheets/ulcsa

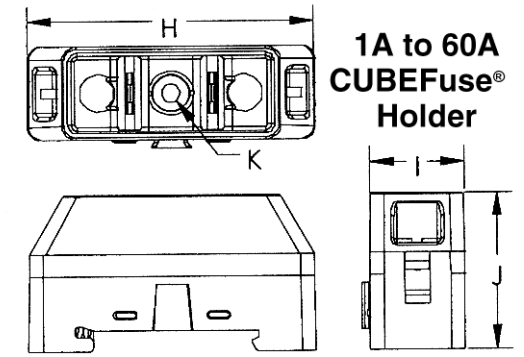
CUBEFuse® Finger-safe Fuse and Fuse Holder System

Dimensions for CUBEFuse® Fuse and Fuse Holder



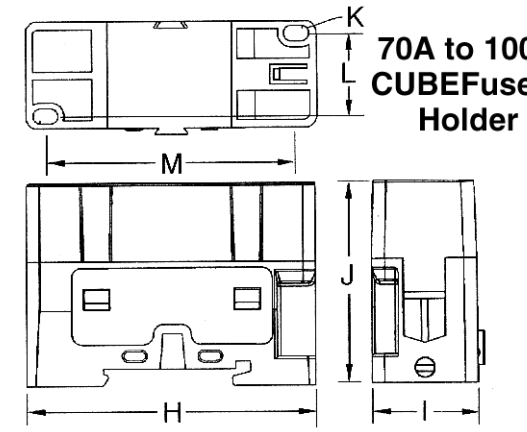
1A to 100A CUBEFuse® Fuse Element

Fuse Amps	Dimensions - in (mm)						
	A	B	C	D	E	F	G
1-15	1.88 (47.75)	0.75 (19.05)	1.00 (25.40)	0.23 (5.84)	0.04 (1.02)	0.63 (15.88)	0.27 (6.86)
17.5-20	1.88 (47.75)	0.75) (19.05)	1.00 (25.40)	0.27 (6.86)	0.04 (1.02)	0.63 (15.88)	0.27 (6.86)
25-30	1.88 (47.75)	0.75 (19.05)	1.00 (25.40)	0.31 (7.94)	0.04 (1.02)	0.63 (15.88)	0.27 (6.86)
35-40	2.13 (54.10)	1.00 (25.40)	1.13 (28.58)	0.36 (9.14)	0.04 (1.02)	0.63 (15.88)	0.38 (9.65)
45-50	2.13 (54.10)	1.00 (25.40)	1.13 (28.58)	0.40 (10.16)	0.04 (1.02)	0.63 (15.88)	0.38 (9.65)
60	2.13 (54.10)	1.00 (25.40)	1.13 (28.58)	0.44 (11.11)	0.04 (1.02)	0.63 (15.88)	0.38 (9.65)
70-100	3.01 (76.45)	1.00 (25.40)	1.26 (32.00)	0.57 (14.4)	0.06 (1.60)	0.63 (15.88)	0.39 (9.93)



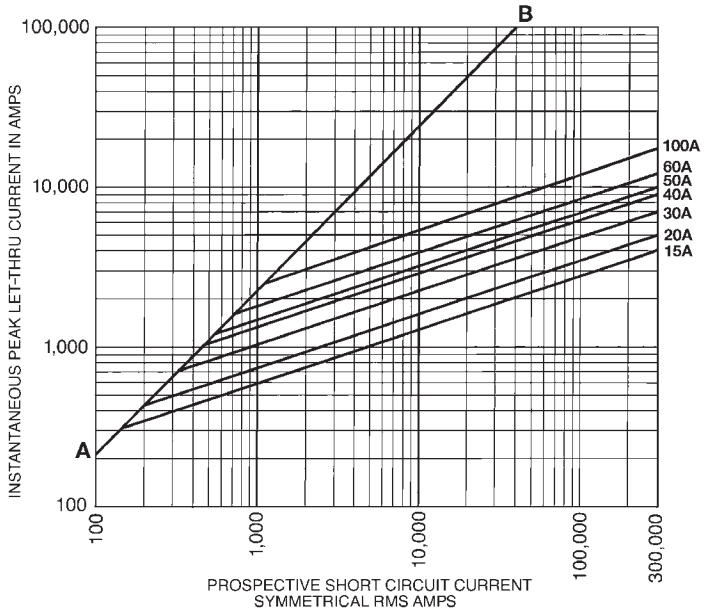
1A to 60A CUBEFuse® Holder

Holder	H	I	J	K	L	M
TCFH30N	2.30 (58.50)	0.76 (19.37)	1.357 (34.24)	0.15 (3.76)	- -	- -
TCFH60N	2.60 (66.12)	1.03 (26.23)	1.60 (40.64)	0.17 (4.34)	- -	- -
TCFH100N	2.91 (73.81)	1.05 (26.74)	2.01 (50.93)	0.15 (3.81)	0.80 (20.39)	2.51 (63.65)



70A to 100A CUBEFuse® Holder

Current Limitation Curves



Data Sheet: 9000 (fuses) and 9007 (holders)

Time-delay Fuses

SC Class G

Specifications
Description: Fast-acting (½-6A), time-delay (7-60A)fuse.

Dimensions: See dimensions illustration.

Ratings:
Volts — 600Vac (½-20A)
— 480Vac (25-60A)
— 170Vdc (½-20A)
— 300Vdc (30 & 60A only)
Amps — ½-60A
IR — 100kA RMS Sym.
— 10kA DC

Agency Information: CE, Std. 248-5, Class G, UL Listed, Guide JDDZ, File E4273, CSA Certified, Class 1422-01, File 53787.

Features and Benefits
- Current limiting for component protection, providing Class G energy-limitation for branch circuit protection.
- 100kA interrupting rating provides cost-effective branch pcircuit fusing.
- Variations in length help prevent overfusing.

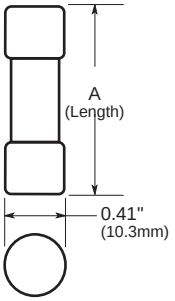
Typical Applications
- Fusible Branch Panelboards
- HVAC Branch Circuit Protection

Catalog Numbers (Amps)

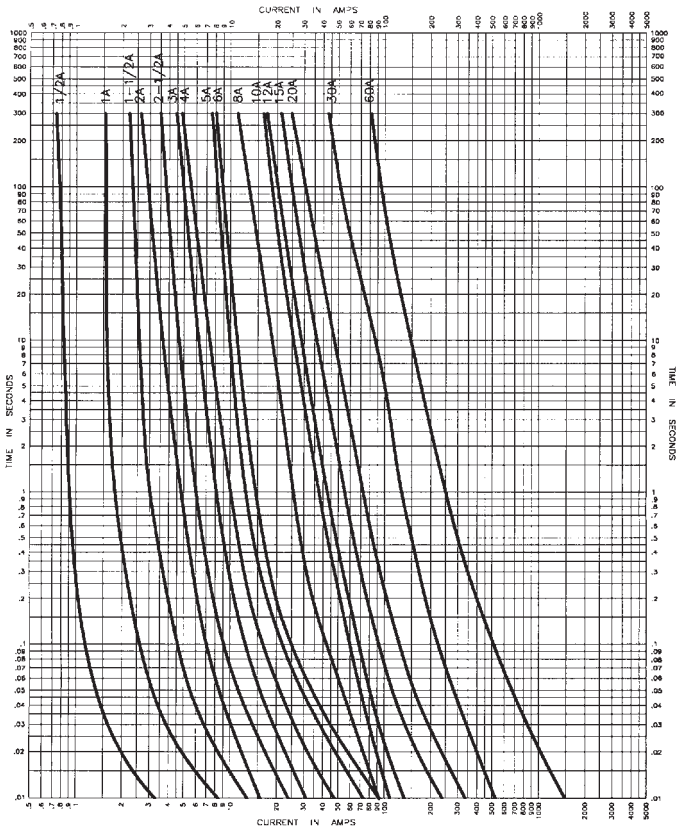
SC-½	SC-2-½	SC-6	SC-10	SC-25	SC-45
SC-1	SC-3	SC-7	SC-12	SC-30	SC-50
SC-1-½	SC-4	SC-8	SC-15	SC-35	SC-60
SC-2	SC-5	SC-9	SC-20	SC-40	

Dimensions -in (mm)

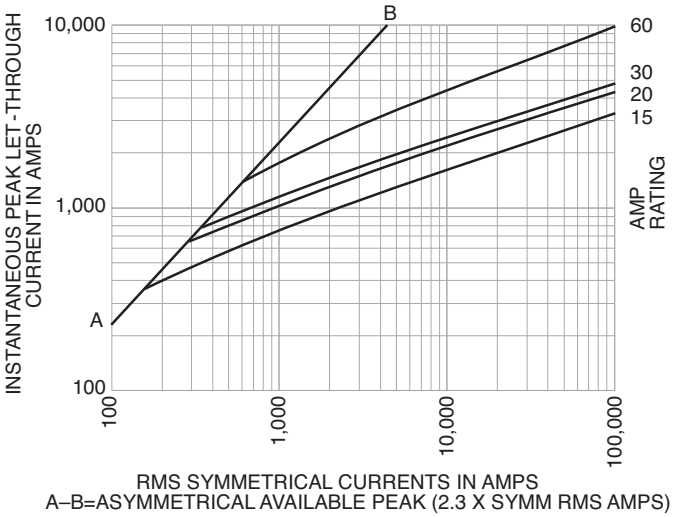
Fuse Amps	Length	Diameter
SC-½ to -15	1.31 (33.3)	0.41" (10.4)
SC-20	1.41 (35.8)	0.41" (10.4)
SC-25 to -30	1.62 (41.2)	0.41" (10.4)
SC-35 to -60	2.25 (57.1)	0.41" (10.4)



Time-Current Characteristic Curves—Average Melt



Current Limitation Curves



Recommended Fuse Holders & Blocks For Class G Fuses
• See page 12

Data Sheet: 1024

Low-Peak® Dual-element, Time-delay Fuses

LPJ_SP Class J

Available With Indication

Specifications
Description:
Dual-element, time-delay fuse;
10 seconds (minimum) at 500% rated amps. Now available with optional indication on select ratings (see Catalog Numbers table).

Dimensions: See page 11 for Class J dimensions.

Ratings:

Volts — 600Vac (or less)
— 300Vdc (or less)

Amps — 1-600A

IR — 300kA RMS Sym.
— 100kA dc

Agency Information: CE, UL Listed - Special Purpose*, Guide JFHR, File E56412, CSA Certified (200k AIR) Class J per CSA-22.2 No. 248.8, Class 1422-02, File 53787.

Features and Benefits

- Separate overload and short-circuit elements provide time delay for sizing of high inrush loads linked with Class J current limitation.
- Selective coordination ratio of 2:1 (within Low-Peak fuse family) prevents electrical shutdowns from extending beyond the failed circuit.
- Series combination ratings with branch circuit breakers allows broad range of coverage, independent of breaker manufacturer.

Typical Applications

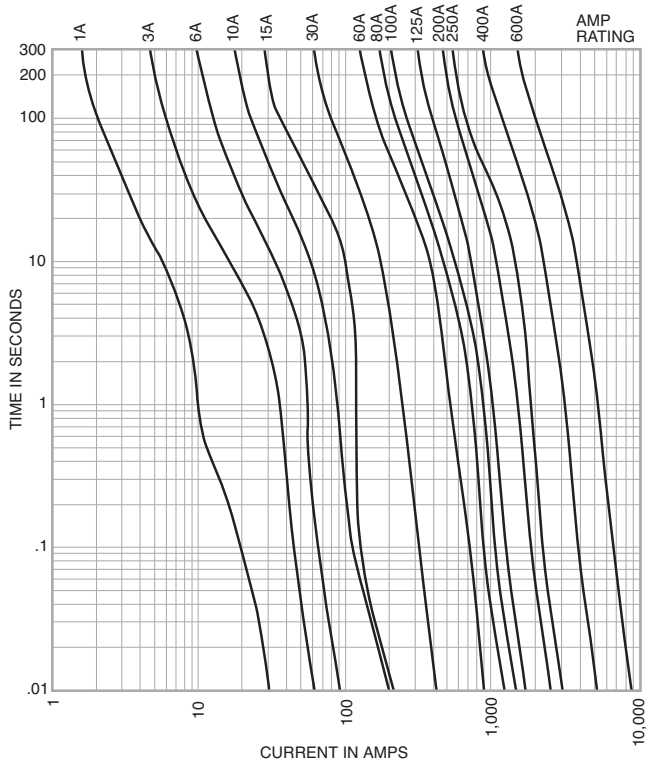
- Power Panelboards
- Branch Circuit Breaker Panelboard Mains
- Machinery Disconnects
- Industrial Control

Catalog Numbers (Amps)

LPJ-1SP	LPJ-4-½SP	LPJ-25SP**	LPJ-125SP**
LPJ-1-½SP	LPJ-5SP	LPJ-30SP**	LPJ-150SP**
LPJ-1-⁶⁄₁₀SP	LPJ-5-⁶⁄₁₀SP	LPJ-35SP**	LPJ-175SP**
LPJ-1-⁸⁄₁₀SP	LPJ-6SP**	LPJ-40SP**	LPJ-200SP**
LPJ-2SP	LPJ-7SP**	LPJ-45SP**	LPJ-225SP**
LPJ-2-¼SP	LPJ-8SP**	LPJ-50SP**	LPJ-250SP**
LPJ-2-½SP	LPJ-9SP**	LPJ-60SP**	LPJ-300SP**
LPJ-2-⁸⁄₁₀SP	LPJ-10SP**	LPJ-70SP**	LPJ-350SP**
LPJ-3SP	LPJ-12SP**	LPJ-80SP**	LPJ-400SP**
LPJ-3-⁴⁄₁₀SP	LPJ-15SP**	LPJ-90SP**	LPJ-450SP**
LPJ-3-½SP	LPJ-17-½SP**	LPJ-100SP**	LPJ-500SP**
LPJ-4SP	LPJ-20SP**	LPJ-110SP**	LPJ-600SP**

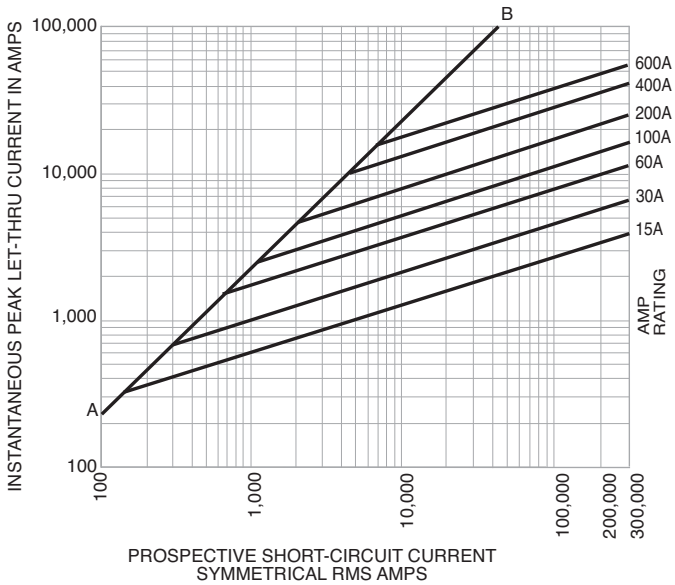
*Meets all performance requirements of UL Standard 248-8 for Class J fuses.
**Available with optional permanent replace fuse indication. To order, place "I" at end of catalog number. Example: LPJ-6SPI.
Available with silver plated terminals. Add SP/ in front of Catalog Number.

Time-Current Characteristic Curves–Average Melt



Current Limitation Curves

LPJ Current Limitation Curves



Data Sheets: 1006 (0-60) and 1007 (70-600)
With indication 1062 (6-60) and 1063 (70-600)

Recommended Fuse Holders & Blocks For Class J Fuses

• See page 14

Limitron® Fast-acting Fuses

JKS Class J

Specifications
Description: Fast-acting, current-limiting fuse.

Dimensions: See page 15 for Class J dimensions.

Ratings:

Volts — 600Vac (or less)

Amps — 1-600A

IR — 200kA RMS Sym.

Agency Information: CE, Std. 248-8, Class J, UL Listed, Guide JDDZ, File E4273, CSA Certified, Class 1422-02, File 53787.

Features and Benefits

- Current limitation for non-inductive circuits provides Class J current-limiting response to maximum ground fault and short-circuit conditions.
- 200kA interrupting rating provides high ratings at all circuit locations.
- Economical solutions for high-fault circuits.

Typical Applications

- Power Panelboards
- Machinery Disconnects

Catalog Numbers (Amps)

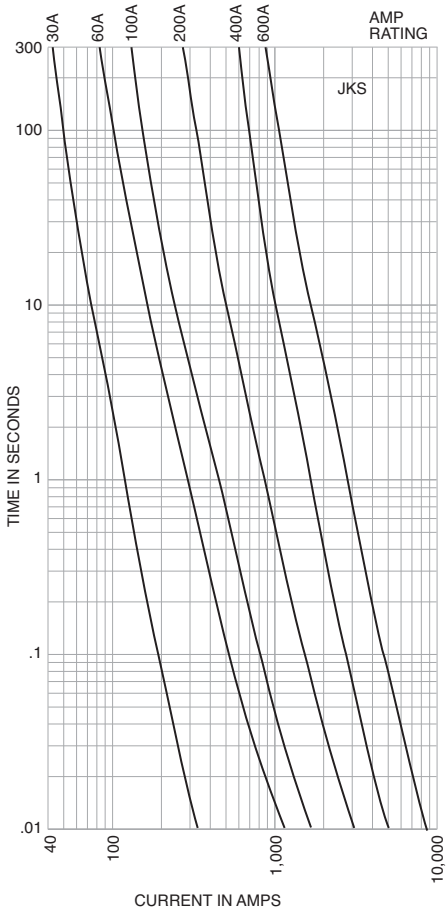
JKS-1	JKS-15	JKS-70	JKS-225
JKS-2	JKS-20	JKS-80	JKS-250
JKS-3	JKS-25	JKS-90	JKS-300
JKS-4	JKS-30	JKS-100	JKS-350
JKS-5	JKS-35	JKS-110	JKS-400
JKS-6	JKS-40	JKS-125	JKS-450
JKS-8	JKS-45	JKS-150	JKS-500
JKS-10	JKS-50	JKS-175	JKS-600
JKS-12	JKS-60	JKS-200	

For superior electrical protection, Cooper Bussmann recommends upgrading JKS fuse applications to Low-Peak LPJ fuses See page 23.

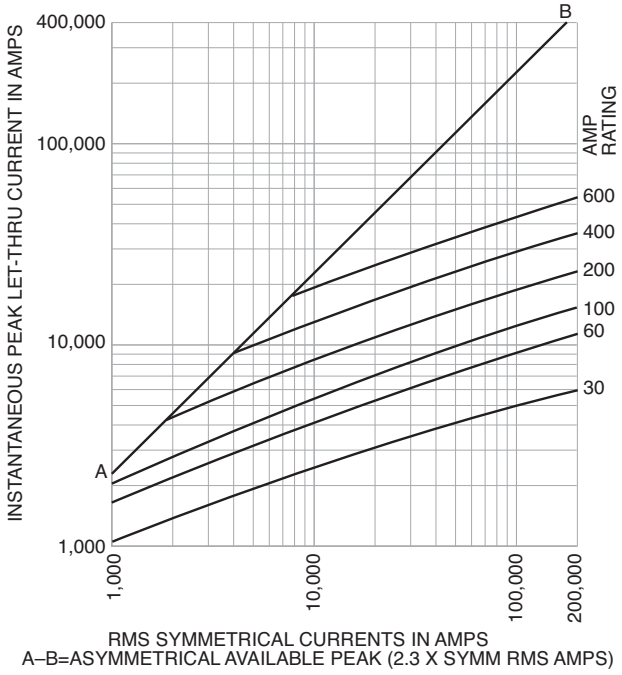
Recommended Fuse Holders & Blocks For Class J Fuses

- See page 14

Time-Current Characteristic Curves—Average Melt



Current Limitation Curves



Data Sheet: 1026 (1-60) and 1027 (70-600)

One-time General Purpose Fuses

NON (250Vac/125Vdc) Class K5 & H
NOS (600Vac) Class K5 & H

Specifications

Description: General purpose, non-current-limiting fuses.

Dimensions: See page 15 for dimensions.

Ratings:

Volts — **NON:**
— 250Vac
— 125Vdc (0-100A)
— **NOS:**
— 600Vac

Amps — ⅛-600A

IR — 50kA RMS Sym. (NON & NOS Class K5 0-60A)
— 10kA RMS Sym. (NON & NOS Class H65-600A)
— 50kA @ 125Vdc (NON Class K5 0-60A)
— 10kA @ 125Vdc (NON Class H 65-100A)

Agency Information: CE, UL Listed – 250V: Class K5 (0-60A), Std. 248-9, Class H (65-600A), Std. 248-6, (125Vdc: NON 0-100), 600V: Class K5 (0-60A), Std. 248-9, Class H (70-600A), Std. 248-6, Guide JDDZ, File E4273, CSA Certified – 250V: (0-12, 65-600)†, 600V: (0-600), Class 1421-01, File 53787.

† *For CSA Certified 15-60A Ratings, see PON Data Sheet 4126*

Features and Benefits

• Original fuse providing circuit protection.

Typical Applications

• Light Duty Circuit Locations

NON (250Vac) Catalog Numbers (Amps)

NON-⅛	NON-5	NON-40	NON-175
NON-½	NON-6	NON-45	NON-200
NON-¾	NON-6-¼	NON-50	NON-225
NON-⅘	NON-7	NON-60	NON-250
NON-1	NON-8	NON-65	NON-300
NON-1-¼	NON-9	NON-70	NON-350
NON-1-½	NON-10	NON-75	NON-400
NON-1-⅘	NON-12	NON-80	NON-450
NON-2	NON-15	NON-90	NON-500
NON-2-½	NON-20	NON-100	NON-600
NON-3	NON-25	NON-110	
NON-3-⅘	NON-30	NON-125	
NON-4	NON-35	NON-150	

NOS (600Vac) Catalog Numbers (Amps)

NOS-1	NOS-12	NOS-70	NOS-200
NOS-2	NOS-15	NOS-75	NOS-225
NOS-3	NOS-20	NOS-80	NOS-250
NOS-4	NOS-25	NOS-90	NOS-300
NOS-5	NOS-30	NOS-100	NOS-350
NOS-6	NOS-35	NOS-110	NOS-400
NOS-7	NOS-40	NOS-125	NOS-450
NOS-8	NOS-45	NOS-150	NOS-500
NOS-9	NOS-50	NOS-175	NOS-600
NOS-10	NOS-60		

Recommended Fuse Reducers

250V Fuse Amp Size	Clip Amp Size	Catalog Number (Pair)	600V Fuse Amp Size	Clip Amp Size	Catalog Number (Pair)
30	60	NO.263	30	60	NO.663
30	100	NO.213	30	100	NO.216
60	100	NO.216	60	100	NO.616
60	200	NO.226	60	200	NO.626
100	200	NO.2621	100	200	NO.2621
100	400	NO.2641	100	400	NO.2641
200	400	NO.2642	200	400	NO.2642
100	600	NO.2661	100	600	NO.2661
200	600	NO.2662	200	600	NO.2662
400	600	NO.2664	400	600	NO.2664

For superior electrical protection, Cooper Bussmann recommends upgrading NON (250Vac) and NOS (600Vac) fuse applications to Low-Peak LPN-RK (250Vac) and LPS-RK (600Vac) fuses See page 29.

Recommended Fuse Holders & Blocks For Class K5 & H 250V & 600V Fuses

• See page 12

Data Sheet: 1030

Low-Peak® Time-delay Fuses

KRP-C_SP Class L

Specifications
Description: Time-delay fuse – 4 seconds (minimum) at 500% rated amps.
Dimensions: See page 16 for Class L dimensions.
Ratings:
Volts — 600Vac (or less)
— 300Vdc (601-2000A)
Amps — 601-6000A
(use KRP-CL for current ratings under 601A)
IR — 300kA RMS Sym.
— 100kA DC
Agency Information: CE, UL Listed-Special Purpose (meets all performance requirements of UL Standard 248-10 for Class L fuses),Guide JFHR, File E56412, CSA Certified (200k AIR), Class 1422-02, File 53787, Class L per CSA C22.2, No. 248.10.

Features and Benefits
- Time delay of four seconds at five times rating allows closer sizing on large motor loads combined with Class L current limitation.
- Selective coordination ratio of 2:1 (within Low-Peak fuse family) prevents electrical shutdowns from extending beyond the failed circuit.
- Interrupting rating of 300kA RMS symmetrical provides adequate ratings without obsolescence for all electrical systems, big or small.
- Quality construction, using high-grade materials, provides lower watts loss and operating temperatures with superior arc quenching during current-limiting action.

Typical Applications
- Large Distribution Switchboards
- Power Panelboards
- Large Machinery Disconnects

Catalog Numbers (Amps)

KRP-C-601SP	KRP-C-1000SP	KRP-C-1800SP	KRP-C-3500SP
KRP-C-650SP	KRP-C-1100SP	KRP-C-1900SP	KRP-C-3800SP
KRP-C-700SP	KRP-C-1200SP	KRP-C-2000SP	KRP-C-4000SP
KRP-C-750SP	KRP-C-1350SP	KRP-C-2001SP	KRP-C-4500SP
KRP-C-800SP	KRP-C-1400SP	KRP-C-2400SP	KRP-C-5000SP
KRP-C-801SP	KRP-C-1500SP	KRP-C-2500SP	KRP-C-6000SP
KRP-C-900SP	KRP-C-1600SP	KRP-C-3000SP	

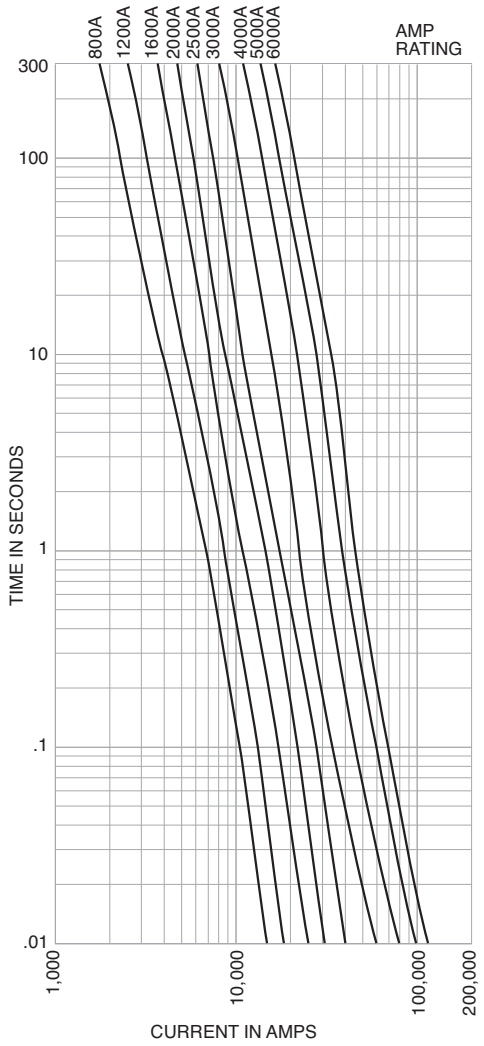
Recommended Fuse Holders & Blocks For Class L Fuses
• See page 13

Data Sheets: 1008 and 1009

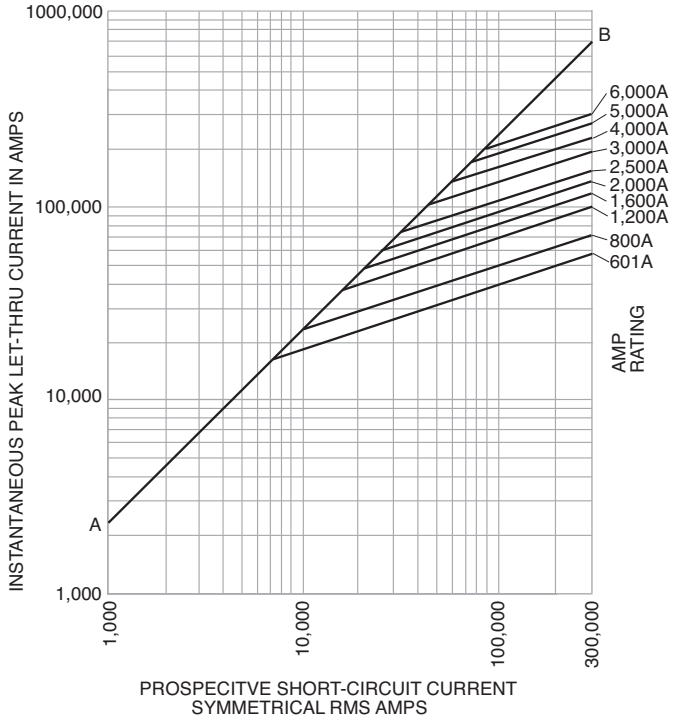
For product data sheets, visit www.cooperbussmann.com/datasheets/ulcsa

Low-Peak® Time-delay Fuses

Time-Current Characteristic Curves—Average Melt



Current Limitation Curves



Data Sheets: 1008 and 1009

KRP-CL Current-limiting, time-delay fuses

Specifications
Description: Current-limiting, time-delay fuse.
Dimensions: See page 16 for Class L dimensions.
Ratings:
Volts — 600Vac (or less)
Amps — 150-600A
IR — 200kA RMS Sym.

Features and Benefits
- Time-delay of four seconds at five times rating allows closer sizing inductive loads coupled with an equivalent Class L current limitation.
- Class L case size for amp ratings from 150A to 600A allows downsize fusing of large Class L fused switches for improved circuit protection.

Typical Applications
- Large Distribution Switchboards
- Power Panelboards
- Machinery Disconnects

Catalog Numbers (Amps)

KRP-CL-150	KRP-CL-300	KRP-CL-500
KRP-CL-200	KRP-CL-350	KRP-CL-600
KRP-CL-225	KRP-CL-400	
KRP-CL-250	KRP-CL-450	

Recommended Fuse Holders & Blocks For Class L Fuses
- See page 13

Data Sheet: 1016

Limitron® Fuses

KTU Class L

Specifications
Description: Fast-acting, bolt-mount fuse.

Dimensions: See page 16 for Class L dimensions.

Ratings:
Volts — 600Vac (or less)
Amps — 601-6000A
IR — 200kA RMS Sym.

Agency Information: CE, Std. 248-10, Class L, UL Listed, Guide JDDZ, File E4273 CSA Certified, Class 1422-02, File 53787.

Features and Benefits
- 200kA interrupting rating provides high ratings at all circuit locations.
- Economical solutions for high-fault circuits.
- Quality construction using high-grade materials provides lower watts loss and operating temperatures with superior arc quenching during current-limiting action.

Typical Applications
- Large Distribution Switchboards
- Power Panelboards

Catalog Number (Amps)

KTU-601	KTU-1100	KTU-2400
KTU-650	KTU-1200	KTU-2500
KTU-700	KTU-1350	KTU-3000
KTU-750	KTU-1400	KTU-3001
KTU-800	KTU-1500	KTU-4000
KTU-801	KTU-1600	KTU-4500
KTU-900	KTU-1800	KTU-5000
KTU-1000	KTU-2000	KTU-6000

For superior electrical protection, Cooper Bussmann recommends upgrading KTU fuse applications to Low-Peak KRP-C fuses See page 26.

Recommended Fuse Holders & Blocks For Class L Fuses
- See page 13

Data Sheet: 1010

KLU Class L

Specifications
Description: Time-delay, bolt-mount fuse - 5 seconds (minimum) at 500% rated amps. See KRP-CL for amp ratings below 601A.

Dimensions: See page 16 for Class L dimensions.

Ratings:
Volts — 600Vac (or less)
Amps — 601-4000A
IR — 200kA RMS Sym.

Agency Information: CE, Std. 248-10, Class L, UL Listed, Guide JDDZ, File E4273, CSA Certified, CSA Class 1422-02, File 53787.

Features and Benefits
- 200kA interrupting rating provides high ratings at all circuit locations.
- Economical solutions for high fault circuits.

Typical Applications
- Large Distribution Switchboards
- Power Panelboards
- Large Machinery Disconnects

Catalog Numbers (Amps)

KLU-601	KLU-1200	KLU-2500
KLU-650	KLU-1500	KLU-3000
KLU-700	KLU-1600	KLU-4000
KLU-800	KLU-1800	
KLU-1000	KLU-2000	

For superior electrical protection, Cooper Bussmann recommends upgrading KLU fuse applications to Low-Peak KRP-C fuses See page 26.

Recommended Fuse Holders & Blocks For Class L Fuses
- See page 13

Data Sheet: 1013

Low-Peak® Dual-element, Time-delay Fuses

LPN-RK_SP (250V) Class RK1
LPS-RK_SP (600V) Class RK1

Available With Indication

Specifications
Description: Current-limiting, dual-element, time-delay fuse; 10 seconds (minimum) at 500% rated amps (8 seconds for 0-30A sizes). Now available with optional indication on select ratings (see Catalog Numbers table).

Dimensions: See page 15 for Class RK1 dimensions.
Ratings:

Volts **LPN-RK:**
— 250Vac (or less)
— 125Vdc (0-60A)
— 250Vdc (70-600A)
LPS-RK:
— 600Vac (or less)
— 300Vdc
Amps — ⅒-600A
IR — 300kA RMS Sym.
— 100kA DC

Agency Information: CE, UL Listed – Special Purpose*, Guide JFHR, File E56412, CSA Certified (200k AIR), Class RK1 per CSA C22.2, No. 248.12, Class 1422-02, File 53787.

Features and Benefits

- Separate overload and short-circuit elements provide time delay for close sizing of high inrush loads linked with RK1 current-limitation and selective coordination ratio of 2:1 (within Low-Peak fuse family) prevents widespread blackouts.
- Inventory consolidation of Class RK1, RK5 and H fuses for reduced SKU investment and minimizing potential for misapplying fuse.
- 300kA RMS symmetrical interrupting rating provides adequate ratings without obsolescence for all electrical systems, big or small.
- Insulated end caps reduces exposure to live parts and extends air gap to distance between blades of adjacent mounted fuses or to housing.

Typical Applications

- Large Distribution Switchboards
- Power Panelboards
- Motor Control Centers
- Machinery Disconnect Switches

LPN Catalog Numbers (Amps)

LPN-RK-⅒SP	LPN-RK-3-½SP	LPN-RK-60SP**
LPN-RK-¹⁵⁄₁₀₀SP	LPN-RK-4SP	LPN-RK-70SP**
LPN-RK-⅜SP	LPN-RK-4-½SP	LPN-RK-80SP**
LPN-RK-⅗SP	LPN-RK-5SP	LPN-RK-90SP**
LPN-RK-⅘SP	LPN-RK-5-⅘SP	LPN-RK-100SP**
LPN-RK-½SP	LPN-RK-6SP	LPN-RK-110SP**
LPN-RK-⅝SP	LPN-RK-6-¼SP	LPN-RK-125SP**
LPN-RK-⅘SP	LPN-RK-8SP	LPN-RK-150SP**
LPN-RK-1SP	LPN-RK-9SP	LPN-RK-175SP**
LPN-RK-1-⅛SP	LPN-RK-10SP	LPN-RK-200SP**
LPN-RK-1-¼SP	LPN-RK-12SP	LPN-RK-225SP**
LPN-RK-1-⅖SP	LPN-RK-15SP	LPN-RK-250SP**
LPN-RK-1-⅗SP	LPN-RK-17-½SP	LPN-RK-300SP**
LPN-RK-1-⅘SP	LPN-RK-20SP	LPN-RK-350SP**
LPN-RK-2SP	LPN-RK-25SP	LPN-RK-400SP**
LPN-RK-2-¼SP	LPN-RK-30SP	LPN-RK-450SP**
LPN-RK-2-½SP	LPN-RK-35SP**	LPN-RK-500SP**
LPN-RK-2-⅘SP	LPN-RK-40SP**	LPN-RK-600SP**
LPN-RK-3SP	LPN-RK-45SP**	
LPN-RK-3-⅗SP	LPN-RK-50SP**	

*Meets all performance requirements of UL Standard 248-12 for Class RK1 fuses.
**Available with optional indication. To order, place "I" at end of Catalog Number. Example: LPN-RK-35SPI.
0-60A fuses available with Nickel plate option. (Ex: LPS-RK30SPNP) 70-600A fuses available with Tin plate option. Example: LPS-RK-100SP-TP.

LPS Catalog Numbers - (Amps)

LPS-RK-⅒SP	LPS-RK-2-½SP	LPS-RK-12SP**	LPS-RK-110SP**
LPS-RK-⅜SP	LPS-RK-2-⅘SP	LPS-RK-15SP**	LPS-RK-125SP**
LPS-RK-⅗SP	LPS-RK-3SP	LPS-RK-17-½SP**	LPS-RK-150SP**
LPS-RK-⅘SP	LPS-RK-3-⅗SP	LPS-RK-20SP**	LPS-RK-175SP**
LPS-RK-½SP	LPS-RK-3-½SP	LPS-RK-25SP**	LPS-RK-200SP**
LPS-RK-⅝SP	LPS-RK-4SP	LPS-RK-30SP**	LPS-RK-225SP**
LPS-RK-⅘SP	LPS-RK-4-½SP	LPS-RK-35SP**	LPS-RK-250SP**
LPS-RK-1SP	LPS-RK-5SP	LPS-RK-40SP**	LPS-RK-300SP**
LPS-RK-1-⅛SP	LPS-RK-5-⅘SP	LPS-RK-45SP**	LPS-RK-350SP**
LPS-RK-1-¼SP	LPS-RK-6SP**	LPS-RK-50SP**	LPS-RK-400SP**
LPS-RK-1-⅒SP	LPS-RK-6-¼SP**	LPS-RK-60SP**	LPS-RK-450SP**
LPS-RK-1-½SP	LPS-RK-7SP**	LPS-RK-70SP**	LPS-RK-500SP**
LPS-RK-1-⅘SP	LPS-RK-8SP**	LPS-RK-80SP**	LPS-RK-600SP**
LPS-RK-1-⅘SP	LPS-RK-9SP**	LPS-RK-90SP**	
LPS-RK-2-¼SP	LPS-RK-10SP**	LPS-RK-100SP**	

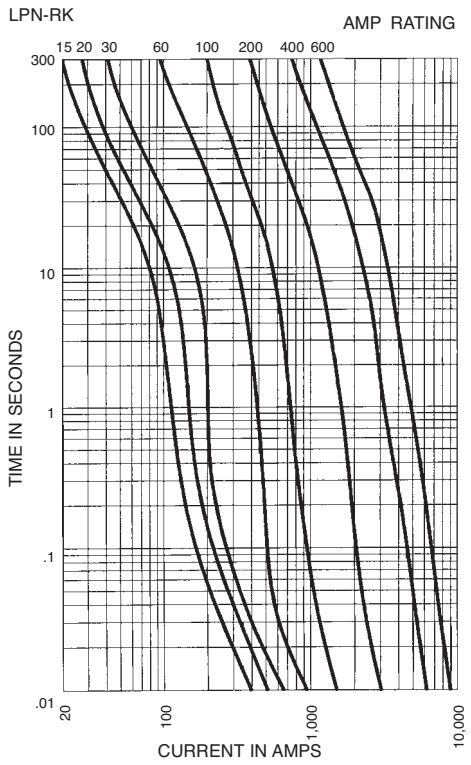
*Meets all performance requirements of UL Standard 248-12 for Class RK1 fuses.
**Available with optional replace fuse indication. To order, place "I" at end of Catalog Number. Example: LPS-RK-15SPI.

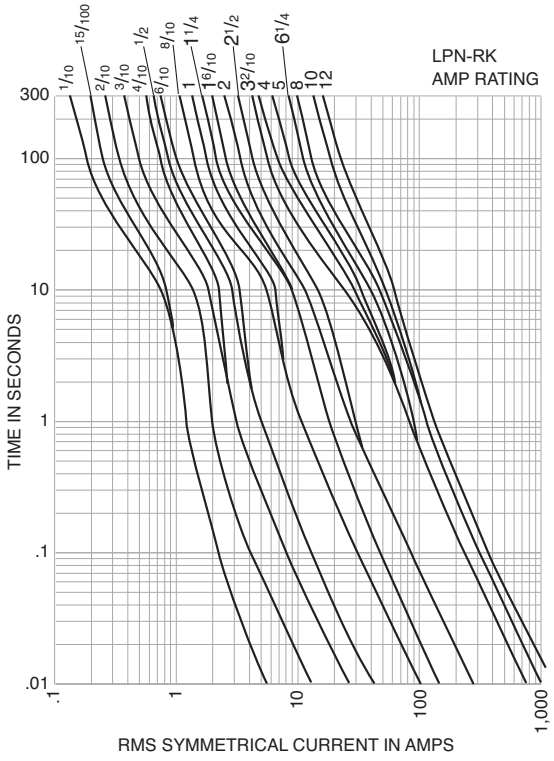
Data Sheets: **LPN-RK — 1003 (0-60) and 1004 (70-600)**
LPN-RK with indication — 1066 (70-600)
LPS-RK — 1001 (0-60) and 1002 (70-600)
LPS-RK with indication — 1061 (0-60) and 1064 (70-600)

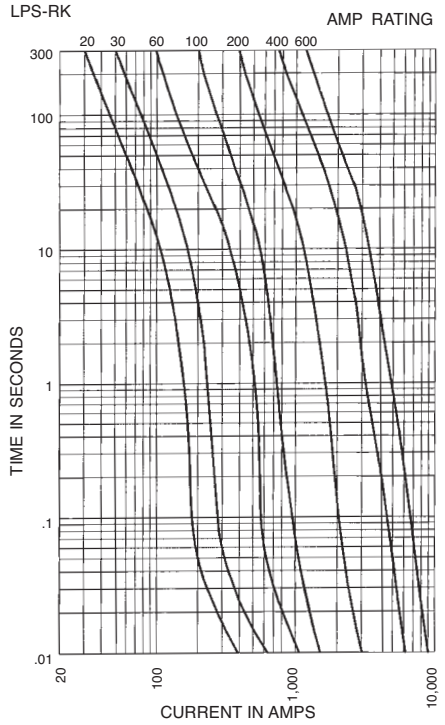
Recommended Fuse Holders & Blocks For Class RK1 Fuses
• See page 13

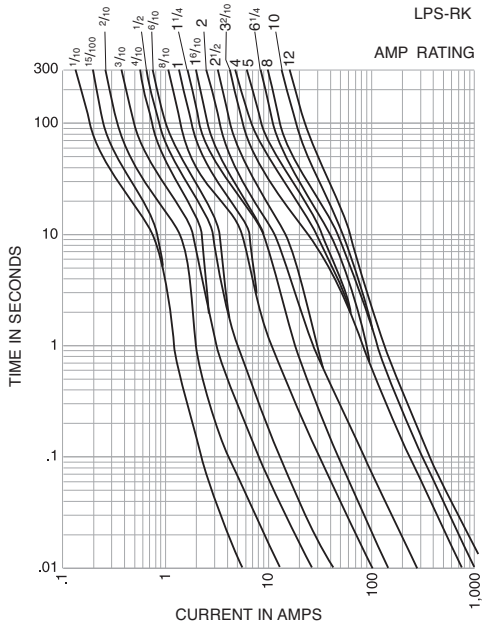
Low-Peak® Dual-element, Time-delay Fuses

Time-Current Characteristic Curves—Average Melt









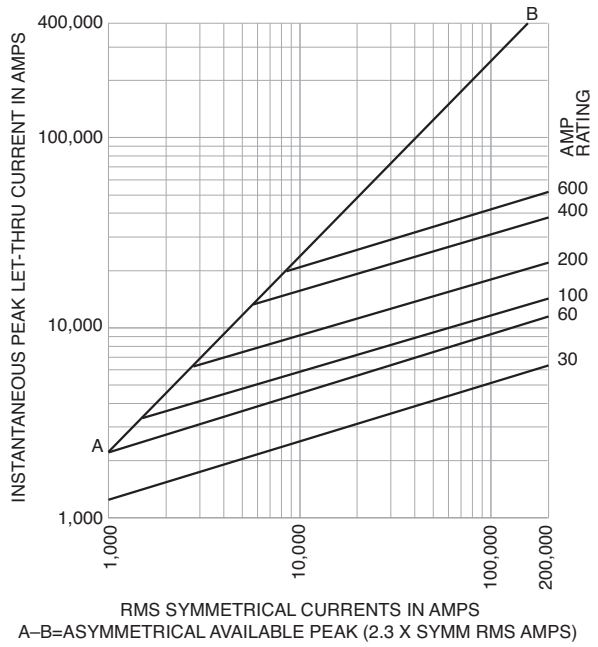
Data Sheets: LPN-RK — 1003 (0-60) and 1004 (70-600)
Data Sheets: LPS-RK — 1001 (0-60) and 1002 (70-600)

Recommended Fuse Holders & Blocks For Class RK1 Fuses
• See page 13

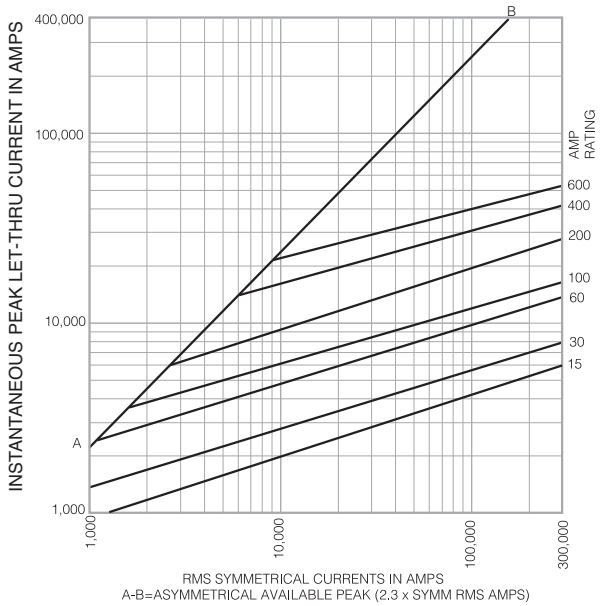
For product data sheets, visit www.cooperbussmann.com/datasheets/ulcsa

Low-Peak® Dual-element, Time-delay Fuses

Current Limitation Curves—LPN-RK



Current Limitation Curves—LPS-RK



Data Sheets: LPN-RK — 1003 (0-60) and 1004 (70-600)
Data Sheets: LPS-RK — 1001 (0-60) and 1002 (70-600)

Recommended Fuse Holders & Blocks For Class RK1 Fuses
• See page 13

Limitron® Fast-acting Fuses

KTN-R (250V) Class RK1

Specifications

Description: Fast-acting, current-limiting fuse.

Dimensions: See page 15 for Class RK1 dimensions.

Ratings:

Volts — 250Vac (or less)

Amps — 1-600A

IR — 200kA RMS Sym.

Agency Information: CE, Std. 248-12, Class RK1, UL Listed, Guide JDDZ, File E54273, CSA Certified, Class 1422-02, File 53787.

Features and Benefits

- Current limitation for non-inductive circuits provides Class RK1 current-limiting response to maximum ground fault and short-circuit conditions.
- 200kA interrupting rating provides high ratings at all circuit locations.
- Economical solutions for high-fault circuits.

Typical Applications

- Panelboards

Catalog Numbers (Amps)

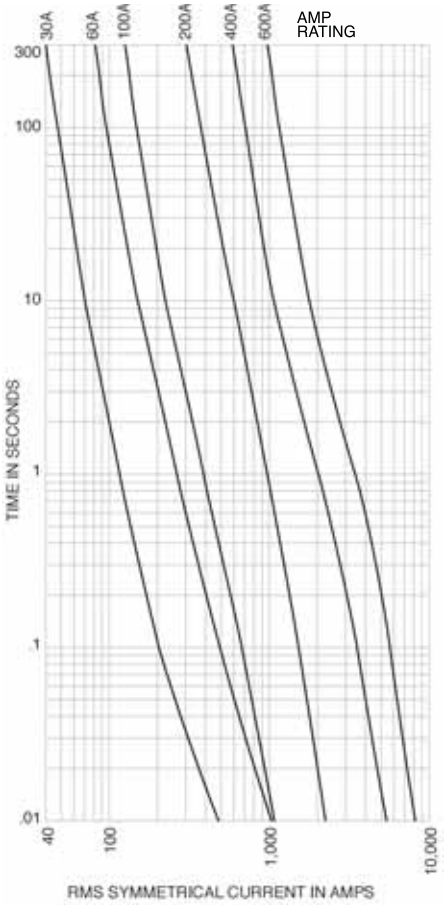
KTN-R-1	KTN-R-30	KTN-R-125
KTN-R-2	KTN-R-35	KTN-R-150
KTN-R-3	KTN-R-40	KTN-R-175
KTN-R-4	KTN-R-45	KTN-R-200
KTN-R-5	KTN-R-50	KTN-R-225
KTN-R-6	KTN-R-60	KTN-R-250
KTN-R-8	KTN-R-70	KTN-R-300
KTN-R-10	KTN-R-75	KTN-R-350
KTN-R-12	KTN-R-80	KTN-R-400
KTN-R-15	KTN-R-90	KTN-R-450
KTN-R-20	KTN-R-100	KTN-R-500
KTN-R-25	KTN-R-110	KTN-R-600

For superior electrical protection, Cooper Bussmann recommends upgrading KTN-R fuse applications to Low-Peak LPN-RK fuses See page 29.

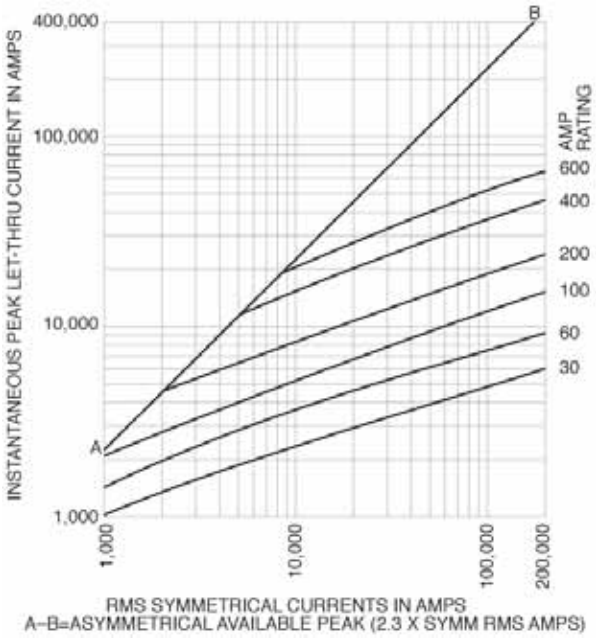
Recommended Fuse Holders & Blocks For Class RK1 Fuses

- See page 13

Time-Current Characteristic Curves—Average Melt



Current Limitation Curves



Data Sheet: 1043

Limitron® Fast-acting Fuses

KWS-R (600Vac/dc) Class RK1

Specifications
Description: Fast-acting, current-limiting fuse.

Dimensions: See page 15 for Class RK1 dimensions.

Ratings:
Volts — 600Vac (or less); 600Vdc (20-600A)
Amps — 1-600A
IR — 200kA RMS Sym. AC
IR — 100kA DC

Agency Information: CE, Std. 248-12, Class RK1, UL Listed, Guide JDDZ, File E54273.

Features and Benefits

- Current limitation for non-inductive circuits provides Class RK1 current-limiting response to maximum ground fault an short-circuit conditions.
- 200kA interrupting rating provides high ratings at all circuit locations.
- Economical solutions for applications with high available short-circuit current.

Typical Applications

- Photovoltaic systems
- Inverters
- Panelboards

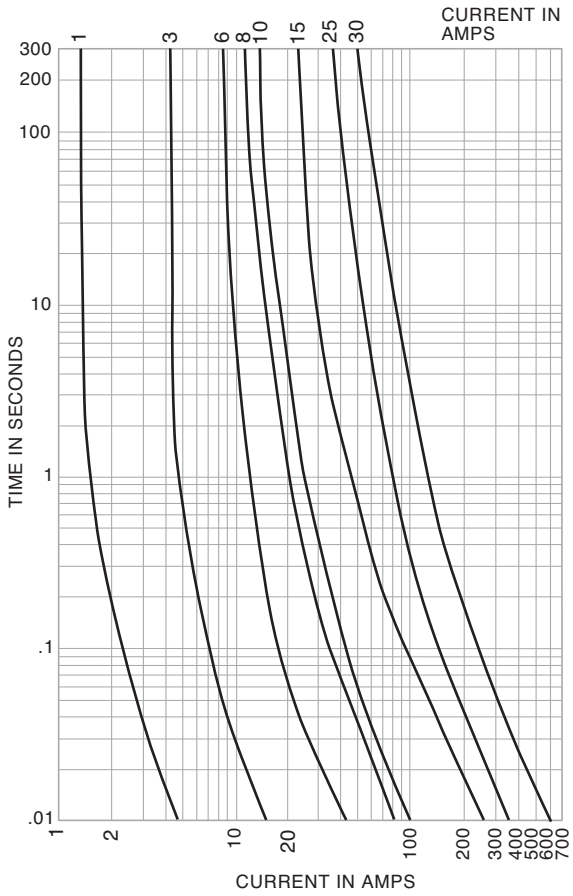
Catalog Numbers (Amps)

KWS-R-1	KWS-R-25	KWS-R-125
KWS-R-2	KWS-R-30	KWS-R-150
KWS-R-3	KWS-R-35	KWS-R-175
KWS-R-4	KWS-R-40	KWS-R-200
KWS-R-5	KWS-R-45	KWS-R-225
KWS-R-6	KWS-R-50	KWS-R-250
KWS-R-8	KWS-R-60	KWS-R-300
KWS-R-10	KWS-R-70	KWS-R-350
KWS-R-12	KWS-R-80	KWS-R-400
KWS-R-15	KWS-R-90	KWS-R-500
KWS-R-20	KWS-R-100	KWS-R-600

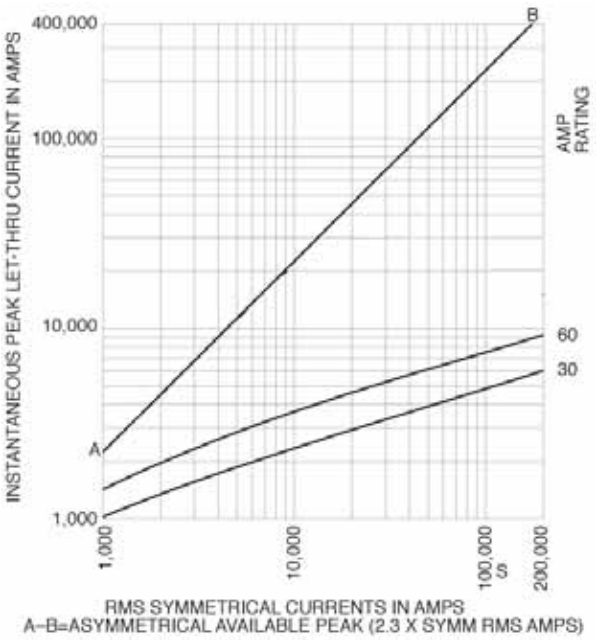
Recommended Fuse Holders & Blocks For Class RK1 Fuses

• See page 13

Time-Current Characteristic Curves—Average Melt



Current Limitation Curves



Data Sheet: 4204

Dura-Lag™ Dual-element, Time-delay Fuses

DLN-R (250V) Class RK5

Specifications
Description: Dual-element, time-delay fuse – 10 seconds (minimum) at 500% rated amps (8 seconds for 0-30A sizes).

Dimensions: See page 15 for Class RK5 dimensions.

Ratings:
Volts — 250Vac (or less)
Amps — 1-600A
IR — 200kA RMS Sym.
— 20kA DC

Agency Information: CE, Std. 248-12, Class RK5, UL Listed, Guide JDDZ, File E4273, CSA Certified, Class 1422-02 File 53787.

Features and Benefits
- Separate overload and short-circuit elements provide time delay for close inductive load sizing, linked with RK5 current limitation.
- 200kA interrupting rating provides high ratings at all circuit locations.

Typical Applications
- Power Panelboards
- Machinery Disconnects

Catalog Numbers (Amps)

DLN-R-1	DLN-R-15	DLN-R-100
DLN-R-2	DLN-R-20	DLN-R-125
DLN-R-2-½	DLN-R-25	DLN-R-150
DLN-R-3	DLN-R-30	DLN-R-175
DLN-R-3-3/10	DLN-R-35	DLN-R-200
DLN-R-4	DLN-R-40	DLN-R-225
DLN-R-5	DLN-R-45	DLN-R-250
DLN-R-6	DLN-R-50	DLN-R-300
DLN-R-6-¼	DLN-R-60	DLN-R-400
DLN-R-8	DLN-R-70	DLN-R-600
DLN-R-10	DLN-R-80	
DLN-R-12	DLN-R-90	

For superior electrical protection, Cooper Bussmann recommends upgrading DLN-R fuse applications to Low-Peak LPN-RK fuses See page 29.

Recommended Fuse Holders & Blocks For Class RK5 Fuses
- See page 13

Data Sheet: 1021

DLS-R (600V) Class RK5

Specifications
Description: Dual-element, time-delay fuse – 10 seconds (minimum) at 500% rated amps.

Dimensions: See page 15 for Class RK5 dimensions.

Ratings:
Volts — 600Vac (or less)
Amps — 1-600A
IR — 200kA RMS Sym.

Agency Information: CE, Std. 248-12, Class RK5, UL Listed, Guide JDDZ, File E4273, CSA Certified, Class 1422-02 File 53787.

Features and Benefits
- Separate overload and short-circuit elements provide time delay for close inductive load sizing, linked with RK5 current limitation.
- 200kA interrupting rating provides high ratings at all circuit locations.

Typical Applications
- Power Panelboards
- Machinery Disconnects

Catalog Numbers (Amps)

DLS-R-1	DLS-R-12	DLS-R-100
DLS-R-1-3/10	DLS-R-15	DLS-R-110
DLS-R-2	DLS-R-17-½	DLS-R-125
DLS-R-2-½	DLS-R-20	DLS-R-150
DLS-R-3	DLS-R-25	DLS-R-175
DLS-R-3-½	DLS-R-30	DLS-R-200
DLS-R-4	DLS-R-35	DLS-R-225
DLS-R-5	DLS-R-40	DLS-R-250
DLS-R-6	DLS-R-45	DLS-R-300
DLS-R-6-¼	DLS-R-50	DLS-R-350
DLS-R-7	DLS-R-60	DLS-R-400
DLS-R-8	DLS-R-70	DLS-R-500
DLS-R-9	DLS-R-80	DLS-R-600
DLS-R-10	DLS-R-90	

For superior electrical protection, Cooper Bussmann recommends upgrading DLS-R fuse applications to Low-Peak LPS-RK fuses See page 29.

Recommended Fuse Holders & Blocks For Class RK5 Fuses
- See page 13

Data Sheet: 1022

Fusetron® Dual-element, Time-delay Fuses

FRN-R (250V) Class RK5

Specifications

Description: Dual-element, time-delay fuse – 10 seconds (minimum) at 500% rated amps (8 seconds for 0-30A sizes). Available with indication on select ratings (see Catalog Numbers table).

Dimensions: See page 15 for Class RK5 dimensions.

Ratings:

Volts — 250Vac (or less)
— 125Vdc (1/10-60A, 110-200A)
— 250Vdc (225-600A)

Amps — 1/10-600A

IR — 200kA RMS Sym.
— 20kA DC

Available With Indication

Agency Information: CE, Std. 248-12, Class RK5, UL Listed, Guide JDDZ, File E4273, CSA Certified, Class 1422-01, File 53787.

Features and Benefits

- Separate overload and short-circuit elements provide time delay for sizing as close as 125% of motor FLA.
- 2:1 selective coordination amp ratio (within the Cooper Bussmann RK5 fuse family) prevents overcurrent events from opening upstream Fusetron fuses.
- Insulated end caps for 225A-600A fuses reduces exposure to live parts and extends air gap to distance between blades of adjacent mounted fuses or to housing.

Typical Applications

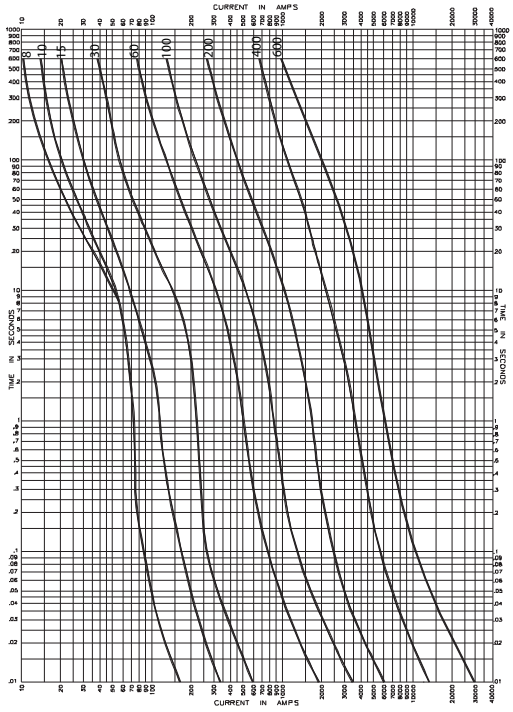
- Power Panelboards
- Motor Control Centers
- Combination Starters
- Machinery Disconnects

Catalog Numbers (Amps)

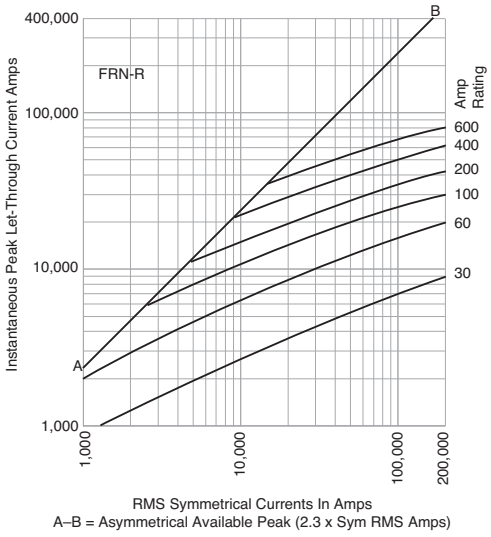
FRN-R-1/10	FRN-R-2	FRN-R-10*	FRN-R-100
FRN-R-1/8	FRN-R-2-1/4	FRN-R-12*	FRN-R-110
FRN-R-15/100	FRN-R-2-1/2	FRN-R-15*	FRN-R-125
FRN-R-3/10	FRN-R-2-9/10	FRN-R-17-1/2*	FRN-R-150
FRN-R-1/4	FRN-R-3	FRN-R-20*	FRN-R-175
FRN-R-3/10	FRN-R-3-3/10	FRN-R-25*	FRN-R-200
FRN-R-4/10	FRN-R-3-1/2	FRN-R-30*	FRN-R-225
FRN-R-1/2	FRN-R-4	FRN-R-35*	FRN-R-250
FRN-R-5/10	FRN-R-4-1/2	FRN-R-40*	FRN-R-300
FRN-R-9/10	FRN-R-5	FRN-R-45*	FRN-R-350
FRN-R-1	FRN-R-5-9/10	FRN-R-50*	FRN-R-400
FRN-R-1-1/8	FRN-R-6	FRN-R-60*	FRN-R-450
FRN-R-1-1/4	FRN-R-6-1/4	FRN-R-70	FRN-R-500
FRN-R-1-4/10	FRN-R-7	FRN-R-75	FRN-R-600
FRN-R-1-1/2	FRN-R-7-1/2	FRN-R-80	
FRN-R-1-9/10	FRN-R-8*	FRN-R-85	
FRN-R-1-9/10	FRN-R-9*	FRN-R-90	

*Available with indication. To order, place "ID" at the end of the catalog number.

Time-Current Characteristic Curves—Average Melt



Current Limitation Curves



For superior electrical protection, Cooper Bussmann recommends upgrading FRN-R fuse applications to Low-Peak® LPN-RK fuses. See page 29.

Recommended Fuse Holders & Blocks For Class RK5 Fuses

- See page 13

Recommended Fuse Reducers For Class R Fuses

- See page 14

Data Sheets: 1019 (0-60) and 1020 (70-600)
Data Sheet: 1169 (8-60) FRN-R with indication

Fusetron® Dual-element, Time-delay Fuses

FRS-R (600V) Class RK5

Available With Indication

Specifications

Description: Dual-element, time-delay fuse – 10 seconds (minimum) at 500% rated amps. Now available with optional indication on select ratings (see Catalog Numbers table).

Dimensions: See page 15 for Class RK5 dimensions.

Ratings:

Volts — 600Vac (or less)
— 300Vdc
Amps — 1/10-600A
IR — 200kA RMS Sym.
— 20kA @ 300Vdc

Agency Information: CE, Std. 248-12, Class RK5, UL Listed, Guide JDDZ, File E4273, CSA Certified, Class 1422-02, File 53787.

Features and Benefits

- 2:1 selective coordination ratio (within RK5 fuse family) prevents electrical shutdowns from extending beyond the failed circuit.
- Insulated end caps for 70-600A fuses reduces exposure to live parts and extends air gap to distance between blades of adjacent mounted fuses or to housing.

Typical Applications

- Power Panelboards
- Motor Control Centers
- Combination Starters
- Machinery Disconnects

Catalog Numbers (Amps)

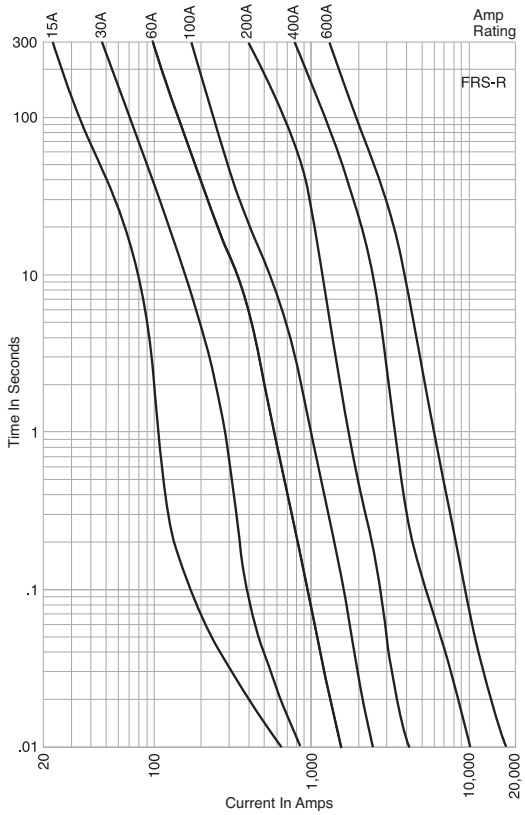
FRS-R-1/10	FRS-R-2	FRS-R-10*	FRS-R-100
FRS-R-1/8	FRS-R-2-1/4	FRS-R-12*	FRS-R-110
FRS-R-15/100	FRS-R-2-1/2	FRS-R-15*	FRS-R-125
FRS-R-2/10	FRS-R-2-9/10	FRS-R-17-1/2*	FRS-R-150
FRS-R-1/4	FRS-R-3	FRS-R-20*	FRS-R-175
FRS-R-3/10	FRS-R-3-2/10	FRS-R-25*	FRS-R-200
FRS-R-4/10	FRS-R-3-1/2	FRS-R-30*	FRS-R-225
FRS-R-1/2	FRS-R-4	FRS-R-35*	FRS-R-250
FRS-R-5/10	FRS-R-4-1/2	FRS-R-40*	FRS-R-300
FRS-R-6/10	FRS-R-5	FRS-R-45*	FRS-R-350
FRS-R-1	FRS-R-5-5/10	FRS-R-50*	FRS-R-400
FRS-R-1-1/8	FRS-R-6*	FRS-R-60*	FRS-R-450
FRS-R-1-1/4	FRS-R-6-1/4*	FRS-R-65	FRS-R-500
FRS-R-1-4/10	FRS-R-7*	FRS-R-70	FRS-R-600
FRS-R-1-1/2	FRS-R-7-1/2*	FRS-R-75	
FRS-R-1-6/10	FRS-R-8*	FRS-R-80	
FRS-R-1 8/10	FRS-R-9*	FRS-R-90	

*Available with indication. To order, place "ID" at the end of the catalog number. Example: FRS-R-7ID.

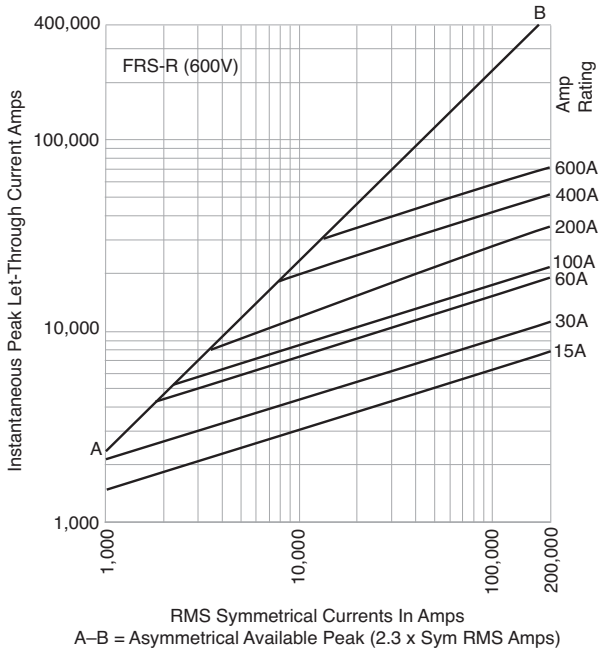
For superior electrical protection, Cooper Bussmann recommends upgrading FRS-R fuse applications to Low-Peak LPS-RK fuses. See page 29.

Data Sheet: 1017 (0-60), 1018 (70-600)
Data Sheet: 1070 (6-60) FRS-R with Indication

Time-Current Characteristic Curves—Average Melt



Current Limitation Curves



A–B = Asymmetrical Available Peak (2.3 x Sym RMS Amps)

Recommended Fuse Holders & Blocks For Class RK5 Fuses
• See page 13

Recommended Fuse Reducers For Class R Fuses
• See page 14

For product data sheets, visit www.cooperbussmann.com/datasheets/ulcsa

Limitron® Fast-acting Fuses

PVS-R (600Vac/dc) Class RK5

Specifications

Description: A range of UL 2579 fast-acting 600Vdc Class RK5 fuses specifically designed to protect solar power systems in extreme ambient temperature, high cycling and low level fault current conditions (reverse current, multi-array fault).

Dimensions: See page 15 for Class RK5 dimensions.

Ratings:

Volts — 600Vac to UL 248-12
600Vdc to UL 2579

Amps — 20-350A

IR — 200kA RMS Sym. AC
20kA DC (20-60A)
10kA DC (70-350A)

Designed to meet the new UL Photovoltaic Fuse Standard

Agency Information: UL Std. 248-12, Class RK5, UL Listed, Guide JFGA, File E335324. Photovoltaic to UL 2579, CSA Component Certified C22.2.

Features and Benefits

- Current limitation for non-inductive circuits provides Class RK5 current-limiting response to ground fault and short-circuit conditions.
- Designed for the protection and isolation of photovoltaic systems.

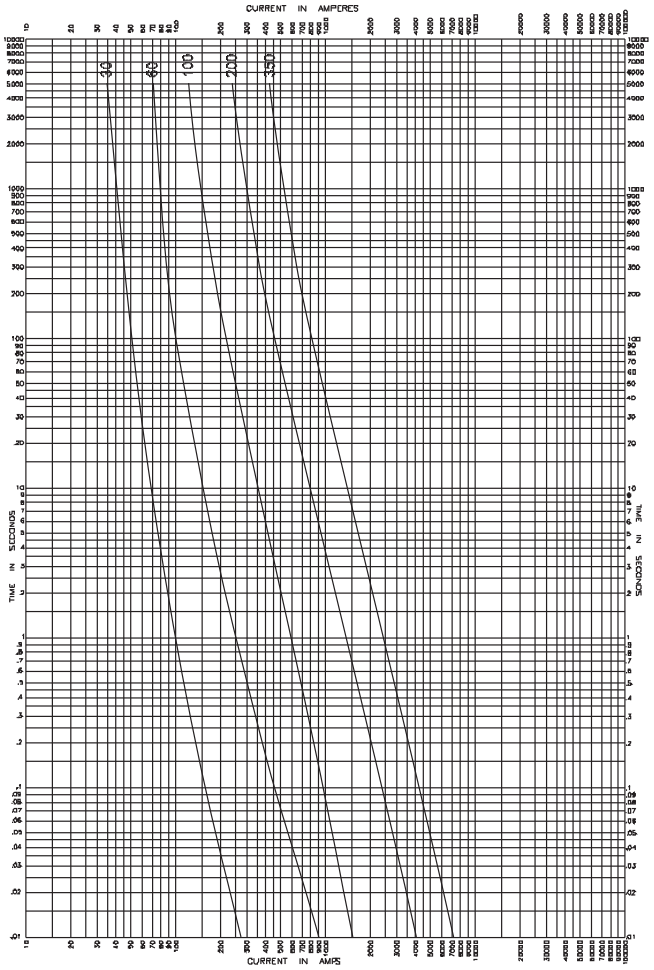
Typical Applications

- Photovoltaic systems
- Inverters

Catalog Numbers (Amps)

PVS-R-20	PVS-R-70	PVS-R-200
PVS-R-25	PVS-R-80	PVS-R-225
PVS-R-30	PVS-R-90	PVS-R-250
PVS-R-35	PVS-R-100	PVS-R-300
PVS-R-40	PVS-R-125	PVS-R-350
PVS-R-50	PVS-R-150	
PVS-R-60	PVS-R-175	

Time-Current Characteristic Curves—Average Melt



Recommended Fuse Holders & Blocks For Class RK5 Fuses

- See page 13

Data Sheet: 4203

T-Tron® Fast-acting Fuses

JJN Class T

Specifications

Description: Fast-acting, current-limiting fuse.

Dimensions: See page 16 for Class T dimensions.

Ratings:

Volts — 300Vac (or less)
— 160Vdc (15-600A)
— 170Vdc (601-1200A)

Amps — 1-1200A

IR — 200kA RMS Sym.
— 20kA DC @ 160Vdc
— 100kA DC @ 170Vdc

Agency Information: CE, Std. 248-15, Class T, UL Listed, Guide JDDZ, File E4273, CSA Certified, Class 1422-02, File 53787.

Features and Benefits

- Series combination ratings with branch circuit breakers allows broad range of coverage, independent of breaker manufacturer.
- Current limitation for non-inductive circuits provides Class T current-limiting response to maximum ground fault and short-circuit conditions.
- 200kA interrupting rating provides high ratings at all circuit locations.
- Small footprint allows more efficient use of available space.

Typical Applications

- Large Apartment Complexes
- Multi-Family Meter Stacks
- VFD Line Protection

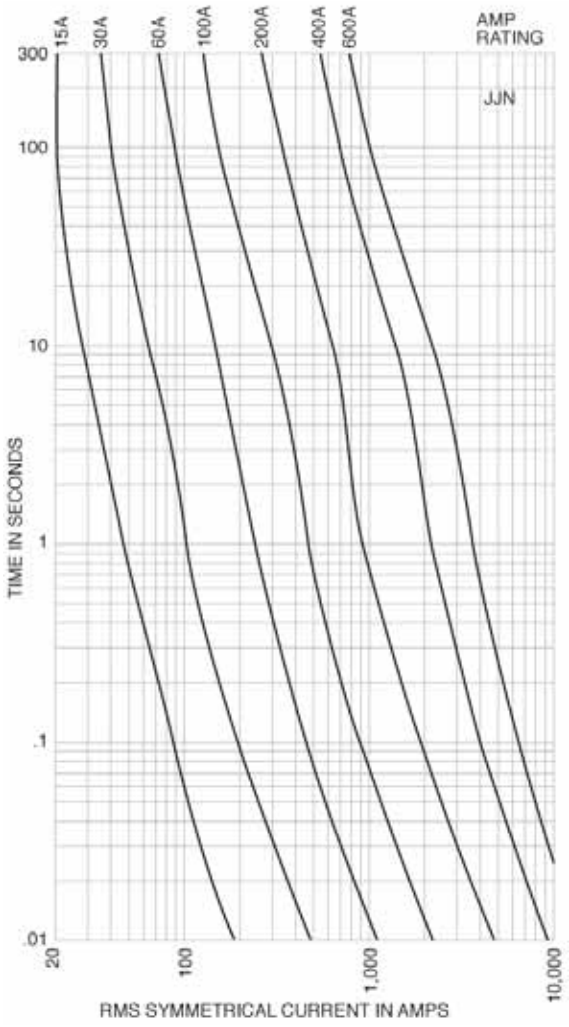
Catalog Numbers (Amps)

JJN-1	JJN-15	JJN-40	JJN-80	JJN-150	JJN-300	JJN-600
JJN-2	JJN-20	JJN-45	JJN-90	JJN-175	JJN-350	JJN-700
JJN-3	JJN-25	JJN-50	JJN-100	JJN-200	JJN-400	JJN-800
JJN-6	JJN-30	JJN-60	JJN-110	JJN-225	JJN-450	JJN-1000
JJN-10	JJN-35	JJN-70	JJN-125	JJN-250	JJN-500	JJN-1200

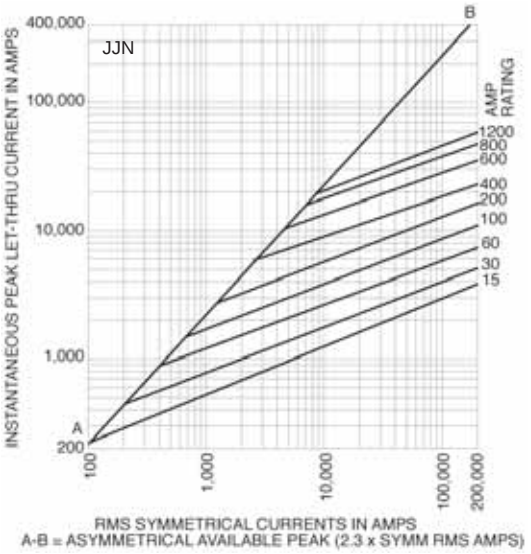
Recommended Fuse Holders & Blocks For Class T Fuses

• See page 13

Time-Current Characteristic Curves—Average Melt



Current Limitation Curves



Data Sheet: 1025

T-Tron® Fast-acting Fuses

JJS Class T

Specifications

Description: Very fast-acting, current-limiting fuse.

Dimensions: See page 16 for Class T dimensions.

Ratings:

Volts — 600Vac (or less)

Amps — 1-800A

IR — 200kA RMS Sym.

Agency Information: CE, Std. 248-15, Class T, UL Listed, Guide JDDZ, File E4273, CSA Certified, Class 1422-02, File 53787.

Features and Benefits

- Series combination ratings with branch circuit breakers allows broad range of coverage, independent of breaker manufacturer.
- Current limitation for non-inductive circuits provides Class T current-limiting response to maximum ground fault and short-circuit conditions.
- 200kA interrupting rating provides high ratings at all circuit locations.
- Small footprint allows more efficient use of available space.

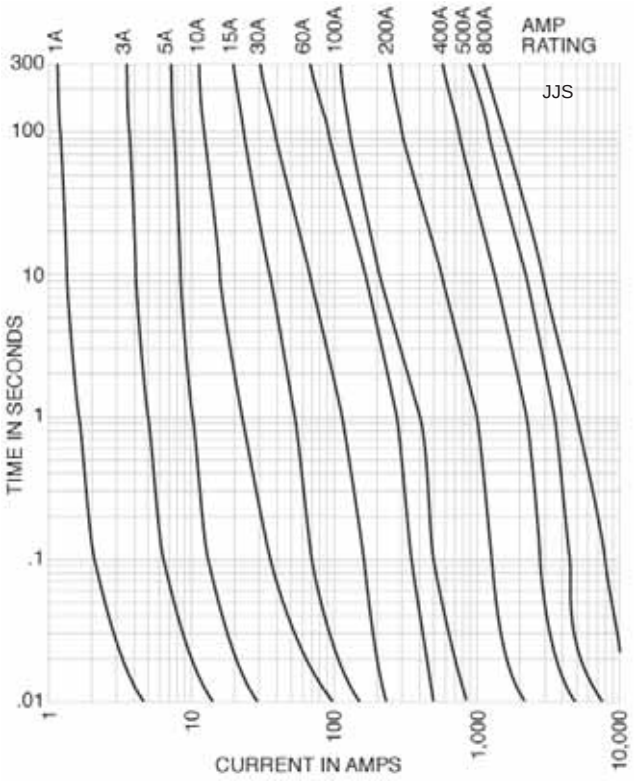
Typical Applications

- Large Apartment Complexes
- Multi-Family Meter Stacks
- VFD Line Protection

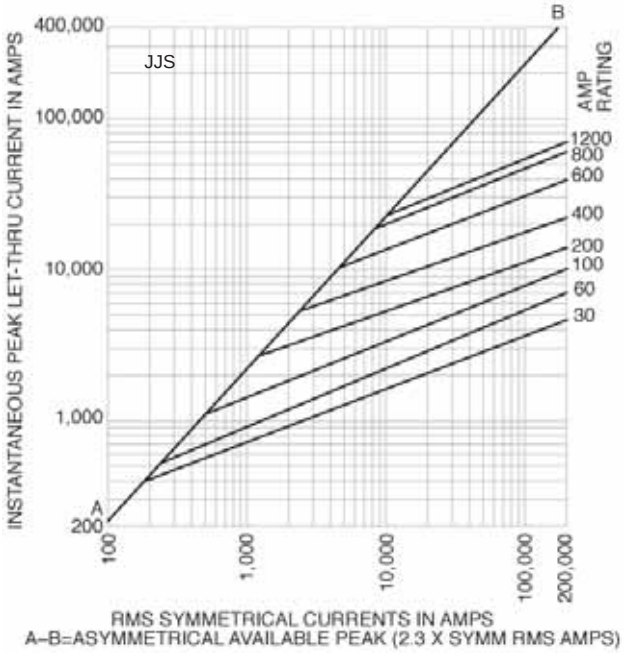
Catalog Numbers (Amps)

JJS-1	JJS-15	JJS-40	JJS-80	JJS-150	JJS-300	JJS-600
JJS-2	JJS-20	JJS-45	JJS-90	JJS-175	JJS-350	JJS-800
JJS-3	JJS-25	JJS-50	JJS-100	JJS-200	JJS-400	
JJS-6	JJS-30	JJS-60	JJS-110	JJS-225	JJS-450	
JJS-10	JJS-35	JJS-70	JJS-125	JJS-250	JJS-500	

Time-Current Characteristic Curves—Average Melt



Current Limitation Curves



Recommended Fuse Holders & Blocks For Class T Fuses

• See page 13

Data Sheet: 1029

Plug Fuses

W Series

Specifications
Description: Fast-acting plug fuse.
Dimensions: Edison base plug.
Construction: Brass threads with plastic body.
Ratings:
Volts — 125Vac
Amps — ½-12A
IR — 10kA RMS Sym.
Agency Information: CE, Std. 248-11, UL Listed, Guide JEFV, File E12112.

Features and Benefits
- Dependable, fast-acting circuit protection with 10kA interrupting rating for added safety when applied to existing plug fuse systems and 125-volt single-phase control circuits.

Typical Applications
- Replacement only in existing systems.
- For general purpose circuit protection.
- Use for lighting and other non-motor circuits.

Catalog Numbers* (Amps)

W-½	W-2 ½	W-6	W-10
W-1	W-3	W-6 ½	W-12
W-1 $^{9}/_{10}$	W-4	W-7	W-DUMMY**
W-2	W-5	W-8	

*W-15, W-20, W-25, and W-30 plug fuses obsoleted. Suggest replacing with either T-(Amp) or TL-(Amp) plug fuses.

** Non-conductive dummy base. Not a fuse.

Data Sheet: 1036

Recommended Fuse Holders For W Series Plug Fuses
- See page 14

SL and TL Series

Specifications
Description: Time-delay, loaded link plug fuse.
Dimensions:
SL — Rejection base
TL — Edison base
Construction:
SL — Plastic base with rejection threads
TL — Brass threads with plastic body
Ratings:
Volts — 125Vac
Amps — 15-30A
IR — 10kA RMS Sym.
Agency Information: CE, Std. 248-11, UL Listed, Guide JEFV, File E12112.

Features and Benefits
- Time-delay loaded link TL Series Edison base plug fuses pass motor overload starting currents without opening and allow closer sizing to motor load for added protection.
- Time-delay loaded link SL Series fuses provide a rejection feature (when used alone or with Fustat adapters to retrofit Edison base holders) to help prevent overfusing.

Typical Applications
- Small motor and inductive load circuits with high in-rush current levels.
- Used with box cover units to provide equipment protection.
- Applications benefiting from fuse rejection (SL Series only).

SL Catalog Numbers (Amps)

SL-15	SL-20	SL-25	SL-30

TL Catalog Numbers (Amps)

TL-15	TL-20	TL-25	TL-30
EDA***	EDN****		

*** Non-conductive Edison base dummy. Not a fuse.
**** Conductive Edison base dummy. Not a fuse.

Data Sheets: 1033 (SL) & 1035 (TL)

Recommended Fuse Holders For SL & TL Series Plug Fuses
- See page 14
- See page 42 for Fustat adapters for use with SL Series

Plug Fuses

S and T Series

Specifications
Description: Dual-element, time-delay plug fuse.

Dimensions:
S — Rejection base
T — Edison base

Construction:
S — Plastic base with rejection threads
T — Brass threads with plastic body

Ratings:
Volts — 125Vac
Amps — S Series: ¼-30A
— T Series: 3/10-30A
IR — 10kA RMS Sym.

Agency Information: CE, Std. 248-11, Type S and T: UL Listed (0-6¼) Guide JFHR, File E56412 (7-30A) Guide JEFV, File E12112; CSA Certified, Class 1423-01, File 53787.

Features and Benefits

- Time-delay, dual-element T Series Edison base plug fuses provide small motor overload protection when used with box cover units.
- Time-delay, dual-element S Series plug fuses provide a rejection feature (when used alone or with Fustat adapters to retrofit Edison base holders) to prevent overfusing of branch circuits.

Typical Applications

- S Series — Residential Load Centers
- T Series — Box Cover Units for small motor overload protection
- Applications benefiting from fuse rejection (S Series only)

S Series Catalog Numbers (Amps)

S-¼	S-3/10	S-1-3/10	S-2-½	S-4	S-7	S-14
S-3/10	S-1	S-1-8/10	S-2-8/10	S-4-½	S-8	S-15
S-4/10	S-1-⅛	S-2	S-3	S-5	S-9	S-20
S-½	S-1-¼	S-2-¼	S-3-2/10	S-6	S-10	S-25
S-5/10	S-1-4/10	S-5-5/10	S-3-½	S-6-¼	S-12	S-30

T Series Catalog Numbers (Amps)

T-3/10	T-1-⅛	T-2-¼	T-4	T-7	T-15
T-4/10	T-1-¼	T-2-½	T-4-½	T-8	T-20
T-½	T-1-4/10	T-2-8/10	T-5	T-9	T-25
T-5/10	T-1-5/10	T-3	T-5-5/10	T-10	T-30
T-8/10	T-1-8/10	T-3-2/10	T-6	T-12	EDA*
T-1	T-2	T-3-½	T-6-¼	T-14	EDN**

* Non-conductive Edison base dummy. Not a fuse.
** Conductive Edison base dummy. Not a fuse.

Data Sheet: 1032 (S) & 1034 (T)
Recommended Fuse Holders For S & T Series Plug Fuses
- See page 14
- See page 42 for Fustat adapters for use with S Series

P & TC Series

Specifications
Description:
P Series - Type P Dual-element fuse
TC Series - Type D Dual-element, Time-delay fuse

Dimensions: Edison base

Construction: Brass threads with plastic body

Ratings:
Volts — 125Vac or less
Amps — 15-30A
IR — 10kA

Agency Information:
P Series - CSA Certified
TC Series - CSA Certified (Class 1423-01, File # 53787)

Features and Benefits

P Series
- "P" rating for Canadian applications.
- Non-time delay for non-inductive loads

TC Series
- "D" rating for Canadian applications
- Heavy duty TC fuses are industrial strength products, featuring dual-element construction.
- This spring loaded design provides superior short-circuit and overload protection.
- The TC fuses have more time-delay than the medium duty fuses in order to better protect industrial motors and residential circuits.

Typical Applications

- P Series — Non-inductive loads, residential load centers
- TC Series — Box Cover Units for small motor overload protection

P Series Catalog Numbers (Amps)

P-15	P-20	P-25	P-30

TC Series Catalog Numbers (Amps)

TC-15	TC-20	TC-25	TC-30

Data Sheet: 1039 (TC Series only)
Recommended Fuse Holders For P & TC Series Plug Fuses
- See page 14
- See page 42 for Fustat adapters for use with S Series

Plug Fuses

MB Edison Base Circuit Breakers

Specifications
Description: Edison base manual reset circuit breakers.
Dimensions: Edison base
Construction: Brass threads with plastic body
Ratings:
Volts — 125Vac only
Amps — 15-20A
IR — 10kA RMS Sym.
Agency Information: UL Listed, File E14942

Features and Benefits
- Fit standard Edison base fuse receptacles.
- Resettable upon overload event.

Typical Applications*
- Replacing Edison base plug fuses in residential fuse panels.

Catalog Numbers* (Amps)

MB-15
MB-20

* Not for use in box cover units or for inductive loads.

Fustat Fuse Adapters

Specifications
Description: Adapters for using Type S and SL rejection fuses in Edison base fuse sockets.

Features and Benefits
- Fustat adapters screw into the “Edison” thread fuse sockets of standard fuse boxes making it easy to retrofit existing fuse installations
- Available in various amp ratings to cover a wide range of rating requirements

Typical Applications
- Plug fuse installations where it is desirable to restrict fuse amp ratings

Catalog Numbers (Amps)

SA-1*	SA-3-$\frac{7}{10}$*	SA-10*
SA-1-$\frac{1}{4}$*	SA-4*	SA-15**
SA-1-$\frac{9}{10}$*	SA-5*	SA-20**
SA-2*	SA-6-$\frac{1}{4}$*	SA-30**
SA-2-$\frac{1}{2}$*	SA-8*	

* Single motor circuits.
** Branch circuits.

Fustat® Adapters for Small Motor Protection*

Adapter	Accepts Fuses
SA-1	S-1 or smaller
SA-1-$\frac{1}{4}$	S-1-$\frac{1}{4}$ or smaller
SA-1-$\frac{9}{10}$	S-1-$\frac{9}{10}$ or smaller
SA-2	S-2 or S-1-$\frac{9}{10}$
SA-2-$\frac{1}{2}$	S-2-$\frac{1}{2}$ to S-1-$\frac{9}{10}$
SA-3-$\frac{7}{10}$	S-3-$\frac{7}{10}$ to S-1-$\frac{9}{10}$
SA-4	S-4 to S-3-$\frac{1}{2}$
SA-5	S-5 to S-3-$\frac{1}{2}$
SA-6-$\frac{1}{4}$	S-6-$\frac{1}{4}$ to S-3-$\frac{1}{2}$
SA-8	S-8 to S-7
SA-10	S-10 to S-7
SA-15	S-15 to S-7
SA-20	S-20
SA-30	S-30 to S-20

* Both motor running and short-circuit protection.

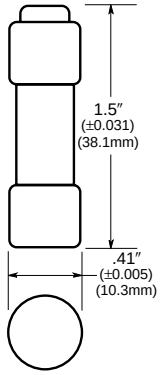
Fustat® Adapters for Branch Circuit Protection

Adapter	Accepts Fuses
SA-15	S-15 to S-7
SA-20	S-20
SA-30	S-25
SA 30	S-30 to S-20

LIMITRON® KTK-R

Fast-Acting Fuses
13/32” x 1-1/2”, Class CC - 600 Volt, 1/10 - 30 Amps

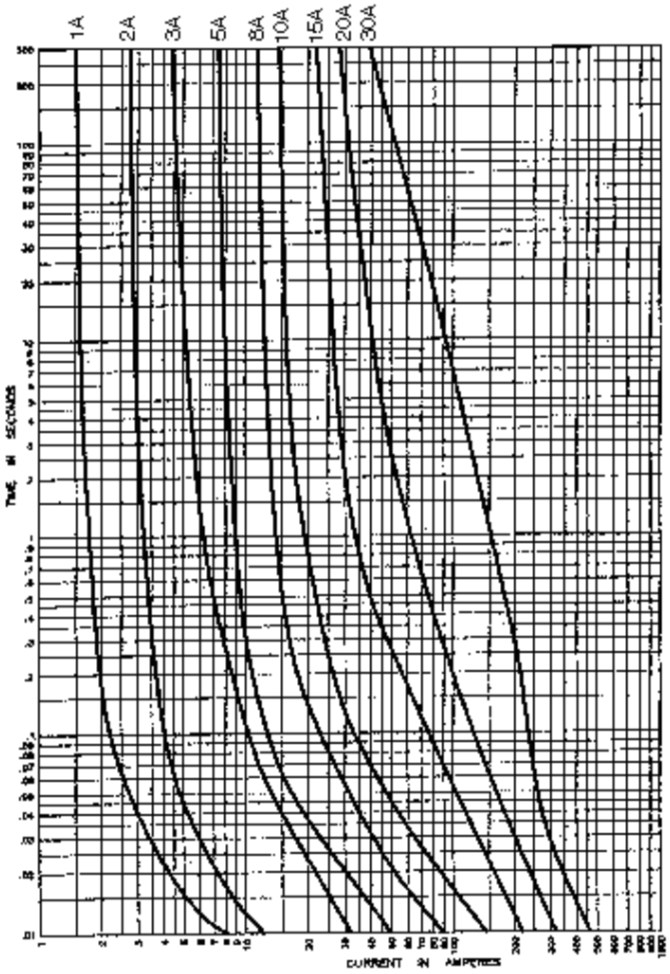
Dimensional Data



Catalog Symbol: KTK-R
Fast-Acting Branch Circuit Fuse:
1/10 TO 30A
Voltage Rating:
600Vac (or less): 0-30A
Interrupting Rating:
ac: 200,000A RMS Sym.
UL LIisted, STD. 248-4, Class CC,
(Guide #JDDZ, File #E4273)
CSA Certified, C22.2 NO. 248.4, (File #53787—Class #1422-02)

- LIMITRON® fast-acting fuse.
- Melamine tube. Nickel-plated brass endcaps.
- U.L. Listed for branch circuit protection.
- Rejection type; for both standard holders or those which reject other type fuses.

Time-Current Characteristic Curves–Average Melt



Electrical Ratings (Catalog Symbol and Amperes)

600Vac - UL Listed & C.S.A.			
KTK-R-1/10	KTK-R-6/10	KTK-R-3-1/2	KTK-R-10
KTK-R-1/8	KTK-R-3/4	KTK-R-4	KTK-R-12
KTK-R-2/10	KTK-R-1	KTK-R-5	KTK-R-15
KTK-R-1/4	KTK-R-1-1/2	KTK-R-6	KTK-R-20
KTK-R-3/10	KTK-R-2	KTK-R-7	KTK-R-25
KTK-R-4/10	KTK-R-2-1/2	KTK-R-8	KTK-R-30
KTK-R-1/2	KTK-R-3	KTK-R-9	–

Carton Quantity and Weight

Ampere Ratings	Carton Qty.	Weight* Lbs.	Kg.
1/10–30	10	.180	.082

*Weight per carton.

Recommended fuseblocks/fuseholders for Class CC 600V fuses
See Data Sheets listed below
- Open fuseblocks - 1105
- Finger-safe fuseholders - 1109, 1102, 1103, 1151
- Panel-mount fuseholders - 2114, 2113
- In-line fuseholders - 2126

CE CE logo denotes compliance with European Union Low Voltage Directive (50-1000Vac, 75-1500Vdc). Refer to Data Sheet: 8002 or contact Bussmann Application Engineering at 636-527-1270 for more information.

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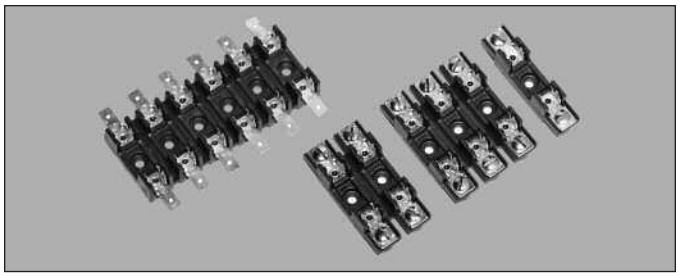
COOPER Bussmann

S-8000 Series

1/4" x 1 1/4" Fuse Blocks



Description

- For 1/4" x 1 1/4" (6.3 x 32mm) fuses
- Bolt-in and snap-in mounting available
- Tight cluster mounting
- All types of terminal configurations
- Clips made of spring-bronze
- Anti-rotational pin provided
- Flame retardant thermoplastic meets UL 94V0

RoHS 2002/95/EC

Environmental Data

- Relative Temperature Index (RTI)
  - Bolt-in 130°C
  - Snap-in 110°C

Agency Information

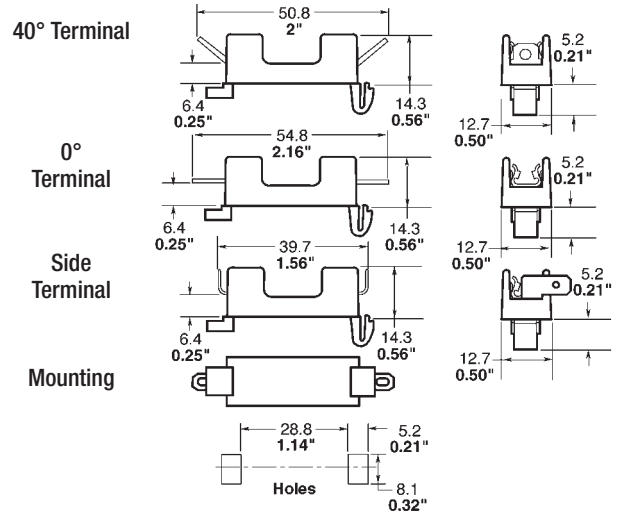
- UL Recognized: E14853
- CSA Certified: 47235

Specifications

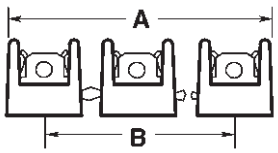
Series	Volts	UL Max Amps	CSA Max. Amps
S-8000	300Vac/dc	25	21
S-8100	300Vac/dc	20	13
S-8200	300Vac/dc	20	16
S-8300	300Vac/dc	30	25

Dimensions - mm/in.

S-8000 Single-Pole Snap-In Mounting Series



Multiple Pole

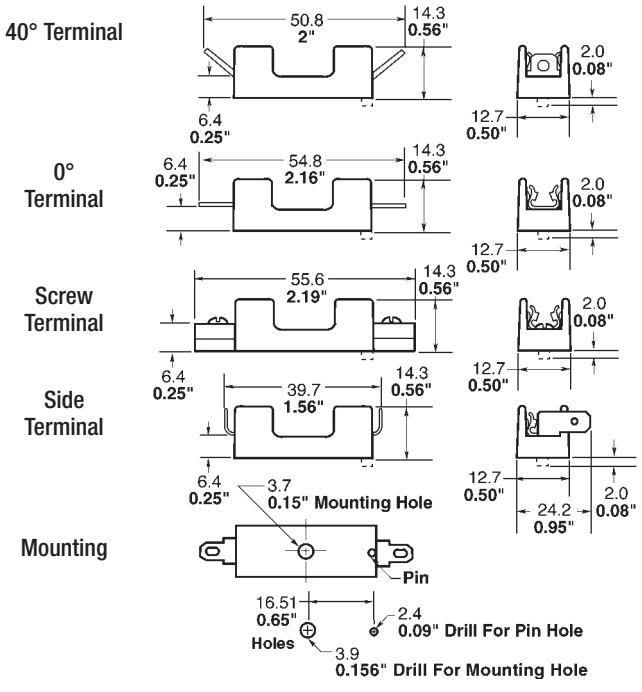


Mounting Dimensions

No. of Poles	Inches		Millimeters	
	A	B	A	B
1	–	–	–	–
2	1 1/8"	5/8"	28.6	15.9
3	1 3/4"	1 1/4"	44.4	31.8
4	2 3/8"	1 7/8"	60.3	47.6
5	3"	2 1/2"	76.2	63.5
6	3 5/8"	3 1/8"	92.1	79.4
7	4 1/4"	3 3/4"	108.0	95.2
8	4 7/8"	4 3/8"	123.8	111.1
9	5 1/2"	5"	139.7	127.0
10	6 1/8"	5 5/8"	155.6	142.9
11	6 3/4"	6 1/4"	171.4	158.8
12	7 3/8"	6 7/8"	187.3	174.6

Dimensions - mm/in.

S-8000 Single-Pole Bolt-In Mounting Series



Component	Material
Clip	Spring-Bronze, Bright Tin-Plate
Body	Thermoplastic

Packaging Code	
Catalog Number Prefix	**Description**
Blank	Varies with number of poles. Contact customer service.
BK/	Varies with number of poles. Contact customer service.

Ordering

- Specify packaging, product, and option code

Bolt-in Mounting Example:
BK/S-8102-6-R

BK/	S-8	1	02	6	-	R
↓	↓	↓	↓	↓		↓
1	2	3	4	5		7

Snap-in Mounting Example:
BK/S-8001-1-SNP-R

BK/	S-8	0	01	-	1	-	SNP	-	R
↓	↓	↓	↓		↓		↓		↓
1	2	3	4		5		6		7

1. Packaging Code:	BK/
2. Series Number:	S-8
3. Type Terminal:	0 = Solder 1 = 3/16" quick connect 2 = 1/4" quick connect 3 = Screw
4. Terminal Angle:	01 = Straight (0°) 02 = 40° Angle 03 = Side*
5. Number of Poles:	(1 – 12) 1X = One pole, No Mounting Stud
6. Mounting Style:	SNP = Snap-in Mounting*
7. RoHS Compliant Version	-R

*Available only in single pole

This bulletin is intended to present product design solutions and technical information that will help the end user with design applications. Cooper Bussmann reserves the right, without notice, to change design or construction of any products and to discontinue or limit distribution of any products. Cooper Bussmann also reserves the right to change or update, without notice, any technical information contained in this bulletin. Once a product has been selected, it should be tested by the user in all possible applications.

Life Support Policy: Cooper Bussmann does not authorize the use of any of its products for use in life support devices or systems without the express written approval of an officer of the Company. Life support systems are devices which support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

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St. Louis, MO 63178
www.cooperbussmann.com

77-100 Series

Bronze Full Port Ball Valve

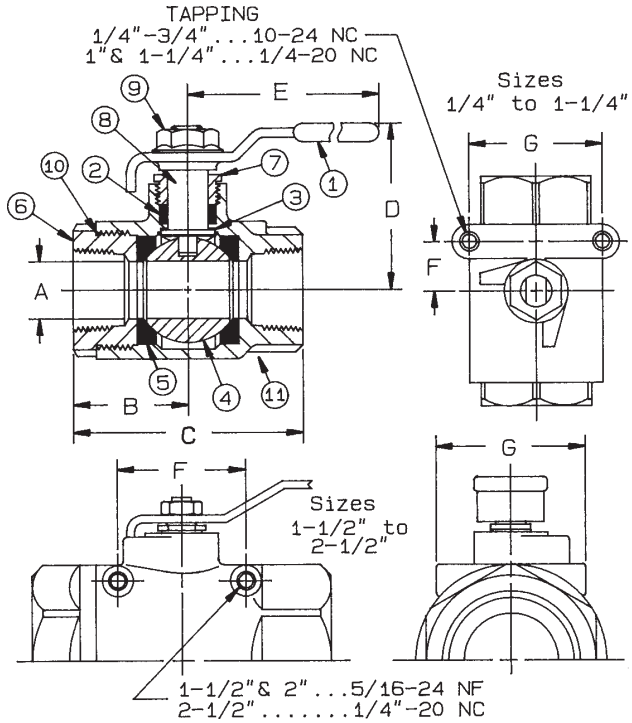
Threaded, 600 psig WOG, Cold Non-Shock. 150 psig Saturated Steam. (See referenced P/T chart)
Vacuum Service to 29 inches Hg.
Federal Specification: WW-V-35C, Type: II, Composition: BZ, Style: 3.
MSS SP-110; Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

FEATURES

- Two-piece body
- Reinforced seats
- Mounting pad for easy actuator mounting
- Blow-out-proof stem design
- Adjustable packing gland
- Full port for full flow & min. pressure drop

STANDARD MATERIAL LIST

1. Lever and grip	Steel, zinc plated w/vinyl	10. Body seal	PTFE (1-1/4" to 2-1/2")
2. Stem packing	MPTFE	11. Body	B584-C84400
3. Stem bearing	RPTFE		
4. Ball	B16, chrome plated		
5. Seat (2)	RPTFE		
6. Retainer	B16 (1/4" to 1") B584-C84400 (1-1/4" to 2-1/2")		
7. Gland nut	B16		
8. Stem	B16		
9. Lever nut	Steel, zinc plated		



BRONZE FULL PORT BALL VALVE

NUMBER	SIZE	A	B	C	D	E	F	G	Wt.
77-101-01	1/4"	.43	1.09	2.18	1.77	3.87	.50	1.12	.79
77-102-01	3/8"	.50	1.09	2.18	1.77	3.87	.50	1.12	.75
77-103-01	1/2"	.50	1.09	2.18	1.77	3.87	.50	1.12	.69
77-104-01	3/4"	.81	1.56	3.12	2.17	4.87	.87	1.37	1.83
77-105-01	1"	1.00	1.81	3.62	2.68	5.50	.93	1.50	3.32
77-106-01	1-1/4"	1.25	2.12	4.25	2.90	5.50	.93	1.50	5.05
77-107-01	1-1/2"	1.50	2.37	4.75	3.10	8.00	2.08	3.06	6.71
77-108-01	2"	2.00	2.65	5.37	3.50	8.00	2.41	3.52	11.75
77-109-01	2-1/2"	2.50	3.25	6.50	4.06	8.00	2.75	3.37	17.25

VARIATIONS AVAILABLE:

77-140 Series (316 SS Ball & Stem)
77-190 Series (Locked Retainer)

OPTIONS AVAILABLE:

(SUFFIX)	OPTION	SIZES
-02-	Stem Grounded	1/4" to 2-1/2"
-04-	2-1/4" CS Stem Extension	1/4" to 2-1/2"
-05-	Plain Ball	1/4" to 2-1/2"
-07-	Steel Tee Handle	1/4" to 1-1/4"
-08-	90° Reversed Stem	1/4" to 2-1/2"
-10-	SS Lever & Nut	1/4" to 2-1/2"
-11-	Therma-Seal™ Insulating Tee Handle	1/4" to 2"
-14-	Side Vented Ball (Uni-Directional)	1/4" to 2-1/2"
-15-	Wheel Handle, Steel	1/4" to 1-1/4"
-16-	Chain Lever - Vertical	3/4" to 2-1/2"
-17-	Rough Chrome Plated - Bronze Valves	1/4" to 2-1/2"
-18-	Plain Yellow Grip	1/4" to 2-1/2"
-20-	Slot Vented Ball	1/4" to 2-1/2"
-21-	UHMWPE Trim (Non-PTFE)	1/4" to 2-1/2"
-24-	Graphite Packing	1/4" to 2-1/2"
-27-	SS Latch-Lock Lever & Nut	1/4" to 2-1/2"
-28-	Mounting Pad Not Drilled & Tapped	1/4" to 2-1/2"
-30-	Cam-Lock and Grounded	1/4" to 1-1/4"
-32-	SS Tee Handle & Nut	1/4" to 1-1/4"
-35-	VTFE Trim	1/4" to 2-1/2"
-36-	SS High-Rise Round Handle & Nut	1/4" to 1-1/4"
-40-	Cyl-Loc and Grounded	1/4" to 1-1/4"
-45-	Less Lever & Nut	1/4" to 2-1/2"
-46-	Latch Lock Lever - Lock in Closed Position Only	1/4" to 2-1/2"
-47-	SS Oval Latch-Lock Handle & Nut	1/4" to 3/4"
-48-	SS Oval Handle (No Latch) & Nut	1/4" to 2"
-49-	Assembled Dry	1/4" to 2-1/2"
-50-	2-1/4" CS Locking Stem Extension	1/4" to 2-1/2"
-56-	Multifill Seats & Packing	1/4" to 2-1/2"
-57-	Oxygen Cleaned	1/4" to 2-1/2"
-58-	Chain Lever - Horizontal	3/4" to 2-1/2"
-60-	Static Grounded Ball & Stem	1/4" to 2-1/2"
-63-	NPT x Solder/Socket Weld	1/4" to 2-1/2"
-64-	250# Steam Trim	1/4" to 2-1/2"
-92-	Balancing Stop	1/4" to 2-1/2"
-P01-	BSPP (Parallel) Thread Connection	1/4" to 2-1/2"
-T01-	BSPT (Tapered) Thread Connection	1/4" to 2-1/2"
-SV-	Safety Vent (H-12)	1/4" to 2"

For Pressure/Temperature Ratings, Refer to Page M-8, Graph No. 4

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FLOW DATA

For Apollo® Ball Valves

The listed Cv "factors" are derived from actual flow testing, in the Apollo® Ball Valve Division, Conbraco Industries, Inc., Pageland, South Carolina. These tests were completed using standard "off the shelf" valves with no special preparation and utilizing standard schedule 40 pipe. It should be understood that these factors are for the valve only and also include the connection configuration. The flow testing is done utilizing water as a fluid media and is a direct statement of the gallons of water flowed per minute with a 1 psig pressure differential across the valve/connection unit. Line pressure is not a factor. Because the Cv is a factor, the formula can be used to estimate flow of most media for valve sizing.

Flow of Liquid

$$Q = Cv\sqrt{\frac{\Delta P}{SpGr}}$$

or $$\Delta P = \frac{(Q)^2\ (SpGr)}{(Cv)^2}$$

Where:
Q = flow in US gpm
ΔP = pressure drop (psig)
SpGr = specific gravity at flowing temperature
Cv = valve constant

Flow of Gas

$$Q = 1360\ Cv\sqrt{\frac{(\Delta P)\ (P_1)}{(SpGr)\ (T)}}$$

or $$\Delta P = \frac{5.4 \times 10^{-7}\ (SpGr)\ (T)\ (Q)^2}{(Cv)^2\ (P_2)}$$

Where:
Q = flow in SCFH
ΔP = pressure drop (psig)
SpGr = specific gravity (based on air = 1.0)
P_2 = outlet pressure–psia (psig + 14.7)
T = (temp. °F + 460)
Cv = valve constant

Cv FACTORS FOR APOLLO VALVES

Valve Size (inches)	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6	8	10	12
Ball Valves															
32-100/200 Series	5.1	6.6	8	24	30	45	55	95	--	--	--	--	--	--	--
64-100/200 Series	6	7	19	34	50	104	268	309	629	1018	1622	--	--	--	--
64W Series	--	--	--	--	--	--	--	--	629	1018	1622	--	--	--	--
70B-140 Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--
70-100/200 Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	---
70-300/400 Series	--	--	15	30	43	48	84	108	--	--	--	--	--	--	--
70-600 Series	2.3	4.5	5.4	12	14	21	34	47	--	--	--	--	--	--	--
70-800 Series	8.4	7.2	15	30	43	48	84	--	--	--	--	--	--	--	--
71AR Series	--	--	--	30	43	48	84	108	190	370	--	--	--	--	--
71-100/200 Series	--	--	--	30	43	48	84	108	190	370	--	--	--	--	--
72-100/900 Series	--	--	26	48	65	125	170	216	--	--	--	--	--	--	--
73A-100 Series	8.4	7.2	15	30	43	48	84	108	--	--	--	--	--	--	--
73-300/400 Series	--	--	26	48	65	125	170	216	--	--	--	--	--	--	--
74-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--
75-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--
76AR Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--
76F-100 Series	8.1	15	15	51	68	125	177	389	--	--	--	--	--	--	--
76-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--
76-300/400 Series	--	--	26	48	65	125	170	216	--	--	--	--	--	--	--
76-600 Series	2.3	4.5	5.4	12	14	21	34	47	--	--	--	--	--	--	--
7K-100 Series	--	--	15	51	68	125	177	389	503	--	--	--	--	--	--
77AR Series	8.1	15	15	51	68	125	177	389	--	--	--	--	--	--	--
77C-100/200 Series	4.5	7.2	16	36	68	125	177	389	503	--	--	--	--	--	--
77D-140 Series	4.5	7.2	16	36	68	125	177	389	--	--	--	--	--	--	--
77D-640 Series	--	--	--	11	24	35	--	--	--	--	--	--	--	--	--
77G-UL Series	4.5	7.2	16	36	68	125	177	389	503	--	--	--	--	--	--
77W Series	--	--	16	36	68	125	177	389	--	--	--	--	--	--	--
77X Series	--	--	16	36	68	--	--	--	--	--	--	--	--	--	--
77-100/200 Series	8.1	15	15	51	68	125	177	389	503	--	--	--	--	--	--

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Cv FACTORS FOR APOLLO VALVES

Valve Size (inches)	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6	8	10	12
Ball Valves															
79 Series	8.5	8.5	9.8	32	44	66	148	218	440	390	--	--	--	--	--
80/81 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--
82-100/200 Series	8.1	14	26	51	68	120	170	376	510	996	1893	--	--	--	--
83A/83B Series	8.1	14	26	51	68	120	170	376	--	--	--	--	--	--	--
83R-100/200 Series	--	--	--	--	--	--	170	376	--	996	1893	--	--	--	--
86A/86B Series	8.1	14	26	51	68	120	170	376	--	--	--	--	--	--	--
86R-100/200 Series	--	--	--	--	--	--	170	376	--	996	1893	--	--	--	--
87A-100 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
87A-200 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
87A-700 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
87A-900 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
87B-100 Series	--	--	--	--	--	--	--	--	--	375	673	1099	1902	3890	--
88A-100 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
88A-200 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
88A-700 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
88A-900 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
88B-100 Series	--	--	--	--	--	--	--	--	--	375	673	1099	1902	3890	--
89-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--
9A-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
91-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
92-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
93-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
94A-100/200 Series	6	7	19	34	50	104	268	309	629	1018	1622	--	--	--	--
95-100/200 Series	--	--	15	51	68	--	--	--	--	--	--	--	--	--	--
95A-300/400 Series	--	--	19	34	50	--	--	--	--	--	--	--	--	--	--
96-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
399-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--
489-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--

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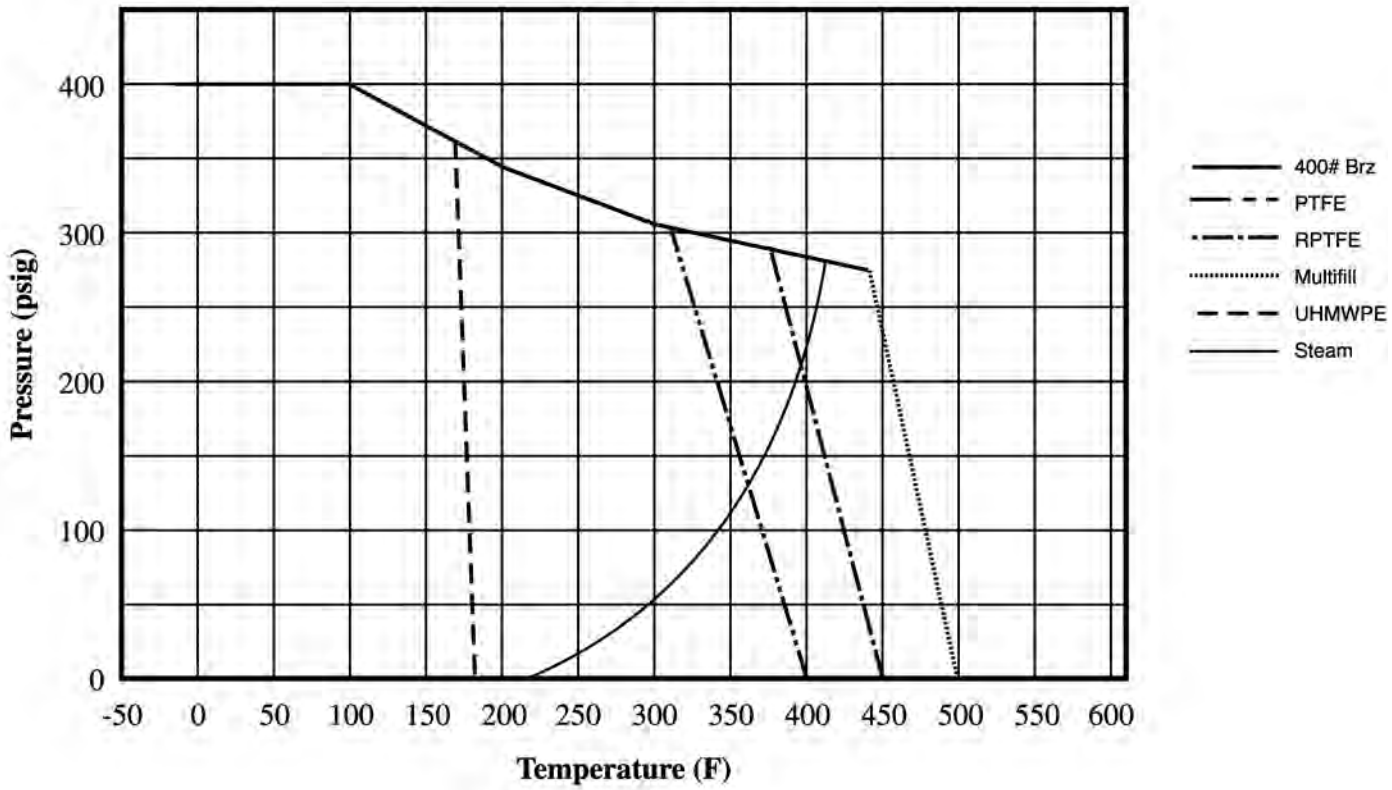
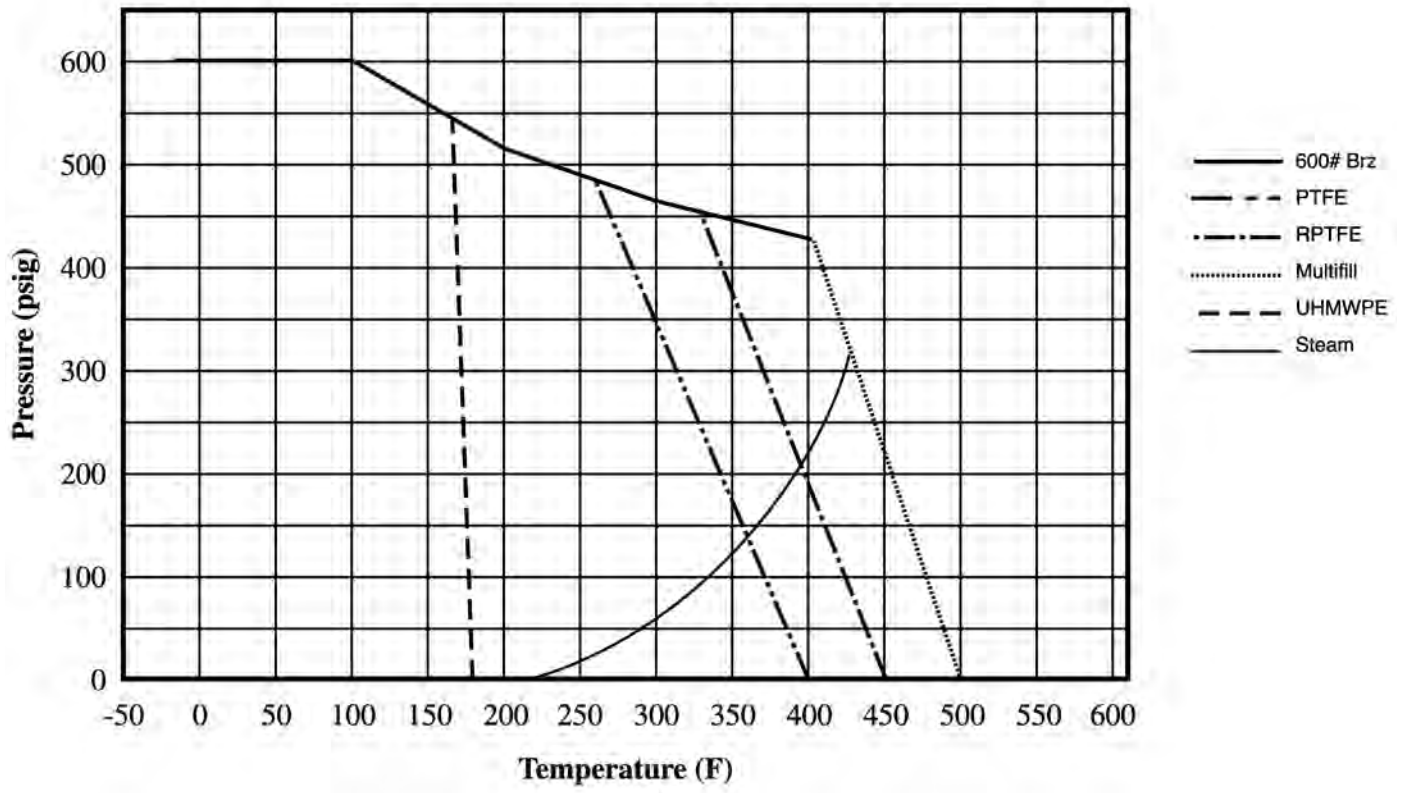
400# Bronze P-T Rating (Graph 3)



600# Bronze P-T Rating (Graph 4)



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Apollo 7K/77-10X-SV Series Threaded End Ball Valves
With Secure Vent Option
Installation, Operation, & Maintenance Manual

Introduction

This manual presents guidelines for the Installation, Operation and Maintenance of Apollo two-piece threaded end ball valves with the secure vent automatic drain option.

Storage & Protection

Valve should be stored in its original shipping container until just prior to installation with any protection means in place and protected from the environment or any other potentially damaging effects. Valve should be properly supported and secured before moving to prevent possible damage to valve, property or harm to personnel.

Limitations

- In-line service only, not recommended for end of line service.
- Valves with the secure vent option are intended for air service only. It is the user's responsibility to determine that the valve is appropriate for the intended application. Application not to allow corrosion >.002"/year (.05mm/year).
- The possibility of material deterioration in service and need for periodic inspections is the responsibility of the user.
- Mechanical supports are not to be welded or brazed directly to the valve, however may be fitted to the associated piping.
- It is the piping system designer's responsibility to implement appropriate protection measures to minimize reaction forces and moments, which result from supports, attachments, piping, etc.
- Laws of the state must be observed as they apply.
- Some National/Local authorities may require periodic hydrostatic testing and inspections.
- Only use Conbraco replacement parts.
- On-off service only (not to be used for throttling).
- Valves are primarily intended for industrial use.
- Level of training, experience or ability of users should be at least that of trained and skilled maintenance personnel or technicians.

Caution

Proper valve selection is the first step in any successful installation. Refer to an "Apollo Ball Valve Binder", where applicable for application guidance or contact your distributor or the factory for more detailed assistance.

WARNING: All installations shall be provided with pressure relief devices in accordance with the requirements of the Pressure Equipment Directive 97/23/EC. Proper installation prior to initial operation is the user's responsibility. Furthermore where an additional hazard can occur due to valve exposure to fire or other unexpected external heat source, a supplemental pressure relief device shall be installed to protect against excessive pressure. This device shall prevent the pressure from rising more than 21% above the maximum allowable working pressure.

Pre-Installation Inspection

Inspect the piping system prior to valve installation whenever possible, to insure that it has been properly flushed and cleared of construction and fabrication debris. The seating surfaces in soft seated valves are particularly susceptible to weld slag and sand blasting grit. Pipe scale, metal chips and other foreign materials should be avoided.

Just prior to installation, remove each valve from its packing. Examine the flow bore for debris. All Apollo ball valves are shipped in the open position to prevent damage to the ball surface. Any grit or foreign matter must be removed. Do not install a damaged valve.

It is also important to check for valve operation clearances. If necessary, valves can be installed at angles other than upright or vertical.

Valves with the secure vent option are directional and must be oriented correctly for proper operation. Each valve is marked with a flow direction arrow.

Drain port leakage is normal and should be considered. Any pressure downstream of the valve will be released from the drain port when the valve is closed. Threaded drain port connections are a standard feature on the 7K series.

Installation

Apollo ball valves are designed to be used with pipe and fittings threaded to American National Taper Pipe Thread standards, NPT.

1. Check mating threads for cleanliness and defects. Correct any issues as necessary.
2. An appropriate thread sealant compound or PTFE tape is required for make-up of pressure tight NPT joints. Following thread sealant application, hand tighten the joint making certain that the flow direction is correct.
3. To complete the joint, the hex flats nearest the joint must be used for tightening. Never apply torque through the valve's body and retainer joint. Tightening approximately one turn past hand tight engagement should be sufficient.
4. Prior to connecting the remaining joint, check for possible excessive piping loads. Vibrations and movement of connected piping can cause severe damage. Connect the remaining joint using the methods described above if piping supports are found to be acceptable.
5. Connect any vent piping if applicable.

Operation

Apollo ball valves are shipped with a hang tag secured about the valve stem. Although each valve is thoroughly tested and inspected before it leaves the factory, a hang tag could be lost or destroyed during shipment or while in storage. If it is missing or not legible, contact your distributor or the factory for assistance before operating valve. **WARNING Provide means to monitor filling valve to prevent over pressurization and instability.**

Ball valves are intended to be on-off devices operating through 90° rotation of the stem. Operation is clockwise to close. Valves with the secure vent, automatic drain option, are designed to relieve any pressure from downstream piping. If downstream pressure is noted, valve maintenance is required.

The most common service failures not related to the installation and start-up processes are:

* Exceeding the operating temperature or pressure limits of the valve due to a process upset condition.
* A chemical attack on valve components due to either misapplication or changes in the service.

Violating temperature and pressure limits can result in immediate valve failure where chemical attack or corrosion generally occurs gradually.

Maintenance

Problems if they occur most frequently appear immediately following initial start-up or following a re- start after a shutdown period. Particular attention needs to be paid to valves and other critical equipment during these times. Once the system has stabilized and is in operation, fewer problems tend to occur.

Valve Adjustments

At some point in the service life of the valve, leakage may occur. This should be noted in the maintenance history log of the valve. The stem packing was adjusted at the factory to provide a leak tight seal when the valve was new, but compaction can occur within these seals that may make re-adjustment necessary. Stem leakage should be stopped as soon as it is detected. Packing adjustment can be accomplished by turning the packing gland screw clockwise to the maximum torque shown in Table 1.

Caution: Never back off the packing gland adjustment screw when the valve is under pressure.

Table 1: Packing Gland Adjustment Screw Torque

Valve Size (inches)	Torque (ft-lbs)
¼", 3/8", 1/2"	12-13
3/4"	20-22
1", 1-1/4"	61-67
1-1/2", 2", 2-1/2"	61-67

Do not over tighten the packing gland adjustment screw. Over-tightening will result in excessive operating torque and shorten the packing's service life. If stem leakage continues, or operating torque becomes excessive, de-pressurize the valve and replace the stem seals.

Valves with high operating torque not resulting from stem seal over-tightening or valves which have leakage by the seats, may have damaged seats or ball surfaces. These valves should be de-pressurized, disassembled, and inspected for damage.

Valve Overhaul

As part of planned maintenance or as a result of a problem that cannot be adjusted away, a valve may require a complete overhaul. Due to the uncomplicated design of the Apollo ball valves this can easily be accomplished.

The first step is to contact your distributor to acquire an appropriate rebuild kit. These kits typically contain a complete set of seats, seals, and gaskets. If ball or stem damage is suspected, it is wise to order these parts when the seal kit is purchased. Most of these items will be in stock at the factory. To properly order spare parts, you will need the valve model number as shown on the hang tag.

Disassembly

Once the spare parts are on hand, the first step in the valve disassembly is to isolate the valve from line pressure. **WARNING do not attempt to work on any valve under pressure, and depending on the service, valve surface temperature may be hot, use proper protective gear to protect against burns. Also provide safe means for uncontrolled release of fluid.**

Using an adjustable wrench, valve lever, or properly sized open end wrench, rotate the stem until the valve is in the one half open, one half closed position. Be careful not to damage the stem. This will allow any cavity pressure to be released into the pipeline. Place the valve in the open position after this is done.

Due to the uncomplicated design of Apollo two-piece ball valves, disassembly and repair can easily be accomplished through the following steps.

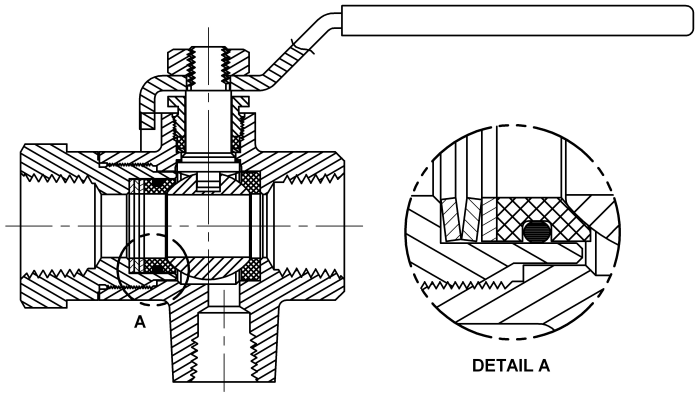
1. Remove the lever nut, lever, and packing gland screw.
2. Secure the valve body to a heavy work table in preparation for removal of the retainer. It may be beneficial to lightly strike the valve body and retainer joint with a small hammer to help break down the loctite® retaining compound.
3. Remove the retainer by turning counter-clockwise. A large pipe wrench will be required to remove the retainers from valves larger than 3/4".
4. After removal of the retainer, the ball and remaining seat can easily be removed from the valve. The valve must be placed in the closed position for ball removal.
5. Next, remove the stem by pressing it downward into the body. Remove the stem and stem bearing from the body.
6. Lastly, remove the stem packing. Take care not to scratch the packing gland wall when removing the stem packing. Screw drivers and other sharp tools should be used with caution.

Inspection

1. Thoroughly clean all the components in preparation for inspection.
2. Inspect stem packing contact surfaces for scratches and pits. If either of these is apparent and can be removed with #120 or finer grit emery cloth, body replacement will not be necessary. Deep scratches running down the side of the packing gland or excessive pitting will necessitate the replacement of the valve body.
3. Inspect the ball in the same manner, replace the ball if necessary.
4. Inspect remainder of body interior for pitting or corrosion and replace if excessive.
5. Inspect all parts for wear due to erosion or abrasion and replace if excessive.

Reassembly

1. Begin the re-assembly process by cleaning each of the component parts with a clean towel or cloth.
2. Place the stem bearing on the stem, and insert the stem into the valve body stem bore. Place the flats on top of the stem perpendicular to the centerline of the body.
3. If the application permits, lightly oil the seats with an oil of the consistency of cooking oil. Place the seat not containing the o'ring groove into the valve body seat pocket.
4. Next, insert the ball making certain that the vented side of the ball is adjacent to the body end seat.
5. The remaining seat, o'ring, spacer, and wavesprings must be correctly installed into the retainer before the retainer is installed into the body. See Detail A below.



6. After securing the body, apply a suitable loctite retaining compound to the retainer threads and assemble to the valve body. Torque to the value shown in table 2 below.

Table 2: Body and Retainer Joint Torque

Valve Size (inches)	Torque (ft-lbs)
1/4”	13
3/8”	16
1/2”	42
3/4”	63
1”	130
1-1/4”	199
1-1/2”	282
2”	686
2-1/2”	905

7. Insert the stem packing, followed by the packing gland screw and torque to the valve shown in table 1.
8. Install the hang tag, lever, and nut to complete the reassembly process.

Final Adjustments

Cycle the valve from open to close several times to verify free operation. Occasionally, after testing or initial start up, a minor stem packing leak may occur. Re-adjust the stem packing torque as necessary.

Hang Tag Information

All two-piece ball valves feature a yellow mylar hang tag secured about the valve stem. If this tag is missing or damaged, please contact your distributor or the factory for a replacement.

MYLAR HANG TAG
7K103SV
BODY: BRZ
STEM: BRZ
BALL: BRZ
SEAT: RPTFE
PACKING: MPTFE
Made In U.S.A.

AMETEK®
DREXELBROOK

For Assistance Call 1-800-527-6297
Outside North America + 215-674-1234

Installation and Operating Instructions

504-1000 Series VeriGAP™

Ultrasonic Level Switch
using:
404-1000 and 404-1060
Series Electronics

U.S. and Canada: 1-800-553-9092
24-Hour Service: 1-800-527-6297
International: +1 215-674-1234
Fax: +1 215-674-2731
E-mail: drexelbrook.service@ametek.com
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EDO# 09-07-102
504-1000-000-LM
Issue #7

504-1000 Series VeriGAP™

Ultrasonic Level Switch using: 404-1000 and 404-1060 Series Electronics

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Introduction

Section 1: Introduction

1.1 General Description

The 504-1000 Series ultrasonic VeriGAP™ switch is an integral assembly which senses liquid presence by ultrasonic techniques and energizes a relay which can be utilized to indicate and/or control the liquid at a predetermined level.

A high frequency acoustic signal is transmitted through the sensor gap when liquid is present. When liquid is not present, no signal transmission occurs. See Figure 1-1. When a signal is received, an electronic circuit produces a relay output. The ultrasonic sensor does not contain moving components. It is not affected by electrical or physical parameters of the process material and will operate over a wide temperature range. These characteristics make the 504-1000 a very reliable and economical solution to industrial liquid level control operations.

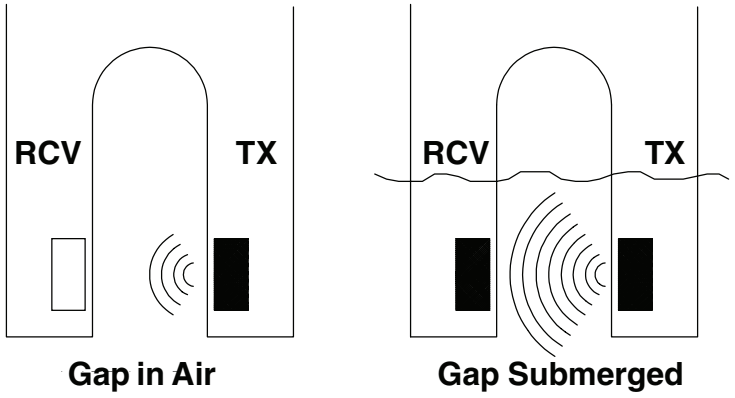


Figure 1-1
Gap Switch Operation

1.2 Verify™ Circuit

As an option, the ultrasonic two-wire Verify™ circuit is used in conjunction with the VeriGAP for pushbutton verification that the entire control system is functioning properly. This option is used with High Level Fail-safe devices only. It simulates a high level at the sensing element to meet spill prevention regulations and recommended practices. This test may also be used for ISO 9000 validation of your high level alarms and spill prevention systems.

1.3 Model Numbering

Technology
504 VeriGAp Switch

Power / Output
0 120 VAC, DPDT Relay
1 24 VDC, DPDT Relay
2 24 VDC. Loop Powered (Separate Instruction Manual)
3 240 VAC, DPDT Relay
6 Dual Gap, 2 DPDT Relays

Configuration
0 Integral Electronics
7 Remote Electronics

Sensing Element
01 316SS
03 Alloy 20
05 Hastelloy “C”
08 3A Approved Sanitary 316SS

5	0	4	–	1		0	0	–			

Electronics
404 VeriGAp Switch

Power / Output
0 120 VAC, DPDT Relay
1 24 VDC, DPDT Relay
2 24 VDC. Loop Powered (Separate Instruction Manual)
3 240 VAC, DPDT Relay

Number of Points
0 Single Point
6 Dual Point

Test Circuit
0 No Testing
V Verify
A Auto Verify

Housing Option
1 No Housing, chassis only
2 5”, Y-Hub, Remote, Explosion-Proof
3 5”, Y-Hub, Remote, Explosion-Proof, with Drexelcote™
4 Remote, NEMA 4X, Explosion-Proof
6 Remote, NEMA 4X, Explosion-Proof with Drexelcote™
8 Integral, NEMA 4X, Explosion-Proof with Drexelcote™
9 Integral, NEMA 4X, Explosion-Proof
F 5”, Y-Hub, Integral, Explosion-Proof
C 5”, Y-Hub, Integral, Explosion-Proof, with Drexelcote™

4	0	4	–	1			0	–	0		

Section 2: Installation

2.1 Unpacking

Carefully remove the contents of the shipping carton and check each item against the packing list before destroying any packing material. If there is any shortage or damage, report it immediately to the factory (1-800-527-6297).

2.2 Mounting The Instrument

The 504-1000 electronic unit was designed for field mounting, but it should be mounted in a location as free as possible from vibration, corrosive atmospheres, and any possibility of mechanical damage. For convenience at start-up, place the instrument in a reasonably accessible location. Ambient temperatures should be between -40°F and 160°F (-40°C to 70°C).

NOTICE

VeriGAP switches can be mounted in any orientation vertically. If the unit is mounted horizontally, rotate the sensor so that the electrical hub is down and the sensor slot is vertical. This allows any product buildup on the sensor to fall free. Note orientation of wrench flats relative to the gap.

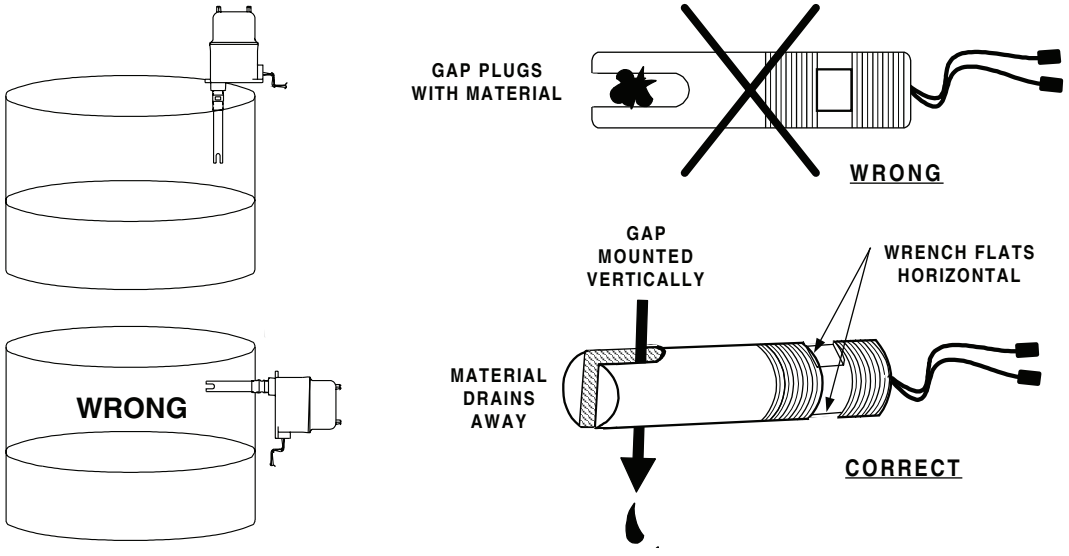
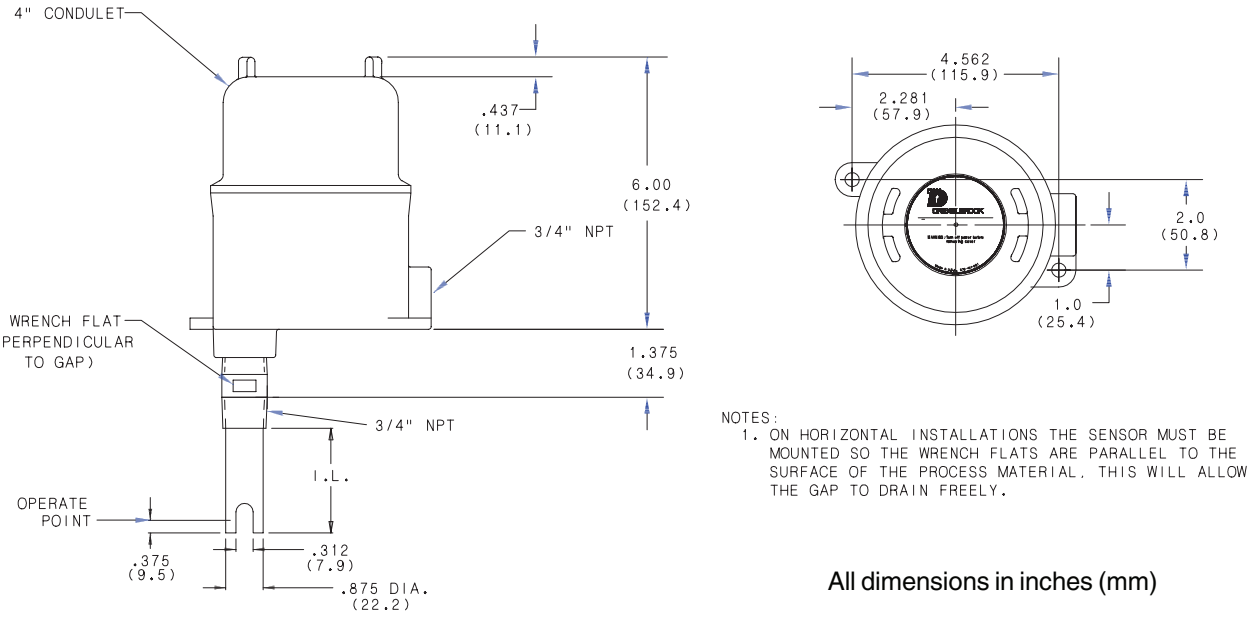
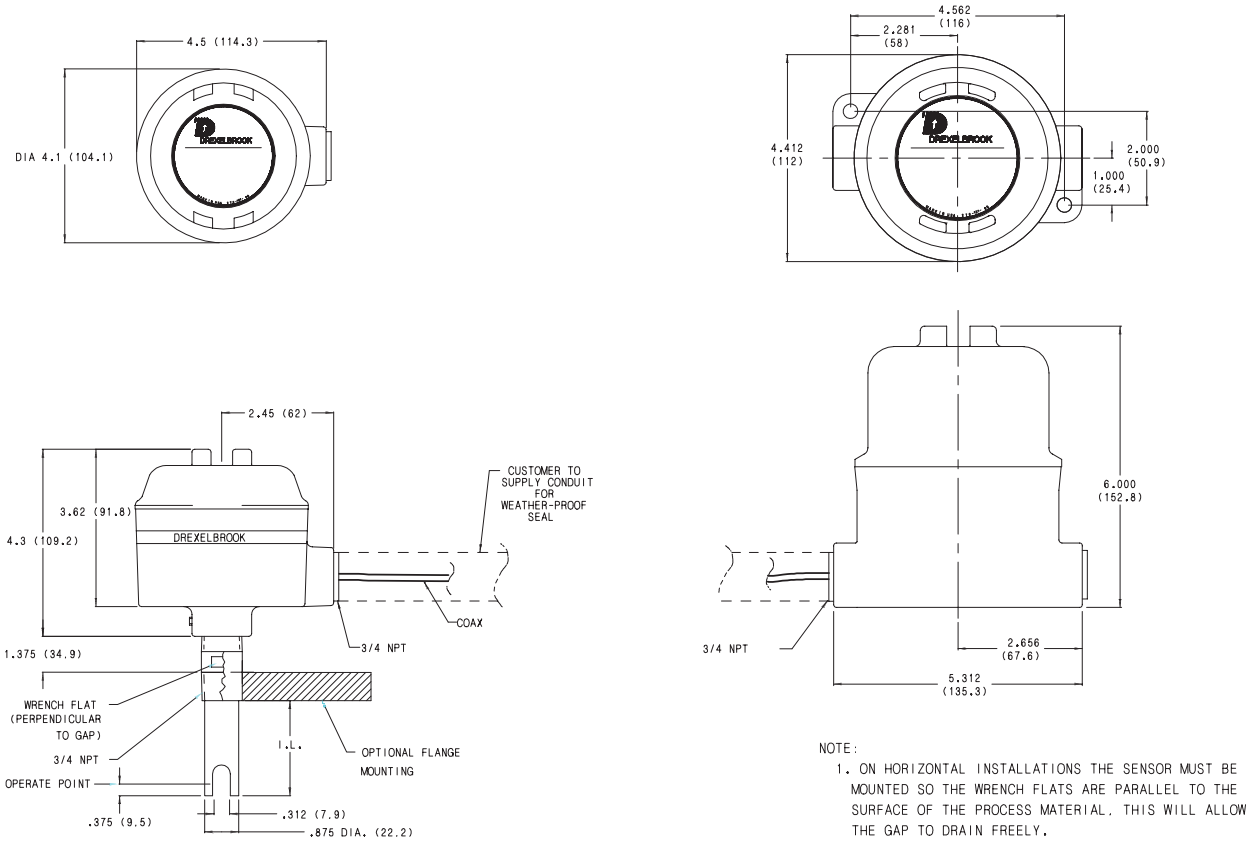


Figure 2-1
Mounting Orientation



All dimensions in inches (mm)

Figure 2-2
Mounting Dimensions, Integral Unit



All dimensions in inches (mm)

Figure 2-3
Mounting Dimensions, Remote Mounting

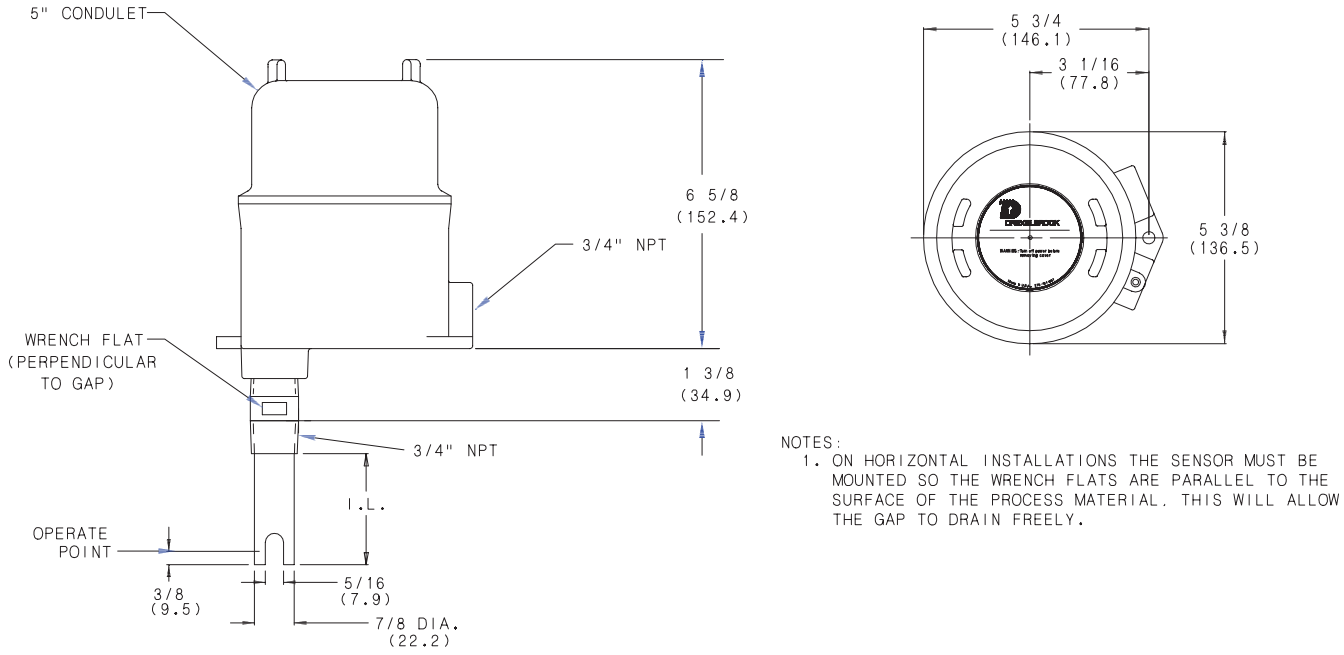


Figure 2-4
Mounting Dimensions, Verify™ Housing

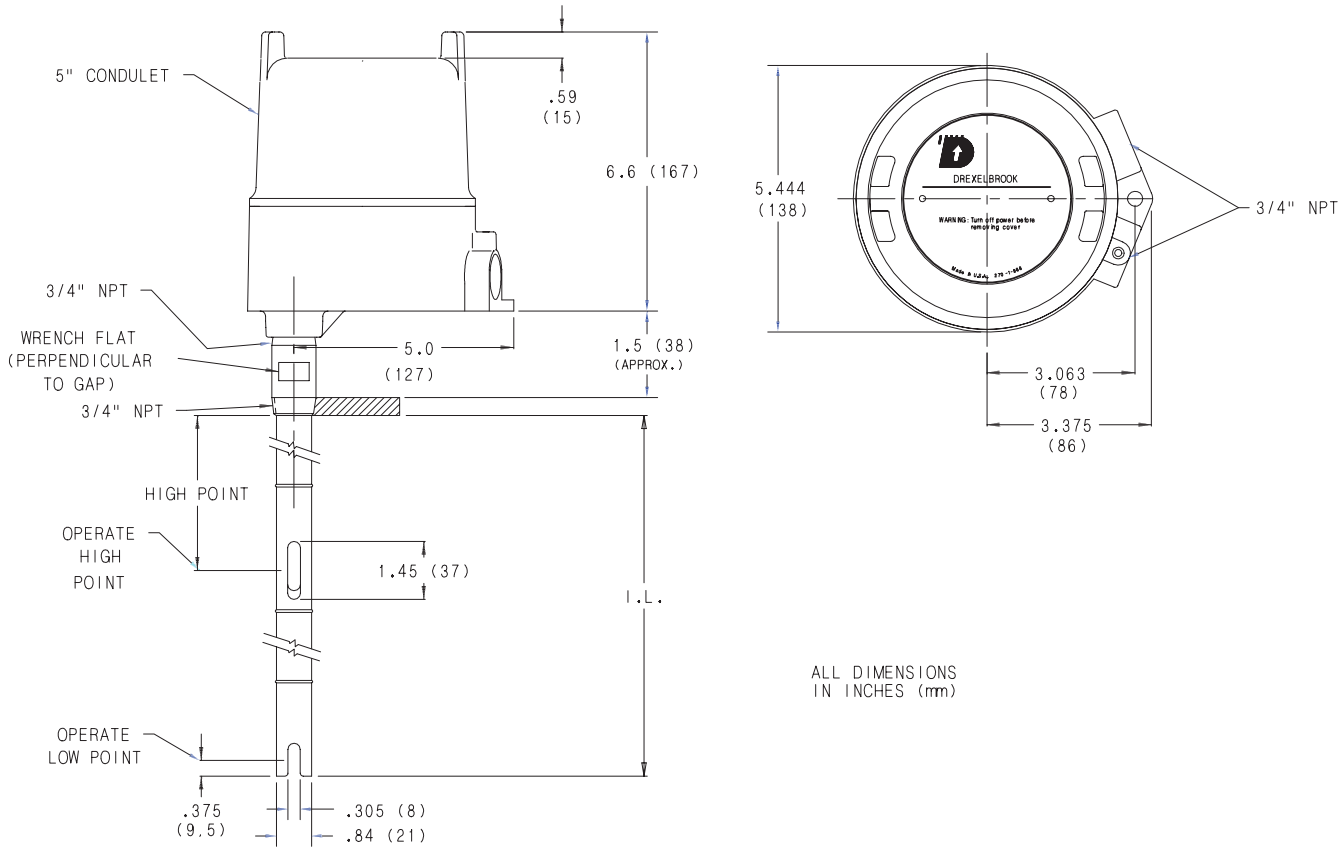


Figure 2-5
Mounting Dimensions, Dual Gap

2.3 Wiring The Instrument

CAUTION

Ensure that all wiring, electrical fittings and conduit connections conform to your local electrical codes for the location and environment of use. If the 504-1000 Gap Switch is located in a hazardous environment, do not open the enclosure cover or make/break any electrical connections without first disconnecting electrical power at the source.

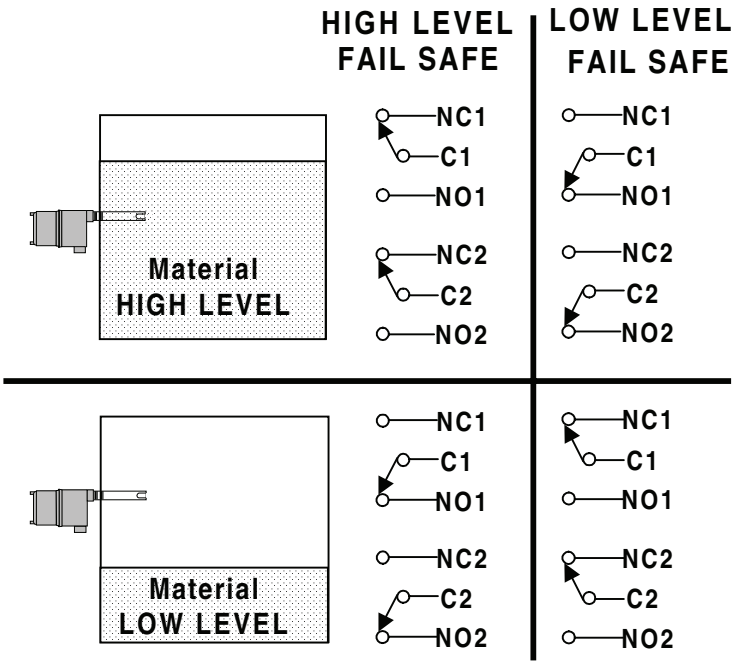
Use the following procedure to wire the 504-1000 Switch:

1. Ensure that the power is off.
2. Remove the cover.
3. Make all electrical connections to the Switch per the wiring diagram shown in Figure 2-7 through Figure 2-9. Use 14-gauge or smaller wiring. All connections are made on the terminal strip.
4. The PC board mounting screws can be removed to allow movement of the PC board during wiring.
5. After connections are secured and dressed, re-insert the PC board and close the enclosure cover.
7. Review Checklist:
   - Wiring correct?
   - Proper input voltage used?
   - Proper relay state at the receiver (relays will be in the alarm condition)?
8. Turn power on.

NOTICE

- Make sure that the 115 Vac supply is clean and free of noise.
- Do not supply power to the VeriGAP that originates at a variable frequency drive motor supply.
- Do not run relay wires or supply wires in same conduit as variable frequency drive wiring.

2.4 Relay Wiring



RELAY CONTACT CHART
(Power applied to instrument)

Figure 2-6
Relay Wiring

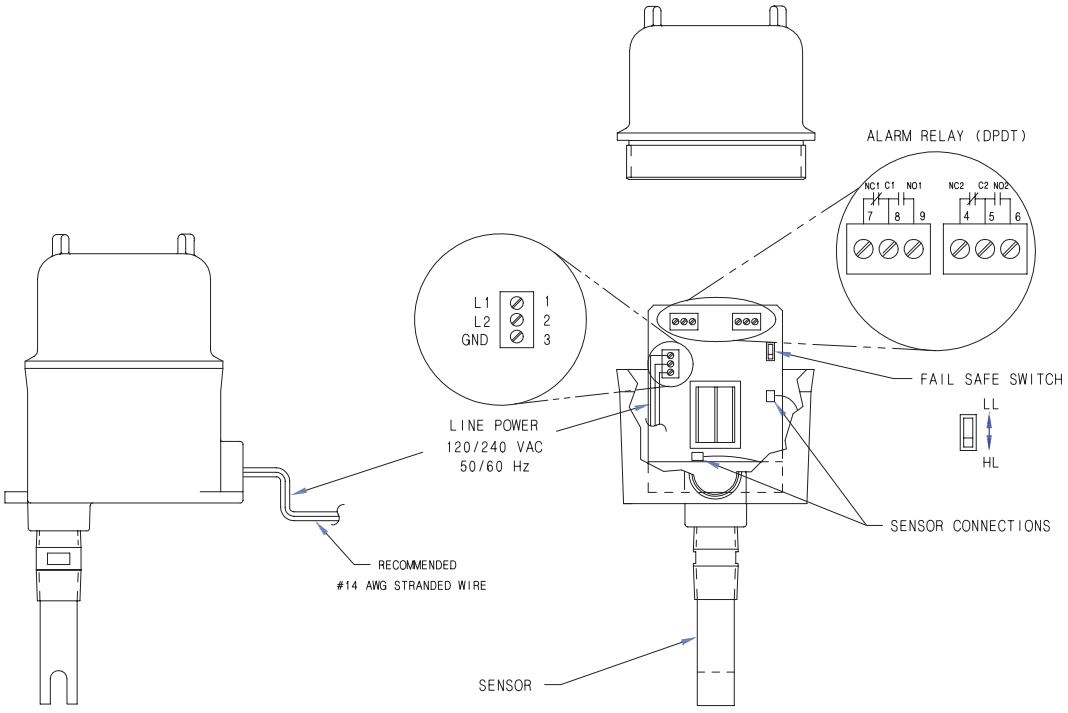


Figure 2-7
Wiring Diagram, 120 / 240 VAC, Integral Gap Switch

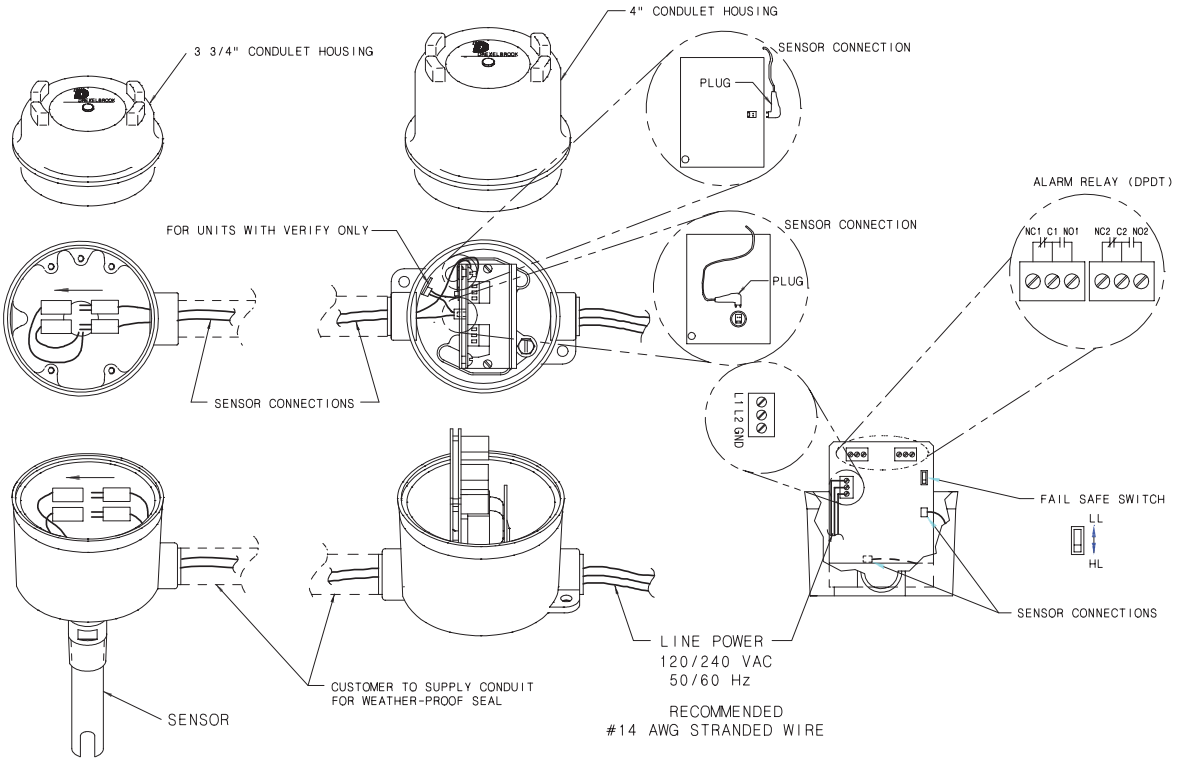


Figure 2-8
Wiring Diagram, 120 / 240 VAC, Remote Gap Switch

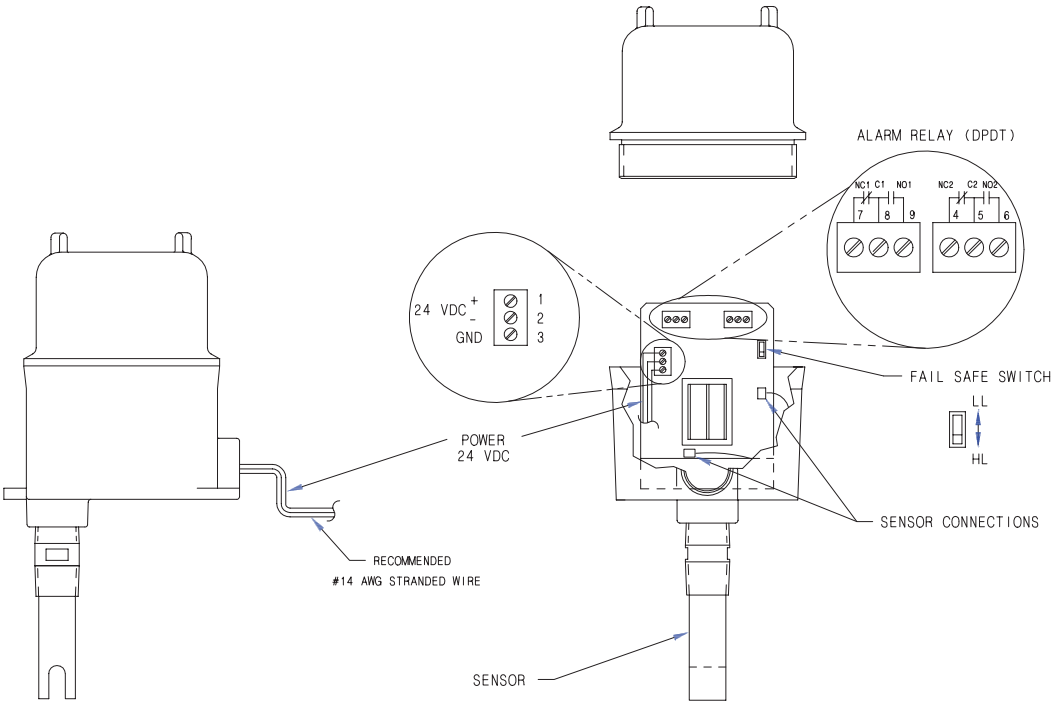


Figure 2-9
Wiring Diagram, 24 VDC, Integral Gap Switch

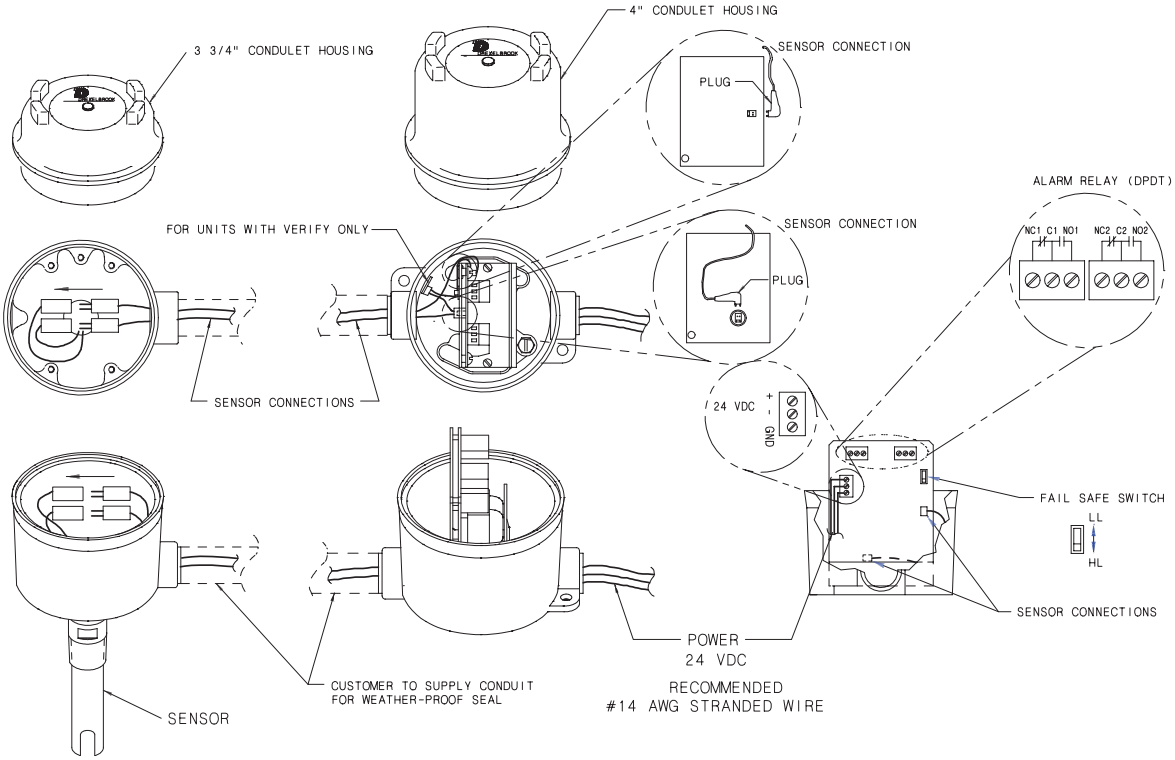


Figure 2-10
Wiring Diagram, 24 VDC, Remote Gap Switch

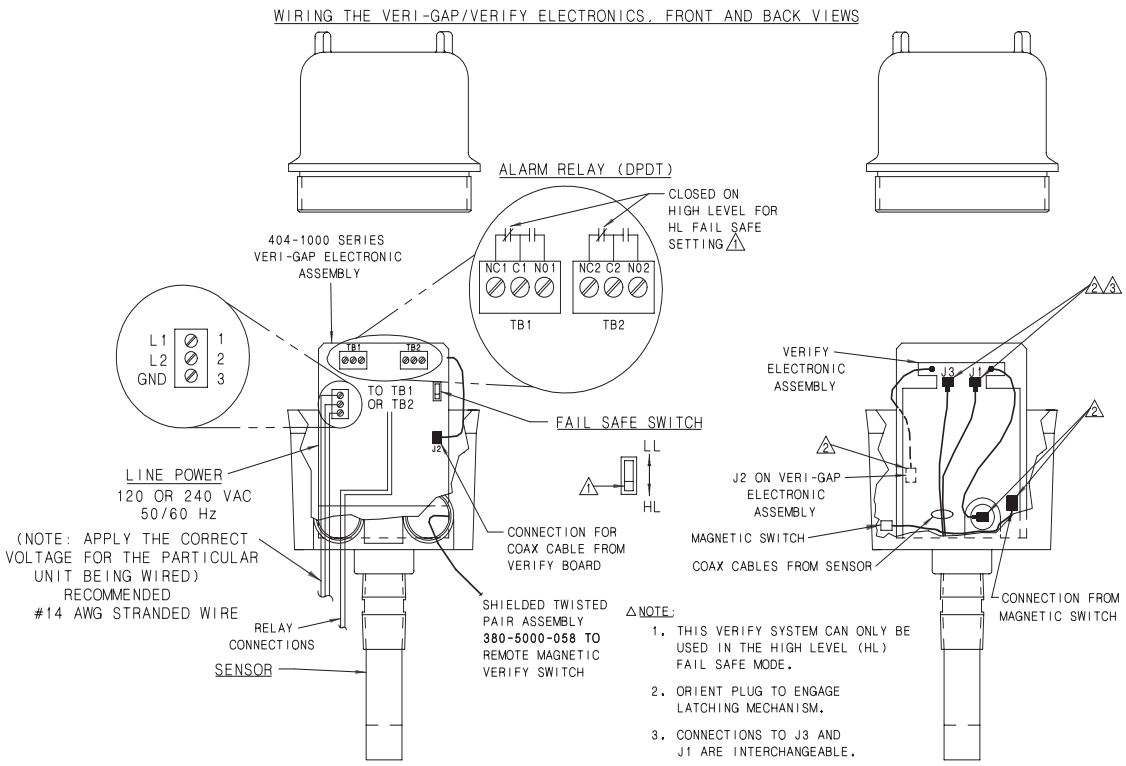


Figure 2-11 View 1
Wiring Diagram, 120 / 240 VAC, Gap Switch with Verify

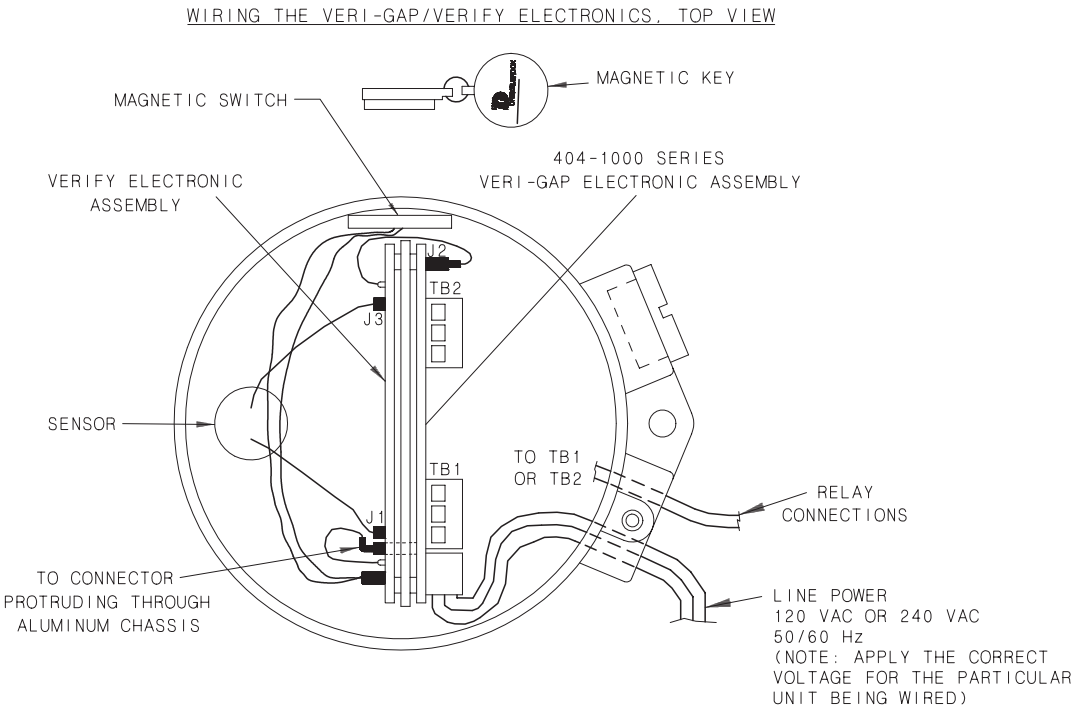


Figure 2-11 View 2
Wiring Diagram, 120 / 240 VAC, Gap Switch with Verify

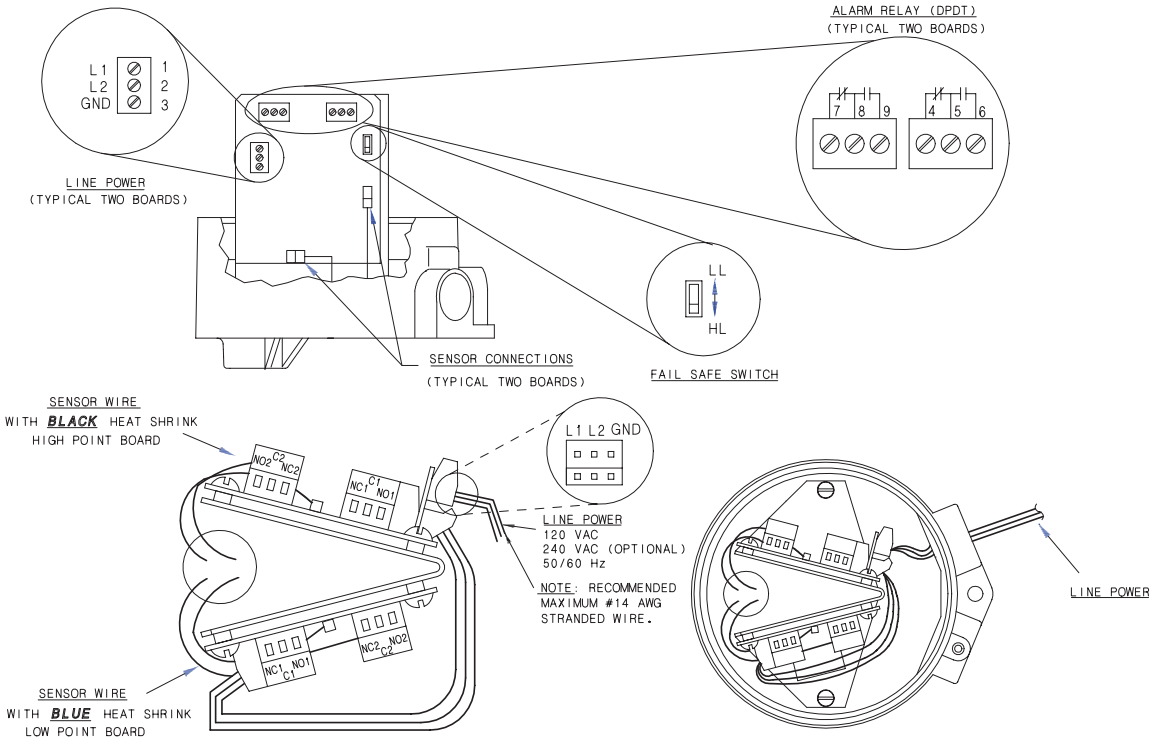


Figure 2-12
Wiring Diagram, 120 / 240 VAC, Integral, Dual, Gap Switch

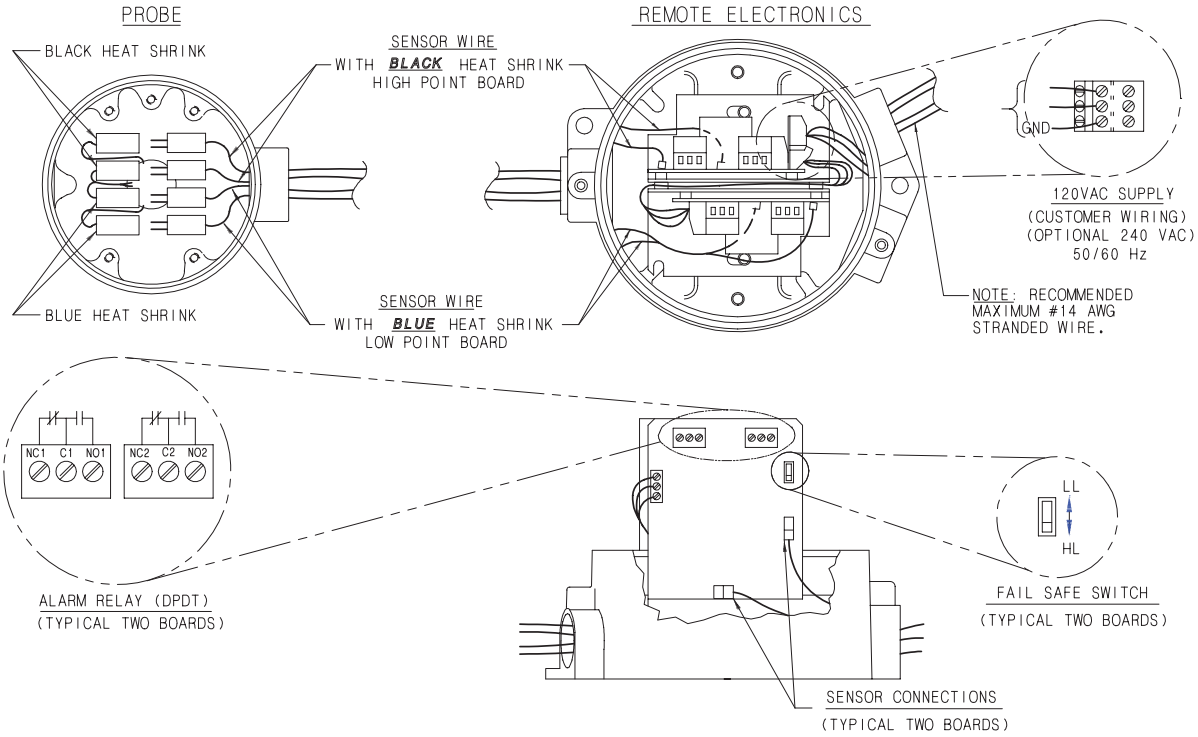


Figure 2-13
Wiring Diagram, 120 / 240 VAC, Remote, Dual, Gap Switch

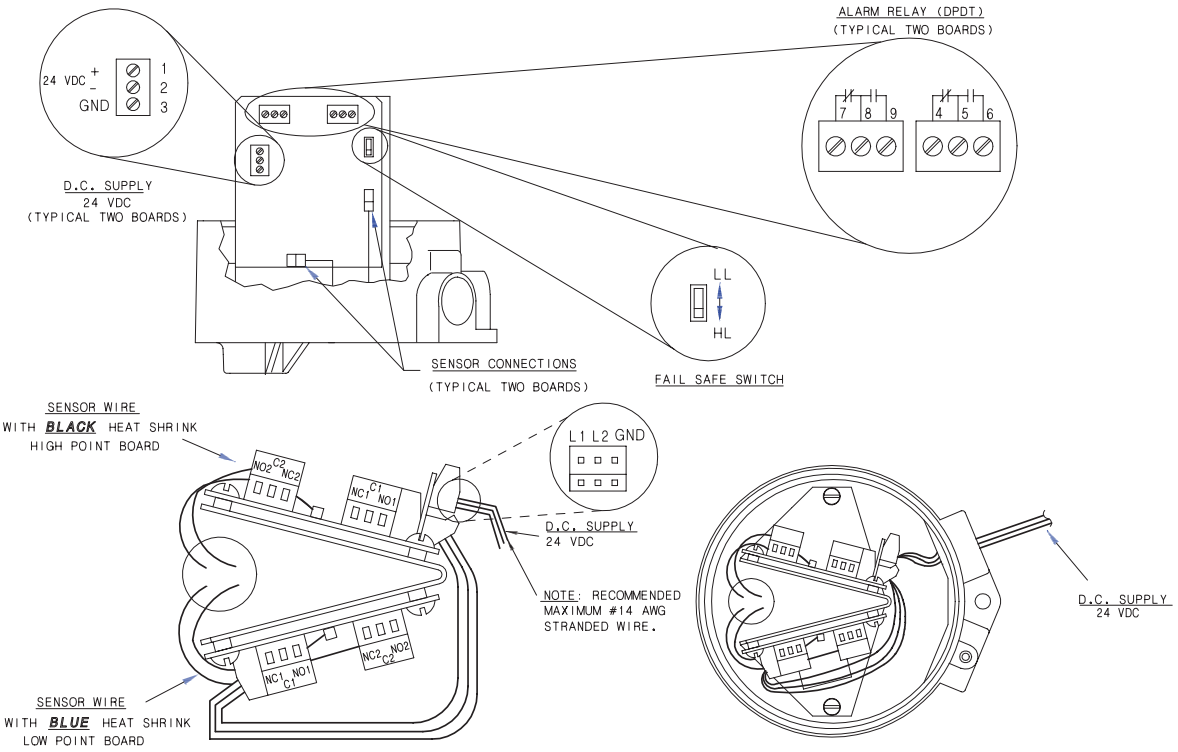


Figure 2-14
Wiring Diagram, 24 VDC, Integral, Dual, Gap Switch

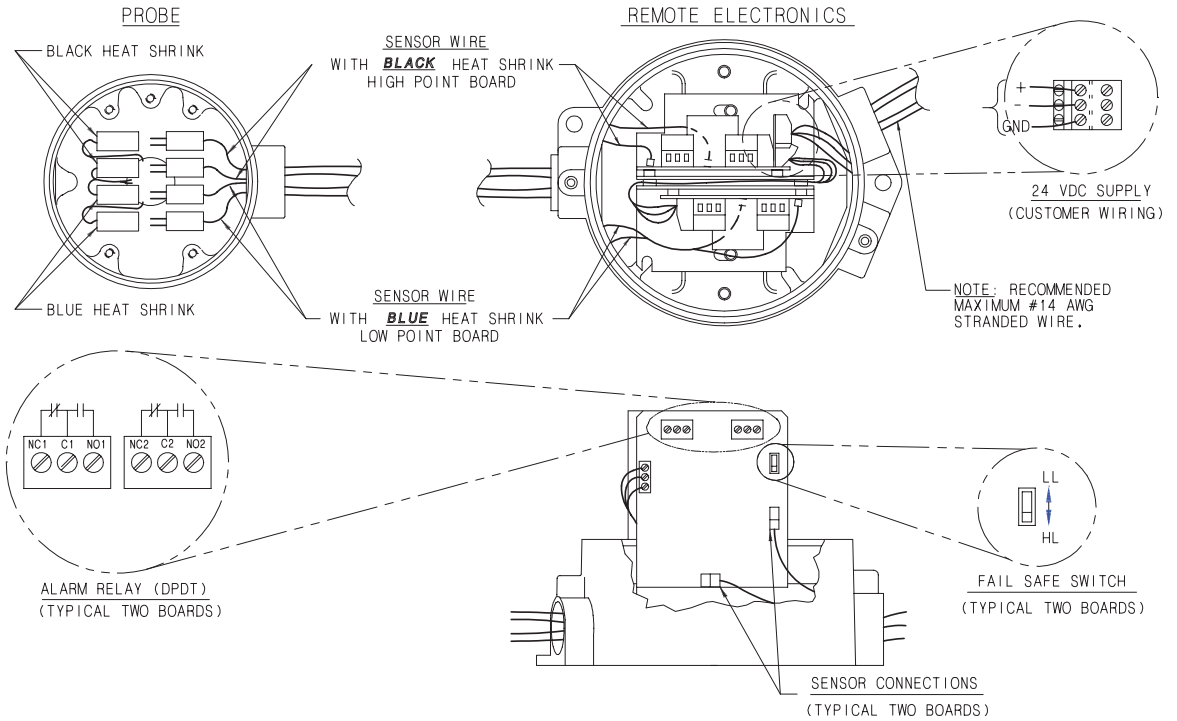


Figure 2-15
Wiring Diagram, 24 VDC, Remote, Dual, Gap Switch

Section 3: Operation

3.1 Failsafe Selector

The VeriGAP switch operates successfully upon applying power to the unit No further calibration or adjustments are necessary.

There is one operating switch on the instrument for failsafe selection.

Failsafe describes the level condition that causes the output signal to change states.

- High Level Failsafe (HLFS) means the output signal will change to the alarm state under high level conditions (indicating high level upon loss of power.
- Low Level Failsafe (LLFS) means the output signal will change to the alarm state under low level conditions (indicating low level upon loss of power.
- The instrument is supplied in the failsafe mode that is requested when the order is placed (HLFS, if not specified).
- The failsafe is field selectable by changing slide switch S1 on the power side of the unit. See Figure 3-1.

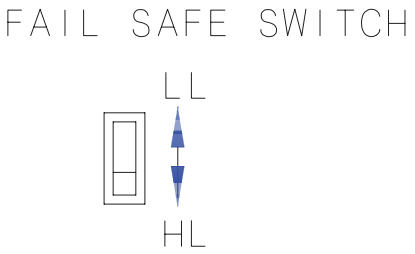


Figure 3-1
Failsafe Switch Settings

3.2 Manual Verify™ Test

As an option, the Manual Verify test feature performs a confidence test of the system by duplicating the same signal as a high-level alarm condition.

Simulating a high level with the Manual Verify test feature:

- confirms that the system is set up correctly for ISO 9000 purposes.
- checks the integrity and continuity of wiring connections.
- verifies that the sensing element is working properly.

The Manual Verify test is initiated by holding the magnetic key against the switch housing at the position indicated on the label marked test key area. If the switch is operating properly, the unit goes into alarm for approximately two seconds. If the switch is not operating properly, the unit goes into fault current condition.

3.3 Auto Verify™

As an option, the VeriGAP switch is equipped with an AutoVerify™ self-check circuit that checks the switch operation automatically every thirty seconds.

The AutoVerify test operates as follows:

a. If the switch is operating properly, the AutoVerify circuit shuts off and waits 20 seconds to test the switch again.

b. If the switch does not function properly , the unit goes into alarm (de-energizes the relay) and the yellow fault LED is lit. Push the blue reset button and wait for the next cycle. If fault is still indicated, refer to Section 4.

The Certify test is initiated by holding the magnetic key against the switch housing at the position indicated on the label marked test key area. The key must be held in this position until the circuit begins the AutoVerify test. This test occurs every five seconds. If the switch is operating properly, the unit goes into alarm for approximately two seconds. If the switch is not operating properly, the unit goes into fault current condition.

Section 4: Troubleshooting

The 504-1000 Ultrasonic VeriGAP Switch is a solid-state device with no moving parts. It requires no maintenance or adjustments. The units are designed to give years of unattended service.

A spare electronic chassis is recommended for every 10 units. In the event of a failed unit, this will prevent the interruption of a critical application while the unit is returned to the factory for repair.

In applications where liquids/products can coat or build up on the sensor tip over a period of time, it is recommended to use the Drexelbrook RF Admittance Point Level switches, which are not affected by coatings.

Proper operation of the gap switch can be verified by dipping the gap assembly in a small container of liquid (e.g. water). An audible click should be heard two seconds after submerging the gap assembly in liquid. If no relay click is heard, remove the equipment from the process.

- Check to see that the gap is not plugged by process material.
- Clean if required.
- Repeat the dip test.
- If no audible click is heard the instrument has failed.
- If spare parts are available find out whether the problem is caused by a defective gap assembly or by a defective electronics module. This is done by substituting a known good gap assembly or electonics module.

The gap assembly is removed by disconnecting the two coax cables from the electronics module.

Gently pull the quick disconnect connectors at the end of the coax wires out of the electronics module circuit card.

Loosen the set screw in the blue cast housing and unscrew the gap assembly from cast housing.

Section: 5

Section 5: Factory Assistance and Field Service

5.1 Telephone Assistance

If you have questions about your AMETEK Drexelbrook equipment:

- Contact your local Drexelbrook representative
- Call the Drexelbrook Service department toll-free at:
  1-800-527-6297 (US and Canada) or
  215-674-1234 (Outside North America)
- Fax the following information to the Service department at: 215-443-5117.

To expedite assistance, please provide the following information:

Instrument Model Number: _____

Original Purchase order number: _____

Material being measured: _____

Temperature: _____

Pressure: _____

Agitation: _____

Brief description of the problem: _____

_____

Checkout procedures that have failed: _____

_____

5.2 Field Service

Trained field service personnel are available on a time-plus-expense basis to assist in start-ups, diagnosing difficult application or equipment problems, or in-plant training of personnel. Preventive Maintenance and Calibration Certification service contracts are also available to maintain plant efficiency. Contact the Service department for further information.

5.3 Equipment Return / Warranty

In order to provide the best service, any equipment being returned for repair or credit must be pre-approved and have a return number issued by the factory.

In many applications, the equipment is exposed to hazardous materials.

- OSHA mandates that our employees be informed and protected from hazardous materials.
- Material Safety Data Sheets (MSDS) listing the hazardous material that the system has been exposed to must accompany any return.
- It is your responsibility to fully disclose all chemicals and decontaminate the returned items.

To obtain a return authorization number, contact the Service department:
1-800-527-6297 (US and Canada) or
215-674-1234 (Outside North America).

Please provide the following information:

Model Number of Returned Equipment:_____

Serial Number: _____

Original Purchase Order Number:_____

Process Material that the equipment has been exposed: _____

MSDS for any hazardous materials

Billing Address:_____

Shipping Address:_____

Purchase Order Number for Repairs: _____

Please include a purchase order number even if the repair is under warranty. If repair is covered under warranty, you will not be charged.

Ship equipment freight prepaid to:
AMETEK Drexelbrook
205 Keith Valley Road
Horsham, PA 19044

COD shipments will not be accepted.

AMETEK Drexelbrook warrants its products free of material defects or manufacturing defects for a period of 1 year after date of shipment.

Section 6: Specifications

6.1 Electronics

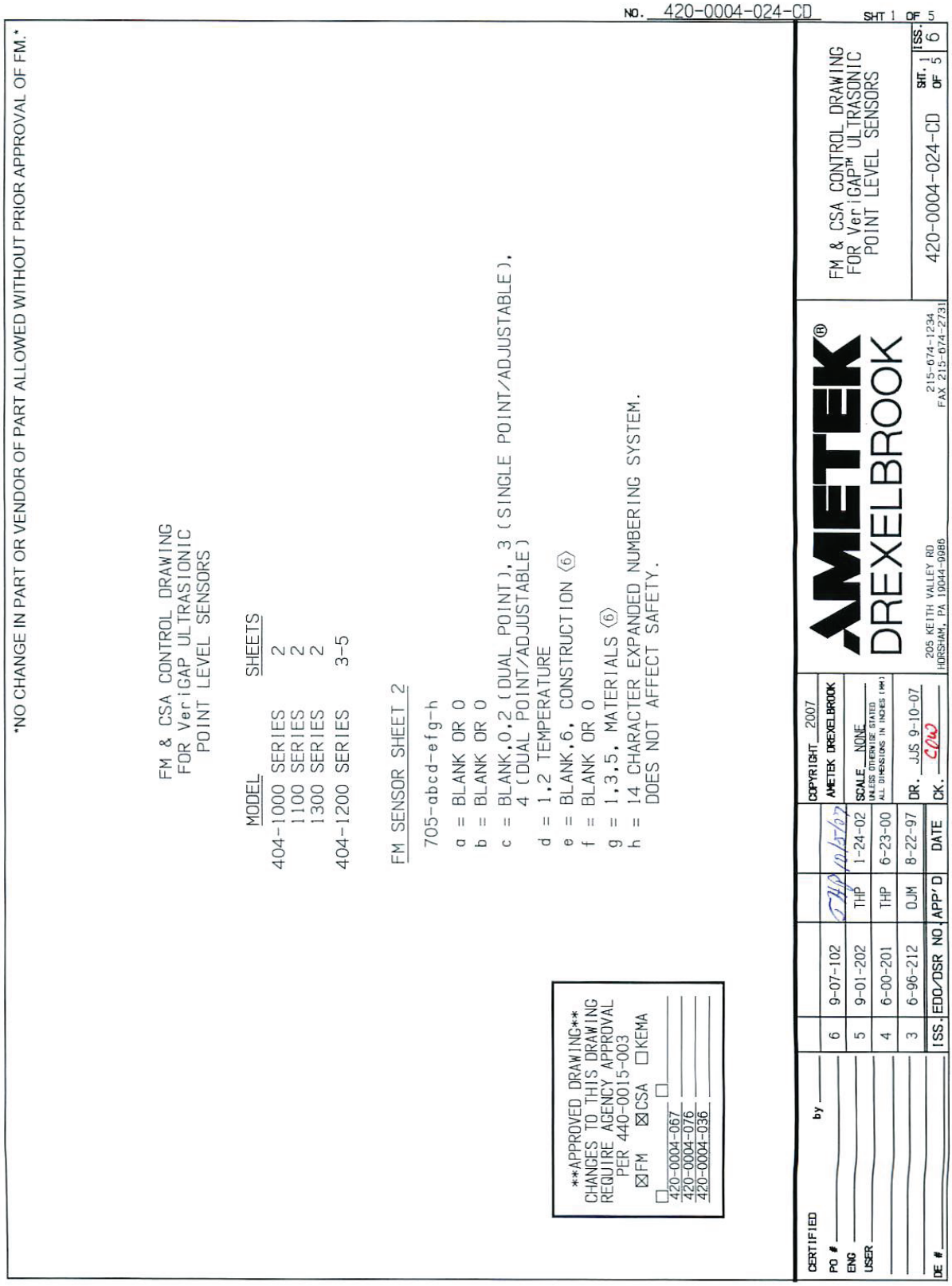
Power Requirements	120 Vac ± 50/60 Hz 240 Vac ± 10% 50/60 Hz 18-30 Vd**c**	
Power Consumption	120 Vac Unit 240 Vac Unit 24 Vdc Unit	2.5 Watts 1.5 Watts 2.5 Watts
Ambient Temperature	-40°F to 160°F	
Repeatability	1/16 inch	
Response Time	2 seconds (Time Delay standard)	
Fail Safe	High Level or Low Level (field-selectable)	
Relay	DPDT	
Contact Rating	5A, 240 Vac, Resistive 5A, 30 Vdc, Resistive 4.9A, 240 Vac, Inductive 4.4A, 120 Vac, Inductive	
Housing	NEMA 1 to 4X, 5 and 12 FM Approved Explosionproof	

6.2 Sensing Element

Insertion Lengths	2, 6, 12, 18, or 24 inches standard (other lengths available**)**
Wetted Materials	Standard 316 SS Optional Alloy 20, Hastelloy "C" (Consult factory for other materials)
Mounting Metallic Sensors:	¾-inch NPT standard, flange mounting available.
Seal Tyte™ Sensors:	Flange mounting only, 1-inch minimum flange
Gap	Single gap standard (404-1000) Dual gap available (404-1600)
Process Temperature	-40°F to 250°F
Process Pressure	1000 psi maximum, metallic sensors

Section 7: Approval Control Drawings

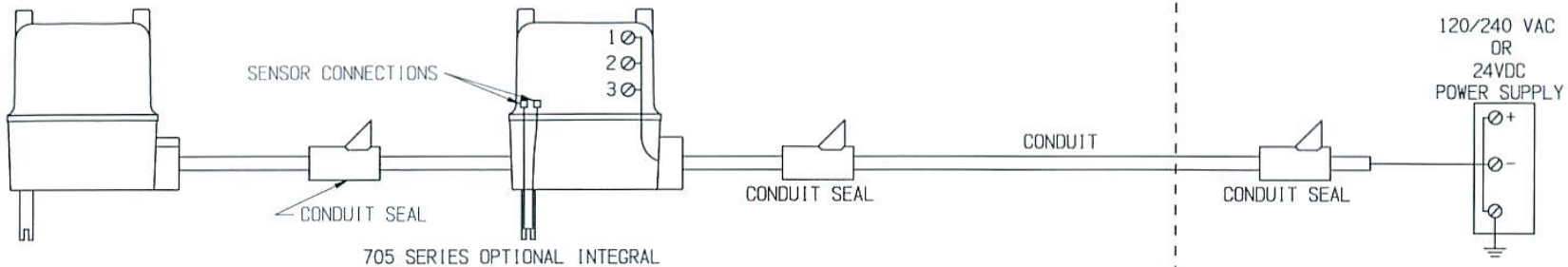
7.1 FM and CSA Approval Control Drawings



404-1000, 1100, 1300 SERIES
EXPLOSIONPROOF INSTALLATION

NO CHANGE IN PART OR VENDOR OF PART ALLOWED WITHOUT PRIOR APPROVAL OF FM.

404-1000/1300 120/240 VAC	404-1100 24 VDC
1 — L1	1 — +
2 — L2	2 — -
3 — GND	3 — GND



705 SERIES OPTIONAL INTEGRAL
AND REMOTE ULTRASONIC SENSOR

FM AND CSA APPROVED ELECTRONICS

404-1ab0-cde-0f

a = 0,1,3 SUPPLY VOLTAGE
b = 0,6 SINGLE OR DUAL POINT
c = AGENCY F=FM C=CSA
d = 0,1 OPTIONS
e = 1,2,3,4,6,8,9,C,F HOUSING WHEN e=2,4 OR 3,6
EXPLOSIONPROOF ENCLOSURE 285-0001-414
285-0001-415 REQUIRED FOR REMOTE SENSOR
INSTALLATION
f = 0,1,2 FAIL SAFE
NOTE: WHEN e = 1 CHASSIS MUST BE
MOUNTED IN FM OR CSA APPROVED
EXPF. HOUSING.
DUAL POINT USES 5" HOUSING.
ALL OTHERS 4"

NOTES:

1. FOR EXPLOSIONPROOF INSTALLATIONS CONDUIT SEALS MUST BE WITHIN 2" OF TRANSMITTER HOUSING.
2. INSTALL PER NEC OR CEC.
3. FOR 404-1060 CONNECTIONS SEE DRAWING 504-1600-001-CD1.
4. REFER TO FOLLOWING DRAWINGS FOR RELAY CONNECTIONS: 504-1000-001-CD1, 504-1100-001-CD1, 504-1600-001-CD1, 504-1600-001-CD2.

CLASS I,II,III, DIVISON 1, GROUP A,B,C,D,E,F,G

CERTIFIED by	ISS.	EDO/DSR NO.	APP'D	DATE
PO #	6	9-07-102	THP 10/5/07	
ENG	5	9-01-202	THP	1-24-02
USER	4	6-00-201	THP	6-23-00
	3	6-96-212	DJM	8-22-97
DE #				

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SCALE NONE
UNLESS OTHERWISE STATED
ALL DIMENSIONS IN INCHES (MM)
DR. JJS 9-10-07
CK. CDW

AMETEK®
DREXELBROOK
205 KEITH VALLEY RD
HORSHAM, PA 19044-9986
215-674-1234
FAX 215-674-2731

FM & CSA CONTROL DRAWING
FOR ULTRASONIC
POINT LEVEL SENSOR
TRANSMITTERS VeriGAP™

420-0004-024-CD SHT. 2 OF 5 ISS. 6

NO. 420-0004-024-CD SHT 2 OF 5

DIV. 2 LOOP, 404-1200 SERIES NO BARRIERS
SAFE AREA
11.5-30 V DC
POWER SOURCE
404-1200 SERIES
TRANSMITTER
4-20mA
SIGNAL
LEADS
50Ω
OPTIONAL
401-0010-210
VERIFY MODULE
SENSOR
CONNECTIONS
GND
INTEGRAL
705 SERIES SENSING
ELEMENT
DIVISION 2 AREA
SENSOR
705-efgh-ijk-l
e = BLANK OR 0
f = BLANK OR 0
g = BLANK OR 0
h = 1,2 TEMPERATURE
i = BLANK,6, CONSTRUCTION ⟨6⟩
j = BLANK OR 0
k = 1,3,5, MATERIALS ⟨6⟩
l = 14 CHARACTER EXPANDED
NUMBERING SYSTEM.
DOES NOT AFFECT SAFETY.
MODEL NUMBERS OF APPROVED TRANSMITTERS
SHOWN ON SHEETS 3-5;
TRANSMITTERS
404-120a-Fbc-0d
a = 0 TIME DELAY
b = 0 OR V OPTIONS
c = 1,7,A HOUSING
d = 0,1 FAIL SAFE
NOTE;
WHEN c = 1 CHASSIS MUST BE MOUNTED IN
APPROVED HOUSING.
SUITABLE FOR
CLASS I GROUPS A,B,C,D, AND
CLASS II GROUPS F,G AND
CLASS III.
WARNING FOR ALL SHEETS:
1. EQUIPMENT CONNECTED TO SIGNAL LEADS MUST NOT USE OR GENERATE MORE THAN 250V MAX.
2. SEE SHEET 3 FOR CLASS II AND CLASS III HOUSING NOTE.
NO. 420-0004-024-CD
SHT 3 OF 5
AMETEK
DREXELBROOK
205 KEITH VALLEY RD
HORSHAM, PA 19044-9986
215-674-1234
FAX 215-674-2731
FM CONTROL DRAWING FOR
ULTRASONIC
POINT LEVEL TRANSMITTER
420-0004-024-CD
SHT. 3 OF 5
ISS. 6
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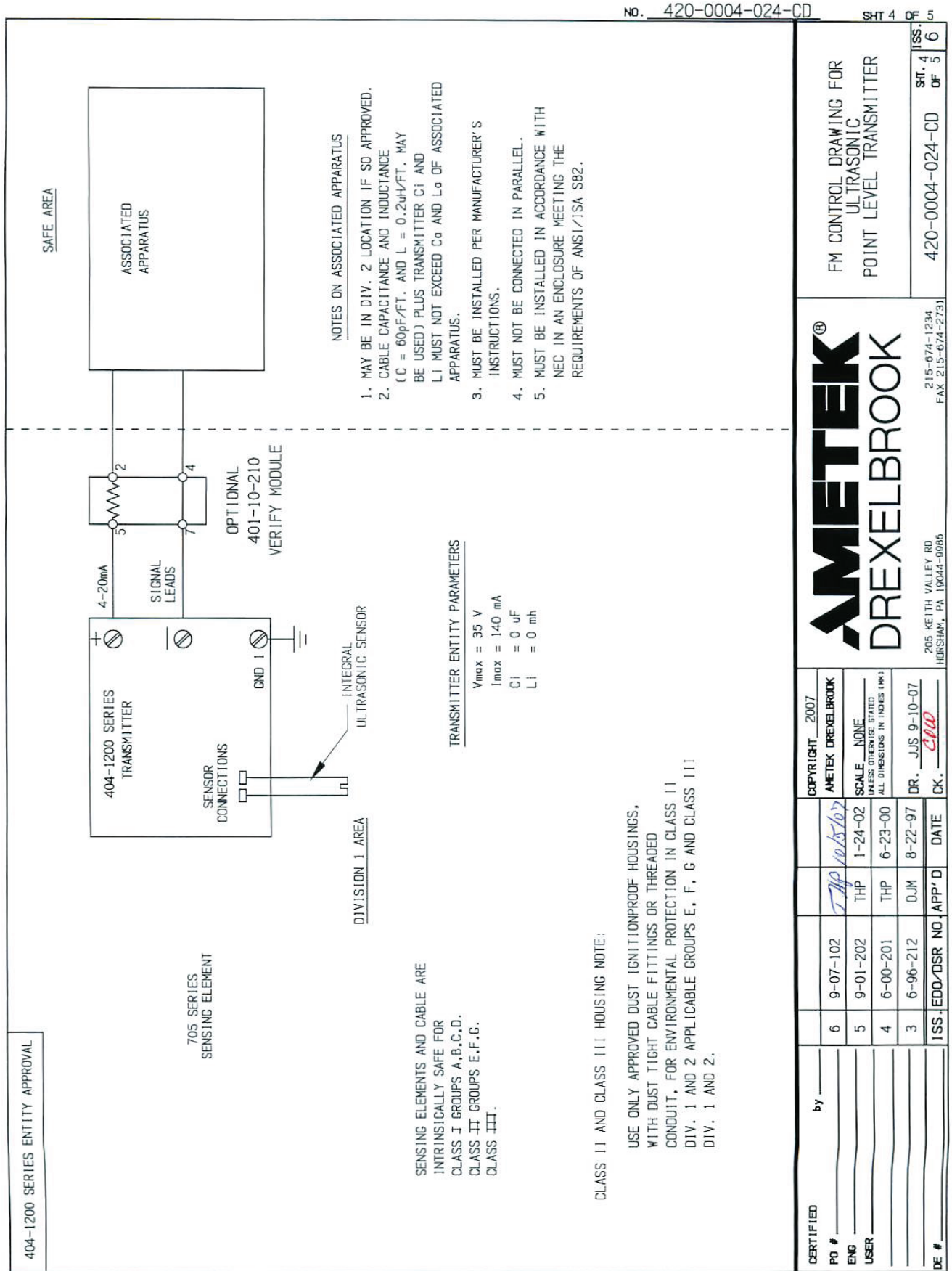
AMETEK DREXELBROOK
SCALE NONE
UNLESS OTHERWISE STATED
ALL DIMENSIONS IN INCHES [MM]
DR. JJS 9-10-07
CK. DDD
CERTIFIED
PO #
ENG
USER
DE #
ISS. EDD/DSR NO. APP'D DATE
6 9-07-102 THP 1/15/07
5 9-01-202 THP 1-24-02
4 6-00-201 THP 6-23-00
3 6-96-212 OJM 8-22-97


404-1200 SERIES ENTITY APPROVAL
SAFE AREA
ASSOCIATED APPARATUS
4-20mA
SIGNAL LEADS
OPTIONAL 401-10-210 VERIFY MODULE
404-1200 SERIES TRANSMITTER
SENSOR CONNECTIONS
GND
INTEGRAL ULTRASONIC SENSOR
705 SERIES SENSING ELEMENT
DIVISION 1 AREA
NOTES ON ASSOCIATED APPARATUS
1. MAY BE IN DIV. 2 LOCATION IF SO APPROVED.
2. CABLE CAPACITANCE AND INDUCTANCE (C = 60pF/FT. AND L = 0.2uH/FT. MAY BE USED) PLUS TRANSMITTER Ci AND Li MUST NOT EXCEED Ca AND La OF ASSOCIATED APPARATUS.
3. MUST BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS.
4. MUST NOT BE CONNECTED IN PARALLEL.
5. MUST BE INSTALLED IN ACCORDANCE WITH NEC IN AN ENCLOSURE MEETING THE REQUIREMENTS OF ANSI/ISA S82.
TRANSMITTER ENTITY PARAMETERS
Vmax = 35 V
Imax = 140 mA
Ci = 0 uF
Li = 0 mh
SENSING ELEMENTS AND CABLE ARE INTRINSICALLY SAFE FOR CLASS I GROUPS A,B,C,D. CLASS II GROUPS E,F,G. CLASS III.
CLASS II AND CLASS III HOUSING NOTE:
USE ONLY APPROVED DUST IGNITIONPROOF HOUSINGS, WITH DUST TIGHT CABLE FITTINGS OR THREADED CONDUIT, FOR ENVIRONMENTAL PROTECTION IN CLASS II DIV. 1 AND 2 APPLICABLE GROUPS E, F, G AND CLASS III DIV. 1 AND 2.
NO. 420-0004-024-CD
SHT 4 OF 5
CERTIFIED
PO #
ENG
USER
DE #
ISS. 6 9-07-102
ISS. 5 9-01-202 THP 1-24-02
ISS. 4 6-00-201 THP 6-23-00
ISS. 3 6-96-212 DJM 8-22-97
ISS. EDO/DSR NO. APP'D DATE
COPYRIGHT 2007 AMETEK DREXELBROOK
SCALE NONE UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (MM)
DR. JJS 9-10-07
CK. CMD
AMETEK®
DREXELBROOK
205 KEITH VALLEY RD
HORSHAM, PA 19044-9986
215-674-1234
FAX 215-674-2731
FM CONTROL DRAWING FOR ULTRASONIC POINT LEVEL TRANSMITTER
420-0004-024-CD
SHT. 4 OF 5
ISS. 6

NO. 420-0004-024-CD
SHT 5 OF 5
EXPLOSIONPROOF 404-1200 SERIES INSTALLATION
NO CHANGE IN PART OR VENDOR OF PART ALLOWED WITHOUT PRIOR APPROVAL OF FM.
24 VDC
POWER SOURCE
FOR 4-20 mA SIGNAL
MAXIMUM
NON-HAZARDOUS AREA
VOLTAGE MUST NOT
EXCEED 250 Vrms.
CONDUIT
CONDUIT SEAL
CONDUIT SEAL
705 SERIES ULTRASONIC SENSOR
WITH INTEGRAL ELECTRONICS
SENSOR
CONNECTIONS
GND
-
+
NON-HAZARDOUS AREA
CLASS I, II, III, DIVISON 1, GROUP A,B,C,D,E,F,G
NOTES;
1. FOR EXPLOSIONPROOF INSTALLATIONS CONDUIT SEALS
MUST BE WITHIN 2 INCHES OF TRANSMITTER HOUSING.
2. EXPLOSIONPROOF INSTALLATIONS MUST COMPLY WITH NEC.
CERTIFIED by
PO #
ENG
USER
DE #
ISS. EDO/DSR NO. APP'D DATE
6 9-07-102 THP 12/5/07
5 9-01-202 THP 1-24-02
4 6-00-201 THP 6-23-00
3 6-96-212 DJM 8-22-97
DR. JJS 9-10-07
CK. DMD
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ALL DIMENSIONS IN INCHES (MM)
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FM & CSA CONTROL DRAWING
FOR ULTRASONIC
POINT LEVEL SENSOR
TRANSMITTERS VeriGAP™
420-0004-024-CD
SHT. 5 OF 5
ISS. 6

Form 440-0001-001 3/1/2006

TERMS AND CONDITIONS OF SALE

AMETEK DREXELBROOK

GENERAL: ***ALL ORDERS ARE SUBJECT TO THE FOLLOWING TERMS AND CONDITIONS. ANY ACCEPTANCE OF ANY OFFER OF BUYER FOR ANY GOODS OR SERVICES IS CONDITIONED UPON THESE TERMS AND CONDITIONS, AND SELLER OBJECTS TO ANY ADDITIONAL OR DIFFERENT TERMS PROPOSED BY BUYER IN ANY DOCUMENT, WHICH SHALL NOT BE BINDING UPON SELLER.*** No salesman or other party is authorized to bind the AMETEK DREXELBROOK Division of AMETEK, Inc. (hereinafter "Seller") by any agreement, warranty, statement, promise, or understanding not herein expressed, and no modifications shall be binding on Seller unless the same are in writing and signed by an executive officer of Seller or his or her duly authorized representative. Verbal orders shall not be executed until written notification has been received and acknowledged by Seller.

QUOTATIONS: Written quotations are valid for thirty (30) days unless otherwise stated. Verbal quotations expire the same day they are made.

PRICES: All prices and terms are subject to change without notice. Buyer-requested changes to its order ("Orders"), including those affecting the identity, scope and delivery of the goods or services, must be documented in writing and are subject to Seller's prior approval and adjustments in price, schedule and other affected terms and conditions. Orders requiring certified test data in excess of commercial requirements, are subject to a special charge.

ORDER ACCEPTANCE: All Orders are subject to final approval and acceptance by Seller at its office located at 205 Keith Valley Road, Horsham, Pennsylvania 19044.

TERMS OF PAYMENT: Seller's standard terms of payment for Buyers who qualify for credit are net thirty (30) days from date of invoice. All invoices must be paid in United States dollars.

CREDIT: Seller reserves the right at any time to revoke any credit extended to Buyer or otherwise modify terms of payment if Buyer fails to pay for any shipments when due or if in Seller's opinion there is a material adverse change in Buyer's financial condition. Seller may, at its option, cancel any accepted Order if Buyer fails to pay any invoices when due.

DELIVERY: Shipments are F.O.B place of manufacture ("Shipping Point") and the Buyer shall pay all freight, transportation, shipping, duties, fees, handling, insurance, storage, demurrage, or similar charges from Shipping Point. Delivery of goods to common carrier shall constitute delivery and passing of title to the Buyer, and all risk of loss or damage in transit shall be borne by Buyer. Any claims or losses for damage or destruction after such delivery shall be the responsibility of Buyer.

Seller reserves the right to make delivery in installments which shall be separately invoiced and paid for when due, without regard to subsequent deliveries. Delay in delivery of any installment shall not relieve Buyer of its obligation to accept remaining deliveries.

Acknowledged shipping dates are approximate only and based on prompt receipt of all necessary information from Buyer and Buyer's compliance with terms of payment.

TAXES: All sales, excise and similar taxes which Seller may be required to pay or collect with respect to the goods and/or services covered by any Order, shall be for the account of the Buyer except as otherwise provided by law or unless specifically stated otherwise by Seller in writing.

TERMINATION AND HOLD ORDERS: No Order may be terminated by Buyer except upon written request by Buyer and approval by Seller, and if said request is approved by Seller, under the following conditions: (1) Buyer agrees to accept delivery of all of the units completed by Seller through the workday on which Seller receives the written termination request; (2) Buyer agrees to pay to Seller all direct costs and expenses applicable to the portion of the Order that is incomplete.

WARRANTY:

A. Hardware: Seller warrants its goods against defects in materials and workmanship under normal use and service for one (1) year from the date of invoice.

B. Software and Firmware: Unless otherwise specified, Seller warrants for a period of one (1) year from date of invoice that standard software or firmware, when used with Seller specified hardware, shall perform in accordance with Seller's published specifications. Seller makes no representation or warranty, expressed or implied, that the operation of the software or firmware shall be uninterrupted or error-free, or that functions contained therein shall meet or satisfy the Buyer's intended use or requirements.

C. Services: Seller warrants that services, including engineering and custom application, whether provided on a fixed cost or time and material basis, shall be performed in accordance with generally accepted industry practices.

D. Remedies: Seller's liability under this section is restricted to replacing, repairing, or issuing credit (at Seller's option) for any returned goods and only under the following conditions: (1) Seller must be promptly notified, in writing, as soon as possible after the defects have been noted by the Buyer, but not later than (1) year from date of invoice from Seller; (2) The defective goods are to be returned to the place of manufacture, shipping charges prepaid by the Buyer; (3) Seller's inspection shall disclose to its satisfaction that the goods were defective in materials or workmanship at the time of shipment; (4) Any warranty service (consisting of time, travel and expenses related to such services) performed other than at Seller's factory, shall be at Buyer's expense.

E. Repaired/Reconditioned Goods: As to out-of-warranty goods which Seller has repaired or reconditioned, Seller warrants for a period of sixty (60) days from date of its invoice only new components replaced in the most recent repair/reconditioning.

F. Returns and Adjustments: No goods may be returned unless authorized in advance by Seller and then only upon such conditions to which Seller may agree. Buyer must obtain an RMA (Return Material Authorization) number from Seller prior to any return shipment and such RMA number must appear on the shipping label and packing slip. Buyer shall be responsible for the returned goods until such time as Seller receives the same at its plant and for all charges for packing, inspection, shipping, transportation, or insurance associated with returned goods. In the event that credit for returned goods is granted, it shall be at the lesser of the then current prices or the original purchase price. Claims for shortage or incorrect material must be made within five (5) days after receipt of shipment.

ALL OTHER WARRANTIES, FOR ANY OF SELLER'S GOODS OR SERVICES, WHETHER ORAL, WRITTEN, EXPRESS, IMPLIED, STATUTORY OR OTHERWISE, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE ARE EXCLUDED.

INTELLECTUAL PROPERTY: Seller's sale of goods or provision of related documentation or other materials to Buyer shall not transfer any intellectual property rights to Buyer unless Seller specifically agrees to do so in writing. Seller shall retain ownership of all applicable patents, trademarks, copyrights and other intellectual property rights. Buyer shall not use, copy or transfer any such items in violation of Seller's intellectual property rights or applicable law, or for any purposes other than that for which the items were furnished.

Seller shall defend any lawsuit brought against the Buyer based on a claim that the design or construction of the goods sold hereunder by Seller infringe any United States or Canadian Patent, Copyright or Mask Work Registration, provided that Buyer promptly notifies Seller of such claim in writing and further provided that, at Seller's expense, (1) Buyer gives Seller the sole right to defend or control the defense of the suit or proceeding, including settlement, and (2) Buyer provides all necessary information and assistance for that defense. In the event of a charge of infringement, Seller's obligation under the agreement shall be fulfilled if Seller, at its option and expense, either (i) settles such claim; (ii) procures for Buyer the right to continue using such goods; (iii) replaces or modifies goods to avoid infringement; or (iv) accepts the return of any infringing goods and refunds their purchase price; or (iv) defends against such claim.

If Buyer furnishes specifications or designs to Seller, the obligations of Seller set forth above shall not apply to goods made by Seller using such specifications or designs, and Buyer shall defend, indemnify and hold Seller harmless against any third party claims for infringement which arise out of Seller's use of specifications or designs furnished by Buyer.

SOFTWARE LICENSE: If goods purchased hereunder include software ("Software"), Buyer may use the Software only as part of the goods. Buyer may not use, copy, or transfer any of the Software except as may be permitted under the applicable License Agreement provided with the goods. Buyer's right to use, copy or transfer the Software shall terminate upon termination of Buyer's right to use the goods.

PACKAGING/WEIGHTS AND DIMENSIONS: Buyer specified packing or marking may be subject to additional charges not otherwise included in the price of the goods. Published weights and dimensions are estimates or approximate only and are not warranted.

FORCE MAJEURE: Seller shall not be responsible for delays in delivery or any failure to deliver due to causes beyond Seller's control, including but not limited to the following items: acts of God, war, terrorism, mobilization, civil commotion, riots, embargoes, domestic or foreign governmental regulations or orders, governmental priorities, port congestion, acts of the Buyer, its agents or employees, fires, floods, strikes, lockouts and other labor difficulties, shortages of or inability to obtain shipping space or transportation, inability to secure fuel, supplies or power at current prices or on account of shortages thereof, or due to limitations imposed by the extent of availability of Seller's normal manufacturing facilities.

If a delay excused per the above extends for more than ninety (90) days and the parties have not agreed upon a revised basis for continuing providing the goods or services at the end of the delay, including adjustment of the price, then Buyer, upon thirty (30) days' prior written notice to Seller may terminate the Order with respect to the unexecuted portion of the goods or services, whereupon Buyer shall promptly pay Seller its reasonable termination charges upon submission of Seller's invoices thereof.

LIMITATION OF LIABILITY: Seller's liability for any claim of any kind, except infringement of intellectual property rights, shall not exceed the purchase price of any goods or services which give rise to the claim. ***SELLER SHALL IN NO EVENT BE LIABLE FOR BUYER'S MANUFACTURING COSTS, LOST PROFITS, LOSS OF USE OF THE GOODS OR SERVICES, COST OF CAPITAL, COST OF SUBSTITUTE GOODS, FACILITIES, SERVICES OR REPLACEMENT POWER, DOWNTIME COSTS, CLAIMS OF BUYER'S CUSTOMERS FOR DAMAGES, OR OTHER SPECIAL, PROXIMATE, INCIDENTAL, INDIRECT, EXEMPLARY OR CONSEQUENTIAL DAMAGES.*** Any action against Seller must be brought within eighteen (18) months after the cause of action accrues. These disclaimers and limitations of liability shall apply regardless of the form of action, whether in contract, tort or otherwise, and further shall extend to the benefit of Seller's vendors, appointed distributors and other authorized resellers as third-party beneficiaries.

PROHIBITION FOR HAZARDOUS USE: Goods sold hereunder generally are not intended for application in and shall not be used by Buyer in the construction or operation of a nuclear installation or in connection with the use or handling of nuclear material, or for any hazardous activity or critical application, where failure of a single component could cause substantial harm to persons or property, unless the goods have been specifically approved for such a use or application. Seller disclaims all liability for any loss or damage resulting from such unauthorized use and Buyer shall defend, indemnify and hold harmless the Seller against any such liability, whether as a result of breach of contract, warranty, tort (regardless of the degree of fault or negligence), strict liability or otherwise.

EXPORT CONTROL: Buyer shall comply with all export control laws and regulations of the United States, and all sales hereunder are subject to those laws and regulations. Seller shall not be named as shipper or exporter of record for any goods sold hereunder unless specifically agreed to in writing by Seller. At Seller's request, Buyer shall furnish Seller with end-use and end-user information to determine export license applicability. Buyer warrants, in accordance with U.S. Export Law, that goods sold hereunder shall not be destined for facilities or activities involving nuclear, chemical or biological weapons, or related missile delivery systems in named prohibited regions or countries.

GOVERNING LAW: Seller intends to comply with all laws applicable to its performance under any order. All matters relating to interpretation and effect of these terms and any authorized changes, modifications or amendments thereto shall be governed by the laws of the Commonwealth of Pennsylvania. No government contract regulations or clauses shall apply to the goods or services, this agreement, or act to bind Seller unless specifically agreed to by Seller in writing.

NON-WAIVER BY SELLER: Waiver by Seller of a breach of any of these terms and conditions shall not be construed as a waiver of any other breach.

SEVERABILITY AND ENTIRE AGREEMENT: If any provision of these terms and conditions is unenforceable, the remaining terms shall nonetheless continue in full force and effect. This writing, together with any other terms and conditions Seller specifically agrees to in writing, constitutes the entire terms and conditions of sale between Buyer and Seller and supercedes any and all prior discussions, and negotiations on its subject matter.

AMETEK®
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An ISO 9001 Certified Company

205 Keith Valley Road, Horsham, PA 19044
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24-Hour Service: 1-800-527-6297
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Fax: +1 215-674-2731
E-mail: drexelbrook.info@ametek.com
Website: www.drexelbrook.com

DynaMax™ Speakers

› Features

- Neo driver.
- 100-watt power.
- Slim and lightweight.
- Easy to install and maintain.
- Can be used on large apparatus, ambulances, law enforcement vehicles, and command fleet.
- Durable and reliable.

› Approval

- SAE and CCR specifications when paired with Class A Federal Signal amplifier and electronic siren.

Sleek Design Meets High-Performance
The Dynamax, ES100, speaker features the Federal Signal Neo driver for increased performance and reliability. The larger diaphragm of the ES100 allows the speaker to capture lower frequency ranges for a more robust sound.

The ES100 is a 100-watt speaker designed to withstand the toughest conditions. The Dynamax is made of black corrosion resistant aluminum housing and is fully encapsulated.

Designed for versatility, the ES100 mounts easily into grille, flush between the bumper and hose tray of large apparatus and to most vehicle bumpers. A variety of mounts and brackets are also available to make installation as simple as possible.

DynaMax speakers fit easily behind the grille.

How to Order

Select Model

ES100	Speaker, 100-watt, high output compact

Brackets

ESB-U	Universal bail bracket, all vehicles
ESB-V08	Ford Crown Vic Interceptor, '02-'11
ESB-TAH08	Chevrolet Tahoe, '03-'11
ESB-IMP08R	Chevrolet Impala, '06-'12
ESB-EXP07	Ford Police Interceptor Utility, 2013
ESB-DHDD11	Dodge Ram Chassis cab, driver side
ESB-DHDP11	Dodge Ram Chassis cab, passenger side
ESB-CAP11	Chevrolet Caprice, '11-'12
ESB-TAR11	Ford Taurus, '11 and Dodge Charger, '11-'12 and Ford Police Interceptor Sedan, 2013
ESBMT-SB	Bumper/surface mount bracket
ESFMT	Recess mount, polished trim ring
ESFMT-EF	Recess mount, stainless steel "Electric F" grille

Factory Set Specifications	
Input Voltage	32VRMS
Power	100W
Sound Output	SAE J1849 CCR Title 13
Impedance	11 ohms
Physical Dimensions	
Height	5.5 in (14 cm)
Width	5.9 in (15 cm)
Depth	2.7 in (6.9 cm)
Ship Weight	
	5.5 lbs (2.5 kg)

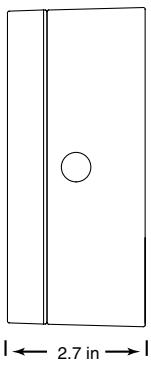
Flush mount, ESFMT

Flush mount with grille, ESFMT-EF

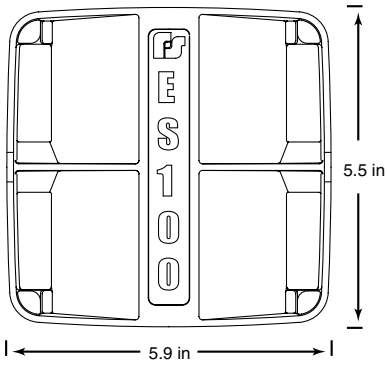
Bumper mount, ESBMT

Dimensional Diagrams

SIDE



FRONT



FEDERAL SIGNAL
2645 Federal Signal Drive, University Park, IL 60484
Tel.: (800) 264-3578 • Fax: (800) 682-8022
www.fedsig.com

Warning: Sirens and Speakers may produce LOUD sounds necessary to request the right-of-way. Sirens and Speakers may cause hearing damage. Wear hearing protection.

DynaMax is a trademark of Federal Signal Corporation.

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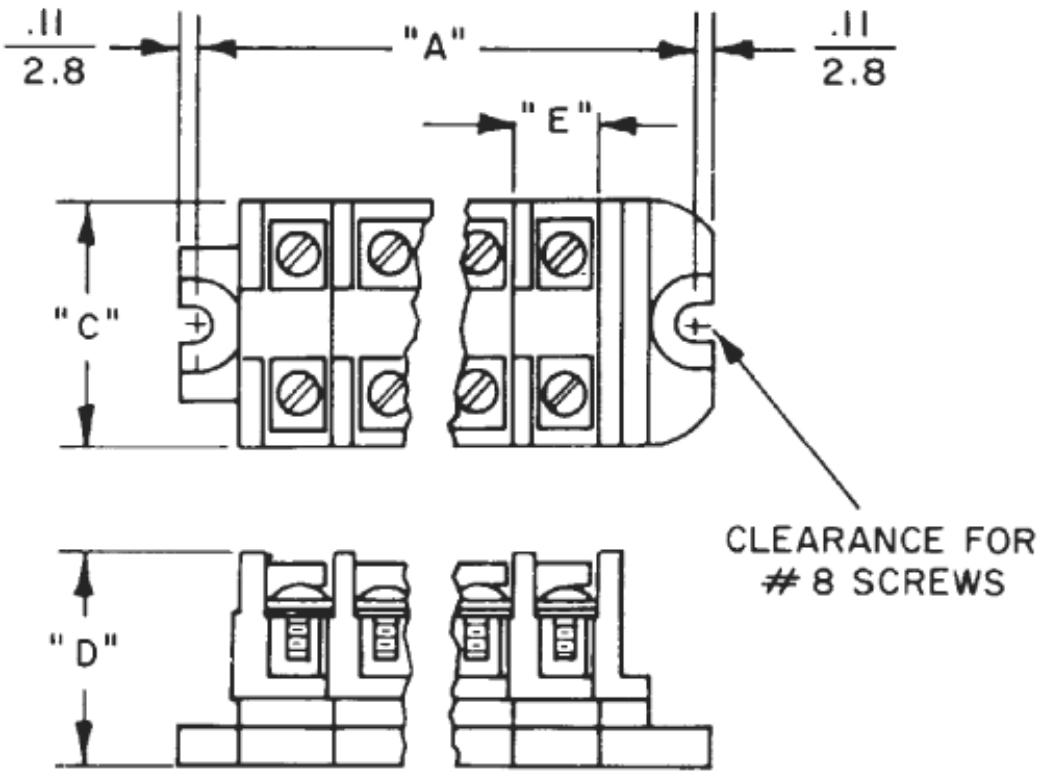

Direct Mount

Direct Mounted Forms (Without Channel)

Current	Dimension A	Dimension C	Dimension D	Dimension E
25 and 30 Amp	[No. of points x 4 (10.2)] + .6 (15.2)	1.12 (28.4)	1.00 (25.4)	0.41 (10.4)
85 Amp	[No. of points x .562 (14.3)] + .68 (17.3)	1.50 (38.1)	1.44 (36.6)	0.56 (14.2)

Note: Terminal boards with more than 12 points should be separated into two or more sections to facilitate mounting with the necessary intermediate mounting screws.
Example: A 15-point board should consist of one 7-point section and one 8-point section.

Dual Dimensions Inches (Millimeters) (Estimating Only)

imagination at work

PUB# GEP1260-12-013

CR151 Direct Mount

File Name	Date	Rev
CR151 Direct Mount	06/01/2010	01

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Model IDP10 Differential Pressure Transmitter with HART Communication Protocol

IDP10
LOW PROFILE
STRUCTURE LP1

IDP10
TRADITIONAL
STRUCTURE

IDP10
LOW PROFILE
STRUCTURE LP2

The Foxboro® brand I/A Series® Model IDP10 is an Intelligent, two-wire d/p Cell® transmitter that provides precise, reliable, measurement of differential pressure, and transmits a 4 to 20 mA output signal with a superimposed HART digital signal for remote configuration and monitoring.

HIGH DEPENDABILITY

- Silicon strain gauge sensors successfully field-proven in many thousands of installations.
- Simple, elegant sensor packaging, with very few parts achieves exceptionally high reliability.
- Transmitter available with traditional or low profile structures (see photos above).
- Aluminum housing has durable, corrosion-resistant epoxy finish; 316 ss housing also available; both meet NEMA 4X and IP66 ratings.
- Can be provided as a sealed measurement system with numerous configurations of direct connect or capillary connected seals available.
- SIL2-Certified Transmitter offered as an option.
- Optional mounting bracket sets allow pipe, surface, or manifold mounting of transmitter.
- Remote configuration with HART communication protocol in a single loop or multidrop mode; or locally via optional LCD indicator.
- Multi-marking is available for FM, CSA, and ATEX intrinsically safe installations. The user determines and permanently marks on the data plate the certification to be applied.
- User-entered cutoff point from 0 to 20% of maximum flow.
- Dual Seal certified by CSA to meet ANSI/ISA 12.27.01-2003 requirements.

- Industry standard 316L ss, Co-Ni-Cr, Hastelloy C, Monel, or Tantalum sensor materials, depending on transmitter structure.
- Complies with NAMUR NE 21 interference immunity requirement, and NAMUR NE 43 for analog output overrange and underrange annunciations.
- CE Marked; complies with applicable EMC, ATEX, and PED European Directives.
- Complies with Electromagnetic Compatibility Requirements of European EMC Directive 2004/108/EC by conforming to the following EN and IEC Standards: EN 61326-1, and IEC 61000-4-2 through 61000-4-6.
- Designed for hazardous area installations. Versions available to meet Agency flameproof and zone requirements.
- Standard 5-year warranty.

I/A Series PRESSURE TRANSMITTER FAMILY

The I/A Series Electronic Pressure Transmitters are a complete family of d/p Cell, gauge, absolute, multirange, multivariable, and premium performance transmitters, as well as transmitters with remote or direct connect seals, all using field-proven silicon strain gauge sensors and common topworks.

MODULAR ELECTRONICS

A common HART electronics module is used for all HART Pressure Transmitters. Also, because all configuration and calibration data is stored in the sensor, you can replace a HART module with another HART module without transmitter reconfiguration or recalibration.

Furthermore, if your needs change, the modular design allows easy migration to other standards - including FoxCom™, FOUNDATION fieldbus, and analog 4 to 20 mA or 1 to 5 V dc versions.

HART COMMUNICATION PROTOCOL VERSION -T ELECTRONICS

Version -T, 4 to 20 mA with HART communications, allows direct analog connection to common receivers while still providing full Digital Communications using a HART Communicator, PC-based configurator, or optional LCD Indicator.

Users having HART Communicators for other devices can have them upgraded with Foxboro software to accommodate these transmitters. Also, Foxboro will make use of the HART Foundation library of registered DDs (Device Descriptors), and reload the Communicator if the user desires to keep another supplier's DD along with the Foxboro DD.

In addition to HART Protocol, Foxboro also offers transmitters with other protocols as described below.

FoxCom Version, Software Configurable for Digital and 4 to 20 mA Output (-D Electronics)

Provides measurement integration with an I/A Series system, or allows direct analog connection to common receivers while still providing full Intelligent Transmitter digital communication with a PC-based configurator. Refer to PSS 2A-1C14 A.

FOUNDATION Fieldbus Version (-F Electronics)

This is a FISCO/FNICO compliant all digital, serial, two-way communication system which interconnects field devices such as transmitters, actuators, and controllers. It is a local area network (LAN) with built-in capability to distribute control application across the network. Refer to PSS 2A-1C13 E.

Analog Output Version (-A Electronics)

Provides a 4 to 20 mA analog output and includes a standard LCD Indicator to provide transmitter configuration directly from on-board pushbuttons. Refer to PSS 2A-1C14 C.

Analog Output Version (-V Electronics)

A low power, low voltage transmitter that draws no more than 3 mA, and transmits a 1 to 5 V dc output signal. Refer to PSS 2A-1C13 D.

HART INTELLIGENT MODULE CONFIGURED FOR 4-20 mA OUTPUT

Measurements and diagnostics are available from the HART Communicator connected to the two-wire loop carrying the 4 to 20 mA measurement signal by using a bidirectional digital signal superimposed on the 4 to 20 mA current signal.

Multiple measurements are transmitted digitally, including not only the primary measurement in either pressure or flow units, but also the electronics and sensor temperatures which can be used to monitor external heat tracing equipment. Complete transmitter diagnostics are also communicated.

Configuration and reranging can be accomplished with the Communicator, PC-based configurator, or Digital Indicator (with pushbuttons) option.

HIGH PERFORMANCE

Transmitters are accurate to ±0.05% of calibrated span in the digital linear mode, and ±0.060% of calibrated span in the 4 to 20 mA linear mode, as well as microprocessor-based correction to achieve excellent ambient temperature compensation.

OPTIONAL SIL2 TRANSMITTERS

Modern industrial processes tend to be technically complex and have the potential to inflict serious harm to persons or property during a mishap. The IEC 61508 standard defines safety as “freedom from unacceptable risk.” SIL2 pressure transmitters with HART communication protocol, in conjunction with Triconex Safety Systems, provide integrated solutions for safety and critical control applications. The integrated solution is certified as interference-free from the 4 to 20 mA loop; this guarantees the integrity of the safety system and the safety of the controlled process. The integrated design allows uninterrupted operation of the safety function, while allowing access to device level information via HART commands. The solution permits interface of device diagnostics with asset management systems without compromising functional safety. Select Option -S2 for a SIL2-Certified HART Transmitter. A copy of the certification is available via Auxiliary Specification (AS) Code CERT-S.

WIDE MEASUREMENT RANGE WITH A MINIMUM OF SENSORS

Five d/p range sensors provide measurement spans from 0.12 to 21 000 kPa (0.018 to 3000 psi). The high turndown capability of the transmitter means that nearly all d/p applications can be satisfied with only these five ranges, greatly simplifying your spare transmitter and spare parts requirements.

MULTIDROP COMMUNICATIONS

Either point-to-point (Figure 20) or multidropping (Figure 21) is permitted. Multidropping is the connection of several transmitters to a single communications line. Communications between the host computer and transmitter takes place digitally, with the analog output of the transmitter fixed. With HART communication protocol, up to fifteen transmitters can be connected on a single twisted pair of wires or over leased telephone lines.

OPTIONAL MOUNTING BRACKET SETS

In addition to the standard style mounting bracket sets optionally offered with these transmitters, a unique universal style mounting bracket has been developed to allow wide flexibility in transmitter mounting configurations consistent with installation requirements. All mounting bracket sets allow mounting to a surface, pipe, or manifold. Refer to Dimensions - Nominal section.

PROCESS CONNECTORS

Removable, gasketed process connectors allow a wide range of selections, including 1/4 NPT, 1/2 NPT, Rc 1/4, Rc 1/2, and weld neck connections. For highly corrosive chemical processes when a traditional structure is used (see transmitter structures further in document), two 1/2 NPT pvdf inserts (Figure 1) are installed in both 316 ss covers and are used as the process connectors. In these applications, tantalum is used as the sensor diaphragm material.

SENSOR CORROSION PROTECTION

For traditional structure, choice of 316L ss, Co-Ni-Cr, Hastelloy C, Monel, Gold-Plated 316L ss, and Tantalum materials. High corrosion resistance of Co-Ni-Cr (TI 037-078) means long service life in many difficult applications without the extra cost for exotic materials. See TI 037-75b for process applicability with Co-Ni-Cr and other process wetted materials.

For low profile structures LP1 and LP2, 316L ss and Hastelloy C are offered as sensor materials.

Refer to Transmitter Structures section that follows for description and application of traditional and low profile (LP1 and LP2) structures.

OPTIONAL LCD DIGITAL INDICATOR)

A two-line digital indicator (Figure 22) with on-board pushbuttons is available to display the measurement with a choice of units. The pushbuttons allow zero and span adjustments, as well as local configuration without the need for a HART Communicator or PC-based configurator.

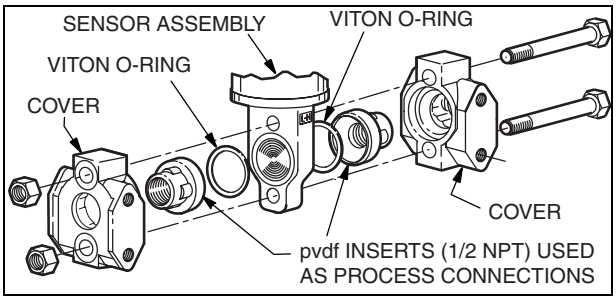


Figure 1. Bottomworks Shown with 1/2 NPT pvdf Inserts Installed in HI- and LO-Side Covers; with Traditional Structure

EASE OF INSTALLATION

Rotatable Topworks allows transmitter installation in tight places, allows indicator to be positioned in preferred direction, and eases field retrofit.

Two Conduit Entrances offer a choice of entry positions for ease of installation and self-draining of condensation regardless of mounting position and topworks rotation.

Wiring Guides and Terminations provide ease of wire entry and support, plenty of space to work and store excess wire, and large, rugged screw terminals for easy wire termination.

UNIQUE PROCESS COVER AND CELL BODY DESIGN

Biplanar Construction (Figure 2) maintains the traditional horizontal process connections and vertical mounting by providing a cell body contained between two process covers, while still achieving light weight, small size, and high standard static pressure rating of 25 MPa (3625 psi). This provides easy retrofit of any conventional differential pressure transmitter, and also is easily mounted in the horizontal position with vertical process connections, when required.

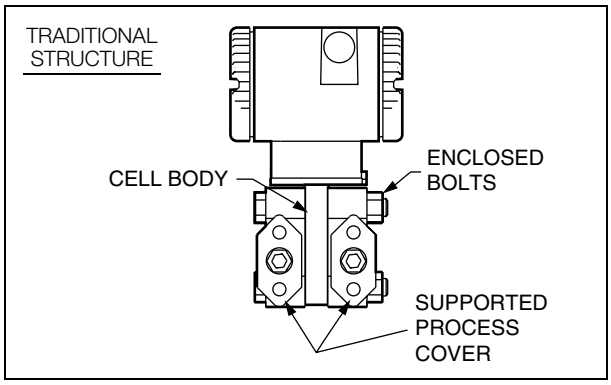


Figure 2. Biplanar Construction Shown with Traditional Horizontal Process Connections

Process Covers (Figure 2) are fully supported by the cell body over their entire height. This prevents bending and results in a highly reliable seal. Also, this provides dimensional stability to the process covers, ensuring that they will always mate properly with 3-valve bypass manifolds.

Process Cover Bolts (Figure 2) are enclosed to minimize corrosion and to minimize early elongation with rapid temperature increases. The design makes it less likely for the transmitter to release process liquid during a fire.

Process Cover Gaskets are ptfe as standard; ptfe provides nearly universal corrosion resistance, and eliminates the need to select and stock various elastomers to assure process compatibility.

Light Weight provides ease of handling, installation, and direct mounting without requiring costly pipe stands.

TRANSMITTER STRUCTURES

Traditional and low profile structures (LP1 and LP2) are offered to accommodate and to provide flexibility in transmitter installations. See paragraphs that follow.

Traditional Structure

The traditional structure (Figure 3) utilizes the right angle design common to most DP transmitters in use throughout the world. Process connections are oriented 90 degrees from the transmitter centerline.

This traditional structure makes it easy to retrofit any transmitters of similar design.

Sensor cavity venting and draining is provided for both vertical and horizontal transmitter installation, using innovative tangential connections to the sensor cavity (Figures 4 and 5). Optional side vents are offered for sensor cavity venting in the upright position (Figure 6).

An extensive variety of process-wetted materials are available for the process covers on this highly versatile and widely used transmitter.

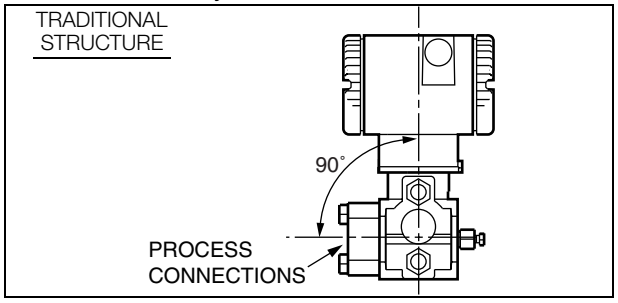


Figure 3. Vertical Mounting Showing Process Connections at 90 degrees

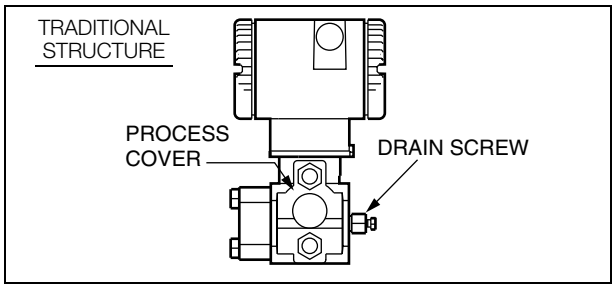


Figure 4. Vertical Mounting - Cavity Draining

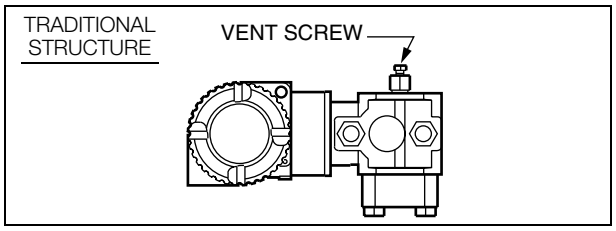


Figure 5. Horizontal Mounting - Cavity Venting, and Self-Draining into Process Line

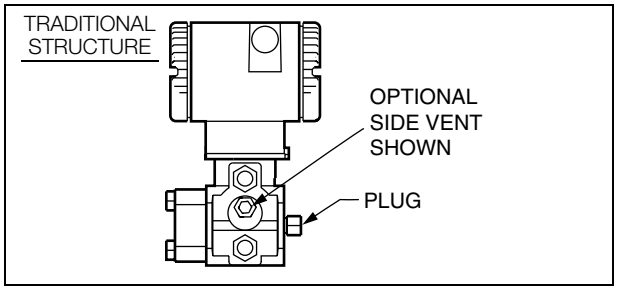


Figure 6. Vertical Mounting - Cavity Venting, and Self-Draining into Process Line

Low Profile Structures

The low profile structures utilize an in-line design, placing the process connections in line with the transmitter centerline (Figures 7 and 8). This allows mounting of the transmitter in the upright position with the process connections facing downward, for connection to vertical process piping or for mounting directly to a three- or five-valve manifold.

The low profile structures provide a mounting style similar to that used by competitive Coplanar™ transmitters. This makes it easy to select Foxboro transmitters for both retrofit and new applications where this type of installation is desired.

Transmitters with the low profile structure can be attached directly to existing, installed Coplanar manifolds, such as the Rosemount Model 305RC or Anderson Greenwood Models MB3, MB5G, and MB5P, by use of an optional adapter plate (Figure 9). Also, when assembled to the same process piping or manifold as a Coplanar transmitter, one of the electrical conduit connections is located within ± one inch of the similar conduit connection on the competitive transmitter, assuring ease of retrofit or conformance with installation design drawings.

All parts making up the low profile versions are identical to the parts in the traditional version except for the process covers and the external shape of the sensor cell body.

For user convenience, two types of low profile structures are offered, type LP1 and LP2. The process covers are the only transmitter parts that differ between structure types LP1 and LP2.

Refer to the sections that follow for further descriptions of low profile structures LP1 and LP2.

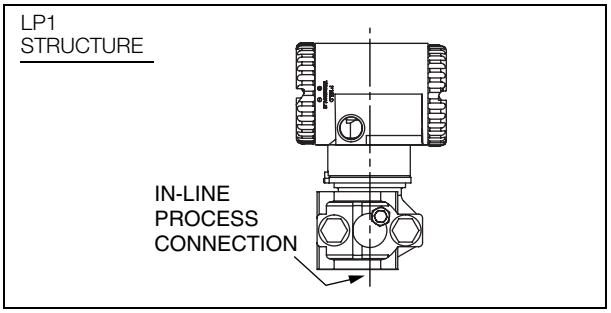


Figure 7. Low Profile Structure - LP1 Shown

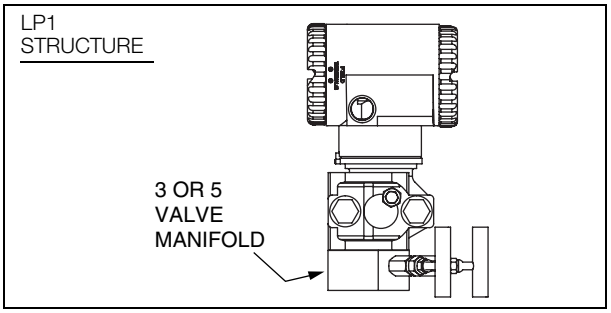


Figure 8. LP1 Shown Directly Mounted to Manifold

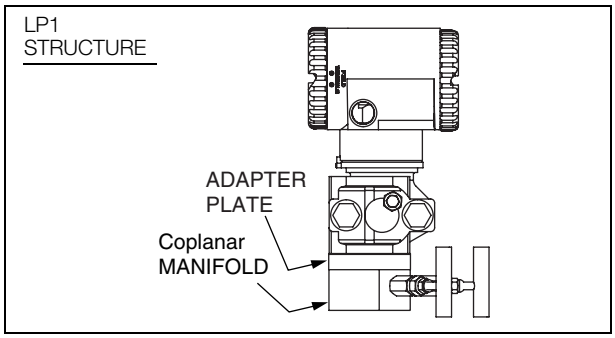


Figure 9. LP1 Shown Mounted to a Coplanar Manifold using an Optional Intermediate Adapter Plate

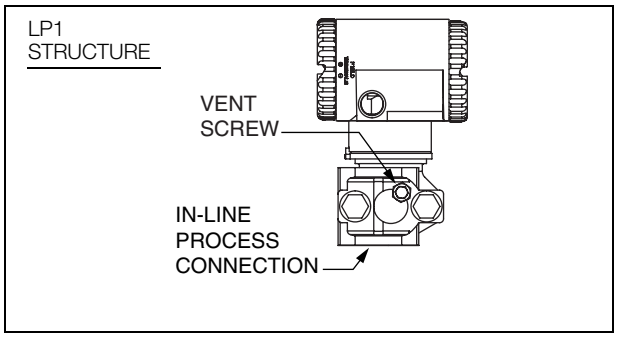


Figure 10. Upright Mounting

Low Profile Structure LP1 – Direct Mount

Low Profile Structure LP1 is a compact, inexpensive, lightweight design for direct mounting to a separately mounted manifold or process piping. These transmitters are not typically bracket-mounted.

They are supplied as standard with a single vent/drain screw in the side of each process cover. In conjunction with the standard tangential venting and draining design, they are suitable for mounting either vertically (Figure 10) or horizontally, and are suitable for nearly all applications, including liquids, gases, and steam. For horizontal installation, they can simply be “turned over” (rotated 180 degrees - Figures 11 and 12) to orient the high and low pressure sides in the preferred locations. There is no need to unbolt process covers. The topworks housing can also be rotated, as shown, to orient the conduit connections in the desired position.

In the vertical, upright position, they are also self-draining and are ideal for gas flow rate service, when directly mounted to a manifold located above the horizontal pipeline. The vent screw can be omitted for this or other applications, if desired.

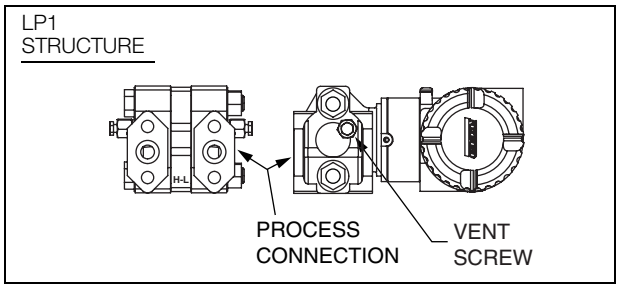


Figure 11. Horizontal Mounting with Vent Screw

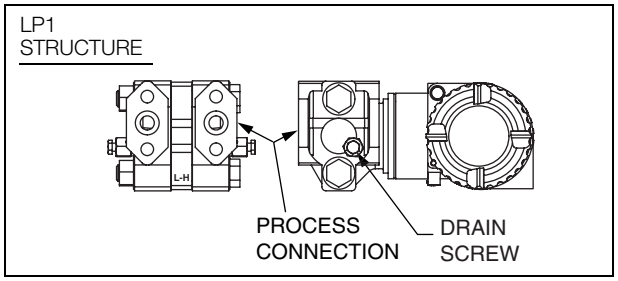


Figure 12. Horizontal Mounting with Drain Screw

Low Profile Structure LP2 - Bracket or Direct Mount

Low Profile Structure LP2 is a universal design for either bracket or direct mounting. Drilled and tapped mounting holes facilitate mounting to either new or existing Foxboro brackets (Options -M1, -M2, and -M3), as well as standard brackets supplied with existing Coplanar transmitters. See Figure 13 and Figure 14.

These transmitters can also be directly mounted to manifolds or process piping and are available with the same optional adapter used with low profile structure LP1 to fit existing Coplanar manifolds (Figure 15).

For extra convenience, they use a full-featured vent and drain design, with separate vent and drain screws positioned in each cover for complete venting or draining directly from the sensor cavity. They are normally recommended for upright, vertical installation.

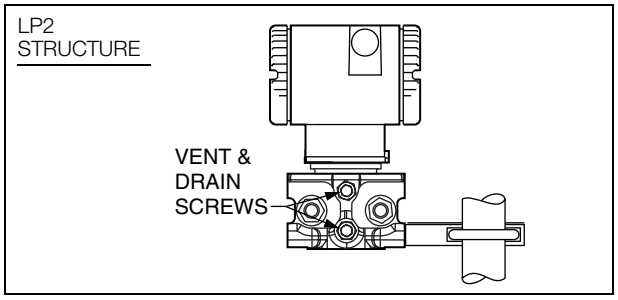


Figure 13. Shown on Foxboro Universal Bracket

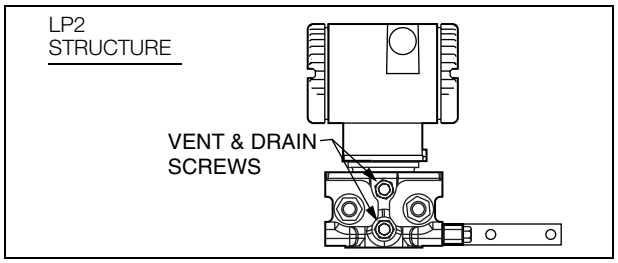


Figure 14. Shown on Coplanar Bracket

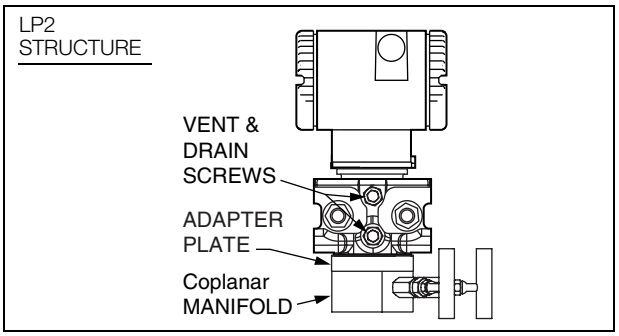


Figure 15. Adapter Mount to Existing Coplanar Manifold

PRESSURE SEALS

Pressure seals are used with transmitters having a traditional structure (see “TRANSMITTER STRUCTURES” on page 5) when it is necessary to keep the transmitter isolated from the process. A sealed system is used for a process fluid that may be corrosive, viscous, subject to temperature extremes, toxic, sanitary, or tend to collect and solidify.

Table 1 lists the various pressure seals that can be used with an IDP10 Transmitter. To order a transmitter with seals, both a Transmitter Model Number and Seal Model Number are required. For a complete listing of pressure seal models and specifications, see PSS 2A-1Z11 A. Also see Figure 16 for typical pressure seal configurations.

Table 1. Pressure Seals Used with IDP10 Transmitters

Direct Connect Pressure Seal Assemblies		
Seal Model	**Seal Description**	**Process Connections**
PSFLT	Flanged, Direct Connect (Flanged Level), Flush or Extended Diaphragm	ANSI Class 150/300/600 flanges and BS/DIN PN 10/40, 10/16, 25/40 flanges
PSSCT	Sanitary, Direct Connect (Level Seal), Flush Diaphragm	Process Connection to Sanitary Piping with 2- or 3-inch Tri-Clamp
PSSST	Sanitary, Direct Connect (Level Seal), Extended Diaphragm	Process Connection to 2-in Mini Spud or 4-in Standard Spud; Tri-Clamp
Remote Mount, Capillary-Connected Pressure Seal Assemblies		
Seal Model	**Seal Description**	**Process Connections**
PSFPS	Flanged, Remote Mount, Flush Diaphragm	ANSI Class 150/300/600 flanges and BS/DIN PN 10/40 flanges
PSFES	Flanged, Remote Mount, Extended Diaphragm	ANSI Class 150/300/600 flanges and BS/DIN PN 10/40, 10/16, 25/40 flanges
PSFAR	Flanged, Remote Mount, Recessed Diaphragm	ANSI Class 150/300/600/1500 flanges
PSTAR	Threaded, Remote Mount, Recessed Diaphragm	1/4, 1/2, 3/4, 1, or 1 1/2 NPT internal thread
PSISR	In-Line Saddle Weld, Remote Mount, Recessed Diaphragm	Lower housing of seal is in-line saddle welded to nominal 3- or 4-inch (and larger) Pipe
PSSCR	Sanitary, Remote Mount, Flush Diaphragm	Process Connection secured with a Tri-Clamp to a 2- or 3-inch pipe
PSSSR	Sanitary, Remote Mount, Extended Diaphragm	Process Connection to 2-in Mini Spud or 4-in Standard Spud; Tri-Clamp

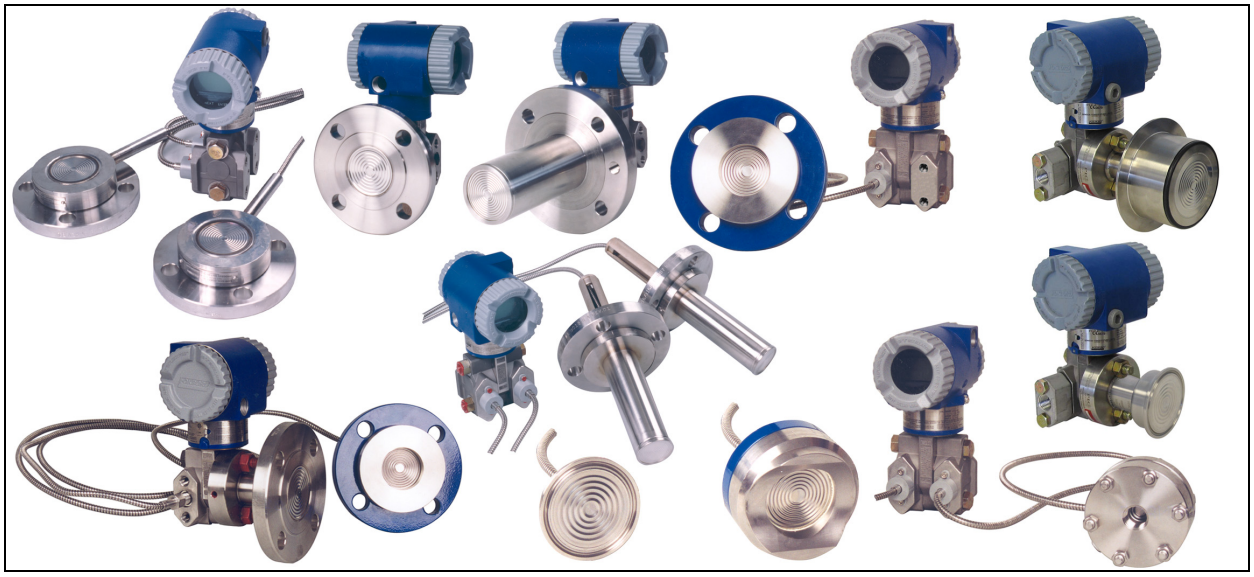


Figure 16. Typical Pressure Seals used with IDP10 Transmitters

TRANSMITTER FUNCTIONAL BLOCK DIAGRAM - FIGURE 17

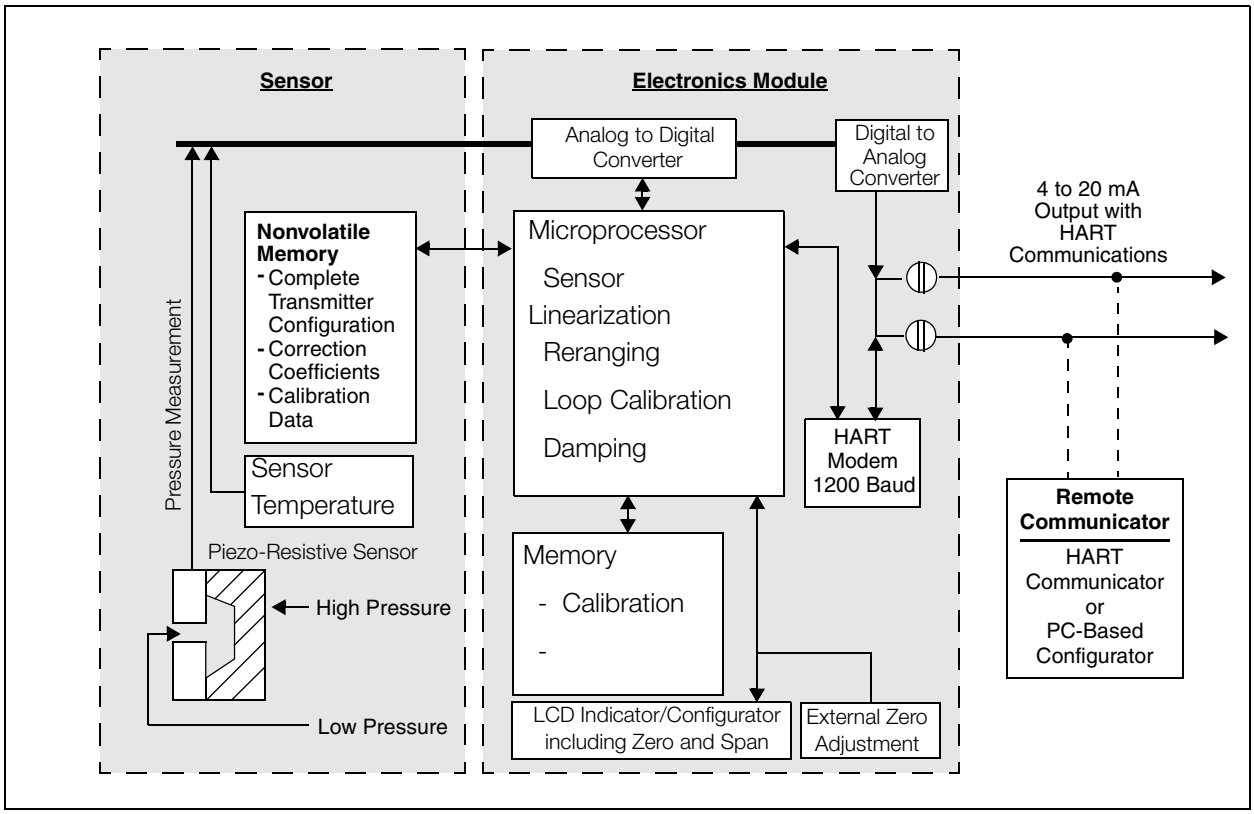


Figure 17. Transmitter Functional Block Diagram

FUNCTIONAL SPECIFICATIONS

Span Limits for IDP10 d/p Cell Transmitters

Span Code	kPa	psi	mbar	mmHg	mmH_2O	inH_2O
A (a)	0.12 and 7.5	0.018 and 1.1	1.2 and 75	0.93 and 56	12 and 750	0.5 and 30
B	0.87 and 50	0.125 and 7.2	8.7 and 500	6.5 and 375	87 and 5000	3.5 and 200
C	7 and 210	1 and 30	70 and 2100	50 and 1500	700 and 21 000	28 and 840
Span Code	**MPa**	**psi**	**bar or kg/cm^2**	**mHg**	**mH_2O**	**ftH_2O**
D	0.07 and 2.1	10 and 300	0.7 and 21	0.5 and 15	7 and 210	23 and 690
E (b)	0.7 and 21(b)	100 and 3000 (b)	7 and 210 (b)	5 and 150 (b)	70 and 2100 (b)	230 and 6900 (b)

(a) Span Limit Code “A” not available when pressure seals are selected.

(b) When certain options are specified, the upper span and range limits are reduced as shown in the “Options Impact” table below.

Range Limits for IDP10 d/p Cell Transmitters (a)

Span Code	kPa	psi	mbar	mmHg	mmH_2O	inH_2O
A (b)	-7.5 and +7.5	-1.1 and +1.1	-75 and +75	-56 and +56	-750 and +750	-30 and +30
B	-50 and +50	-7.2 and +7.2	-500 and +500	-375 and +375	-5000 and +5000	-200 and +200
C	-210 and +210	-30 and +30	-2100 and +2100	-150 and +150	-21 000 and +21 000	-840 and +840
Span Code	**MPa**	**psi**	**bar or kg/cm^2**	**mHg**	**mH_2O**	**ftH_2O**
D	-0.21 and +2.1	-30 and +300	-2.1 and +21	-1.5 and +15	-21 and +210	-69 and +690
E (c)	-0.21 and 21 (c)	-30 and +3000 (c)	-2.1 and +210 (c)	-1.5 and +150 (c)	-21 and +2100 (c)	-69 and +6900 (c)

(a) Positive values indicate HI side of sensor at the high pressure, and negative values indicate LO side of sensor at the high pressure.

(b) Span Limit Code “A” not available when pressure seals are selected.

(c) When certain options are specified, the upper span and range limits are reduced as shown in the “Options Impact” table below.

Impact of Certain Options on Span and Range Limits (a)

Option	Description (Also see Model Code)	Span and Range Limits Derated to:
-B3	B7M Bolts and Nuts (NACE)	20 MPa (2900 psi, 200 bar, or kg/cm^2)
-D1	DIN Construction	16 MPa (2320 psi, 160 bar or kg/cm^2)
-D5 or -B1	DIN Construction or 316 ss Bolting	15 MPa (2175 psi, 150 bar or kg/cm^2)
-D2, -D4, -D6, or -D8 (a)	DIN Construction[(a)]	10 MPa (1500 psi, 100 bar or kg/cm^2)[(a)]

(a) Refer to Model Code section for application and restrictions related to the items listed in the table.

FUNCTIONAL SPECIFICATIONS (CONT.)

Maximum Static and Proof Pressure Ratings for IDP10 d/p Cell Transmitters(1)

Transmitter Configuration (See Model Code for Description of Options)	Static Pressure Rating			Proof Pressure Rating(a)		
	MPa	psi	bar or kg/cm^2	MPa	psi	bar or kg/cm^2
With Option -D9 or -Y	40	5800	400	100	14500	1000
Standard or with Option -B2, -D3, or -D7	25	3625	250	100	14500	1000
With Option -B3	20	2900	200	70	11150	700
With Option -D1	16	2320	160	64	9280	640
With Option -B1 or -D5	15	2175	150	60	8700	600
With Option -D2, -D4, -D6, or -D8	10	1500	100	40	6000	400
With Structure Codes 78 and 79 (pvdf insert)	2.1	300	21	8.4	1200	84

(a) Proof pressure ratings meet ANSI/ISA Standard S82.03-1988. Unit may become nonfunctional after application of proof pressure.

Output Signal and Configuration

4 to 20 mA with HART Communications. When configured for multidrop applications, the mA signal is fixed at 4 mA to provide power to the device. Configurable using a HART Communicator, PC-based Configurator, or optional LCD Indicator with on-board pushbuttons.

Field Wiring Reversal

No transmitter damage.

Suppressed Zero and Elevated Zero

Suppressed/elevated zero ranges are acceptable as long as the Span/Range Limits are not exceeded.

Electronics and Sensor Temperatures

Readable from the HART Communicator, PC-based Configurator, or optional LCD Indicator with on-board pushbuttons. Measurement is transmitter temperature, not necessarily process temperature.

Adjustable Damping

Response time is normally 0.75 s, or electronically adjustable setting of 0.00 (none), 0.25, 0.50, 1, 2, 4, 8, 16, or 32 seconds, whichever is greater, for a 90% recovery from an 80% input step as defined in ANSI/ISA S51.1. (For 63.2% recovery, 0.50 s with sensors B to E, and 0.60 s with Sensor A.)

Zero and Span Adjustments

Zero and span adjustments can be initiated from the HART Communicator, PC-based Configurator, or optional LCD Indicator having on-board pushbuttons.

Zeroing for Nonzero-Based Ranges

Dual Function Zeroing allows zeroing with the transmitter open to atmosphere, even when there is a nonzero-based range. This greatly simplifies position effect zeroing on many pressure and level applications. It applies to optional LCD Indicator with on-board pushbuttons and optional External Zero Adjustment.

Current Outputs for Overrange, Fail, and Offline Conditions

OFFLINE	User configurable between 4 and 20 mA
SENSOR FAILURE	User configurable to Fail LO or Fail HI
FAIL LO	3.60 mA
UNDERRANGE	3.80 mA
OVERRANGE	20.50 mA
FAIL HI	21.00 mA

Write Protect Jumper

Can be positioned to lock out all configurators from making transmitter database changes. This makes transmitter suitable for Safety Shutdown System Applications that require this feature.

(1) Refer to Model Code section for application and restrictions related to the items listed in the table.

FUNCTIONAL SPECIFICATIONS (CONT.)

Square Root Low Flow Cutoff

User configurable using HART Communicator, PC-based Configurator, or optional LCD with on-board pushbuttons to provide:

- User settable for cutoff to zero at any flow rate between 0 and 20% of maximum flow.
- Cutoff to zero at flows <10% of maximum flow (1% of maximum differential pressure).
- Or active point-to-point line between zero and 20% of maximum flow (4% of maximum differential pressure).

Minimum Allowable Absolute Pressure vs. Transmitter Temperature

WITH SILICONE FILL FLUID

Full vacuum: up to 121°C (250°F)

WITH INERT FILL FLUID

Refer to Figure 18.

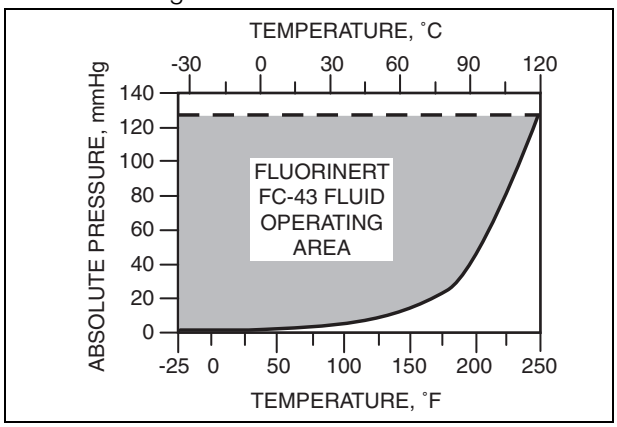


Figure 18. Minimum Allowable Absolute Pressure vs. Transmitter Temperature, Inert FC-43, 2.6 cSt at 25°C (77°F)

Supply Voltage Requirements and External Loop Load Limitations (Figure 19)

Minimum voltage shown in Figure 19 is 11.5 V dc. This value can be reduced to 11 V dc by using a plug-in jumper across the test receptacles in the field wiring compartment terminal block. See Figure 23.

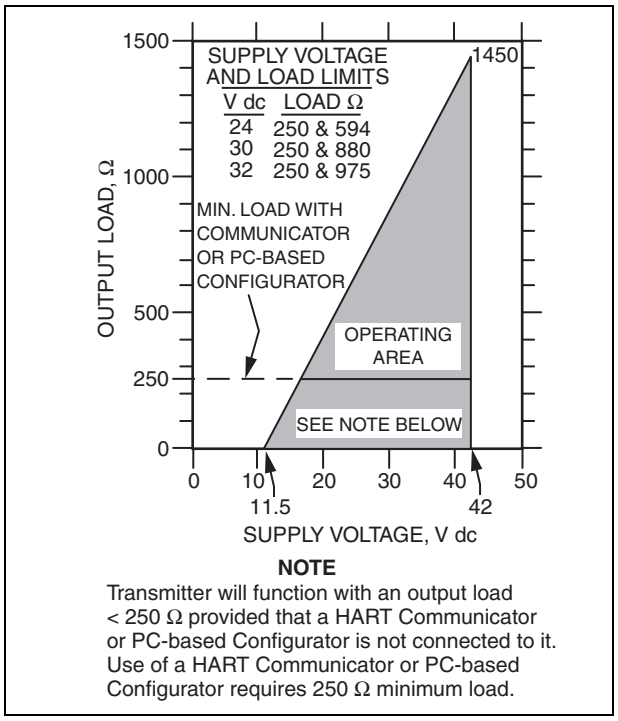


Figure 19. 4 to 20 mA Output, Supply Voltage vs. Output Load

FUNCTIONAL SPECIFICATIONS (CONT.)

Configuration and Calibration Data

All factory characterization data and user configuration and calibration data are stored in the sensor, as shown in the transmitter block diagram, Figure 17. This means that the electronics module may be replaced, with one of like type, without the need for reconfiguration or recalibration. Replacing the module can affect accuracy by a maximum of 0.20% of span. Error can be removed by a mA trim that does not require application of pressure.

Electronics Upgradeability

As stated above, all factory characterization data is stored in the sensor and is accessed by each electronics module type. This means that electronics modules can be changed from one type to another, allowing for easy upgrade from an analog output type to a fully intelligent type module. Changing module types may require reconfiguration and recalibration, but all factory characterization data is retained.

Communications

Configurable for either Analog (4 to 20 mA) or Multidrop Mode. Digital communications is provided in both modes based upon the FSK (Frequency Shift Keying) technique which alternately superimposes one of two different frequencies on the uninterrupted current carried by the two signal/power wires.

ANALOG MODE (4 to 20 mA)

The output signal is updated 30 times per second. Digital communications between the transmitter and HART Communicator or PC-based Configurator is rated for distances up to 3050 m (10 000 ft). The communications rate is 1200 baud and requires a minimum loop load of 250 ohms. See Figure 20.

MULTIDROP MODE (FIXED CURRENT)

Multidrop Mode supports communications with up to 15 transmitters on a single pair of signal/power wires. The digital output signal is updated 4 times per second and carries pressure measurement and sensor/electronics temperatures (internal recalculation rate for temperature is once per second). Communications between the transmitter and the system, or between the transmitter and HART Communicator or PC-based Configurator, is rated for distances up to 1525 m (5000 ft). The digital communications rate is 1200 baud and requires a minimum loop load of 250 ohms. See Figure 21.

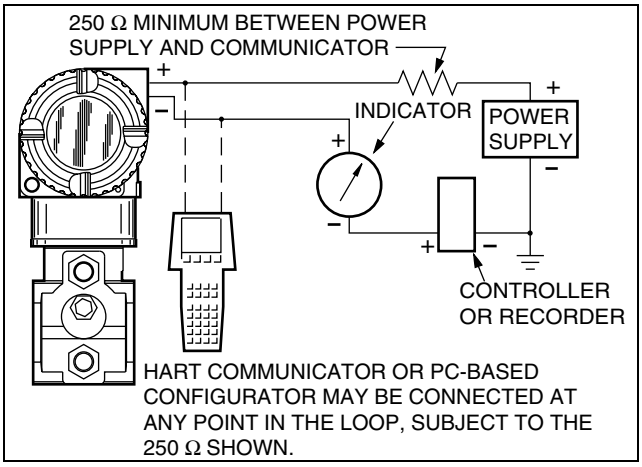


Figure 20. 4 to 20 mA Output Block Diagram

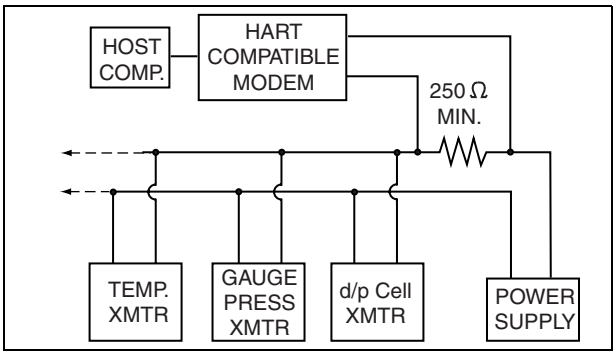


Figure 21. Typical Multidrop Block Diagram

FUNCTIONAL SPECIFICATIONS (CONT.)

Remote Communications

The HART Communicator or PC-based Configurator has full access to all of the "Display" and "Display and Reconfigure" items listed below. It may be connected to the communications wiring loop and does not disturb the mA current signal. Plug-in connection points are provided on the transmitter terminal block.

"Display" Items

- Process Measurement in Two Formats
- Transmitter Temperatures (Electronics and Sensor)
- mA Output

"Display and Reconfigure" Items

- Zero and Span Calibration
- Reranging without Pressure
- Linear or Square Root Output
- Choice of Pressure and Flow EGU
- Electronic Damping
- Temperature Sensor Failure Strategy
- Failsafe Direction
- Tag, Descriptor, and Message
- Date of Last Calibration

Configuration Capability

CALIBRATED RANGE

– Input range within Span and Range Limits
– One of pressure units shown in Table 2

OUTPUT MEASUREMENT #1 – DIGITAL PRIMARY VARIABLE AND 4 TO 20 mA

– Mode
  Linear or Square Root
– Units for Linear Mode
  One of pressure units shown in Table 2
– Units for Square Root Mode
  One of flow units shown in Table 3

OUTPUT MEASUREMENT #2 – DIGITAL SECONDARY VARIABLE

– Mode
  Linear or Square Root (independent of Measurement #1)
– Units for Linear Mode
  One of pressure units shown in Table 2
– Units for Square Root Mode
  One of flow units shown in Table 3.

Table 2. Allowable Linear Pressure Units for Calibrated Range (a)

inH_2O	psi	Pa	atm	g/cm^2
ftH_2O	inHg	kPa	bar	kg/cm^2
mmH_2O	mmHg	MPa	mbar	torr
mH_2O	–	–	–	–

(a) See Optional LCD Indicator for percent (%) display.

Table 3. Allowable Square Root (Flow) Units

% flow	gal/s	m^3/s	ft^3/s	lgal/s	bbl/s
l/s	gal/m	m^3/m	ft^3/m	lgal/m	bbl/m
l/m	gal/h	m^3/h	ft^3/h	lgal/h	bbl/h
l/h	gal/d	Nm^3/h	ft^3/d	lgal/d	bbl/d
Ml/d	Mgal/d	Sm^3/h			lb/h
		Am^3/h			kg/h
		m^3/d			t/h
					MMSCFD

Optional Custom Configuration (Option -C2)

For the transmitter to be custom configured by the factory, the user must fill out a data form. If this option is not selected, a standard default configuration will be provided; for example, see Table 4 below.

Any of the above configurable parameters in Table 4 can easily be changed using the HART Communicator or PC-based Configurator.

FUNCTIONAL SPECIFICATIONS (CONT.)

Table 4. Option -C2 Example

Parameter	Default Config.	Example of Option -C2
Tagging Info. Tag (8 char. max.) Descriptor (16 char. max.) Message (32 char. max.) HART Poll Address (0 to 15)	 TAG TAG NAME LOCATION 0	 FT103A FEEDWATER BUILDING 4 0[a]
Calibrated Range Pressure EGU LRV URV	 per S.O.[b] per S.O.[c] per S.O.[c]	 inH_2O 0 100
Measurement #1 Linear/Sq. Root (Flow) Pressure/Flow EGU Range Output	 Linear per S.O. [d] per S.O. [d] 4 to 20 mA	 Sq. Rt gal/m 0-500 gal/m 4 to 20 mA[e]
Measurement #2 Linear/Sq. Root (Flow) Pressure/Flow EGU Range	 Linear per S.O. [d] per S.O. [d]	 Linear inH_2O 0-100
Other Electronic Damping Failsafe Direction Failure Strategy Ext. Zero Option	 None Upscale Continue Enabled	 0.5 s Downscale Failsafe Disabled

(a) Address is 1 to 15 for multidrop applications.

(b) See Table 2. If not specified, the factory default calibration is zero to maximum span; default units vary by sensor code.

(c) Within Span and Range Limits for selected sensor code.

(d) Same as Calibrated Range.

(e) Fixed current is used for multidrop applications.

Optional LCD Digital Indicator (Figure 22)

Indicator provides:

- Two Lines; Five numeric characters on top line (four when a minus sign is needed); and seven alphanumeric characters on bottom line.
- Measurement Readout; Value displayed on top line, and units label displayed on bottom line.
- Configuration and Calibration prompts.

Pushbuttons (two) Provide the Following Configuration and Calibration Functions:

- Zero and Span settings, non-interactive to automatically set output to either 4 mA or 20 mA using the “NEXT” and “ENTER” pushbuttons.
- 4 and 20 mA Jog Settings, allowing the user to easily increment the mA output signal up or down in fine steps to match a value shown on an external meter.
- Linear or Square Root Output
- User-entered cutoff point from 0 to 20% of maximum flow.
- Forward or Reverse Output
- Damping Adjustment
- Enable/Disable Optional External Zero
- Temperature Sensor Failure Strategy
- Failsafe Action
- Units Label (Bottom Line of Display)
- Settable Lower and Upper Range Values for Transmission and Display (Top Line)
- Reranging
- Percent (%) Output

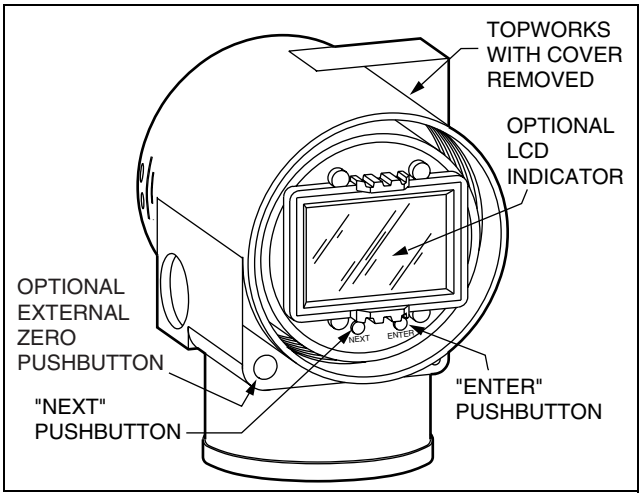


Figure 22. LCD Indicator with On-Board Pushbuttons

FUNCTIONAL SPECIFICATIONS (CONT.)

Optional External Zero Adjustment

An external pushbutton (Figure 22) mechanism is isolated from electronics compartment and magnetically activates an internal reed switch through the housing. This eliminates a potential leak path for moisture or contaminants to get into the electronics compartment. This zero adjustment can be disabled by a configuration selection.

OPERATING, STORAGE, AND TRANSPORTATION CONDITIONS

Influence	Reference Operating Conditions	Normal Operating Conditions (a)	Operative Limits (a)	Storage and Transportation Limits
Process Connection Temp. ▸ with Silicone Fill Fluid ▸ with Inert Fill Fluid	 ▸ 24 ±2°C (75 ±3°F) ▸ 24 ±2°C (75 ±3°F)	 ▸ -29 to + 82°C (-20 to +180°F) ▸ -29 to + 82°C (-20 to +180°F)	 ▸ -46 and +121°C(b) (-50 and +250°F) ▸ -29 and +121°C (-20 and +250°F)	 ▸ Not Applicable ▸ Not Applicable
Electronics Temperature ▸ with LCD Indicator (c)	▸ 24 ±2°C (75 ±3°F) ▸ 24 ±2°C (75 ±3°F)	▸ -29 to + 82 °C(g) (-20 to +180 °F)(g) ▸ -20 to + 82 °C(g) (-4 to +180 °F)(g)	▸ -40 and +85°C(g) (-40 and +185°F)(g) ▸ -29 and +85°C(g) (-20 and +185°F)(g)	▸ -54 and +85°C (-65 and +185°F) ▸ -54 and +85°C (-65 and +185°F)
Relative Humidity (d)	50 ±10%	0 to 100%	0 and 100%	0 and 100% Noncondensing
Supply Voltage – mA Output	30 ±0.5 V dc	11.5 to 42 V dc (e)	11.5 and 42 V dc (e)	Not Applicable
Output Load – mA Output	650 Ω	0 to 1450 Ω	0 and 1450 Ω	Not Applicable
Vibration	1 m/s^2 (0.1 “g”)	6.3 mm (0.25 in) Double Amplitude: from 5 to 15 Hz with Aluminum Housing and from 5 to 9 Hz with 316 ss Housing - 0 to 30 m/s^2 (0 to 3 “g”) from 15 to 500 Hz with Aluminum Housing; and 0 to 10 m/s^2 (0 to 1 “g”) from 9 to 500 Hz with 316 ss Housing		11 m/s^2 (1.1 “g”) from 2.5 to 5 Hz (in Shipping Package)
Mounting Position	Upright or Horizontal (f)	Upright or Horizontal (f)	No Limit	Not Applicable

(a) When Traditional Structure Codes 78/79 (pvdf inserts in Hi- and Lo-side process covers) are used, maximum overrange is 2.1 MPa (300 psi), and temperature limits are -7 and +82°C (20 and 180°F); when DIN Construction Options D2/D4/D6/D8 are used, temperature limits are 0 and 60°C (32 and 140°F).

(b) Selection of Option -J extends the low temperature operative limit of transmitters with silicone filled sensors down to -50°C (-58°F).

(c) Although the LCD will not be damaged at any temperature within the “Storage and Transportation Limits”, updates will be slowed and readability decreased at temperatures outside the “Normal Operating Conditions”.

(d) With topworks cover on and conduit entrances sealed.

(e) 11.5 V dc can be reduced to 11 V dc by using a plug-in shorting bar; see “Supply Voltage Requirements” section and Figure 23.

(f) Sensor process wetted diaphragms in a vertical plane.

(g) Refer to the Electrical Safety Specifications section for a restriction in ambient temperature limits with certain electrical certifications.

PERFORMANCE SPECIFICATIONS

Zero-Based Calibrations; Cobalt-Nickel-Chromium or Stainless Steel Sensor w/Silicone Fluid; Under Reference Operating Conditions unless otherwise Specified. URL = Upper Range Limit and Span = Calibrated Span.

Accuracy (Linear Output) - Table 1 (a)

Accuracy, % of Span[a] [b] [c]	
Spans ≥10% URL	Spans <10% URL
±0.060%	±[0.025 + 0.0035 (URL/Span)]%

(a) Accuracy includes Linearity, Hysteresis, and Repeatability.

(b) Add ±0.04% for Span Code A, and ±0.02% for Span Code E.

(c) Subtract ±0.01% for digital output accuracy.

Accuracy (Square Root Output) (2)

Operating Point % of Flow Rate Span	Accuracy % of Flow Rate Span
50% and Greater	Accuracy % from Table 1
Less than 50% (to cutoff)	$\frac{\text{(Accuracy \% from Table 1)(50)}}{\text{Operating Point in \% of Flow Rate Span}}$

Stability

Long term drift is less than ±0.05% of URL per year over a 5-year period.(3)

Calibration Frequency

The calibration frequency is five years. The five years is derived using the values of allowable error (% span), TPE (% span), performance margin (% span), and stability (% span/month); where:

$$\text{Calibration Frequency} = \frac{\text{Performance Margin}}{\text{Stability}} = \text{Months}$$

Power-up Time

Less than 5 seconds for output to reach first valid measurement.

RFI Effect

The output error is less than 0.1% of span for radio frequencies from 27 to 1000 MHz and field intensity of 30 V/m when the transmitter is properly installed with shielded conduit and grounding, and housing covers are in place. (Per IEC Std. 61000-4-3.)

Supply Voltage Effect

Output changes less than 0.005% of span for each 1 V change within the specified supply voltage requirements. See Figure 19.

Vibration Effect

Total effect is ±0.2% of URL per “g” for vibrations in the frequency range of 5 to 500 Hz; with double amplitudes of 6.3 mm (0.25 in) in the range of 5 to 15 Hz, or accelerations of 3 “g” in the range of 15 to 500 Hz, whichever is smaller, for transmitter with aluminum housing; and with double amplitudes of 6.3 mm (0.25 in) in the range of 5 to 9 Hz, or accelerations of 1 “g” in the range of 9 to 500 Hz, whichever is smaller, for transmitter with 316 ss housing.

Position Effect

Any zero effect caused by mounting position can be eliminated by rezeroing. There is no span effect.

(2) Accuracy includes Linearity, Hysteresis, and Repeatability.
(3) Add an additional 0.05% to stability specification for Span Code A.

PERFORMANCE SPECIFICATIONS (CONT.)

Static Pressure Effect

The zero and span shift for a 7 MPa, 1000 psi, change in static pressure is:

ZERO SHIFT(4)

Span Code	Zero Shift-Static Pressure Effect
A	±0.30% URL (a)
B and C	±0.10% URL
D	±0.50% URL(a)
E	±0.50% URL

(a) Per 3.5 MPa (500 psi) for Span Codes A and D.

SPAN SHIFT

±0.15% of Reading.

Switching and Indirect Lightning Transients

The transmitter can withstand a transient surge up to 2000 V common mode or 1000 V normal mode without permanent damage. The output shift is less than 1.0%. (Per ANSI/IEEE C62.41-1980 and IEC Std. 61000-4-5.)

Ambient Temperature Effect

Total effect for a 28°C (50°F) change within Normal Operating Condition limits is:

Span Code	Ambient Temperature Effect
A	±(0.18% URL + 0.025% Span)
B and C	±(0.03% URL + 0.060% Span)
D	±(0.05% URL + 0.045% Span)
E	±(0.08% URL + 0.025% Span)

NOTE

For additional ambient temperature effect with pressure seals are used, see PSS 2A-1Z11 A.

(4) Can be calibrated out by zeroing at nominal line pressure.

PHYSICAL SPECIFICATIONS

Process Cover and Connector Material (Process Wetted)

Carbon Steel, 316 ss, Monel, Hastelloy C, or pvdf (Kynar) inserts in 316 ss covers for transmitter traditional structure; and 316 ss for transmitter low profile structures. For exceptional value and corrosion resistance, 316 ss is the least expensive material.

Process Cover and Process Connection Gaskets

Glass filled ptfe, or Viton when Structure Codes 78/79 (pvdf inserts) are used.

Process Cover Bolts and Nuts

ASTM A193, Grade B7 high strength alloy steel for bolts, and ASTM A194 Grade 2H high strength alloy steel for nuts are standard. Options include NACE Class B7M bolting, 17-4 ss bolting, and 316 ss bolting.

Sensor Material (Process Wetted)

Co-Ni-Cr, 316 L ss, Gold-Plated 316L ss, Monel, Hastelloy C, or Tantalum for transmitter traditional structure; and 316L ss or Hastelloy C for transmitter low profile structures. For exceptional value and corrosion resistance, 316L ss is the least expensive material. Refer to TI 037-078 and TI 37-75b for information regarding the corrosion resistance of Co-Ni-Cr and other sensor materials.

Sensor Fill Fluids

Silicone Oil or Inert (FC-43)

Environmental Protection

The enclosure has the dusttight and weatherproof rating of IP66 as defined by IEC 60529, and provides the environmental and corrosion resistant protection rating of NEMA 4X.

Electronics Housing and Housing Covers

Housing has two compartments to separate the electronics from the field connections. The housing and covers are made from low copper, die-cast aluminum alloy with an epoxy finish, or from 316 ss. Buna-N O-ring seals are used to seal the threaded housing covers, housing neck, and terminal block.

Electrical Connections

Field and RTD sensor wires enter through 1/2 NPT, PG 13.5, or M20 threaded entrances, as specified, on either side of the electronics housing. Wires terminate under screw terminals and washers on terminal block in the field terminal compartment. Unused entrance is plugged to insure moisture and RFI/EMI protection. See Figure 23.

Electronics Module

Printed wiring assemblies are conformally coated for moisture and dust protection.

Mounting Position

The transmitter may be mounted in any orientation.

Approximate Mass (with Process Connectors)

4.2 kg (9.2 lb) – with Traditional Structure

Add 0.1 kg (0.2 lb) – with Low Profile Structure LP1

Add 0.8 kg (1.8 lb) – with Low Profile Structure LP2

Add 1.1 kg (2.4 lb) – with 316 ss Housing

Add 0.2 kg (0.4 lb) – with LCD Indicator Option

Dimensions

See “Dimensions - Nominal” section and Dimensional Print DP 020-446.

PHYSICAL SPECIFICATIONS (CONT.)

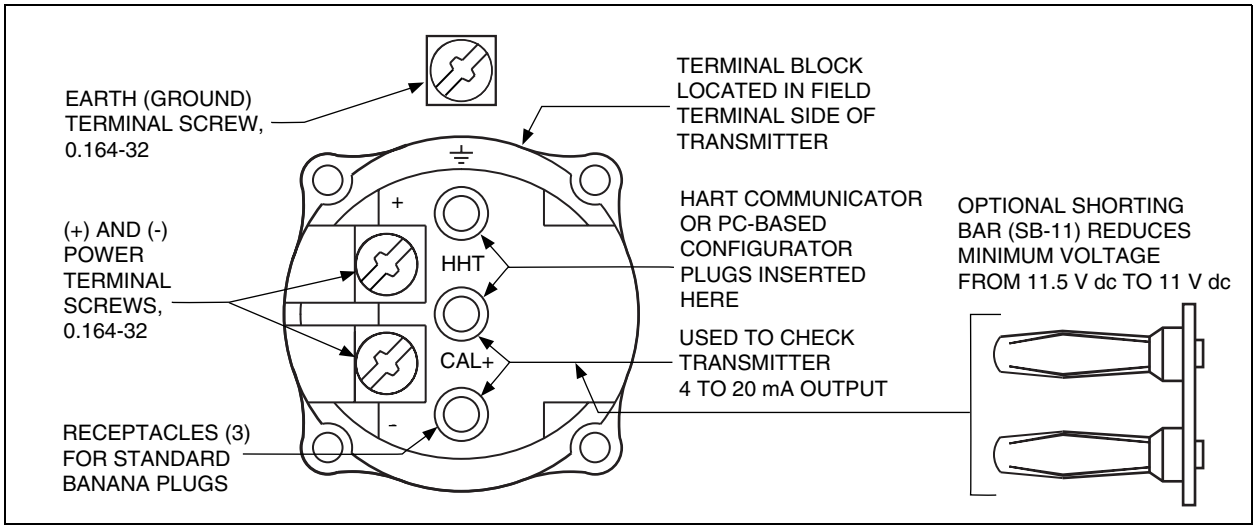


Figure 23. Field Terminal Block

ELECTRICAL SAFETY SPECIFICATIONS

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
ATEX flameproof; II 2 GD, EEx d IIC, Zone 1.	Temperature Class T6, Ta = -40°C to +85°C.	D (a)
ATEX intrinsically safe; II 1 GD, EEx ia IIC, Zone 0.	Temperature Class T4, Ta = -40°C to +80°C.	E
ATEX protection n; II 3 GD, EEx nL IIC, Zone 2.	Temperature Class T4, Ta = -40°C to +80°C.	N
ATEX multiple certifications, ia, d, and n. Refer to ATEX Codes D, E, and N for details.	Applies to Codes D, E, and N. (a)	M
CSA intrinsically safe for Class I, Division 1, Groups A, B, C, and D, Class II, Division 1, Groups E, F, and G; Class III, Division 1.	Temperature Class T4A at 40°C and T3C at 85°C maximum ambient.	C
CSA explosionproof for Class I, Division 1, Groups B, C, and D, and dust-ignitionproof for Class II, Division 1, Groups E, F, and G; and Class III, Division 1.	Maximum Ambient Temperature 85°C.	C
CSA Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2.	Temperature Class T4A at 40°C and T3C at 85°C maximum ambient.	C
CSA field device zone certified flameproof Ex d IIC. Also, all certifications of Code C above.	Maximum Ambient Temperature 85°C.	B
CSA zone certified intrinsically safe Ex ia IIC, and energy limited Ex nA II.	Temperature Class T4 at 40°C and T3 at 85°C maximum ambient.	B
FM intrinsically safe for Class I, Division 1, Groups A, B, C, and D, Class II, Division 1, Groups E, F, and G; Class III, Division 1.	Temperature Class T4A at 40°C and T4 at 85°C maximum ambient.	F
FM explosionproof for Class I, Division 1, Groups B, C, and D; and dust-ignitionproof for Class II, Division 1, Groups E, F, and G; and Class III, Division 1.	Temperature Class T6 at 80°C and T5 at 85°C maximum ambient.	F
FM nonincendive Class I, Div. 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G, and Class III, Div. 2.	Temperature Class T4A at 40°C and T4 at 85°C maximum ambient.	F
FM field device zone approved flameproof AEx d IIC. Also, all certifications of Code F above.	Temperature Class T6 at 75°C maximum ambient.	G
FM zone approved intrinsically safe AEx ia IIC.	Temperature Class T4 at 85°C maximum ambient.	G
IECEx intrinsically safe; Ex ia IIC.	Temperature Class T4, Ta = -40 to +80°C.	T
IECEx protection n; Ex nL IIC.	Temperature Class T4, Ta = -40 to +80°C.	U
IECEx flameproof; Ex d IIC.	T6, Ta = 80°C; T5, Ta = 85°C; Ambient Temperature -20 to +85°C.	V

Table continued on next page

ELECTRICAL SAFETY SPECIFICATIONS (CONT.)

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
Multi-marked as follows: **CSA** intrinsically safe, Cl. I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III, Div. 1; also CSA zone certified intrinsically safe Ex ia IIC.	See application conditions for Code C intrinsically safe applications.	W (b)
FM intrinsically safe, Cl. I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III, Div. 1. Also FM zone certified intrinsically safe AEx ia IIC.	See application conditions for Code F intrinsically safe applications.	
ATEX intrinsically safe, II 1 GD, EEx ia IIC, Zone 0.	See application conditions for Code E intrinsically safe applications.	

(a.) When selecting ATEX Safety Design Code M, the user must permanently mark (check off on rectangular box on data plate) one type of protection only (ia, d, or n). Do not change this mark once it has been applied.

(b) When selecting Safety Design Code W, the user must permanently mark (check off in rectangular block on data plate) intrinsically safe certifications for ATEX, CSA, or FM, as applicable. Do not change this mark once it has been applied.

MODEL CODE

Description			Model
I/A Series, Electronic d/p Cell Transmitter for Differential Pressure Measurement			IDP10
Electronics Versions and Output Signal			
Intelligent; Digital, HART and 4 to 20 mA (Version -T)			-T
Structure Code - Select from one of the following six groups:			
1. Transmitter with Traditional Structure			
Covers	**Sensor**	**Fill Fluid**	
Steel	Co-Ni-Cr	Silicone	10
Steel	Co-Ni-Cr	Inert	11
Steel	316L ss	Silicone	12
Steel	316L ss	Inert	13
Steel	Hastelloy C	Silicone	16
Steel	Hastelloy C	Inert	17
316 ss	Co-Ni-Cr	Silicone	20
316 ss	Co-Ni-Cr	Inert	21
316 ss	316L ss	Silicone	22
316 ss	316L ss	Inert	23
316 ss	316L ss, Gold Plated	Silicone	2G
316ss	Monel	Silicone	24
316 ss	Monel	Inert	25
316 ss	Hastelloy C	Silicone	26
316 ss	Hastelloy C	Inert	27
Monel	Monel	Silicone	34
Monel	Monel	Inert	35
Hastelloy C	Hastelloy C	Silicone	46
Hastelloy C	Hastelloy C	Inert	47
Hastelloy C	Tantalum	Silicone	48
Hastelloy C	Tantalum	Inert	49
pvdf Insert (Kynar)	Tantalum	Silicone (Used w/Process Connector Type 7)	78 (a)
pvdf Insert (Kynar)	Tantalum	Inert (Used w/Process Connector Type 7)	79 (a)
2. Transmitter with Low Profile Structure LP1 (Not available with Pressure Seals)			
Covers	**Sensor**	**Fill Fluid**	
316 ss	316L ss	Silicone	LL
316 ss	316L ss	Inert	LM
316 ss	Hastelloy C	Silicone	LC
316 ss	Hastelloy C	Inert	LD
3. Transmitter with Low Profile Structure LP2 (Not available with Pressure Seals)			
Covers	**Sensor**	**Fill Fluid**	
316 ss	316L ss	Silicone	52
316 ss	316L ss	Inert	53
316 ss	Hastelloy C	Silicone	56
316 ss	Hastelloy C	Inert	57

Model Code continued on next page

MODEL CODE (CONT.)

Description (Cont.)	Model
4. Transmitter prepared for Foxboro Model Coded Remote Mount Seals (b)(c)	
Transmitter prepared for Remote Seals on Both HI and LO Sides, Silicone Fill in Sensor	S1
Transmitter prepared for Remote Seals on Both HI and LO Sides, Inert Fill in Sensor	S2
Transmitter prepared for Remote Seal HI Side, 1/2 NPT Connector LO Side, Silicone Fill in Sensor	S3
Transmitter prepared for Remote Seal HI Side, 1/2 NPT Connector LO Side, Inert Fill in Sensor	S4
Transmitter prepared for Remote Seal LO Side, 1/2 NPT Connector HI Side, Silicone Fill in Sensor	S5
Transmitter prepared for Remote Seal LO Side, 1/2 NPT Connector HI Side, Inert Fill in Sensor	S6
5. Transmitter Prepared for Foxboro Model Coded Direct Connect Seals (b)	
PSFLT, PSSCT, or PSSST Direct Connect Seal on HI Side; 1/2 NPT Process Connector LO Side; Silicone Fill	F1
PSFLT, PSSCT, or PSSST Direct Connect Seal on HI Side; 1/2 NPT Process Connector LO Side; Inert Fill	F2
PSFLT, PSSCT, or PSSST Direct Connect Seal on HI Side; Remote Seal with Capillary LO Side; Silicone Fill	F3
PSFLT, PSSCT, or PSSST Direct Connect Seal on HI Side; Remote Seal with Capillary LO Side; Inert Fill	F4
6. Transmitter Prepared for non-Foxboro Seals	
Remote Seals on High and Low Sides; Silicone Fill in Sensor	SA
Remote Seals on High and Low Sides; Inert Fill in Sensor	SB
Remote Seal on High Side and 1/2 NPT Connector on Low Side, Silicone Fill in Sensor	SC
Remote Seal on High Side and 1/2 NPT Connector on Low Side, Inert Fill in Sensor	SD
Remote Seal on Low Side and 1/2 NPT Connector on High Side, Silicone Fill in Sensor	SE
Remote Seal on Low Side and 1/2 NPT Connector on High Side, Inert Fill in Sensor	SF
Span Limits (Differential Pressure Units)	
kPa **inH2O** **mbar**	
0.12 and 7.5 0.5 and 30 1.2 and 75	A (e)
0.87 and 50 3.5 and 200 8.7 and 500	B
7 and 210 28 and 840 70 and 2100	C
MPa **psi** **bar or kg/cm^2**	
0.07 and 2.1 10 and 3000 .7 and 21	D
0.7 and 21 100 and 3000 7 and 210	E (f)
Process Connector Type (Material Same as Process Cover Material) (g)	
See below: ▸ For d/p: No connectors; both covers tapped for 1/4 NPT (316 ss only, no side vents) ▸ Flange Mount Hi Side: 1/2 NPT, 316 ss Process Connector on Lo Side (F1 and F2 only) ▸ Flange Mount Hi Side: No connectors; both sides prepared for seals (F3 and F4 only) ▸ Two Remote Seals: No connectors; both covers tapped for capillary connection (S1, S2, SA, SB only) ▸ One Remote Seal: 1/2 NPT, 316 ss Process Connector on Side Opposite Seal (S3 to S6, SC to SF only)	0
1/4 NPT, Not with Structure Codes 46 to 49, 78, 79; or pressure seals	1
1/2 NPT, Not with Structure Codes 78 or 79, or pressure seals	2
Rc 1/4, Not with Structure Codes 46 to 49, 78, 79; or pressure seals	3
Rc 1/2, Not with Structure Codes 78 or 79, or pressure seals	4
1/2 Schedule 80 Welding Neck, Not with Structure Codes 46 to 49, 78, 79; or pressure seals	6
None; pvdf Insert tapped for 1/2 NPT/Process Inlet on Side of 316 ss Process Covers (only with 78/79 above)	7

Model Code continued on next page

MODEL CODE (CONT.)

Description (Cont.)	Model
Conduit Connection and Housing Material	
1/2 NPT Conduit Connection, Aluminum Housing	1
PG 13.5 Conduit Connection, Aluminum Housing (With Electrical Safety Codes E, D, M, and N only)	2
1/2 NPT Conduit Connection, 316 ss Housing	3
PG 13.5 Conduit Connection, 316 ss Housing (With Electrical Safety Codes E, D, M, and N only)	4
M20 Conduit Connection, Both Sides, Aluminum Housing (With Electrical Safety Codes E, D, M, and N only)	5
M20 Conduit Connection, Both Sides, 316 ss Housing (With Electrical Safety Codes E, D, M, and N only)	6
Electrical Safety - Also see Electrical Safety Specifications section for descriptions	
ATEX II 1 GD, EEx ia IIC, Zone 0; or II 1/2 GD, EEx ib IIC, Zone 0/1	E
ATEX II 2 GD, EEx d IIC, Zone 1 (d)	D
ATEX II 3 GD, EEx nL IIC, Zone 2	N
ATEX Multiple Certifications (includes ATEX Codes E, D, and N) (d) (See Electrical Safety Specifications section for user marking)	M
CSA Certified Division 1 intrinsically safe, explosionproof, dust-ignitionproof, and Division 2, Classes I, II, and III.	C
CSA Zone Certified Ex d IIC; and all certifications of Code C above, Ex ia and Ex n (d).	B
FM approved Division 1 intrinsically safe, explosionproof, dust-ignitionproof, and nonincendive, Division 2.	F
FM approved AEx d IIC; and also all approvals of Code F above, AEx ia (d).	G
IECEx intrinsically safe; Ex ia IIC	T
IECEx protection n; Ex nL IIC	U
IECEx flameproof; Ex d IIC	V
Multi-marked for ATEX, CSA, and FM Intrinsically Safe Applications only (w)	W
Optional Selections	
Refer to Optional Selections below.	
Mounting Bracket Set (h)	
Standard Style Painted Steel Bracket with Plated Steel Bolts (not available with LP1 structure)	-M1
Standard Style Stainless Steel Bracket with Stainless Steel Bolts (not available with LP1 structure)	-M2
Universal Style Stainless Steel Bracket with Stainless Steel Bolts (not with Structure Codes LL, LM, LC, or LDD)	-M3
Digital Indicator with Pushbuttons	
Digital Indicator, Pushbuttons, and Window Cover	-L1
DIN 19213 Construction used with Process Connector Code 0 and 316 ss Covers with no side vents	
(not available when remote or direct connect seals are specified)	
Single Ended Process Cover with M10, B7 Steel Bolting (j)(v)	-D1
Double Ended Process Cover with M10, B7 Steel Bolting (Blind Kidney Flange on Back) (j)(k)(l)	-D2
Single Ended Process Cover with 7/16 in, B7 Steel Bolting; standard pressure rating 25 MPa (3625 psi) (v)	-D3
Double Ended Process Cover with 7/16 in, B7 Steel Bolting (Blind Kidney Flange on Back) (j)(k)(l)	-D4
Single Ended Process Cover with 7/16 in, 316 ss Bolting (j)(v)	-D5
Double Ended Process Cover with 7/16 in, 316 ss Bolting (Blind Kidney Flange on Back) (j)(k)(l)	-D6
Single Ended Process Cover with 7/16 in, 17-4 ss Bolting; standard pressure rating 25 MPa (3625 psi) (v)	-D7
Double Ended Process Cover with 7/16 in, 17-4 ss Bolting (Blind Kidney Flange on Back) (j)(k)(l)	-D8
Single Ended Process Cover with 7/16 in, 17-4 ss Bolting; pressure rating 40 MPa (5800 psi) (v) Not available with Span Codes A, D, or E; or Option Codes -V, -B1, -B2, -B3, or -Y	-D9

Model Code continued on next page

MODEL CODE (CONT.)

Description (Cont.)	Model
Cleaning and Preparation - Not Available with Gold-Plated Sensor, Structure 2G; also not with seals	
Unit Degreased - for Silicone Filled Sensors Only (Not for Oxygen/Chlorine/Other Fluids that may react with Silicone)	-X1
Cleaned and Prepared for Oxygen Service - for Inert Filled Sensors Only (Not Available with Carbon Steel Covers or with Silicone Filled Sensors)	-X2
Cleaned and Prepared for Chlorine Service - for Inert Filled Sensors Only (m) (Not Available with Carbon Steel Covers or with Silicone Filled Sensors)	-X3
Bolting for Process Covers/Connectors - Not with DIN 19213 Construction or Structure Codes 78 and 79 (n)	
316 ss Bolts and Nuts (Pressure Derated; Not Available with -Y Option) (j)	-B1
17-4 ss Bolts and Nuts (m)	-B2
B7-M Bolts and Nuts (NACE)(pressure derated) (j)	-B3
Conduit Thread Adapters (Not available with Conduit Connection Codes 5 and 6)	
Hawke-Type 1/2 NPT Cable Gland for use with Conduit Connection Codes 1 and 3 (p)	-A1
Plastic PG 13.5 Cable Gland for use with Conduit Connection Codes 2 and 4 (q)	-A2
M20 Conduit Thread Adapter for use with Conduit Connection Codes 1 and 3 (p)	-A3
Brass PG 13.5 Cable Gland (Trumpet-Shaped) for use w/Conduit Connection Codes 2 and 4 (q)	-A4
Electronics Housing Features	
External Zero Adjustment	-Z1
Custody Transfer Lock and Seal	-Z2
External Zero Adjustment and Custody Transfer Lock/Seal	-Z3
Custom Factory Configuration	
Full Factory Configuration (Requires Configuration Form to be Filled Out)	-C2
Tubing Connectors - Not available with Structure Codes 78 and 79; also not with pressure seals	
Steel, Connecting 6 mm Tubing to 1/4 NPT Process Connector Only with Structure Codes 10 to 13; and Process Connector Codes 0 and 1	-E1
Steel, Connecting 12 mm Tubing to 1/2 NPT Process Connector Only with Structure Codes 10 to 13; and Process Connector Code 2	-E2
316 ss, Connecting 6 mm Tubing to 1/4 NPT Process Connector Only with Structure Codes 10 to 13 and 20 to 23; and Process Connector Codes 0 and 1	-E3
316 ss, Connecting 12 mm Tubing to 1/2 NPT Process Connector Only with Structure Codes 10 to 13 and 20 to 23; and Process Connector Code 2	-E4
Vent Screw in Process Cover	
Supply Vent Screw in Side of Each Process Cover (Available only on Traditional Process Cover Structure Codes 10 to 49)	-V
Omit Vent Screw in Side of Each Process Cover (Available only on Type LP1 Low Profile Process Cover Structures Codes LL, LM, LC, and LD)	-V1
Adapter Plate, Bolts, and Gaskets for Direct Mount to Competitive Manifolds (t) See inside pages for manifold compatibility.	
Adapter Set for MC Coplanar Manifolds, B7 Bolts (not with options -B1, -B2, or -B3)	-P1
Adapter Set for MC Coplanar Manifolds, 316 ss Bolts (requires -B1 option)	-P2
Adapter Set for MC Coplanar Manifolds, 17-4 ss Bolts (requires -B2 option)	-P3
Adapter Set for MC Coplanar Manifolds, B7M Bolts (requires -B3 option)	-P4
Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, B7 Bolts (not with options -B1, -B2, or -B3)	-P5
Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, 316 ss Bolts (requires -B1 option)	-P6
Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, 17-4 ss Bolts (requires -B2 option)	-P7
Adapter Set for MT3 Coplanar Manifolds, Traditional Flange, B7M Bolts (requires -B3 option)	-P8

Model Code continued on next page

MODEL CODE (CONT.)

Description (Cont.)	Model
Gaskets	
Metal O-ring for pressure seals in Vacuum Service (s)	-G1
SIL2 Transmitters	
SIL2-Certified HART Transmitter	-S2
Instruction Books (Common MI, Brochure, and Full Documentation Set on CD-ROM is Standard)	
Without Instruction Book and CD; only "Getting Started" brochure is supplied.	-K1
Miscellaneous Optional Selections	
Low Temperature Operative Limit of Electronics Housing Extended Down to -50°C (-58°F) Not available with sensors and seals with Inert fill; Structure Codes 78 and 79; and DIN Options -D2, -D4, -D6, and -D8	-J
Supplemental Customer Tag (Stainless Steel Tag wired onto Transmitter)	-T
Static Pressure Rating to 40 MPa (5800 psi); Only with Span Codes B and C Not available with: – Options -B1, -B2, and -B3 (r) – Options -D1 to -D9 – Structure Codes 34, 35, 78, 79, S1 to S6, SA to SF, F1 to F4	-Y

(a) Maximum static pressure rating is 2.1 MPa (300 psi); temperature limits are -7 and +82°C (20 and 180°F).

(b) Both Transmitter and Pressure Seal Model Numbers are required. See PSS 2A-1Z11 A for the various pressure seal Model Codes.

(c) Remote Seal Models that may be specified are PSFPS, PSFES, PSFAR, PSTAR, PSISR, PSSCR, and PSSSR.

(d) Cover lock provided as standard with Electrical Safety Codes D, B, G, and M.

(e) Span Limit Code A is not available with pressure seals, except for Sanitary Spud Seals Models PSSSR-.4 and PSSST-.4.

(f) Span Limit Code E is not available with Structure Codes 78 and 79 above (pvdf insert in HI side cover).

(g) Select Code "0" if a pressure seal is specified. Otherwise select Code 1 through 7.

(h) Mounting sets not offered with direct connect (flange mount) seals.

(j) See Functional Specifications section for pressure deratings when certain DIN 19213 versions and Bolting Options -B1 and -B3 are specified.

(k) Temperature limits derated to 0 and 60°C (32 and 140°F). Also not available with Structure Codes 52 to 57, and LL, LM, LC, or LD.

(l) Mounting Bracket Set options are not available.

(m) When -X3 is specified, the standard bolting is replaced with 17-4 ss bolts and nuts. Therefore, there is no need to specify Option -B2 when selecting the Chlorine Service Option -X3.

(n) Not available with DIN construction options. For stainless steel bolts with DIN construction, specify -D5 to -D9, as required.

(p) Available with Electric Safety Codes E, D, M, and N only.

(q) Available with Electric Safety Code E only.

(r) -B2 Bolt Option (17-4 ss) is not available with the -Y option because 17-4 ss bolts and nuts are supplied as part of the -Y option.

(s) -G1 is a required option when pressure seal will be used in vacuum applications. This option substitutes vacuum service metal gasket for standard ptfe process cover gasket.

(t) Adapter plate options -P1 to -P8 are not available with:
– Pressure Seal Structure Codes.
– Process Connector Codes 1-7.
– DIN Construction Options -D1, -D2, -D4, -D5, -D6, -D7, -D8, -D9.

(v) Not available with Low Profile Structure Codes 52 to 67.

(w) For multi-marking details, see Electrical Safety Specifications section.

SUGGESTED RFQ SPECIFICATIONS

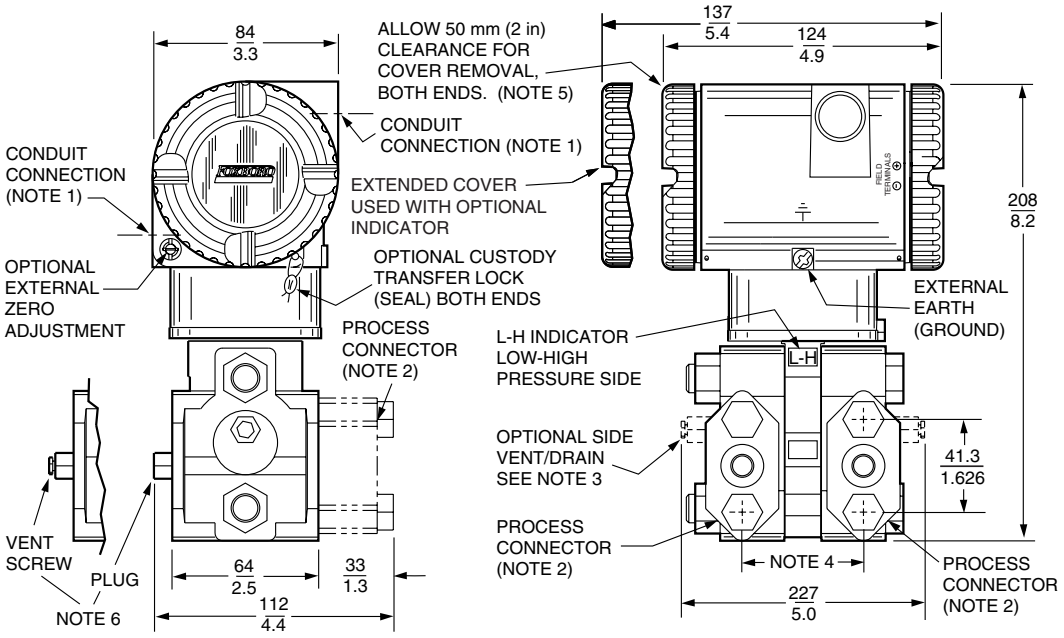
The manufacturer shall provide field-mounted differential pressure transmitter(s) featuring remote digital communications capability for measuring differential pressure and transmitting a 4 to 20 mA dc output with a superimposed HART digital signal for use in a standard two-wire dc supply voltage system. They are offered with traditional or low profile structures. Transmitters with a traditional structure can also be provided (as required) with direct connect seals or remote capillary connected seals. The specifications for these transmitters are as follows:

Communication Protocol:	4 to 20 mA dc with HART communication
Remote Communications:	Must not interfere with output
Accuracy:	Digital Output, Linear: ±0.050% of calibrated span 4 to 20 mA Output, Linear: ±0.060% of calibrated span
Damping:	Settable for a range of none to 32 seconds
RFI Protection:	0.1% error between 27 and 1000 MHz at 30 V/m field intensity
Span Limits:	0.5 and 30 inH_2O, 3.5 and 200 inH_2O, 1 and 30 psi, 10 and 300 psi, 100 and 3000 psi, as specified; or SI and metric equivalents.
Proof Pressure:	14 500 psi for standard transmitters
Mounting:	On process piping, on a manifold, or optional mounting bracket
Input Connection:	With process connectors to accept 1/4 NPT, 1/2 NPT, Rc 1/4, Rc 1/2, or 1/2 Schedule 80 welding neck; or 1/2 NPT pvdf inserts installed in 316 ss process covers; or prepared for a direct connect seal; or prepared for a single remote capillary connected seal, or two remote capillary connected seals.
Electronics Housing:	316 ss, or aluminum housing with epoxy finish
Modular Electronics:	Enclosed in a NEMA 4X (IEC IP66) housing sealed with O-rings for protection against moisture or other contaminants. Optional Integral LCD indicator with on-board configuration pushbuttons.
Process Cover:	Traditional Structures Steel, 316 ss, Monel, Hastelloy C, or pvdf insert Low Profile Structures: 316 ss
Sensor Materials:	Traditional Structure: 316L ss, Hastelloy C, Co-Ni-Cr, Monel, Tantalum, or Gold-Plated 316L ss Low Profile Structures: 316L ss or Hastelloy C
Approvals and Certifications:	Must be suitable for Division 1 hazardous locations, and conform to all applicable European Union Directives. Also versions available to meet Agency flameproof and zone requirements.
Approximate Mass: (with Process Connectors)	4.2 kg (9.2 lb), with Traditional Structures; Add 0.1 kg (0.2 lb) with Low Profile Structure LP1; Add 0.8 kg (1.8 lb) with Low Profile Structure LP2; Add 1.1 kg (2.4 lb) with 316 ss housing; Add 0.2 kg (0.4 lb) with optional LCD indicator.
Model Code:	I/A Series IDP10 Intelligent d/p Cell Transmitter with HART Communication Protocol, with or without pressure seals, or equivalent.

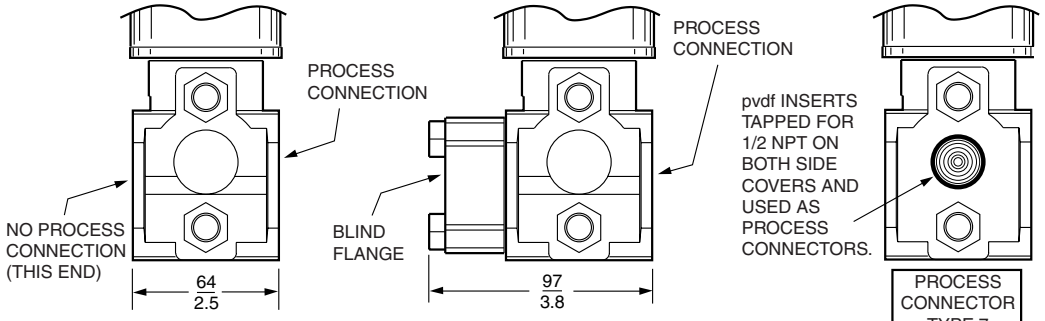
DIMENSIONS-NOMINAL

mm
in

TRANSMITTER WITH TRADITIONAL STRUCTURE



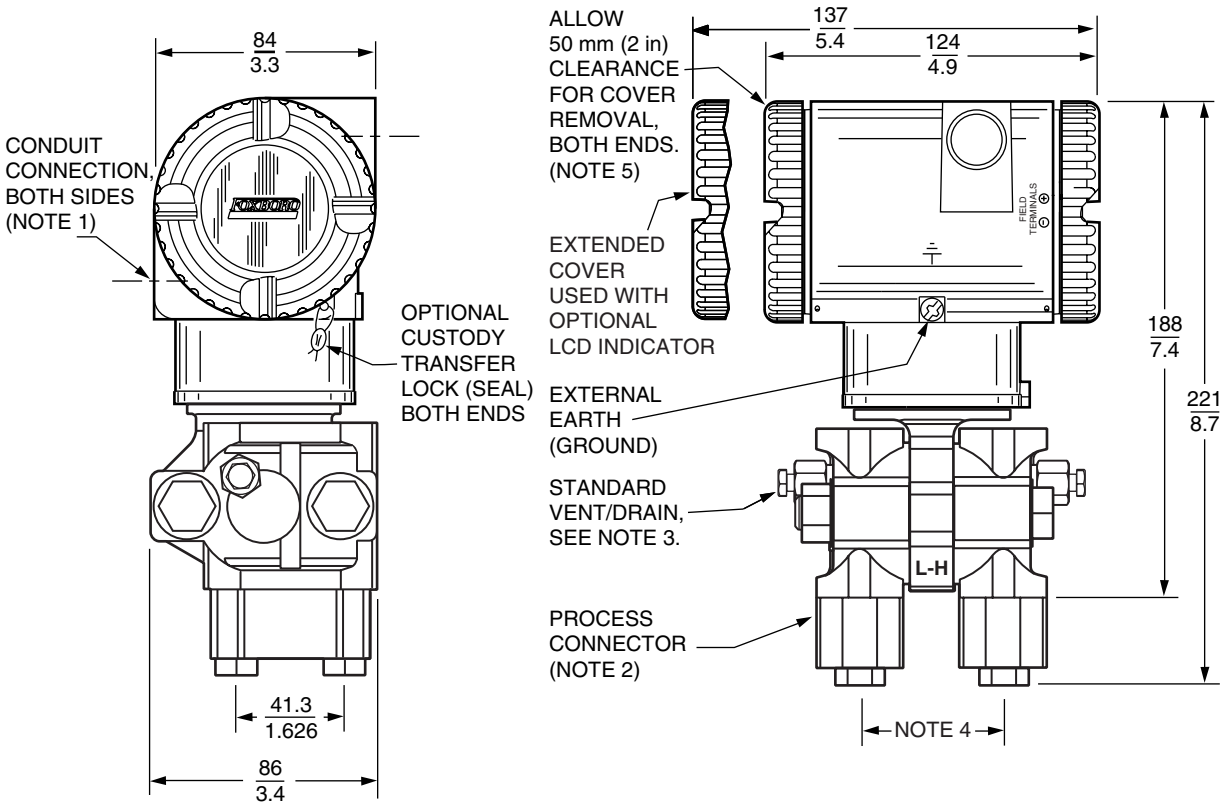
NOTES:
1. CONDUIT CONNECTION 1/2 NPT OR PG 13.5, BOTH SIDES: PLUG UNUSED CONNECTION WITH METAL PLUG (SUPPLIED).
2. PROCESS CONNECTORS MAY BE REMOVED AND TRANSMITTER MOUNTED DIRECTLY ON A MANIFOLD, OR CONNECTIONS MADE DIRECTLY TO PROCESS COVER USING 1/4 NPT INTERNAL THREAD IN PROCESS COVER.
3. PROCESS COVER CAN BE INVERTED MAKING OPTIONAL SIDE VENTS OR SIDE DRAINS
4. PROCESS CONNECTORS CAN BE INVERTED TO GIVE EITHER 51, 54, OR 57 mm (2.0, 2.125, OR 2.25 in) CENTER-TO-CENTER DISTANCE BETWEEN HIGH AND LOW PRESSURE CONNECTIONS.
5. TOPWORKS CAN BE ROTATED TO ANY POSITION WITHIN ONE TURN COUNTERCLOCKWISE OF THE FULLY TIGHTENED POSITION.
6. PROCESS COVER END PLUGS ARE SUBSTITUTED FOR VENT SCREWS WHEN OPTIONAL SIDE VENTS (NOTE 3) ARE SPECIFIED.



DIMENSIONS-NOMINAL (CONT.)

mm
in

TRANSMITTER WITH LOW PROFILE STRUCTURE LP1

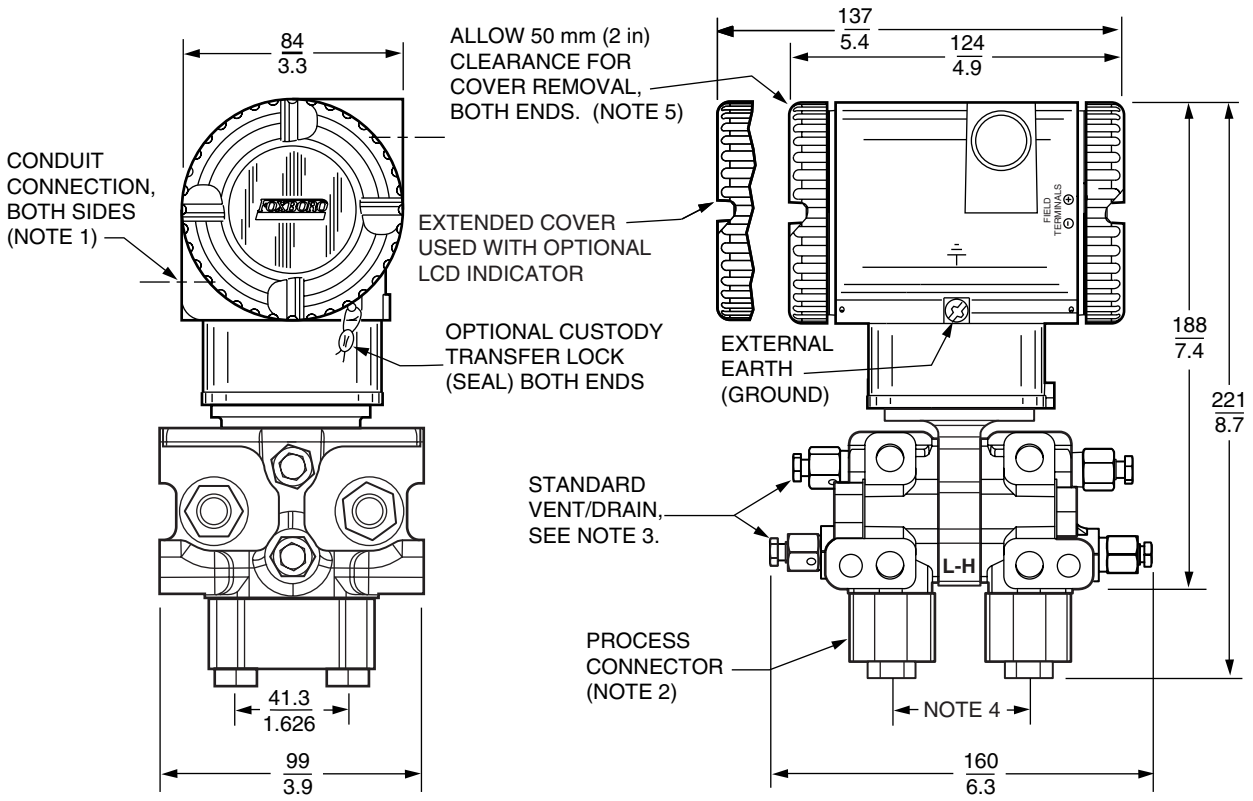


NOTES:
1. CONDUIT CONNECTION 1/2 NPT, PG 13.5, OR M20, BOTH SIDES: PLUG UNUSED CONNECTION WITH METAL PLUG (SUPPLIED).
2. PROCESS CONNECTORS MAY BE REMOVED AND TRANSMITTER MOUNTED DIRECTLY ON A MANIFOLD, OR CONNECTIONS MADE DIRECTLY TO PROCESS COVER USING 1/4 NPT INTERNAL THREAD IN PROCESS COVER.
3. THE TRANSMITTER'S LOW PROFILE STRUCTURE LP1 IS SHOWN IN THE VERTICALLY UPRIGHT POSITION. NOTE THE LOCATION OF THE STANDARD VENT/DRAIN SCREW. IN THIS CONFIGURATION THE TRANSMITTER CAN BE VENTED OR IS SELF-DRAINING. ALSO RECOMMENDED IS A HORIZONTAL INSTALLATION WHERE THE INSTALLED ORIENTATION CAN BE SET TO ALLOW FOR VENTING OR DRAINING.
4. PROCESS CONNECTORS CAN BE INVERTED TO GIVE EITHER 51, 54, OR 57 mm (2.0, 2.125, OR 2.25 in) CENTER-TO-CENTER DISTANCE BETWEEN HIGH AND LOW PRESSURE CONNECTIONS.
5. TOPWORKS CAN BE ROTATED TO ANY POSITION WITHIN ONE TURN COUNTERCLOCKWISE OF THE FULLY TIGHTENED POSITION.

DIMENSIONS-NOMINAL (CONT.)

mm
in

TRANSMITTER WITH LOW PROFILE STRUCTURE LP2

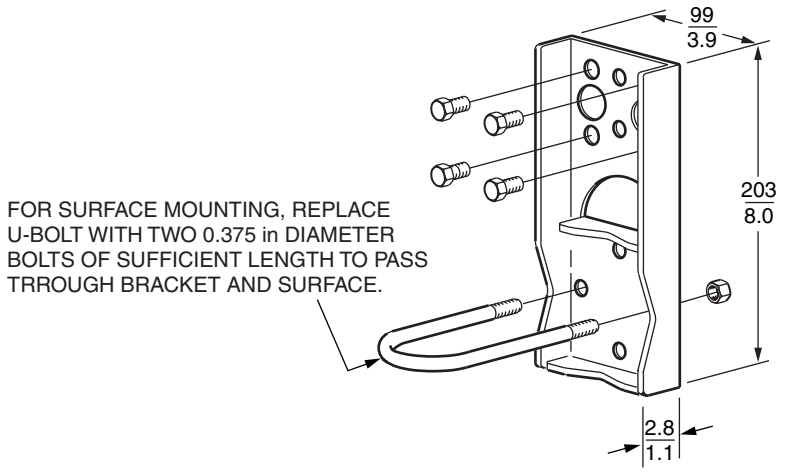


NOTES:
1. CONDUIT CONNECTION 1/2 NPT, PG 13.5, OR M20, BOTH SIDES: PLUG UNUSED CONNECTION WITH METAL PLUG (SUPPLIED).
2. PROCESS CONNECTORS MAY BE REMOVED AND TRANSMITTER MOUNTED DIRECTLY ON A MANIFOLD, OR CONNECTIONS MADE DIRECTLY TO PROCESS COVER USING 1/4 NPT INTERNAL THREAD IN PROCESS COVER.
3. THE TRANSMITTER'S LOW PROFILE STRUCTURE LP2 IS SHOWN IN THE RECOMMENDED VERTICAL UPRIGHT POSITION. NOTE THE STANDARD VENT OR DRAIN SCREWS. HORIZONTAL INSTALLATIONS ARE NOT RECOMMENDED.
4. PROCESS CONNECTORS CAN BE INVERTED TO GIVE EITHER 51, 54, OR 57 mm (2.0, 2.125, OR 2.25 in) CENTER-TO-CENTER DISTANCE BETWEEN HIGH AND LOW PRESSURE CONNECTIONS.
5. TOPWORKS CAN BE ROTATED TO ANY POSITION WITHIN ONE TURN COUNTERCLOCKWISE OF THE FULLY TIGHTENED POSITION.

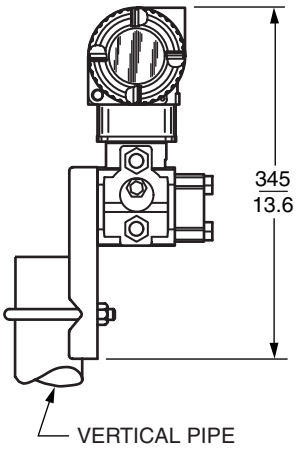
DIMENSIONS-NOMINAL (CONT.)

mm
in

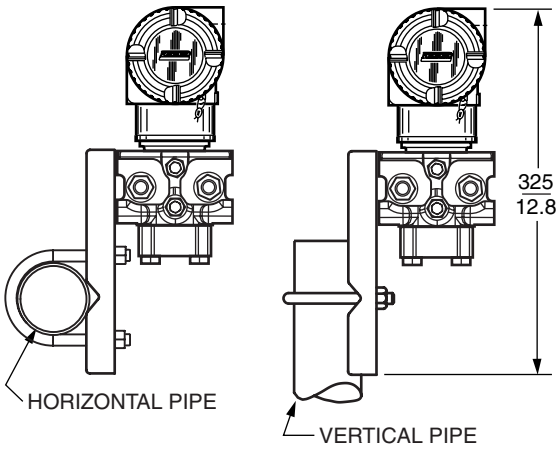
TRANSMITTER WITH STANDARD STYLE MOUNTING BRACKET KIT (Options -M1 and -M2)



TRANSMITTER WITH TRADITIONAL STRUCTURE



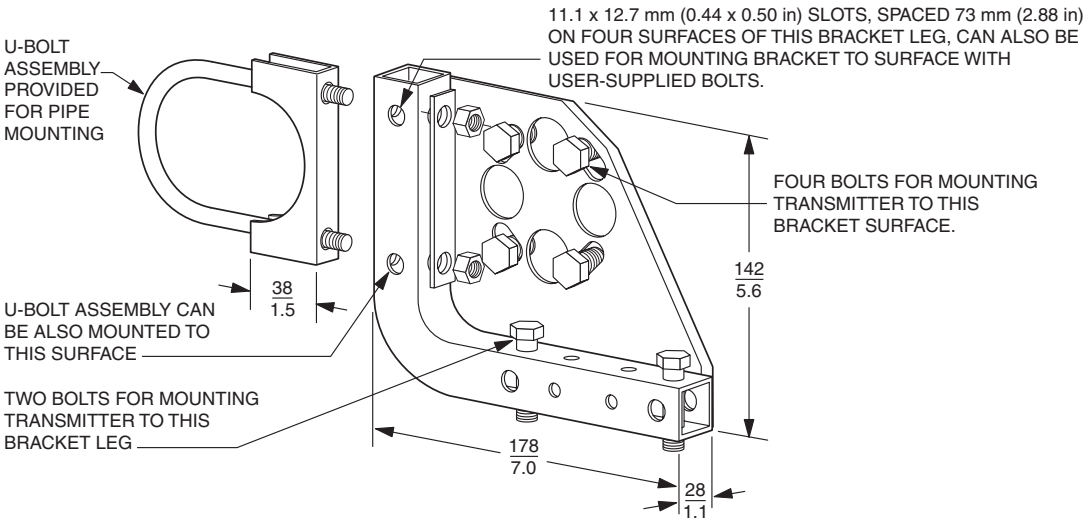
TRANSMITTER WITH LOW PROFILE STRUCTURE LP2



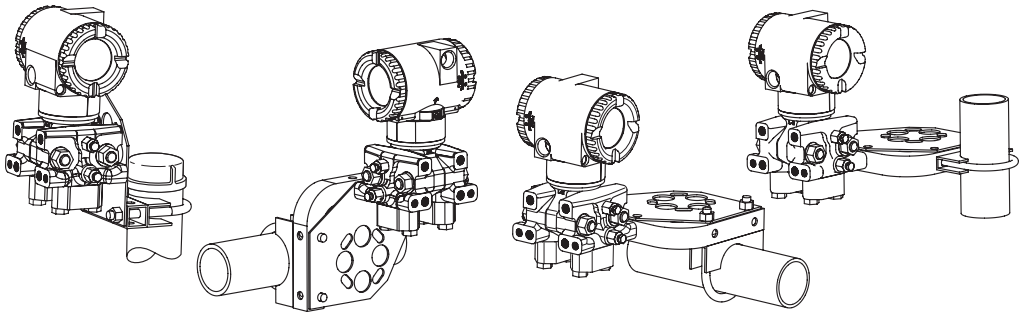
DIMENSIONS-NOMINAL (CONT.)

mm
in

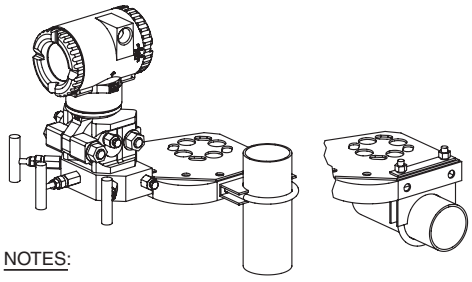
TRANSMITTER WITH UNIVERSAL STYLE MOUNTING BRACKET KIT (Option -M3)



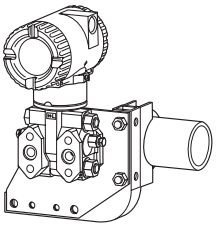
TYPICAL PIPE MOUNTING WITH LOW PROFILE STRUCTURE LP2



TYPICAL PIPE MOUNTING
LOW PROFILE STRUCTURE LP1



TYPICAL PIPE MOUNTING
WITH TRADITIONAL STRUCTURE



NOTES:

1. FOR SURFACE MOUNTING CONFIGURATIONS, USE THE U-BOLT MOUNTING HOLES FOR ATTACHING THE BRACKET TO A SURFACE RATHER THAN TO THE U-BOLT ASSEMBLY. SURFACE MOUNTING BOLTS FOR ATTACHING THE BRACKET TO A SURFACE ARE USER SUPPLIED.
2. REFER TO DIMENSIONAL PRINT DP 020-446 FOR FURTHER IDP10 MOUNTING CONFIGURATIONS, INCLUDING MOUNTING WITH -P SERIES OPTIONAL MOUNTING PLATES.

ORDERING INSTRUCTIONS

1. Model Number(s) as follows:
   - Transmitter only if pressure seals are not selected
   - Both transmitter and pressure seals if pressure seals are selected with traditional structure. See PSS 2A-1Z11 A.
2. Calibrated Pressure Range (using Allowable Pressure Units from the table below.

inH_2O	inHg	Pa	mbar	psia
ftH_2O	mmHg	kPa	bar	atm
mmH_2O	cmHg	MPa	g/cm^2	
cmH_2O	dy/cm^2	torr	kg/cm^2	

3. Configuration Data Form when Factory Calibration Option -C2 is specified.
4. If Option -S2 (SIL-Certified HART Transmitter) is selected, a copy of the certification can be provided by specifying AS Code CERT-L.
5. Options and Accessories not in Model Code (see PSS 2A-1Z9 E).
6. User Tag Data - Data Plate; 32 characters maximum. For additional tag data, specify Optional Supplemental Tag -T.
7. User Tag Data - Software (Database); 8 characters maximum (user configured).

OTHER M&I PRODUCTS

Foxboro provides a broad range of measurement and instrument products, including solutions for pressure, flow, analytical, positioners, temperature, controlling and recording. For a listing of these offerings, visit the Invensys Operations Management web site at:

www.iom.invensys.com

Invensys Operations Management
5601 Granite Parkway Suite 1000
Plano, TX 75024
United States of America
http://www.iom.invensys.com

Global Client Support
Inside U.S.: 1-866-746-6477
Outside U.S.: 1-508-549-2424 or contact your local Invensys representative.
Email: support@invensys.com
Website: http://support.ips.invensys.com

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invensys Foxboro®

PSS 2A-1C13 B

Models IAP10, IGP10, IAP20, and IGP20 Absolute and Gauge Pressure Transmitters with HART Communication Protocol

IAP20/IGP20 TRANSMITTER

IAP10/IGP10 TRANSMITTER STRUCTURE CODES 52, 53, 60-63, D5, D6, S5, S6, SH, AND SJ

IAP10/IGP10 TRANSMITTER STRUCTURE CODES 20-23, 30, 31, D1, D2, S3, S4, SC, AND SD

The Foxboro® brand I/A Series® Models IAP10, IGP10, IAP20, and IGP20 are Intelligent, two-wire transmitters provide precise, reliable, measurement of absolute or gauge pressure, and transmit a 4 to 20 mA output signal with a superimposed HART digital signal for remote configuration and monitoring.

HIGH DEPENDABILITY

- Silicon strain gauge sensors successfully field-proven in many thousands of installations.
- Simple, elegant sensor packaging with very few parts; achieves exceptionally high reliability.
- Aluminum housing has durable, corrosion-resistant epoxy finish; 316 ss housing also available; both meet the ratings of NEMA 4X and IEC IP66.
- Remote configuration or locally via the optional LCD Indicator.
- Can be provided with numerous configurations of direct connect or remote mount seals.
- HART protocol allows multidrop topology.
- SIL2-Certified transmitter offered as an option.
- The IAP10 and IGP10 are offered with integral process connections for sanitary, and pulp and paper installations. Also, the IGP10 is offered for high gauge pressure applications to 52, 105, or 210 MPa (7500, 15 000, or 30 000 psi).
- Sensor wetted parts materials include Co-Ni-Cr, 316L ss, and Nickel alloy (equivalent to Hastelloy®(1)); additionally, Monel, tantalum, and gold-plated 316L ss sensors offered for the IAP20/IGP20.
- CE marked; complies with applicable EMC, ATEX, and PED European Union Directives.

(1) Hastelloy is a registered trademark of Haynes International, Inc.

- Multi-marking available for ATEX, CSA, and FM intrinsically safe applications. User determines and permanently marks the certification to be applied.
- Complies with NAMUR NE 21 interference immunity requirement, and NAMUR NE 43 analog output overrange and underrange annunciations.
- Complies with electromagnetic compatibility requirements of European EMC Directive 2004/108/EC by conforming to following EN and IEC Standards: EN 61326-1, and IEC 61000-4-2 through 61000-4-6.
- Meet numerous requirements for hazardous locations. Versions available to meet Agency flameproof and zone requirements.
- Dual Seal certified by CSA to meet ANSI/ ISA 12.27.01-2003 requirements.
- Numerous mounting bracket set options. Many other options and accessories offered.
- Standard 5-year warranty.

I/A Series® PRESSURE TRANSMITTER FAMILY

The I/A Series Electronic Pressure Transmitters are a complete family of d/p Cell®, gauge, absolute, multirange, multivariable, and premium performance transmitters, as well as transmitters with remote or direct connect pressure seals, all using field-proven silicon strain gauge sensors and common topworks.

MODULAR ELECTRONICS

A common HART electronics module is used for all I/A Series HART Pressure Transmitters. Also, because all configuration and calibration data is stored in the sensor, you can replace a HART module with another HART module without transmitter reconfiguration or recalibration.

Furthermore, if your needs change, the transmitter modular design allows easy migration to other standards, including FoxCom™, FOUNDATION Fieldbus, and Analog 4 to 20 mA or 1 to 5 V dc.

HART COMMUNICATION PROTOCOL VERSION -T ELECTRONICS

4 to 20 mA with HART communications. Allows direct analog connection to common receivers while still providing full digital communications using a Communicator, PC-based Configurator, or optional LCD Indicator.

HART Communicators can be upgraded with software to accommodate these transmitters. Also, Invensys will make use of the HART Foundation library of registered DDs (Device Descriptors), and reload a Communicator if the user desires to keep another supplier's DD along with the Foxboro DD.

In addition to HART, Invensys also offers transmitters with other protocols as described below.

FoxCom Version, Software Configurable for Digital or 4 to 20 mA Output (-D Electronics):

Provides measurement integration with an I/A Series system, or allows direct analog connection to common receivers while still providing full intelligent digital communication with a PC-based configurator.

FOUNDATION Fieldbus Version (-F Electronics):

This is a FISCO/FNICO compliant all digital, serial, two-way communication system which interconnects field devices such as transmitters, actuators, and controllers. It is a local area network (LAN) with built-in capability to distribute control across the network.

Analog Output Version (-A Electronics):

Provides a 4 to 20 mA analog output and includes a standard LCD Indicator to provide transmitter configuration directly from on-board pushbuttons.

Analog Output Version (-V Electronics):

A low power, low voltage transmitter that draws no more than 3 mA, and transmits a 1 to 5 V dc output signal. As with the -A version, it includes a standard LCD Indicator. Refer to PSS 2A-1C13 D.

HART INTELLIGENT MODULE CONFIGURED FOR 4 TO 20 mA OUTPUT

Measurements and diagnostics are available from the HART Communicator connected to the two-wire loop carrying the 4 to 20 mA measurement signal by using a bidirectional digital signal superimposed on the 4 to 20 mA current signal.

Multiple measurements are transmitted digitally, including not only the primary measurement in pressure units, but also the electronics temperature and sensor temperature which can be used to monitor external heat tracing equipment. Complete transmitter diagnostics are also communicated.

Configuration and reranging can be accomplished with the Communicator, PC-based Configurator, or the optional LCD Indicator with pushbuttons.

HIGH PERFORMANCE

Both direct-connected and bracket-mounted transmitters utilize microprocessor-based correction to achieve both excellent accuracy and ambient temperature compensation.

OPTIONAL SIL2 TRANSMITTERS

Modern industrial processes tend to be technically complex and have the potential to inflict serious harm to persons or property during a mishap. The IEC 61508 standard defines safety as “freedom from unacceptable risk.” SIL2 pressure transmitters with HART communication protocol, in conjunction with Triconex Safety Systems, provide integrated solutions for safety and critical control applications. The integrated solution is certified as interference-free from the 4 to 20 mA loop; this guarantees the integrity of the safety system and the safety of the controlled process. The integrated design allows uninterrupted operation of the safety function, while allowing access to device level information via HART commands. The solution permits interface of device diagnostics with asset management systems without compromising functional safety. Select Option -S2 for a SIL2-certified HART Transmitter. A copy of the certification is available via Auxiliary Specification (AS) Code CERT-S.

MULTIDROP COMMUNICATIONS

Point-to-point or multidrop topologies are permitted. Multidropping is the connection of several transmitters to a single communications line. Communications between the host computer and transmitters takes place digitally with the analog output of the transmitter fixed. Up to fifteen transmitters can be connected on a single twisted pair of wires or over leased telephone lines. See Figure 8 and Figure 9.

CHOOSE MOUNTING CONFIGURATION NEEDED

Direct Connected Transmitters (Models IAP10 and Models IGP10)

These transmitters are light weight and easy-to-install. They use 316L ss or Nickel alloy process connections, and a choice of either 316L ss, Cobalt-Nickel-Chrome, or Nickel alloy for the sensing diaphragm. See Direct-Connected Transmitters section.

Bracket-Mounted Transmitters (Models IAP20 and Models IGP20)

These transmitters offer a large selection of corrosion resistant process covers and sensing diaphragm materials. They are suitable for applications requiring low spans, vacuum service, and high overrange pressure. See Bracket-Mounted Transmitters section.

EASE OF INSTALLATION

Rotatable Topworks allows transmitter installation in tight places, allows indicator to be positioned in preferred direction, and eases field retrofit.

Two Conduit Entrances offer a choice of entry positions for ease of installation and self-draining of condensation regardless of mounting position and topworks rotation.

Wiring Guides and Terminations provide ease of wire entry and support, plenty of space to work and store excess wire, and large, rugged screw terminals for easy wire termination.

OPTIONAL LCD DIGITAL INDICATOR

This is a two-line digital indicator with on-board pushbuttons that displays the measurement with a choice of units. The pushbuttons allow zero and span adjustments, as well as local configuration without the need for a Communicator or PC-based Configurator. See Figure 10.

DIRECT CONNECTED TRANSMITTERS — IAP10 AND IGP10 (FIGURE 1)

EXCEPTIONAL VALUE

The combination of small size, light weight, direct mounting, standard materials, and wide measurement capability with high performance make this an exceptionally cost effective solution for process pressure measurement.

DIRECT PROCESS MOUNTING

Because of their light weight and external threaded connection, these transmitters can be installed directly on process piping without mounting brackets. However, for unique requirements, an optional bracket is offered and connection can be made to the standard 1/4 NPT internal thread.

WIDE RANGEABILITY

Three absolute pressure versions are offered to allow spans from 7 to 21 000 kPa (1 to 3000 psi), and four gauge pressure versions are offered to allow spans from 7 to 42 000 kPa (1 to 6000 psi). Refer to IGP20 Transmitter for gauge pressure vacuum service.

316L ss, NICKEL ALLOY, AND Co-Ni-Cr PROCESS WETTED PARTS

With process connection of 316L ss or Nickel alloy, and sensor diaphragm available in either 316L ss, Nickel alloy, or highly corrosion resistant Co-Ni-Cr, this transmitter is an excellent choice for the vast majority of process pressure measurements.

FLAMEPROOF DESIGN

The IAP10 and IGP10 flameproof versions are designed to meet Agency flameproof and zone requirements.

Figure 1. Direct Connected Transmitter (Flameproof Version Shown on Left)

HIGH GAUGE PRESSURE VERSIONS

Three high gauge pressure versions with URLs of 52, 105, and 210 MPa (7500, 15 000, and 30 000 psi) are available in the IGP10 line. See PSS 2A-1C13 F.

SANITARY AND PULP AND PAPER VERSIONS

These transmitters are also available with integral process connections for use in sanitary, and pulp and paper installations. See PSS 2A-1C13 K and PSS 2A-1C13 L, respectively.

BRACKET-MOUNTED TRANSMITTER — IAP20 AND IGP20 (FIGURE 2)

SENSOR CORROSION PROTECTION

Choice of 316L ss, Co-Ni-Cr, Nickel alloy, Monel, Gold-Plated 316L ss, and Tantalum materials. High corrosion resistance of Co-Ni-Cr (TI 037-078) means long service life in many difficult applications without the extra cost for exotic materials. Also see TI 37-75b for process applicability with Co-Ni-Cr and other process wetted parts materials.

WIDE RANGEABILITY

Gauge pressure measurement spans may be as low as 0.12 kPa (0.5 inH_2O) to as high as 35 MPa (5000 psi) by choosing one of only six sensors, and absolute pressure measurement spans may be as low as 0.87 kPa (3.5 inH_2O) to as high as 21 MPa (3000 psi) by choosing one of only four sensors. This provides exceptional measurement range capability with a minimum of versions.

VACUUM SERVICE

A lower range limit of -100 kPa (-14.7 psi, -1 bar or kg/cm^2) means that vacuum measurements are easily handled with the versatile IGP20 Gauge Pressure transmitter.

PROCESS CONNECTOR

Removable, gasketed process connector (Figure 2) allows a wide range of selections, including 1/4 NPT, 1/2 NPT, Rc 1/4, Rc 1/2, and weld neck connections.

For highly corrosive chemical processes, a 1/2 NPT pvdf (Kynar) insert, as shown in Figure 3, is installed in the HI-side 316 ss cover and is used as the process connector. In these applications, tantalum is used as the sensor diaphragm material.

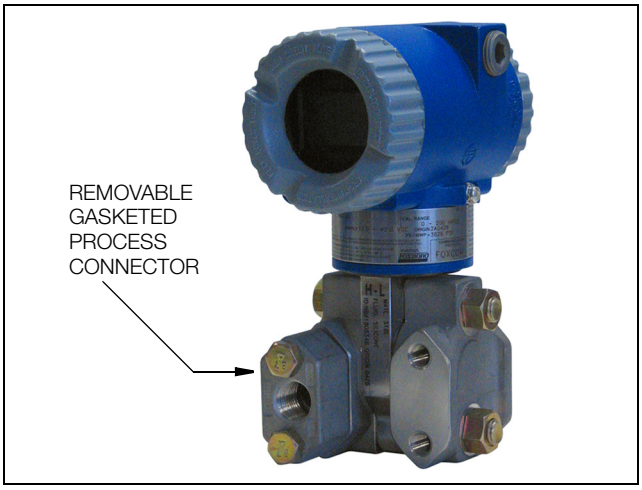


Figure 2. Bracket-Mounted Transmitter Shown with Conventional Process Connector

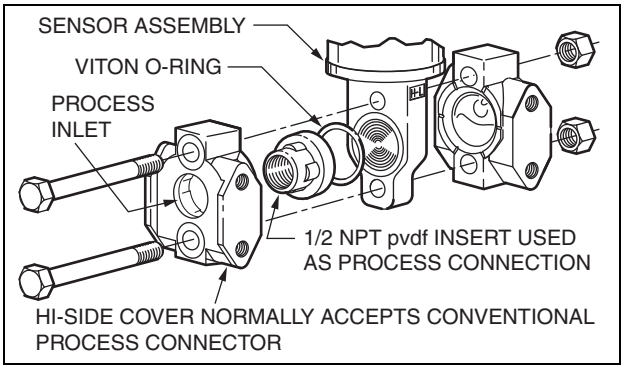


Figure 3. Bracket-Mounted Transmitter Shown with 1/2 NPT pvdf Insert Installed in HI-Side Cover

EASE OF MOUNTING TWO-VALVE MANIFOLD

Optional two-valve manifold to isolate transmitter, and vent pressure, is easily mounted directly to transmitter.

FLAMEPROOF DESIGN

The transmitters are designed to meet Agency flameproof and zone requirements.

PRESSURE SEALS

Pressure seals are used with the IAP10, IGP10, IAP20, and IGP20 Series Transmitters when it is necessary to keep the transmitter isolated from the process. A sealed system is used for a process fluid that may be corrosive, viscous, subject to temperature extremes, toxic, sanitary, or tend to collect and solidify.

Table 1 and Table 2 lists the various seals that can be used with these transmitters. To order a transmitter with seals, both a Transmitter Model Number and Seal Model Number are required. See PSS 2A-1Z11 A for a complete listing of pressure seal models and specifications. Also see Figure 4 for typical pressure seal configurations.

Table 1. Pressure Seals Used with IAP10, IGP10, IAP20, and IGP20 Transmitters

Direct Connect Pressure Seal Assemblies		
Seal Model	**Seal Description**	**Process Connections**
PSFLT	Flanged, Direct Connect (Flanged Level), Flush or Extended Diaphragm	ANSI Class 150/300/600 flanges and BS/DIN PN 10/40, 10/16, 25/40 flanges
PSFAD	Flanged, Direct Connect, Recessed Diaphragm	ANSI CLass 150, 300, 600, 1500 flanges
PSTAD	Threaded, Direct Connect, Recessed Diaphragm	1/4, 1/2, 3/4, 1, or 1 1/2 NPT internal thread
PSISD	In-Line Saddle Weld, Direct Connect, Recessed Diaphragm	Lower housing of seal is in-line saddle welded to nominal 3- or 4-inch (and larger) Pipe
PSSCT	Sanitary, Direct Connect (Level Seal), Flush Diaphragm	Process Connection to Sanitary Piping with 2- or 3-inch Tri-Clamp
PSSST	Sanitary, Direct Connect (Level Seal), Extended Diaphragm	Process Connection to 2-in Mini Spud or 4-in Standard Spud; Tri-Clamp
Remote Mount, Capillary-Connected Pressure Seal Assemblies		
Seal Model	**Seal Description**	**Process Connections**
PSFPS	Flanged, Remote Mount, Flush Diaphragm	ANSI Class 150/300/600 flanges and BS/DIN PN 10/40 flanges
PSFES	Flanged, Remote Mount, Extended Diaphragm	ANSI Class 150/300/600 flanges and BS/DIN PN 10/40, 10/16, 25/40 flanges
PSFAR	Flanged, Remote Mount, Recessed Diaphragm	ANSI Class 150/300/600/1500 flanges
PSTAR	Threaded, Remote Mount, Recessed Diaphragm	1/4, 1/2, 3/4, 1, or 1 1/2 NPT internal thread
PSISR	In-Line Saddle Weld, Remote Mount, Recessed Diaphragm	Lower housing of seal is in-line saddle welded to nominal 3- or 4-inch (and larger) Pipe
PSSCR	Sanitary, Remote Mount, Flush Diaphragm	Process Connection secured with a Tri-Clamp to a 2- or 3-inch pipe
PSSSR	Sanitary, Remote Mount, Extended Diaphragm	Process Connection to 2-in Mini Spud or 4-in Standard Spud; Tri-Clamp
PSFFR	Flanged, Remote Mount, Flush Diaphragm	ANSI Class 150/300/600 flanges and DIN/BS PN 10/40

PRESSURE SEALS (CONT.)

Table 2. I/A Series Pressure Transmitters and Applicable Pressure Seals

Transmitter Model	Used with Pressure Seal Model: (a)													
	FLT	FAD	TAD	ISD	SCT	SST	FPS	FES	FAR	TAR	ISR	SCR	SSR	FFR
IAP10	–	✓	✓	✓	–	–	✓	✓	✓	✓	✓	✓	✓	✓
IGP10	–	✓	✓	✓	–	–	✓	✓	✓	✓	✓	✓	✓	✓
IAP20	–	–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓
IGP20	✓	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

(a) Pressure Seal models are shown with an abbreviated code; all seal codes have a PS prefix; for example, FLT is really PSFLT.

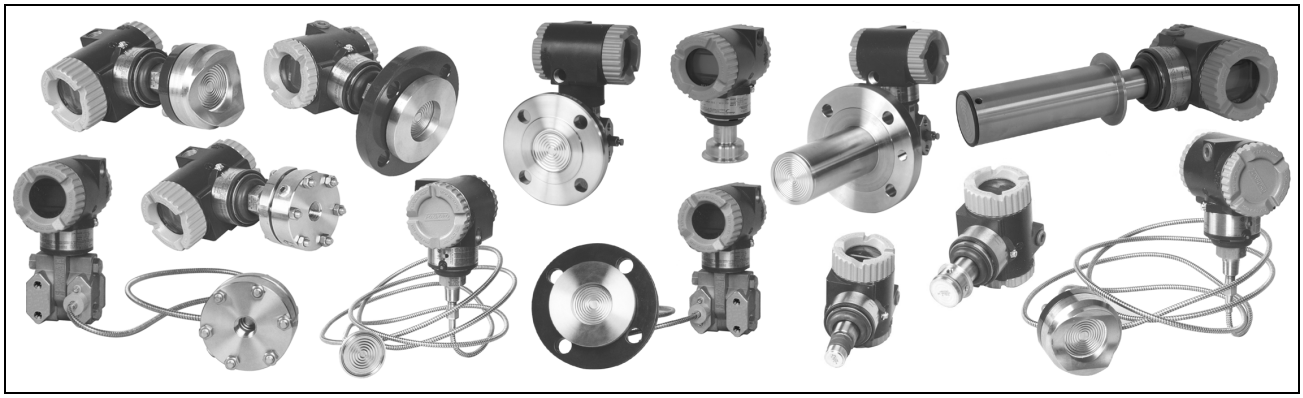


Figure 4. Typical Pressure Seals used with IAP10, IGP10, IAP20, and IGP20 Transmitters

FUNCTIONAL SPECIFICATIONS

Table 3. Span and Range Limits for IAP10 and IGP10 Transmitters

Span Code	Span Limits			Range Limits (Absolute or Gauge Units)		
	MPa	psi	bar or kg/cm^2	MPa	psi	bar or kg/cm^2
C	0.007 and 0.21	1 and 30	0.07 and 2.1	0 and 0.21	0 and 30	0 and 2.1
D	0.07 and 2.1	10 and 300	0.7 and 21	0 and 2.1	0 and 300	0 and 21
E	0.7 and 21	100 and 3000	7 and 210	0 and 21	0 and 3000	0 and 210
F (a)	14 and 42	2000 and 6000	140 and 420	0 and 42	0 and 6000	0 and 420

(a) Span Limit Code F is applicable to IGP10 Transmitter only.

Table 4. Maximum Overrange and Proof Pressure Ratings for IAP10 and IGP10 Transmitters

Span Code	Maximum Overrange Pressure Rating (a)			Proof Pressure Rating (a)(b)		
	MPa	psi	bar or kg/cm^2	MPa	psi	bar or kg/cm^2
C	0.31	45	3.15	0.827	120	8.27
D	3.1	450	31.5	8.27	1200	82.7
E	31	4500	315	79.3	11500	793
F (c)	59	8400	588	152	22000	1517

(a) Values listed are in absolute or gauge pressure units, as applicable. Maximum overrange pressure is the maximum pressure that may be applied without causing damage to the transmitter.

(b) Proof pressure ratings meet ANSI/ISA Standard S82.03-1988. Unit may become nonfunctional after application of proof pressure.

(c) Span Limit Code F is applicable to IGP10 Transmitter only.

Table 5. Span and Range Limits for IAP20 and IGP20 Transmitters

Span Code	Span Limits			Range Limits (Absolute or Gauge Units) (a)		
	kPa	inH_2O	mbar	kPa	inH_2O	mbar
A (b)	0.12 and 7.5	0.5 and 30	1.2 and 75	-7.5 and +7.5	-30 and +30	-75 and +75
B	0.87(c) and 50	3.5(c) and 200	8.7(c) and 500	-50(a) and +50	-200(a) and +200	-500(a) and +500
	MPa	psi	bar or kg/cm^2	MPa	psi	bar or kg/cm^2
C	0.007 and 0.21	1 and 30	0.07 and 2.1	-0.1(a) and 0.21	-14.7(a) and +30	-1(a) and +2.1
D (e)	0.07 and 2.1	10 and 300	0.7 and 21	-0.1(a) and 2.1	-14.7(a) and +300	-1(a) and +21
E (d)	0.7 and 21	100 and 3000	7 and 210	-0.1(a) and 21	-14.7(a) and +3000	-1(a) and +210
F (b)	1.38 and 35	200 and 5000	13.8 and 350	-0.1 and +35	-14.7 and +5000	-1 and +350

(a) For absolute pressure transmitters (IAP20), the lower range limit is 0.

(b) Span Codes A and F applicable to IGP20 Transmitter only. Also, Span Code A is not available when pressure seals are specified.

(c) For the IAP20, the minimum span for factory calibration is 1.2 kPa (5 inH_2O, 12.4 mbar). This span can be field reranged within the limits shown in Table 5.

(d) When certain options are specified, the upper span and range limit values are reduced as shown in the “Options Impact” table.

(e) Minimum span limit is 30 psi (0.21 MPa, 2.1 bar) for Analog protocol (-A).

FUNCTIONAL SPECIFICATIONS (CONT.)

Table 6. Maximum Overrange and Proof Pressure Ratings for IAP 20 and IGP20 Transmitters (a)

Transmitter Configuration (See Model Code for Description of Options)	Overrange Pressure Rating			Proof Pressure Rating (b)		
	MPa	psi	bar or kg/cm^2	MPa	psi	bar or kg/cm^2
Standard with IGP20 Span Code F only	51.8	7500	518	100	14500	1000
Standard (c) or with Option -B2, -D3, or -D7	25	3625	250	100	14500	1000
With Option -B3	20	2900	200	70	11150	700
With Option -D1	16	2320	160	64	9280	640
With Option -B1 or -D5	15	2175	150	60	8700	600
With Option -D2, -D4, -D6, or -D8	10	1500	100	40	6000	400
With Structure Codes 78 and 79 (pvdf insert)	2.1	300	21	8.4	1200	84

(a) Refer to Model Code section for application and restrictions related to the items listed in the table.

(b) Proof pressure ratings meet ANSI/ISA Standard S82.03-1988. Unit may become nonfunctional after application of proof pressure.

(c) Standard with IAP20/IGP20 Span Codes A to E.

Table 7. Impact of Certain Options on IAP20/IGP20 Span and Range Limits (a)

Option	Description (Also see Model Code)	Span and Range Limits Derated to:
-B3	B7M Bolts and Nuts (NACE)	20 MPa (2900 psi, 200 bar, or kg/cm^2)
-D1	DIN Construction	16 MPa (2320 psi, 160 bar or kg/cm^2)
-D5 or -B1	DIN Construction or 316 ss Bolting	15 MPa (2175 psi, 150 bar or kg/cm^2)
-D2, -D4, -D6, or -D8 (a)	DIN Construction (a)	10 MPa (1500 psi, 100 bar or kg/cm^2) (a)

(a) Refer to Model Code section for application and restrictions related to the items listed in the table.

Output Signal and Configuration

Output is 4 to 20 mA with digital HART communications. For multidrop applications, the mA signal is fixed at 4 mA to provide power to the device. Configurable using the HART Communicator, PC-based Configurator, or optional LCD Indicator with on-board pushbuttons.

Electronics and Sensor Temperatures

Readable from the Communicator or PC-based Configurator. Measurement is transmitter temperature, at the sensor and the electronic module, not necessarily process temperature.

Field Wiring Reversal

No transmitter damage.

Suppressed Zero and Elevated Zero

Suppressed or elevated zero ranges are acceptable as long as the Span and Range Limits are not exceeded (elevated zero applicable to IGP20 only).

Zero and Span Adjustments

Zero and span adjustments can be initiated using the Communicator, a PC-based Configurator, or the optional LCD with on-board pushbuttons.

FUNCTIONAL SPECIFICATIONS (CONT.)

Write Protect Jumper

Can be positioned to lock out all configurators from making transmitter database changes. This makes transmitter suitable for Safety Shutdown System Applications that require this feature.

Supply Voltage Requirements and External Loop Load Limitations (Figure 5)

Nominal minimum supply voltage is 11.5 V dc. This value can be reduced to 11 V dc by using a plug-in jumper across the test receptacles in the field wiring compartment terminal block as shown in the Physical Specifications section.

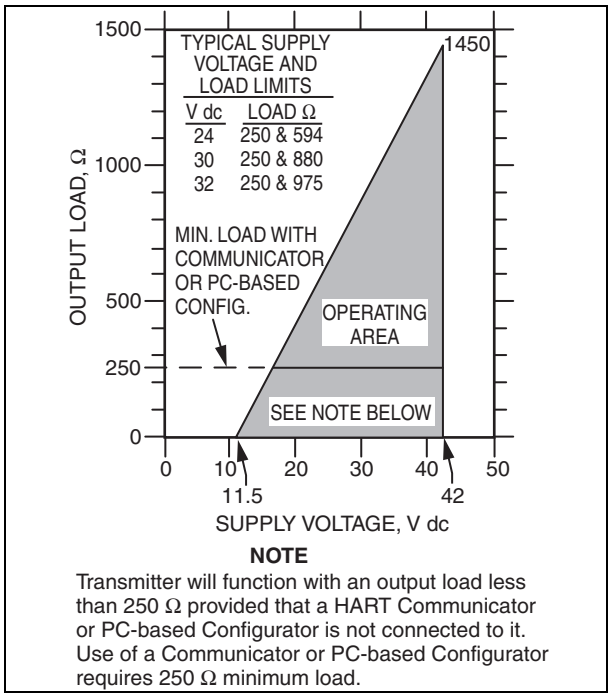


Figure 5. 4 to 20 mA Output, Supply Voltage vs. Output Load

Zeroing for Nonzero-Based Ranges

Dual Function Zeroing allows zeroing with the transmitter open to atmosphere, even when there is a nonzero-based range. This greatly simplifies position effect zeroing on many pressure and level applications. It applies to the LCD Indicator pushbuttons and optional External Zero Adjustment.

Adjustable Damping

The transmitter response time is normally 0.75 s, or the electronically adjustable setting of 0.00 (none), 0.25, 0.50, 1, 2, 4, 8, 16, or 32 seconds, whichever is greater, for a 90% recovery from an 80% input step as defined in ANSI/ISA S51.1. (For 63.2% recovery, 0.50 s with sensors B to F, and 0.60 s with sensor A.)

Minimum Allowable Absolute Pressure vs. Transmitter Temperature

WITH SILICONE FILL FLUID

Full Vacuum: up to 121°C (250°F)

WITH INERT FILL FLUID

Refer to Figure 6.

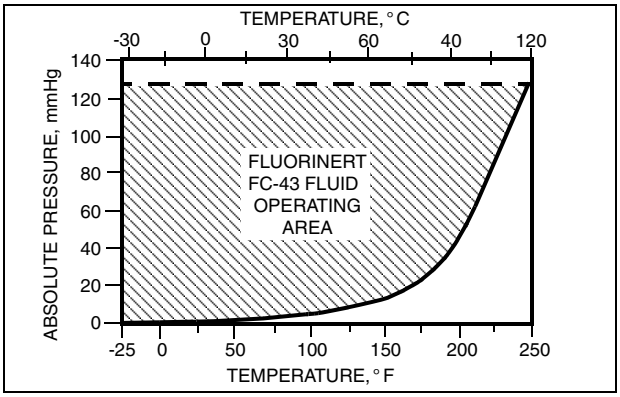


Figure 6. Minimum Allowable Absolute Pressure vs. Transmitter Temperature, Inert FC-43, 2.6 cSt at 25°C (77°F)

FUNCTIONAL SPECIFICATIONS (CONT.)

Current Outputs for Overrange, Fail, and Offline Conditions

Parameter	Current Outputs
Offline	Configurable between 4 and 20 mA
Sensor Failure	Configurable to Fail LO or Fail HI
Fail LO	3.60 mA
Underrange	3.80 mA
Overrange	20.50 mA
Fail HI	21.00 mA

Configuration and Calibration Data and Electronics Upgradeability

All factory characterization data and user configuration and calibration data are stored in the sensor (refer to Figure 7, Transmitter Functional Diagram). This means that the electronics module may be replaced, with one of like type, without the need for reconfiguration or recalibration.

Although module replacement can affect accuracy by a maximum of 0.20% of span, this error can be removed by a mA trim without application of pressure. Changing module types (e.g., from one to another communication protocol) may require reconfiguration and recalibration, as well as a different terminal block, but all factory characterization data is retained.

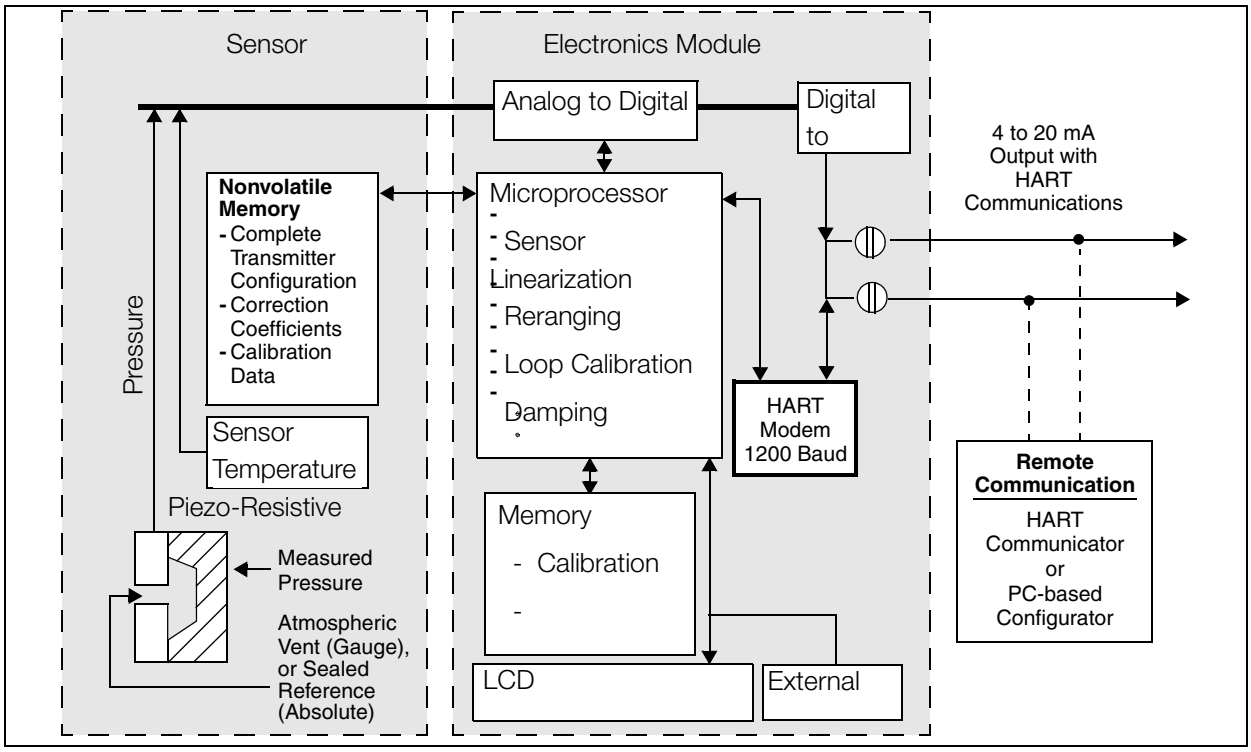


Figure 7. Transmitter Functional Block Diagram

FUNCTIONAL SPECIFICATIONS (CONT.)

Configuration Capability

CALIBRATED RANGE

– Input range within Range Limits
– See Table 8 for pressure units

OUTPUT MEASUREMENT #1 – DIGITAL PRIMARY VARIABLE AND 4 TO 20 mA

Mode: Linear

Units: See Table 8 for pressure units

OUTPUT MEASUREMENT #2 – DIGITAL SECONDARY VARIABLE

Mode: Linear

Units: See Table 8 for pressure units

Communications

Configurable for either Analog or Multidrop (fixed current) Modes. Digital communications is provided in both modes based upon the FSK (Frequency Shift Keying) technique which alternately superimposes one of two different frequencies on the uninterrupted current carried by the two signal/power wires. See Figure 8 and Figure 9.

ANALOG MODE (4 to 20 mA)

The 4 to 20 mA output signal is updated 30 times per second. Digital communications between the transmitter and HART Communicator is rated for distances up to 3050 m (10 000 ft). The communications rate is 1200 baud and requires a minimum loop load of 250 ohms.

MULTIDROP MODE (FIXED CURRENT)

This Mode supports communications with up to 15 transmitters on a single pair of signal/power wires. The output signal is updated 4 times per second and carries not only the pressure measurement, but also the sensor and electronics temperatures (internal recalculation rate for temperature is once per second). Communication between transmitter and system, or between transmitter and Communicator or Configurator, is rated for distances up to 1525 m (5000 ft). The communications rate is 1200 baud and requires a minimum loop load of 250 ohms.

Table 8.
Allowable Pressure Units for Calibrated Range (a)

inH_2O	psi	Pa	atm	g/cm^2
ftH_2O	inHg	kPa	bar	kg/cm^2
mmH_2O	mmHg	MPa	mbar	torr
mH_2O	–	–	–	–

(a) For absolute pressure, change psi to psia and MPa to MPaa, etc.

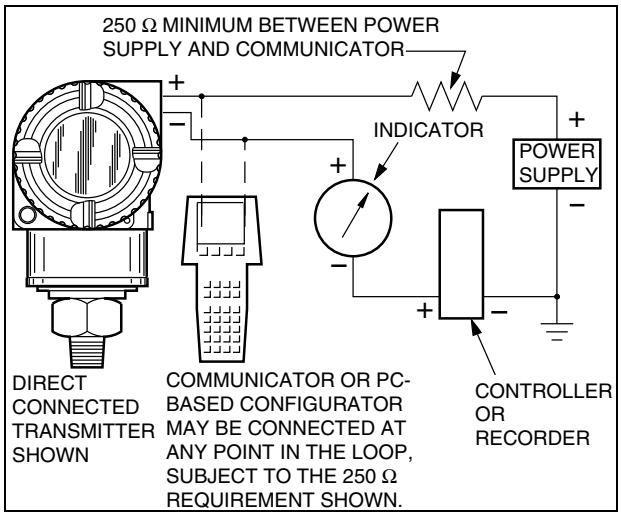


Figure 8. 4 to 20 mA Output Functional Block Diagram Point-to-Point Communications

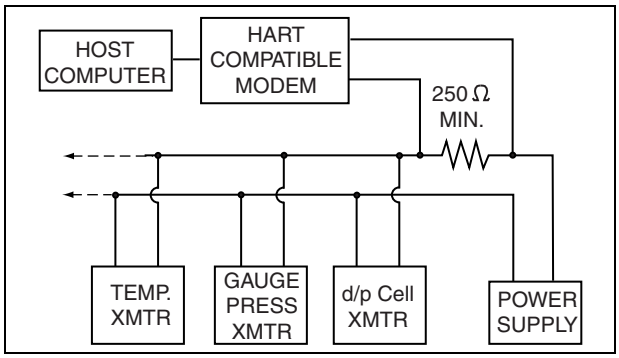


Figure 9. Typical Multidrop Functional Block Diagram (Up to Fifteen Transmitters)

FUNCTIONAL SPECIFICATIONS (CONT.)

Remote Communications

The HART Communicator or PC-based Configurator has full access to all of the "Display" and "Display and Reconfigure" items listed below. It may be connected to the communications wiring loop, and does not disturb the mA current signal. Plug-in connection points for the communicator are also provided on the transmitter terminal block.

"Display" Items

- Process Measurement in two formats
- Electronics and Sensor Temperatures
- mA Output

"Display and Reconfigure" Items

- Two Digital Outputs for Pressure
- Choice of Pressure Engineering Units
- Reranging without Pressure
- Zero and Span Calibration
- Electronic Damping
- Temperature Sensor Failure Strategy
- Failsafe Direction
- Tag, Descriptor, and Message
- Date of Last Calibration

Optional Custom Configuration (Option -C2)

For the transmitter to be custom configured by the factory, the user must fill out a data form. If this option is not selected, a standard (default) configuration will be provided. Refer to Table 9.

Table 9.
Example of Custom Configuration Option -C2

Parameter	Standard (Default) Configuration	Example of Custom Configuration Option -C2
Tagging Info.		
Tag (8 char. max.)	TAG	PT101
Descriptor (16 char. max.)	TAG NAME	WATER PRESS.
Message (32 char. max.)	LOCATION	BUILDING 2
HART Poll Address (0 to 15)	0	0 (a)
Calibrated Range		
Pressure EGU	per S.O. (b)	inH_2O
LRV	per S.O. (c)	0
URV	per S.O. (c)	100
Measurement #1		
Pressure EGU	per S.O. (d)	inH_2O
Output	4 to 20 mA	4 to 20 mA (e)
Measurement #2		
Pressure EGU	per S.O. (d)	inH_2O
Other		
Electronic Damping	None	0.5 s
Failsafe Direction	Upscale	Downscale
Failure Strategy	Continue	Failsafe
Ext. Zero Option	Enabled	Disabled

(a) Address is 1 to 15 for multidrop applications.
(b) Units from Table 8. If not specified, factory default calibration is zero to maximum span; default units vary by sensor code.
(c) Within Span and Range Limits for selected sensor code.
(d) Same as Calibrated Range.
(e) Fixed current is used for multidrop applications.

NOTE

Any of the configurable parameters in Table 9 can easily be changed using the HART Communicator or PC-based Configurator.

FUNCTIONAL SPECIFICATIONS (CONT.)

Optional LCD Indicator w/Pushbuttons (Figure 10)

Indicator provides:

- Two Lines: Five numeric characters on top line (four when a minus sign is needed); and seven alphanumeric characters on bottom line.
- Measurement readout: Value displayed on top line, and units label displayed on bottom line.
- Configuration and calibration prompts.

Pushbuttons (two) provide the following configuration and calibration prompts:

- Zero and Span settings, noninteractive to automatically set output to either 4 mA or 20 mA using the “NEXT” and “ENTER” pushbuttons.
- 4 and 20 mA Jog Settings, allowing the user to easily increment the mA output signal up or down in fine steps to match a value shown on an external calibrator.
- Forward or Reverse Output
- Damping Adjustment
- Enable/Disable Optional External Zero
- Temperature Sensor Failure Strategy
- Failsafe Action (High or Low)
- Units Label (Bottom Line of Display)
- Settable Lower and Upper Range Values for Transmission and Display (Top Line)
- Reranging without Pressure
- Percent (%) Output

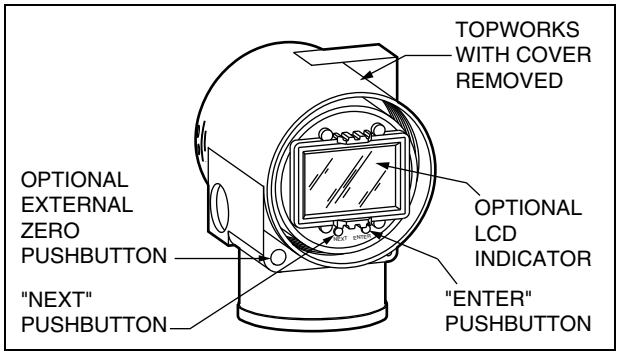


Figure 10. LCD Indicator with Pushbuttons

Optional External Zero Adjustment

An external pushbutton mechanism (Figure 10) is isolated from the electronics compartment and magnetically activates an internal reed switch through the housing. This eliminates a potential leak path for moisture or contaminants to get into the electronics compartment. This zero adjustment can be disabled by a configuration adjustment.

OPERATING, STORAGE, AND TRANSPORTATION CONDITIONS

Influence	Reference Operating Conditions	Normal Operating Conditions (a)	Operative Limits (a)	Storage and Transportation Limits
Process Connection Temp. ▸ with Silicone Fill Fluid ▸ with Inert Fill Fluid	▸ 24 ± 2°C (75 ± 3°F) ▸ 24 ± 2°C (75 ± 3°F)	▸ -29 to + 82°C (-20 to +180°F) ▸ -29 to + 82°C (-20 to +180°F)	▸ -46 and +121°C(b) (-50 and +250°F)(b) ▸ -29 and +121°C (-20 and +250°F)	▸ Not Applicable ▸ Not Applicable
Electronics Temperature ▸ with LCD Indicator (c)	▸ 24 ± 2°C (75 ± 3°F) ▸ 24 ± 2°C (75 ± 3°F)	▸ -29 to + 82°C(g) (-20 to +180°F)(g) ▸ -20 to + 82°C(g) (-4 to +180°F)(g)	▸ -40 and +85°C(g) (-40 and +185°F)(g) ▸ -29 and +85°C(g) (-20 and +185°F)(g)	▸ -54 and +85°C (-65 and +185°F) ▸ -54 and +85°C (-65 and +185°F)
Relative Humidity (d)	50 ± 10%	0 to 100%	0 and 100%	0 and 100% Noncondensing
Supply Voltage - mA Output	30 ± 0.5 V dc	11.5 to 42 V dc (e)	11.5 and 42 V dc (e)	Not Applicable
Output Load - mA Output	650 Ω	0 to 1450 Ω	0 and 1450 Ω	Not Applicable
Vibration	1 m/s^2 (0.1 “g”)	6.3 mm (0.25 in) Double Amplitude: from 5 to 15 Hz with Aluminum Housing and from 5 to 9 Hz with 316 ss Housing - 0 to 30 m/s^2 (0 to 3 “g”) from 15 to 500 Hz with Aluminum Housing; and 0 to 10 m/s^2 (0 to 1 “g”) from 9 to 500 Hz with 316 ss Housing		11 m/s^2 (1.1 “g”) from 2.5 to 5 Hz (in Shipping Package)
Mounting Position	Upright (f)	Upright (f)	No Limit	Not Applicable

(a) Temperature limits are derated as follows:
IAP20 and IGP20 Transmitters:
to -7 and +82°C (20 and 180°F) when Structure Codes 78/79 (pvdf inserts) are used, and
to 0 and 60°C (32 and 140°F) when DIN Construction Options D2/D4/D6/D8 are used.

(b) Selection of Option -J extends the low temperature limit of transmitters with silicone filled sensors down to -50°C (-58°F).

(c) Although the LCD will not be damaged at any temperature within the “Storage and Transportation Limits”, updates will be slowed and readability decreased at temperatures outside the “Normal Operating Conditions”.

(d) With topworks covers on and conduit entrances sealed.

(e) 11.5 V dc can be reduced to 11 V dc by using a plug-in shorting bar; see “Physical Specifications” sections.

(f) Sensor process wetted diaphragms in a vertical plane for IAP20 and IGP20 Transmitter.

(g) Refer to the Electrical Safety Specifications section for a restriction in ambient temperature limits with certain electrical approvals/certifications.

PERFORMANCE SPECIFICATIONS

Zero-Based Calibrations; 316L ss or Co-Ni-Cr Diaphragms with Silicone Fluid for IGP10 and IAP10;
Cobalt-Nickel-Chromium or 316L Stainless Steel Sensor with Silicone Fluid for IGP20;
Under Reference Operating Conditions unless otherwise Specified;
URL = Upper Range Limit, and Span = Calibrated Span.

Accuracy (Includes Linearity, Hysteresis, and Repeatability)

Accuracy, % of Span (a)(b)	
Spans ≥10% URL	Spans <10% URL
±0.060%	±[0.025 + 0.0035 (URL/Span)]%

(a) Add ±0.04% for Span Code A, and ±0.02% for Span Codes E and F.

(b) Subtract ±0.01% for digital output accuracy.

Stability

Long term drift is less than ±0.05% of URL per year over a 5-year period.

Calibration Frequency

The calibration frequency is five years. The five years is derived using the values of allowable error (% span), TPE (% span), performance margin (% span), and stability (% span/month); where:

$$\text{Calibration Frequency} = \frac{\text{Performance Margin}}{\text{Stability}} = \text{Months}$$

Power-Up Time

Less than 5 seconds for output to reach first valid measurement.

Supply Voltage Effect

The output changes less than 0.005% of span for each 1 V change within the specified supply voltage requirements. See Figure 5.

Position Effect

The transmitter may be mounted in any position. Any zero effect caused by the mounting position can be eliminated by rezeroing. There is no span effect.

Ambient Temperature Effect

Total effect for a 28°C (50°F) change within Normal Operating Condition limits is:

For the IAP10 and IGP10 Transmitters

Span Code (a)	Ambient Temperature Effect
C, D, E, and F	± (0.03% URL + 0.060% Span)

(a) Span Code F applicable to IGP10 Transmitter only.

For the IAP20 and IGP20 Transmitters

Span Code	Ambient Temperature Effect
A (a)	± (0.18% URL + 0.025% Span)
B and C	± (0.03% URL + 0.060% Span)
D	± (0.05% URL + 0.045% Span)
E and F (a)	± (0.08% URL + 0.025% Span)

(a) Span Codes A and F applicable to IGP20 Transmitter only.

NOTE

For additional ambient temperature effect when pressure seals are used, see PSS 2A-1Z11 A.

PERFORMANCE SPECIFICATIONS (CONT.)

Vibration Effect

Total effect is ±0.2% of URL per “g” for vibrations in the frequency range of 5 to 500 Hz; with double amplitudes of 6.3 mm (0.25 in) in the range of 5 to 15 Hz, or accelerations of 3 “g” in the range of 15 to 500 Hz, whichever is smaller, for transmitters with aluminum housings; and with double amplitudes of 6.3 mm (0.25 in) in the range of 5 to 9 Hz, or accelerations of 1 “g” in the range of 9 to 500 Hz, whichever is smaller, for transmitters with 316 ss housings.

RFI Effect

The output error is less than 0.1% of span for radio frequencies in the range of 27 to 1000 MHz and field intensity of 30 V/m when the transmitter is properly installed with shielded conduit and grounding, and housing covers are in place. (Per IEC Std. 61000-4-3.)

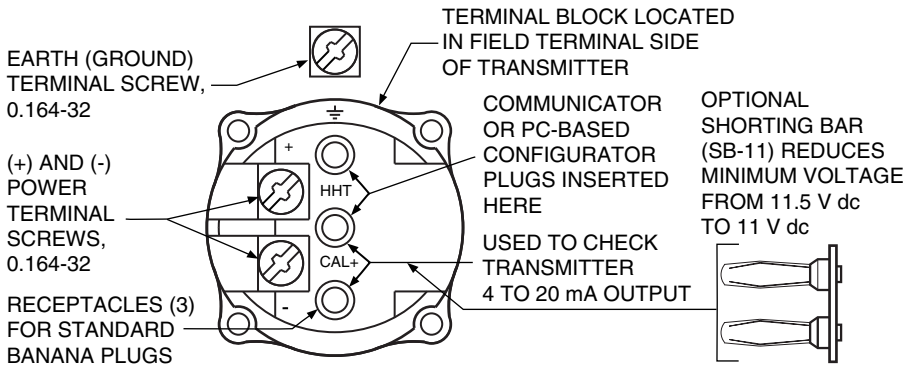
Switching and Indirect Lightning Transients

The transmitter can withstand a transient surge up to 2000 V common mode or 1000 V normal mode without permanent damage. The output shift is less than 1.0%. (Per ANSI/IEEE C62.41-1980 and IEC Std. 61000-4-5.)

PHYSICAL SPECIFICATIONS

Description	Direct Connected Absolute and Gauge Pressure Transmitters IAP10 and IGP10	Bracket Mounted Absolute and Gauge Pressure Transmitters IAP20 and IGP20
Process Wetted Parts Mat'ls. (High Pressure Side) ▸ Process Connection ▸ Gaskets ▸ Sensor Diaphragm	▸ 316L ss or Nickel alloy ▸ Not Applicable ▸ 316L ss, Co-Ni-Cr, or Nickel alloy	▸ Carbon Steel, 316 ss, Nickel alloy, Monel, or pvdf (Kynar) ▸ Glass Filled ptfe (Chemloy), Viton ▸ Co-Ni-Cr, 316L ss, Gold-Plated 316L ss, Nickel alloy, Monel, or Tantalum
Reference Side Mat'ls. (Atmospheric Pressure Side)	IGP10 Transmitter: Silicon, Pyrex, RTV, and 316 ss IAP10 Transmitter: N/A	Sensor Diaphragm: Same as specified for High Pressure side process wetted material. Cover: 316 ss
Sensor Fill Fluid	Silicone or Fluorinert	Silicone or Fluorinert
Bolts and Nuts for Process Cover and Connector	N/A	Standard Bolting: ASTM A193, Grade B7 Bolts ASTM A194, Grade 2H Nuts Optional Bolting: 316 ss, Type 17-4 ss, or B7M (NACE)
Electrical Housing and Housing Covers	Two compartments to separate electronics from field connections. Material is low copper (1% maximum) die-cast aluminum alloy with epoxy finish, or 316 ss.	
Environmental Protection	The enclosure has the dusttight and weatherproof rating of IP66 as defined by IEC 60529, and provides the environmental and corrosion resistant protection rating of NEMA 4X.	
Electronics Module	Printed wiring assemblies are conformally coated for moisture and dust protection.	
Electrical Connections	1/2 NPT (Code 1) or PG 13.5 (Code 2) entrances on both sides of electronics housing, as specified. Unused entrance must be plugged to ensure moisture and RFI protection (Aluminum or 316 ss plug supplied by Invensys).	
Mounting Position	The transmitter may be mounted in any orientation.	
Approximate Mass (Does not include seals. Refer to PSS 2A-1Z11 A for integral transmitter and seal systems)	Standard Transmitter 1.5 kg (3.3 lb) With 316 ss Housing Add 1.1 kg (2.4 lb) With LCD Indicator Option Add 0.2 kg (0.4 lb)	With Process Connectors 4.2 kg (9.2 lb) Without Process Connectors 3.5 kg (7.8 lb) With 316 ss Housing Add 1.1 kg (2.4 lb) With LCD Indicator Option Add 0.2 kg (0.4 lb)

PHYSICAL SPECIFICATIONS (CONT.)

Description	Direct Connected Absolute and Gauge Pressure Transmitters IAP10 and IGP10	Bracket Mounted Absolute and Gauge Pressure Transmitters IAP20 and IGP20
Field Terminal Connections		

ELECTRICAL SAFETY SPECIFICATIONS

IAP10 and IGP10 Transmitters

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
ATEX flameproof; II 2 GD EEx d IIC, Zone 1.	Temperature Class T6, T85°C, Ta = -40°C to +80°C.	D
ATEX intrinsically safe; II 1 GD EEx ia IIC, Zone 0.	Temperature Class T4, Ta = -40°C to +80°C.	E
ATEX protection n; II 3 GD, EEx nL IIC, Zone 2.	Temperature Class T4, Ta = -40°C to +80°C.	N
ATEX multiple certifications, ia and ib, and n. Refer to ATEX Codes E and N for details.	Applies to Codes E and N but not to Code D.	M
ATEX multiple certifications, ia and ib, d, and n. Refer to ATEX Codes D, E, and N for details.	Applies to Codes D, E, and N.	P
CSA intrinsically safe for Class I, Division 1, Groups A, B, C, and D, Class II, Division 1, Groups E, F, and G; Class III, Division 1.	Temperature Class T4A at 40°C and T3C at 85°C maximum ambient.	C
CSA explosionproof for Class I, Division 1, Groups B, C, and D, and dust-ignitionproof for Class II, Division 1, Groups E, F, and G; and Class III, Division 1.	Maximum Ambient Temperature 85°C.	C
CSA Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2.	Temperature Class T4A at 40°C and T3C at 85°C maximum ambient.	C
CSA field device zone certified flameproof Ex d IIC. Also, all certifications of Code C above.	Maximum Ambient Temperature 85°C.	B
CSA zone certified intrinsically safe Ex ia IIC, and energy limited Ex nA II.	Temperature Class T4 at 40°C and T3 at 85°C maximum ambient.	B
FM intrinsically safe for Class I, Division 1, Groups A, B, C, and D, Class II, Division 1, Groups E, F, and G; Class III, Division 1.	Temperature Class T4A at 40°C and T4 at 85°C maximum ambient.	F
FM explosionproof for Class I, Division 1, Groups B, C, and D; and dust-ignitionproof for Class II, Division 1, Groups E, F, and G; and Class III, Division 1.	Temperature Class T6 at 80°C and T5 at 85°C maximum ambient.	F
FM nonincendive Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G, and Class III, Division 2.	Temperature Class T4A at 40°C and T4 at 85°C maximum ambient.	F
FM field device zone certified flameproof AEx d IIC. Also, all certifications of Code F above.	Temperature Class T6 at 75°C maximum ambient.	G
FM zone certified intrinsically safe AEx ia IIC.	Temperature Class T4 at 85°C maximum ambient.	G
IECEx intrinsically safe, Ex ia IIC.	Temperature Class T4, Ta = -40°C to +80°C.	T
IECEx protection n, Ex nL IIC.	Temperature Class T4, Ta = -40°C to +80°C.	U
IECEx flameproof, Ex d IIC.	Temperature Class T6, Ta = -40°C to +75°C.	V

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ELECTRICAL SAFETY SPECIFICATIONS (CONT.)

IAP10 and IGP10 Transmitters (Cont.)

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
Multi-marked for HART as follows: **ATEX** intrinsically safe, II 1 GD, EEx ia IIC, Zone 0.	See application conditions for Code E intrinsically safe applications.	W
CSA intrinsically safe, Cl. I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III, Div. 1; also CSA zone certified intrinsically safe Ex ia IIC.	See application conditions for Code C intrinsically safe applications.	
FM intrinsically safe, Cl. I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III, Div. 1. Also FM zone certified intrinsically safe AEx ia IIC.	See application conditions for Code F intrinsically safe applications.	

NOTE

1. Transmitter has been designed to meet the electrical safety descriptions listed. Contact IPS for information or status of testing laboratory approvals or certifications.
2. See Model Code for availability of Electrical Safety Design Codes with particular Transmitter structures.
3. Refer to applicable Instruction Manual for application conditions and connectivity requirements.
4. When selecting ATEX Safety Design Code M or P, the user must permanently mark (check off in rectangle block on data plate) one type of protection only (ia and ib, d, or n). Do not change this mark once it has been applied.
5. When selecting Safety Design Code W, the user must permanently mark (check off in rectangular block on data plate) intrinsically safe certifications for ATEX, CSA, or FM, as applicable. Do not change this mark once it has been applied.

ELECTRICAL SAFETY SPECIFICATIONS (CONT.)

IAP20 and IGP20 Transmitters

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
ATEX flameproof; II 2 GD EEx d IIC, Zone 1.	Temperature Class T6, T85°C, Ta = -40°C to +80°C.	D
ATEX intrinsically safe; II 1 GD EEx ia IIC, Zone 0.	Temperature Class T4, Ta = -40°C to +80°C.	E
ATEX protection n; II 3 GD, EEx nL IIC, Zone 2.	Temperature Class T4, Ta = -40°C to +80°C.	N
ATEX multiple certifications, ia and ib, and n. Refer to ATEX Codes E and N for details.	Applies to Codes D, E, and N.	M
CSA intrinsically safe for Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1.	Temperature Class T4A at 40°C and T3C at 85°C maximum ambient.	C
CSA explosionproof for Class I, Division 1, Groups B, C, and D, and dust-ignitionproof for Class II, Division 1, Groups E, F, and G; and Class III, Division 1.	Maximum Ambient Temperature 85°C.	C
CSA Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2.	Temperature Class T4A at 40°C and T3C at 85°C maximum ambient.	C
CSA field device zone certified flameproof Ex d IIC. Also, all certifications of Code C above.	Maximum Ambient Temperature 85°C.	B
CSA zone certified intrinsically safe Ex ia IIC, and energy limited Ex nA II.	Temperature Class T4 at 40°C and T3 at 85°C maximum ambient.	B
FM intrinsically safe for Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1.	Temperature Class T4A at 40°C and T4 at 85°C maximum ambient.	F
FM explosionproof for Class I, Division 1, Groups B, C, and D; and dust-ignitionproof for Class II, Division 1, Groups E, F, and G, and Class III, Division 1.	Temperature Class T6 at 80°C and T5 at 85°C maximum ambient.	F
FM nonincendive Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2.	Temperature Class T4A at 40°C and T4 at 85°C maximum ambient.	F
FM field device zone certified flameproof AEx d IIC. Also, all certifications of Code F above.	Temperature Class T6 at 75°C maximum ambient.	G
FM zone certified intrinsically safe AEx ia IIC.	Temperature Class T4 at 85°C maximum ambient.	G
IECEx intrinsically safe, Ex ia IIC.	Temperature Class T4, Ta = -40°C to +80°C.	T
IECEx protection n, Ex nL IIC.	Temperature Class T4, Ta = -40°C to +80°C.	U
IECEx flameproof, Ex d IIC.	Applies to Version 5 electronic module. T6, Ta = 80°C; T5, Ta = 85°C Ambient Temperature -20°C to +85°C.	V

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ELECTRICAL SAFETY SPECIFICATIONS (CONT.)

IAP20 and IGP20 Transmitters (Cont)

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
Multi-marked for HART as follows: **ATEX** intrinsically safe, II 1 GD, EEx ia IIC, Zone 0.	See application conditions for Code E intrinsically safe applications.	W
CSA intrinsically safe, Cl. I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III, Div. 1; also CSA zone certified intrinsically safe Ex ia IIC.	See application conditions for Code C intrinsically safe applications.	
FM intrinsically safe, Cl. I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III, Div. 1. Also FM zone certified intrinsically safe AEx ia IIC.	See application conditions for Code F intrinsically safe applications.	

NOTE

1. Transmitter has been designed to meet the electrical safety descriptions listed. Contact IPS for information or status of testing laboratory approvals or certifications.
2. See Model Code for availability of Electrical Safety Design Codes with particular Transmitter structures.
3. Refer to applicable Instruction Manual for application conditions and connectivity requirements.
4. When selecting ATEX Safety Design Code M or P, the user must permanently mark (check off in rectangle block on data plate) one type of protection only (ia and ib, d, or n). Do not change this mark once it has been applied.
5. When selecting Safety Design Code W, the user must permanently mark (check off in rectangular block on data plate) intrinsically safe certifications for ATEX, CSA, or FM, as applicable. Do not change this mark once it has been applied.

MODEL CODES

IAP10 and IGP10 Transmitters

Description				Model
I/A Series, Electronic, Direct Connected Absolute Pressure Transmitter				IAP10 (a)
I/A Series, Electronic, Direct Connected Gauge Pressure Transmitter				IGP10 (a)
Electronics Versions and Output Signal				
Intelligent; Digital HART and 4 to 20 mA dc (Version -T)				-T
Structure Code - Select from one of the following six groups:				
1. Transmitter Only (no seals)				
Process Connection	**Sensor**	**Fill Fluid**	**Connection Type**	
316L ss	Co-Ni-Cr	Silicone	1/2 NPT External Thread, 1/4 NPT Internal Thread	20
316L ss	Co-Ni-Cr	Inert	1/2 NPT External Thread, 1/4 NPT Internal Thread	21
316L ss	316L ss	Silicone	1/2 NPT External Thread, 1/4 NPT Internal Thread	22
316L ss	316L ss	Inert	1/2 NPT External Thread, 1/4 NPT Internal Thread	23
316L ss	Nickel alloy	Silicone	1/2 NPT External Thread, 1/4 NPT Internal Thread	30
316L ss	Nickel alloy	Inert	1/2 NPT External Thread, 1/4 NPT Internal Thread	31
2. Transmitter Prepared for Foxboro Model Coded Seals (b)				
Transmitter Prepared for Foxboro Direct Connect Seal; Silicone Fill in Sensor (c)				D1
Transmitter Prepared for Foxboro Direct Connect Seal; Inert Fill in Sensor (IGP10 only) (c)				D2
Transmitter Prepared for Foxboro Remote Mount Seal; Silicone Fill in Sensor (d)				S3
Transmitter Prepared for Foxboro Remote Mount Seal; Inert Fill in Sensor (IGP10 only) (d)				S4
3. Transmitters Prepared for non-Foxboro Seals				
Transmitter Prepared for Remote Seal; Silicone Fill in Sensor (e)				SC
Transmitter Prepared for Remote Seal; Inert Fill in Sensor (f)				SD
4. Flameproof Transmitter Only (no seals)				
Process Connection	**Sensor**	**Fill Fluid**	**Connection Type**	
316L ss	316L ss	Silicone	1/2 NPT External Thread, 1/4 NPT Internal Thread	52
316L ss	316L ss	Inert	1/2 NPT External Thread, 1/4 NPT Internal Thread	53
316L ss	Nickel alloy	Silicone	1/2 NPT External Thread, 1/4 NPT Internal Thread	60
316L ss	Nickel alloy	Inert	1/2 NPT External Thread, 1/4 NPT Internal Thread	61
Nickel alloy	Nickel alloy	Silicone	1/2 NPT External Thread, 1/4 NPT Internal Thread	62
Nickel alloy	Nickel alloy	Inert	1/2 NPT External Thread, 1/4 NPT Internal Thread	63
5. Flameproof Transmitter Prepared for Foxboro Model Coded Seals (b)				
Flameproof Transmitter Prepared for Direct Connect Seal; Silicone Fill in Sensor (c)				D5
Flameproof Transmitter Prepared for Direct Connect Seal; Inert Fill in Sensor (IGP10 only) (c)				D6
Flameproof Transmitter Prepared for Remote Mount Seal; Silicone Fill in Sensor (d)				S5
Flameproof Transmitter Prepared for Remote Mount Seal; Inert Fill in Sensor (IGP10 only) (d)				S6
6. Flameproof Transmitter Prepared for non-Foxboro Seals				
Flameproof Transmitter Prepared for Remote Seal; Silicone Fill in Sensor (e)				SH
Flameproof Transmitter Prepared for Remote Seal; Inert Fill in Sensor (f)				SJ
Span Limits - Absolute or Gauge Pressure Units, as Applicable				
MPa	**psi**	**bar or kg/cm^2**		
0.007 and 0.21	1 and 30	0.07 and 2.1		C
0.07 and 2.1	10 and 300	0.7 and 21		D
0.7 and 21	100 and 3000	7 and 210		E
14 and 42	2000 and 6000	140 and 420 (IGP10 only)		F

Model Code continued on next page

MODEL CODES (CONT.)

IAP10 and IGP10 Transmitters (Cont.)

Description (Cont.)	Model
Conduit Connection and Housing Material	
1/2 NPT Conduit Connection, Aluminum Housing	1
PG 13.5 Conduit Connection, Aluminum Housing (With Electrical Safety Codes E, D, M, N, and P only)	2
1/2 NPT Conduit Connection, 316 ss Housing	3
PG 13.5 Conduit Connection, 316 ss Housing (With Electrical Safety Codes E, D, M, N, and P only)	4
M20 Conduit Connection, Both Sides, Aluminum Housing (With Electrical Safety Codes E, D, M, N, and P only)	5
M20 Conduit Connection, Both Sides, 316 ss Housing (With Electrical Safety Codes E, D, M, N, and P only)	6
Electrical Safety (Also See Electrical Safety Specifications Section)	
ATEX II 1 GD, EEx ia IIC, Zone 0	E
ATEX II 2 GD, EEx d IIC, Zone 1 (g)(j)	D
ATEX II 3 GD, EEx nL IIC, Zone 2	N
ATEX Multiple Certifications (includes ATEX Codes E and N) (See Electrical Safety Specifications section for user marking)	M
ATEX Multiple Certifications (includes ATEX Codes E, D, and N) (g)(j) (See Electrical Safety Specifications section for user marking)	P
CSA Certifications: (h) Division 1 intrinsically safe, explosionproof, dust-ignitionproof Zone certified Ex ia IIC and energy limited Ex nA II Division 2, Classes I, II, and III	C
CSA zone certified flameproof Ex d IIC; also all certifications of Code C above (g)(j)	B
FM Approvals: (h) Division 1 intrinsically safe, explosionproof, dust-ignitionproof Zone approved AEx ia IIC Division 2 nonincendive, Classes I, II, and III	F
FM approved flameproof AEx d IIC; also all approvals of Code F above (g)(j)	G
IECEx intrinsically safe, Ex ia IIC	T
IECEx protection n, Ex nL IIC	U
IECEx flameproof, Ex d IIC (g)(j)	V
Multi-marked for ATEX, CSA, and FM Intrinsically Safe Applications only (q)	W
Optional Selections See descriptions below.	
Mounting Bracket Set (i)	
Painted Steel Bracket with Plated Steel Bolts, 1/2 NPT (with Conduit Connection Codes 1 and 3 only)	-M1
Stainless Steel Bracket with Stainless Steel Bolts, 1/2 NPT (with Conduit Connection Codes 1 and 3 only)	-M2
Painted Steel Bracket with Plated Steel Bolts, PG 13.5 (with Conduit Connection Codes 2 and 4 only)	-M3
Stainless Steel Bracket with Stainless Steel Bolts, PG 13.5 (with Conduit Connection Codes 2 and 4 only)	-M4
Painted Steel Bracket with Plated Steel Bolts, M20 (with Conduit Connection Codes 5 and 6 only)	-M5
Stainless Steel Bracket with Stainless Steel Bolts, M20 (with Conduit Connection Codes 5 and 6 only)	-M6
Digital Indicator with Pushbuttons	
Digital Indicator, Pushbuttons, and Window Cover	-L1
Vent Screw and Block & Bleed Valve	
316 ss Vent Screw in Process Connection (Not with Structure Codes 32 or 33, or Pressure Seals)	-V1
Block and Bleed Valve, Carbon Steel (Not with Pressure Seals)	-V2
Block and Bleed Valve, 316 ss (Not with Pressure Seals)	-V3
Block and Bleed Valve, 316 ss w/Monel Trim (Not with Pressure Seals)	-V4

Model Code continued on next page

MODEL CODES (CONT.)

IAP10 and IGP10 Transmitters (Cont.)

Description (Cont.)	Model
Conduit Thread Adapters	
Hawke-Type 1/2 NPT Cable Gland for use with Conduit Connection Codes 1 and 3 only (l)	-A1
Plastic PG 13.5 Cable Gland for use with Conduit Connection Codes 2 and 4 only (m)	-A2
M20 Connector for use with Conduit Connection Codes 1 and 3 only (l)	-A3
Brass PG 13.5 Cable Gland (Trumpet-Shaped) for use with Conduit Connection Codes 2 and 4 only (m)	-A4
Electronics Housing Features	
External Zero Adjustment	-Z1
Custody Transfer Lock and Seal	-Z2
External Zero Adjustment and Custody Transfer Lock and Seal	-Z3
Custom Factory Configuration	
Full Factory Configuration (Requires Configuration Form to be filled out)	-C2
Cleaning and Preparation	
Unit Degreased - for Silicone Filled Sensors Only Not for Oxygen/Chlorine Service, Option -V1, or Pressure Seals	-X1
Cleaned and Prepared for Oxygen Service - for Inert Filled Sensors Only Not with Option -V1, or Pressure Seals	-X2
Cleaned and Prepared for Chlorine Service - with Structure Code 33 Only Not with Option -V1, or Pressure Seals	-X3
SIL2 Transmitters	
SIL2-Certified HART Transmitter	-S2
Instruction Books (Common MI, Brochure, and Full Documentation Set on CD-ROM is Standard)	
Without Instruction Book and CD - Only “Getting Started” Brochure is supplied	-K1
Miscellaneous Optional Selections	
G 1/2 B Manometer Process Connection (Not Available with Option -V1 or Pressure Seals)	-G
Low Temperature Operative Limit of Electronics Housing Extended Down to -50°C (-58°F) (n)	-J
R 1/2 Process Connection (1/2 NPT to R 1/2 Adapter) (p)	-R
Supplemental Customer Tag (Stainless Steel Tag wired onto Transmitter)	-T

(a) Refer to PSS 2A-1C13 F for very high GP versions with upper range limits of 52, 105, and 210 MPa (7500, 15000, and 30000 psi). Refer to PSS 2A-1C13 K and PSS 2A-1C13 L for AP and GP versions for sanitary and pulp/paper industries, respectively.

(b) Both transmitter and pressure seal Model Numbers are required. Refer to PSS 2A-1Z11 A for pressure seal Model Codes.

(c) Direct Connect Seal Models that may be specified are PSTAD, PSFAD, and PSISD.

(d) Remote Mount Seal Models that may be specified are PSFPS, PSFES, PSFAR, PSTAR, PSISR, PSSCR, and PSSSR.

(e) For transmitters with Silicone fill prepared for remote seal by others, specify Structure Code 22 or 52.

(f) For transmitters with Inert fill prepared for remote seal by others, specify Structure Code 23 or 53.

(g) Electrical Safety Codes B, D, G, V, and P are only available with flameproof transmitter Structure Codes 52, 53, 60, 61, 62, 63, D5, D6, S5, S6, SH, and SJ.

(h) Electrical Safety Codes C and F are not available with flameproof transmitter Structure Codes 52, 53, 60, 61, 62, 63, D5, D6, S5, S6, SH, and SJ.

(j) A cover lock is provided as standard with Electrical Safety Codes B, D, G, V, and P.

(k) Mounting sets not offered with direct mounted seals, except if a direct mounted PSTAD threaded seal with a 1/4 NPT process connection is used, then a mounting set is recommended.

(l) Available with Electrical Safety Codes E, D, M, N, and P only.

(m) Available with Electrical Safety Code E only.

(n) Not available with Inert fill in sensor or seal.

(p) Not available with pressure seals, or Nickel alloy sensors.

(q) For multi-marking details, see Electrical Safety Specifications section.

MODEL CODES (CONT.)

IAP20 and IGP20 Transmitters

Description			Model
I/A Series, Electronic, Bracket-Mounted Absolute Pressure Transmitter			IAP20
I/A Series, Electronic, Bracket-Mounted Gauge Pressure Transmitter			IGP20
Electronics Versions and Output Signal			
Intelligent; Digital HART and 4 to 20 mA dc (Version -T)			-T
Structure Code - Select from one of the following three groups:			
1. Transmitter			
Hi-Side Cover	**Sensor**	**Fill Fluid**	
Steel	Co-Ni-Cr	Silicone	10
Steel	Co-Ni-Cr	Inert	11
Steel	316L ss	Silicone	12
Steel	316L ss	Inert	13
Steel	Nickel alloy	Silicone	16
Steel	Nickel alloy	Inert	17
316 ss	Co-Ni-Cr	Silicone	20
316 ss	Co-Ni-Cr	Inert	21
316 ss	316L ss	Silicone	22
316 ss	316L ss	Inert	23
316 ss	316L ss, Gold Plated	Silicone	2G
316 ss	Monel	Silicone	24
316 ss	Monel	Inert	25
316 ss	Nickel alloy	Silicone	26
316 ss	Nickel alloy	Inert	27
Monel	Monel	Silicone	34
Monel	Monel	Inert	35
Nickel alloy	Nickel alloy	Silicone	46
Nickel alloy	Nickel alloy	Inert	47
Nickel alloy	Tantalum	Silicone	48
Nickel alloy	Tantalum	Inert	49
2. Transmitter Prepared for Foxboro Model Coded Seals (b)			
Transmitter Prepared for Remote Seal on HI Side; Silicone fill in sensor			S3 (c)
Transmitter Prepared for Remote Seal on HI Side; Inert fill in sensor (IGP20 only)			S4 (c)
Transmitter Prepared for PSFLT, PSSCT, or PSSST Seal, HI Side; Silicone fill in sensor (IGP20 only)			F1
Transmitter Prepared for PSFLT, PSSCT, or PSSST Seal, HI Side; Inert fill in sensor (IGP20 only)			F2
3. Transmitter Prepared for non-Foxboro Seals			
Transmitter Prepared for Remote Seal; Silicone Fill in Sensor			SC
Transmitter Prepared for Remote Seal; Inert Fill in Sensor			SD
Span Limits (Absolute or Gauge Pressure Units)			
kPa	**inH_2O**	**mbar**	
0.12 and 7.5	0.5 and 30	1.2 and 75 (IGP20 only)	A (d)
0.87 and 50	3.5 and 200	8.7 and 500	B
MPa	**psi**	**kPabar or kg/cm^2**	
0.007 and 0.21	1 and 30	0.07 and 2.1	C
0.07 and 2.1	10 and 300	0.7 and 21	D
0.7 and 21	100 and 3000	7 and 210	E (e)
1.38 and 35	200 and 5000	13.8 and 350 (IGP20 only)	F (e)

Model Code continued on next page

MODEL CODES (CONT.)

IAP20 and IGP20 Transmitters (Cont.)

Description (Cont.)	Model
Process Connector Type (Material Same as Process Cover Material)	
None; connect directly to process cover (not available with Structure Codes 78 and 79)	0
1/4 NPT (not available with Structure Codes 46, 47, 48, 49, 78, 79)	1
1/2 NPT (not available with Structure Codes 78, 79)	2
Rc 1/4 (not available with Structure Codes 46, 47, 48, 49, 78, 79)	3
Rc 1/2 (not available with Structure Codes 78, 79)	4
1/2 Schedule 80 Welding Neck (not available with Structure Codes 46, 47, 48, 49, 78, 79)	6
None; pvdf (Kynar) insert tapped for 1/2 NPT on side of 316 ss Process Cover (only with Codes 78/79)	7
Conduit Connection and Housing Material	
1/2 NPT Conduit Connection, Aluminum Housing	1
PG 13.5 Conduit Connection, Aluminum Housing (With Electrical Safety Codes E, D, M, and N only)	2
1/2 NPT Conduit Connection, 316 ss Housing	3
PG 13.5 Conduit Connection, 316 ss Housing (With Electrical Safety Codes E, D, M, and N only)	4
M20 Conduit Connection, Both Sides, Aluminum Housing	5
M20 Conduit Connection, Both Sides, 316 ss Housing	6
Electrical Safety (Also see Electrical Safety Specifications section)	
ATEX II 1 GD, EEx ia IIC, Zone 0 ATEX II 2 GD, EEx d IIC, Zone 1 (n) ATEX II 3 GD, EEx nL IIC, Zone 2 ATEX Multiple Certifications (includes ATEX Codes E, D, and N) (n) (See Electrical Safety Specifications section for user marking)	E D N M
CSA Certifications: Division 1 intrinsically safe, explosionproof, dust-ignitionproof Zone certified Ex ia IIC and energy limited Ex nA II Division 2, Classes I, II, and III	C
CSA zone certified flameproof Ex d IIC; also all certifications of Code C above (h)	B
FM Approvals: Division 1 intrinsically safe, explosionproof, dust-ignitionproof Zone approved AEx ia IIC Division 2 nonincendive, Classes I, II, and III	F
FM approved flameproof AEx d IIC; also all approvals of Code F above (h)	G
IECEx intrinsically safe, Ex ia IIC IECEx protection n, Ex nL IIC IECEx flameproof, Ex d IIC	T U V
Multi-marked for ATEX, CSA, and FM Intrinsically Safe Applications only (p)	W
Optional Selections Refer to Optional Selection descriptions below.	
Mounting Bracket Set - Not available with Direct Connect Seals, Structure Codes F1 and F2 Standard Style Painted Steel Bracket with Plated Steel Bolts Standard Style Stainless Steel Bracket with Stainless Steel Bolts Universal Style Stainless Steel Bracket with Stainless Steel Bolts	 -M1 -M2 -M3

Model Code continued on next page

MODEL CODES (CONT.)

IAP20 and IGP20 Transmitters (Cont.)

Description (Cont.)				Model
Optional Selections (Cont.)				
Digital Indicator with Pushbuttons				
Digital Indicator, Pushbuttons, and Window Cover				-L1
Process Cover Type	**Cover Screw Material**	**Connector Screw Size**	**Connector Screw Material**	
Single Ended (f)	Steel	M10 (by User)	N/A	-D1
Double Ended (f)(g) (Blind Kidney Flange on back)	Steel	M10	Steel	-D2
Single Ended	Steel	7/16 (by User)	N/A	-D3
Double Ended (f)(g) (Blind Kidney Flange on back)	Steel	7/16	Steel	-D4
Single Ended (f)	316 ss	7/16 (by User)	N/A	-D5
Double Ended (f)(g) (Blind Kidney Flange on back)	316 ss	7/16	316 ss	-D6
Single Ended	17-4 ss	7/16 (by User)	N/A	-D7
Double Ended (f)(g) (Blind Kidney Flange on back)	17-4 ss	7/16	17-4 ss	-D8
Cleaning and Preparation - Not Available w/Gold-Plated Sensor, Structure 2G (h)				
Unit Degreased - for Silicone Filled Sensors Only (Not for Oxygen/Chlorine/Other Fluids that may react with Silicone)				-X1
Cleaned and Prepared for Oxygen Service - for Inert Filled Sensors Only (Not available with Carbon Steel Covers or with Silicone Filled Sensors)				-X2
Cleaned and Prepared for Chlorine Service - for Inert Filled Sensors Only (i) (Not available with Carbon Steel Covers or with Silicone Filled Sensors)				-X3
Bolting for Process Covers/Connectors (j)				
316 ss Bolts and Nuts (Pressure Derated) (f)				-B1
17-4 ss Bolts and Nuts (i)				-B2
B7M Bolts and Nuts (NACE)(Pressure Derated) (f)				-B3
Conduit Thread Adapters				
Hawke-Type 1/2 NPT Cable Gland for use with Conduit Connection Codes 1 and 3 (k)				-A1
Plastic PG 13.5 Cable Gland for use with Conduit Connection Codes 2 and 4 (l)				-A2
M20 Connector for use with Conduit Connection Codes 1 and 3 (k)				-A3
Brass PG 13.5 Cable Gland (Trumpet-Shaped) for use with Conduit Connection Codes 2 and 4 (l)				-A4
Electronics Housing Features				
External Zero Adjustment				-Z1
Custody Transfer Lock and Seal				-Z2
External Zero Adjustment and Custody Transfer Lock and Seal				-Z3
Custom Factory Configuration				
Full Factory Configuration (Requires Configuration Form to be filled out)				-C2
Tubing Connectors - Specify Only One (Only 316 ss process covers; no side vents on cover) (h)				
Steel, Connecting 6 mm Tubing to 1/4 NPT Process Connector				-E1
Steel, Connecting 12 mm Tubing to 1/2 NPT Process Connector				-E2
316 ss, Connecting 6 mm Tubing to 1/4 NPT Process Connector				-E3
316 ss, Connecting 12 mm Tubing to 1/2 NPT Process Connector				-E4
Gaskets				
Gasket for Vacuum Service with Pressure Seals (m)				-G1

Model Code continued on next page

MODEL CODES (CONT.)

AP20 and IGP20 Transmitters (Cont.)

Description (Cont.)	Model
Optional Selections (Cont.)	
SIL2 Transmitters	
SIL2-Certified Transmitter	-S2
Instruction Books (Common MI, Brochure, and Full Documentation Set on CD-ROM is Standard)	
Without Instruction Book and CD - Only "Getting Started" Brochure is supplied	-K1
Miscellaneous Optional Selections	
Low Temperature Operative Limit of Electronics Housing Extended Down to -50°C (-58°F) Not available with sensors and seals with Inert fill, Structure Codes 78 and 79, or DIN Options -D2, -D4, -D6, and -D8	-J
Vent Screw in side of Process Cover (with 316 ss process covers only) Not available with seals, DIN construction options, or Structure Codes 78 and 79	-V (h)
Supplemental Customer Tag (Stainless Steel Tag wired onto Transmitter)	-T
Examples: IGP20-T20B21F-M1Z2; IAP20-TS3C11F-T	

(a) Maximum overrange pressure is 2.1 MPa (300 psi); temperature limits are -7 and +82°C (20 and 180°F).

(b) Transmitter and Pressure Seal Model Codes are both required. See PSS 2A-1Z11 A for the various pressure seal model codes.

(c) Remote Seal Models that may be specified are PSFPS, PSFES, PSFAR, PSTAR, PSISR, PSSCR, and PSSSR.

(d) Span Limit Code A is not available with pressure seals (Structure Codes F1, F2, S3, S4, SC, SD).

(e) Span Limit Codes E and F not available with Structure Codes 78 and 79 (pvdf insert in HI Side Cover).

(f) Pressure derated. See derating table in specifications section.

(g) Temperature limits derated to 0 and 60°C (32 and 140°F). Also Mounting Sets -M1 and -M2 not available.

(h) Not available when Remote Mount or Direct Connect Pressure Seals are specified.

(i) When -X3 is specified, the standard bolting is replaced with 17-4 ss bolts and nuts. Therefore, there is no need to specify Option -B2 when selecting the Chlorine Service Option -X3.

(j) Not available with DIN construction options. For stainless steel bolts with DIN construction, specify -D5 to -D8, as required.

(k) Available with Electrical Safety Codes E, D, M, and N only.

(l) Available with Electrical Safety Code E only.

(m) Standard offering with IAP20 Transmitters with pressure seals. However, -G1 is a required option with IGP20 Transmitters when pressure seal (Structure Codes S3, S4, F1, F2, SC, and SD) will be used in vacuum applications. This option substitutes vacuum service metal gasket for standard ptfe process cover gasket.

(n) A cover lock is provided as standard with Electrical Safety Codes D, B, G, and M.

(p) For multi-marking details, see Electrical Safety Specifications section.

SUGGESTED RFQ SPECIFICATIONS

The manufacturer shall provide direct connected or bracket mounted pressure transmitters featuring remote digital communications capability for measuring absolute or gauge pressure and transmitting a 4 to 20 mA output with a superimposed HART digital signal for use in a standard two-wire dc supply voltage system. These transmitters shall also be provided (as required) with direct connect pressure seals, or remote mount capillary connected pressure seals. The specifications for these transmitters are as follows:

Communication Protocol:	HART, 4 to 20 mA dc, and digital output signal.
Remote Communications:	Must not interfere with output.
Accuracy:	Digital Output: ±0.050% of calibrated span. 4 to 20 mA Output: ±0.060% of calibrated span.
RFI Protection:	0.1% error between 27 and 1000 MHz at 30 V/m field intensity
Proof Pressure:	120, 1200, 11 500, or 22 000 psi for direct connected transmitters; 27 250 psi for bracket mounted transmitters, as specified.
Span Limits:	From 1 to 6000 psi for standard direct connected transmitters; and from 0.5 inH_2O to 5000 psi for standard bracket mounted transmitters, as specified; or SI and Metric equivalents.
Electronics Housing:	IEC IP66 (NEMA 4X); 316 ss or aluminum housing with Epoxy finish; two compartments (field wiring and electronics); housing sealed with O-rings for double protection against moisture or other contaminants.
Modular Electronics:	Easily replaceable modular electronics; optional integral LCD Digital Indicator with on-board configuration pushbuttons.
Mounting:	Direct to process or bracket mounted to pipe or surface.
Process Connection:	IAP10/IGP10 Transmitters: Direct to process piping or pressure seal with 1/2 NPT; optional Rc 1/2 or G 1/2 B external threads to process piping. Internal 1/4 NPT thread also provided as plumbing connection to process; or prepared for a direct connect seal or capillary connected seal. IAP20/IGP20 Transmitters: Used with process connectors to accept 1/4 NPT, 1/2 NPT, Rc 1/4, Rc 1/2, Schedule 80 welding neck; or a pvdf insert (tapped for 1/2 NPT) in HI side process cover is used as process connection. Process connection can also be prepared to accept a direct connect seal; or prepared for a remote capillary connected seal.
Process Cover Materials Available:	Applicable to IAP20/IGP20 transmitters only. Industry Standard 316 ss, Carbon Steel, Monel, and Nickel alloy.
Sensor Materials:	Co-Ni-Cr, 316L ss, and Nickel alloy for IAP10/IGP10 transmitters; and Co-Ni-Cr, 316L ss, Nickel alloy, Monel, Tantalum, and Gold-Plated 316L ss for IAP20/IGP20 transmitters.
Electrical Classification:	Nonincendive for Class I and Class II, Division 2 locations; intrinsically safe or explosionproof for Class I and Class II, Division 1 locations. Versions available to meet Agency flameproof and zone requirements; comply with applicable European Union Directives.

SUGGESTED RFQ SPECIFICATIONS (CONT.)

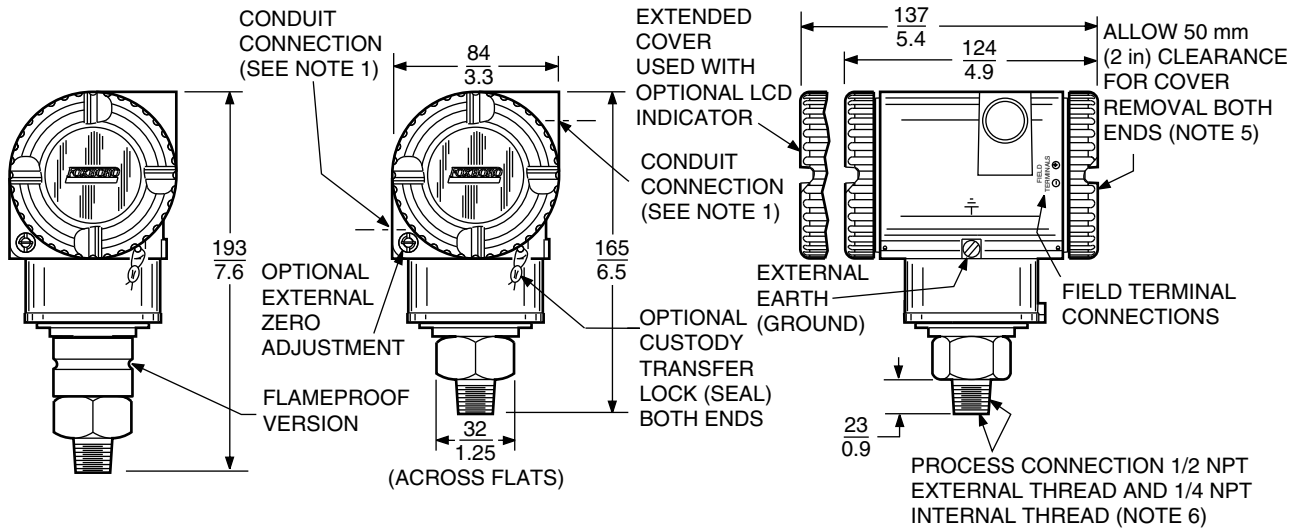
Approximate Mass: Direct Connected Transmitter:1.5 kg (3.3 lb)
Bracket-Mounted Transmitter:3.5 kg (7.8 lb) w/o process connector
4.2 kg (9.2 lb) w/process connector
With 316 ss Electronics Housing:Add 1.1 kg (2.4 lb)
With Optional LCD Indicator:Add 0.2 kg (0.4 lb)
With Pressure Seals: See PSS 2A-1Z11 A

Model Code: I/A Series IGP10 or IAP10 Direct Connected Gauge or Absolute Pressure Transmitters; or IGP20 or IAP20 Bracket Mounted Gauge or Absolute Pressure Transmitters; all with HART Communication Protocol; with or without pressure seals; or equivalent.

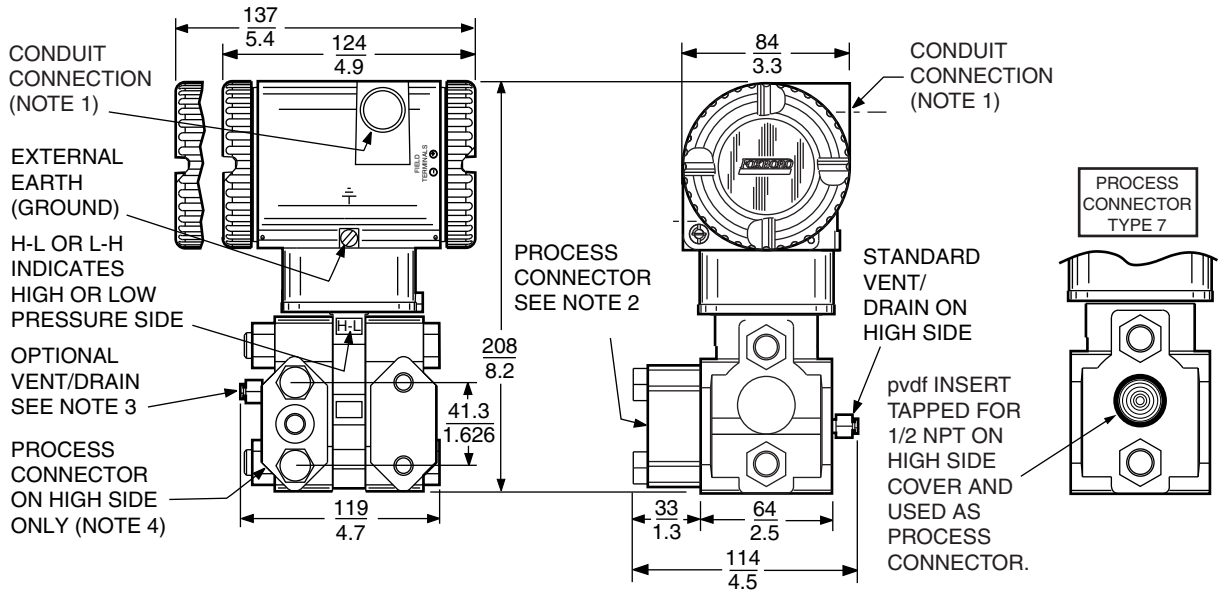
DIMENSIONS-NOMINAL

IAP10 AND IGP10 DIRECT CONNNECTED TRANSMITTERS

mm / in



IAP20 AND IGP20 BRACKET MOUNTED TRANSMITTERS



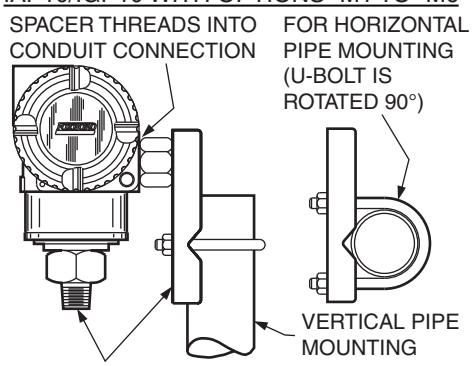
NOTES

1. CONDUIT CONNECTION 1/2 NPT, PG 13.5, OR M20, BOTH SIDES : PLUG UNUSED CONNECTION WITH METAL PLUG (SUPPLIED).
2. PROCESS CONNECTOR CAN BE REMOVED AND CONNECTION MADE DIRECTLY TO PROCESS COVER USING 1/4 NPT INTERNAL THREAD IN PROCESS COVER. NOTE THAT WITH PROCESS CONNECTION CODE "0", THERE IS NO CONNECTOR.
3. PROCESS COVER CAN BE INVERTED MAKING OPTIONAL SIDE VENT A SIDE DRAIN.
4. FOR USERS WHO DESIRE THE PROCESS CONNECTOR ON THE RIGHT SIDE, MERELY ROTATE TRANSMITTER 180˚ AND RELOCATE PROCESS CONNECTOR SHOWN TO THE RIGHT SIDE.
5. TOPWORKS ROTATABLE TO ANY POSITION WITHIN ONE TURN COUNTERCLOCKWISE OF FULLY TIGHTENED POSITION.
6. DO NOT USE THE 1/4 NPT INTERNAL THREAD TO DIRECT-CONNECT THE TRANSMITTER.

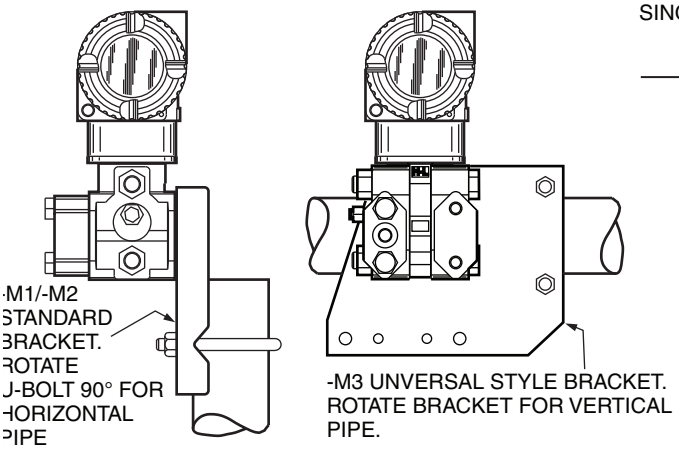
DIMENSIONS-NOMINAL (CONT.)

mm
in

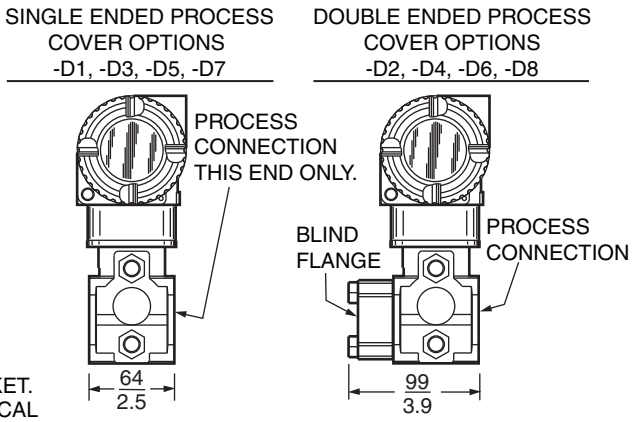
IAP10/IGP10 WITH OPTIONS -M1 TO -M6



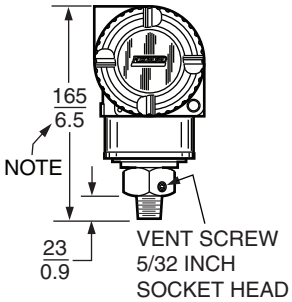
IAP20/IGP20 WITH OPTIONS -M1, -M2, AND -M3



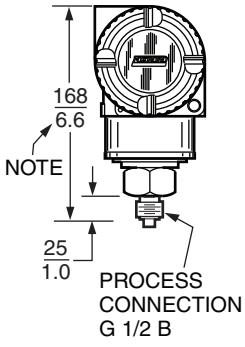
IAP20/IGP20 WITH DIN CONSTRUCTION OPTIONS



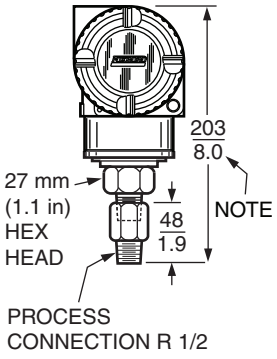
IAP10/IGP10 OPTION -V1



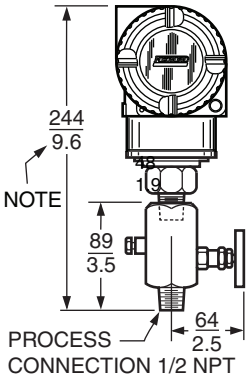
IAP10/IGP10 OPTION -G



IAP10/IGP10 OPTION -R



IAP10/IGP10 -V2, -V3, -V4



NOTES

1. FOR FLAMEPROOF TRANSMITTERS, ADD 28 mm (1.1in) TO OVERALL HEIGHT DIMENSION.
2. REFER TO DIMENSIONAL PRINT DP 020-447 FOR FURTHER INFORMATION.

ORDERING INSTRUCTIONS

1. Model Number(s) as follows:
   - Transmitter only if pressure seals are not selected
   - Both transmitter and pressure seal if pressure seal is selected. See PSS 2A-1Z11 A.
2. Calibrated Pressure Range (using Allowable Pressure Units from the table below).

inH_2O	inHg	kPa	mbar	kg/cm^2
ftH_2O	mmHg	MPa	bar	psi
mmH_2O	Pa	torr	g/cm^2	atm
mH_2O	–	–	–	–

(a) Absolute or gauge pressure units, as applicable. The suffix (a) is added to the unit to indicate absolute pressure; e.g., psia, MPaa.

3. Configuration Data Form when Factory Calibration Option -C2 is specified.
4. If Option -S2 (SIL-Certified HART Transmitter) is selected, a copy of the certification can be provided by specifying AS Code CERT-L.
5. Options and Accessories not in Model Code (see PSS 2A-1Z9 E).
6. User Tag Data - Data Plate; 32 characters maximum. For additional tag data, specify Optional Supplemental Tag -T.
7. User Tag Data - Software (Database); 8 characters maximum (user configured).

OTHER M&I PRODUCTS

Invensys provides a broad range of measurement and instrument products, including solutions for pressure, flow, analytical, positioners, temperature, controlling and recording. For a listing of these offerings, visit the Invensys Operations Management website at:

www.iom.invensys.com

Invensys Operations Management
5601 Granite Parkway Suite 1000
Plano, TX 75024
United States of America
http://iom.invensys.com

Global Customer Support
Inside U.S.: 1-866-746-6477
Outside U.S.: 1-508-549-2424 or contact your local Invensys representative.
Website: http://support.ips.invensys.com

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MB 010 0811

invensys
Foxboro®

PSS 2A-1F4 A

I/A Series® Intelligent Temperature Transmitter Model RTT20 Transmitter with Analog 4 to 20 mA Output or HART Communication Protocol

The Model RTT20 Intelligent Temperature Transmitter receives input signals from RTDs, thermocouples, ohms sensors, or dc mV sources. It transmits a 4 to 20 mA output (with no remote communications), a smart version with HART communications, or an intelligent version with software selectable 4 to 20 mA. Remote communication and database configuration is provided by a hand-held communicator, a PC-based configurator, or an I/A Series System.

- 4 to 20 mA, HART
- Field-proven microprocessor-based transmitter
- Superior Accuracy
- Long-Term Stability
- Multiple Packaging Configurations offered, including Pipe or Surface Mounting, DIN Rail Mounting, Integral Bare Sensor, and Integral Sensor with Thermowell
- One Unit Configurable for all T/C, RTD, mV, Ohm, and Dew Point Inputs. Custom Inputs can also be accommodated.
- Available as a Basic Unit, or in Aluminum or 316 ss Enclosure. Enclosure is Explosionproof and meets NEMA Type 4X and IEC IP65.
- Automatic Self-Diagnostics and Self-Calibration
- Configurable Failsafe Value
- Optional Three-Line Integral, Plug-in LCD Indicator/Configurator
- Wide Selection of Thermowell Configurations
- RFI, Voltage Surge, and Reverse Polarity Protection
- Conforms to Applicable European Union Directives (Product marked with “CE” Logo)
- NAMUR Compliant Failure Current
- Transmitter complies with EMC (ElectroMagnetic Compatibility) Directives
- Approved/Certified by many Testing Agencies for Hazardous Area Installations
- Standard 2-Year Warranty

GENERAL DESCRIPTION

The RTT20 provides a wide range of packaging, sensor types, and options along with three choices of output signals, 4 to 20 mA, smart HART, and Intelligent, making this transmitter suitable for virtually all temperature measurement applications. The microprocessor-based electronics eliminates ambient temperature effects and results in high accuracy, repeatability and linearization of the sensor signal. Ease of mounting and installation makes these transmitters an extremely attractive offering.

INTELLIGENT TRANSMITTER FAMILY

The RTT20 Temperature Transmitter is designed for single measurements, but can be configured for dual 2-wire RTDs. However, for dual thermocouples, or dual 3- or 4-wire RTDs, the Model RTT25 is the correct choice. The Model RTT25 Temperature Transmitter is available with FOUNDATION Fieldbus Communication Protocol (refer to PSS 2A-1F4 C).

EFFICIENT AND DURABLE

Industrial-grade integrated circuits and sealed electronics combine to make this microprocessor-based transmitter an efficient and durable device.

MULTIPLE PACKAGING CONFIGURATIONS

The transmitter (Figure 1) is suitable for use in a variety of applications. Transmitters with integrally mounted sensor have an environmentally protected enclosure and are mounted directly to the process. Surface- and pipe-mounted configurations allow the transmitter to be mounted remotely from the process. The transmitter is also available with DIN-mounting hardware, and as a basic transmitter package. Built-in protection from vibration and radio frequency interference (RFI) are also provided.

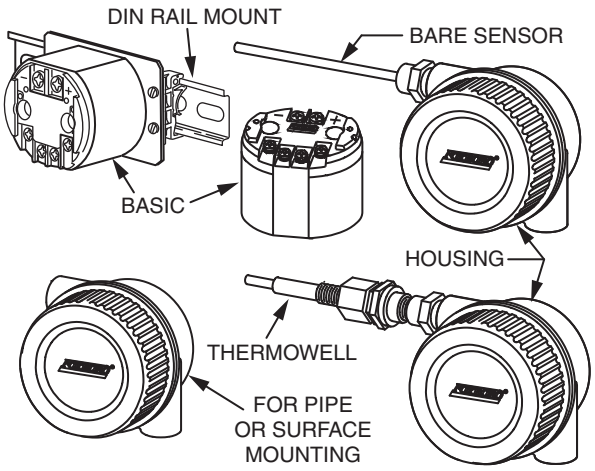


Figure 1. Multiple Packaging Configurations

REMOTE COMMUNICATIONS

This high-performance temperature transmitter can be ordered with or without remote communications, making it ideal for use in new process applications and for upgrading existing applications. Remote communication is available with HART communication protocol.

INPUT TYPES

This RTT20 Intelligent Temperature Transmitter can be used with a wide variety of temperature sensors, including two, three, and four-wire RTDs, all popular thermocouples, and other resistance and millivolt input devices. The following is a general list of transmitter input types:

- Platinum RTDs
- Nickel RTDs
- Copper RTDs
- Differential RTDs
- Thermocouples
- Millivolts
- Ohms
- Dew Point
- Custom

OUTPUT TYPES AND REMOTE CONFIGURATION

The transmitter provides a 4 to 20 mA or digital output linear with temperature (°F, °C, K, or °R), linear with input (mV, ohms, or mA), or linear with Dew Point. The internal, or an external Cold Junction (CJ) sensor automatically compensates thermocouple measurements. When configured with HART output, four HART outputs can be provided to the host control system. The HART output can be configured for Burst Mode or Multidrop operation. The transmitter can be locally or remotely reconfigured as follows:

- 4 to 20 mA: Local configuration via optional integral three-line LCD Indicator/Configurator. No remote communications.
- 4 to 20 mA with HART Communication Protocol: Local configuration via optional integral three-line LCD Indicator/Configurator. Remote configuration using HART Communicator or Foxboro PC-based Configurator.

LCD INDICATOR/CONFIGURATOR OPTION

This versatile three-line Indicator plugs into the top of the transmitter (see Figure 2) and provides the following features:

- Local Configuration – Indicator has two pushbuttons to rerange or reconfigure the transmitter database without using a separate configurator. Menu messages are configurable in English, French, German, or Spanish.
- Highly Accurate – Indicator is microprocessor driven, thereby eliminating any D/A conversion error caused by the 4 to 20 mA output signal.
- Non-Interactive – Transmitter output is unaffected whether inserting or removing the indicator, reading parameters, or downloading data; or by indicator failure.
- Portable – A single indicator can be used for multiple transmitters. No tools are required to install or remove it. Simply plug it in, make desired readings and/or adjustments to the transmitter, unplug the indicator, and install it in the next transmitter.
- One Indicator – The same indicator is used regardless of transmitter output.
- Custody Transfer/Security – Provided for HART version, the pushbuttons can be disabled via the remote configurators.
- Highly Visible Measurement Display – Top line of this 3-Line Indicator has six 8 mm (0.31 in) high digits. The indicator displays negative values with a minus sign.
- Innovative 3-Line Indicator – The second line of this indicator is an eleven-segment bargraph that displays readings in percent of calibrated range. Temperatures outside the calibrated range are indicated by a left-pointing (underrange) or right-pointing (overrange) arrow. The third line displays a user-configurable tag number on a 6 mm (0.25 in) high, seven-character, alphanumeric display. This line also automatically displays the following fault messages:
  - FAILSAFE – transmitter or sensor failure
  - D FAIL (Display FAIL) – temperature exceeds the limit of the display
- Configurable Display – The top line of the Indicator displays the output in any one of five different ways:
  - Engineering Units (EGU)
  - mA, or mA and EGU
  - %, or % and EGU

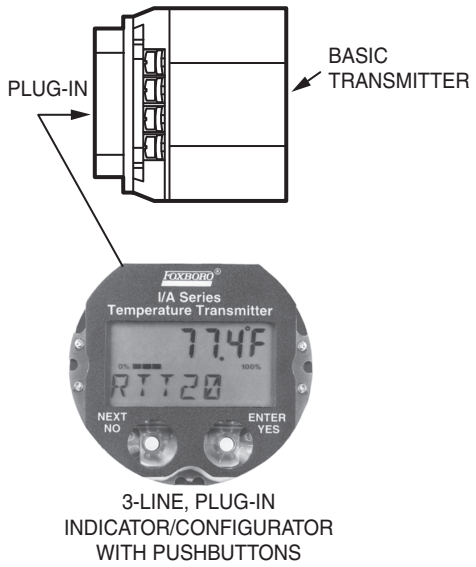


Figure 2. LCD Indicator/Configurator Option

AUTOMATIC SELF-CALIBRATION

This transmitter has an advanced automatic self-calibration routine that greatly extends the time between recalibrations. Every three seconds, the transmitter checks the zero and full scale output against highly accurate and stable internal voltage signals that are referenced back to the factory calibration stored in non-volatile EEPROM memory. Any necessary adjustments are made automatically without interrupting the output signal.

NAMUR COMPLIANT FAILURE CURRENT

The transmitter's current output is linear between 3.8 to 20.75 mA. But the failsafe current is adjustable between 3.6 to 3.8 mA for a failsafe-low condition, or from 20.75 to 23 mA for a failsafe-high condition. By having the failsafe current different from the out-of-range current, determining whether the transmitter is in a failsafe condition, or just the process temperature is beyond the calibrated range, is quick and easy without the use of a configurator tool.

INSTALLATION ASSISTANT

Let Invensys be your Installation Assistant. When you order a transmitter with an integral sensor and thermowell, everything is assembled, tagged, wired, calibrated, and configured to your specifications. Just open the shipping container and install. This feature is ordered by specifying Model Code Package Configuration Code "L" or "M," along with Option "-D2." See Figure 3.

REAL WORLD PERFORMANCE

The transmitter nonvolatile memory stores many coefficients to eliminate errors. Every transmitter is factory tested from -40 to +85°C (-40 to +185°F) ambient temperature, and the error coefficients, along with the curves for all sensor types, are stored in the nonvolatile memory. Therefore, the accuracy specification is applicable merely by choosing the sensor type and calibrated range, without the need for any calibration equipment. In addition, the internal cold junction sensor not only compensates for a thermocouple measurement, but its temperature is used to compensate any ambient temperature error, no matter what sensor type is selected.

FAILSAFE MODE

Transmitter failsafe operation is user-configurable as either ON or OFF. The failsafe output is user configurable for any value between 3.60 and 3.80 mA (downscale failsafe) or 20.75 and 23.00 mA (upscale failsafe). Every three seconds, the transmitter checks for open or shorted sensor leads and for internal transmitter faults. If two successive faults are reported while failsafe is ON, the transmitter output will default to the configured failsafe value.

The transmitter underrange and overrange currents have been set to 3.80 and 20.75 mA, respectively, which are inside the failsafe value. This makes troubleshooting quick and easy because the mA failsafe current will be different than an out-of-range condition.

With HART communication, the transmitter reset mode is also user-configurable. When configured for AUTO reset, the transmitter automatically returns to normal operation after the fault has been eliminated. With LATCHED reset, transmitter power must be turned off, then back on to return to normal operation.

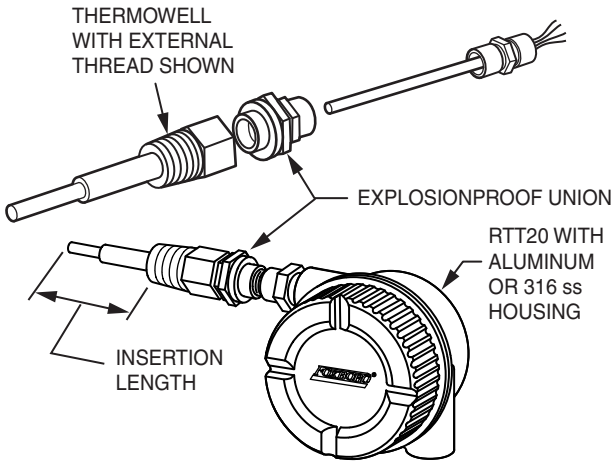


Figure 3. RTT20 with Integral Sensor with Thermowell

CONFIGURATION STORAGE

All configurable parameters are stored in nonvolatile EEPROM memory and retained when power is removed from the transmitter. The transmitter is ready for immediate use when repowered.

Configured data from the Intelligent version can also be stored offline in a Hand-Held Terminal Memory Pak, on a floppy disk (using PC-based configurator software), or in an I/A Series system allowing other transmitters to be easily cloned or configured. This data can be factory-customized by ordering Option Code “-C2”. It can also be supplied on a floppy disk by ordering Option Code “-C3”.

INTELLIGENT SMOOTHING

Innovative Intelligent Smoothing automatically eliminates noise while maintaining fast response to rapid input changes. It provides a highly accurate and smooth output signal without the need for excessive damping. A digital filtering algorithm (signal conditioner) is active over a band of input fluctuations. Any noise (process or electrical) is eliminated while the conditioned signal reacts immediately to any input change that exceeds the smoothing band. This allows the transmitter to be used in a wide variety of electrically noisy installations.

When there is a rapid signal change, the smoothing band is immediately exceeded, and the output of the signal conditioner uses this change as the basis for the output signal. As long as the input fluctuates or moves at a rate that is outside the smoothing band, the output instantly tracks the input signal. Once the input settles at a new value, the filtering algorithm is automatically reactivated, eliminating noise and producing an accurate and stable output.

OPERATING, STORAGE, AND TRANSPORTATION CONDITIONS

Influence	Reference Operating Conditions	Operative Limits	Storage and Transportation Limits
Ambient Temperature Without Integral Display With Integral Display	24 ±2°C (75 ±3°F) 24 ±2°C (75 ±3°F)	-40 and +85°C (a) (-40 and +185°F) (a) -29 and +70°C (a) (-20 and +158°F) (a)	-54 and +85°C (-65 and +185°F) -54 and +85°C 65 and +185°F)
Relative Humidity	50 ±10%	0 and 100% (noncondensing)	0 and 100% (noncondensing)
Supply Voltage	30 ±0.5 V dc	12 and 42 V dc	Not Applicable
Vibration	Negligible	19 mm (0.75 in) Double Amplitude from 5 to 9 Hz 0 to 30 m/s^2 (0 to 3 “g”)(b) from 9 to 500 Hz	107 mm (42 in) Drop in Shipping Container

PERFORMANCE SPECIFICATIONS
(UNDER REFERENCE OPERATING CONDITIONS UNLESS OTHERWISE SPECIFIED)

Accuracy
Refer to Table 1. The accuracy specification is applicable merely by choosing a sensor type and calibrated range without the need for any calibration equipment.

Repeatability and Linearity
Included in accuracy.

Long-Term Stability
DIGITAL OUTPUT:
< 0.05% of input reading (mV or Ω) per year
4 to 20 mA OUTPUT:
Digital Stability plus 0.043% of span per year.

Vibration Effect
< 0.05% at 30 m/s^2 (3 g)

Ambient Temperature Effect
Error is less than 1/2 the reference accuracy plus 0.1°C per 28°C (50°F)

Relative Humidity Effect
< 0.01% of calibrated span from 0 to 100% RH, noncondensing.

Mounting Position Effect
None

Supply Voltage Effect
DIGITAL OUTPUT: None
4 to 20 mA OUTPUT: ≤ 0.005% per volt

Output Load Effect
DIGITAL OUTPUT: None
4 to 20 mA OUTPUT: ≤ 0.005% per volt

PHYSICAL SPECIFICATIONS

Basic Transmitter (Package Code B)
Enclosed in polycarbonate material

Enclosure Construction
HOUSING (Package Codes S, W, L):
Epoxy-coated, low-copper aluminum
HOUSING (Package Codes T, Y, M):
316 ss (CF-8M/UNS-J92900)
HOUSING COVER O-RING
UV Stabilized Buna-N

Union Coupling for Thermowell Mount
- Zinc-Plated Steel for Foxboro Code “L” housing, or with user-supplied thermowell option “-D5” (Codes “L” or “M” housing). See Model Code.
- Stainless Steel for Foxboro Code “M” housing, or with Option “-H2”. See Model Code.

Environmental Protection
Housing: NEMA Type 4X, IP65

Mounting Options

Option	Code	Bracket	Hardware
Mounting Set	-M1	Epoxy-Coated Steel	Plated Steel
	-M2	Stainless Steel	Stainless Steel
DIN Rail	-D1	Aluminum and Plastic	Plated Steel

Approximate Transmitter Mass
BASIC: 0.13 kg (0.28 lb)
SURFACE MOUNT (Aluminum): 1.47 kg (3.25 lb)
SURFACE MOUNT (316 ss): 3.25 kg (7.25 lb)
WITH 1-LINE INDICATOR: Add 0.02 kg (0.05 lb)
WITH 3-LINE INDICATOR: Add 0.06 kg (0.13 lb)

FUNCTIONAL SPECIFICATIONS

Input Types and Range Limits
See Table 1 and Table 2.

Input Impedance (in mV Input Mode)
>10 MΩ

Span Limits
MINIMUM: 5°C (10°F)
MAXIMUM: See Table 1.

Engineering Units
The transmitter electronic database can be configured for ohms, mV, mA, °F, °C, K, or Dew Point.

Output Types
- 4 to 20 mA
- Smart HART

Output
RANGING:
Zero and span adjustment are non-interacting.
FAILSAFE (User-Configurable):
Downscale: 3.6 to 3.8 mA
Upscale: 20.75 to 23.0 mA
UNDERRANGE CURRENT: 3.8 mA
OVERRANGE CURRENT: 20.75 mA
ACTION: Direct or Reverse

Table 1. Range Limits, Maximum Span, and Accuracy[a]

Input Type	Model Code	See Note	Range Limits		Maximum Span		Digital Accuracy (b, q)	
			°C	°F	°C	°F	°C	°F
RTD (2, 3, or 4 wire)								
Pt100 DIN/IEC	Q	c	-200 and +850	-328 and +1562	1050	1890	±0.05	±0.09
Pt100 DIN/IEC	A	d	-200 and +850	-328 and +1562	1050	1890	±0.05	±0.09
Pt100 SAMA	P	e	-200 and +650	-328 and +1202	850	1530	±0.05	±0.09
Ni 200	D	f, n	-130 and +315	-202 and + 599	445	801	±0.44	±0.79
Ni 120, Minco	G	n	-80 and +320	-112 and + 608	400	720	±0.03	±0.05
Ni 100	I	g, n	-60 and +250	-76 and +482	310	558	±0.04	±0.07
Cu 10	F	h, n	-70 and +150	-94 and +302	220	396	±0.51	±0.92
Thermocouple								
Type B	B	k, r	0 and +1820	+32 and +3308	1820	3276	±0.51	±0.92
Type C	C	k, p	0 and +2320	+32 and +4208	2320	4176	±0.38	±0.68
Type E	E	k	-270 and +1000	-454 and +1832	1270	2286	±0.08	±0.14
Type J	J	k	-210 and +1200	-346 and +2129	1410	2538	±0.11	±0.20
Type K	K	k	-270 and +1372	-454 and +2502	1642	2956	±0.14	±0.25
Type L	L	m	-200 and +900	-328 and +1652	1100	1980	±0.13	±0.23
Type N	N	k	-270 and +1300	-454 and +2372	1570	2862	±0.15	±0.27
Type R	R	k	-50 and +1768	-58 and +3214	1818	3272	±0.42	±0.76
Type S	S	k	-50 and +1768	-58 and +3214	1818	3272	±0.49	±0.88
Type T	T	k	-270 and +400	-454 and +752	670	1206	±0.10	±0.18
Type U	U	m	-200 and +600	-328 and -1112	800	1440	±0.09	±0.16
Other								
Millivolt	M	–	-15 and +115 mV dc		130 mV dc		±6 µV	
Resistance	O	–	1 and 500 Ω		500 Ω		±20 mΩ	
Dew Point	W	n	-45 and +60°C (-50 and +140°F)		105°C (190°F)		±0.05°C (0.09°F)	
Custom	Z	n	2- to 22-point user-configurable curve					

(a) For 4 to 20 mA output accuracy, add ±0.05% of span to digital accuracy.

(b) Digital accuracy is either the listed value or ±0.01% of span, whichever is greater. For thermocouples only, add the applicable cold junction error to digital accuracy:
Integral: ±0.2°C (±0.5°F)
Remote: Depends on accuracy of remote sensor.

(c) IEC/DIN 751; alpha = 0.00385 (1984) ASTM-B Standard Accuracy.
(d) IEC/DIN 751; alpha = 0.00385 (1984) ASTM-A High Accuracy
(e) SAMA Standard RC 21-4; alpha = 0.003923.
(f) Foxboro NR 226/227. Refer to TI 005-24a.
(g) DIN 43760.
(h) Foxboro CR 228/229. Refer to TI 005-25a.
(k) NIST Monogram 125, DIN IEC 584.
(m) DIN 43710 (1985).
(n) Not accessible with optional LCD Indicator/Configurator.
(p) Tungsten 5% Rhenium-Tungsten 26%.
(q) Does not include sensor accuracy.
(r) May exhibit a decrease in performance at temperatures below 43°C (109°F).

Table 2. Input Types

Single Sensor Type	Analog, 4 to 20 mA Output Code "-I"	HART Output Code "-T"
T/C Type B, C, E, J, K, L, N, R, S, T, U	YES	YES
RTD (2, 3, or 4 wire) 100 ohm DIN or SAMA	YES	YES
RTD (2, 3, or 4 wire) 100, 120, or 200 ohm nickel	NO	YES
RTD (2, 3, or 4 wire) 10 ohm copper	NO	YES
Millivolt	YES	YES
Ohms (2, 3, or 4 wire)	YES	YES
Dew Point	NO	YES
2 to 22 Point Custom Curve	NO	YES

FUNCTIONAL SPECIFICATIONS (CONT.)

Supply Voltage Requirements and External Loop Load Limitations

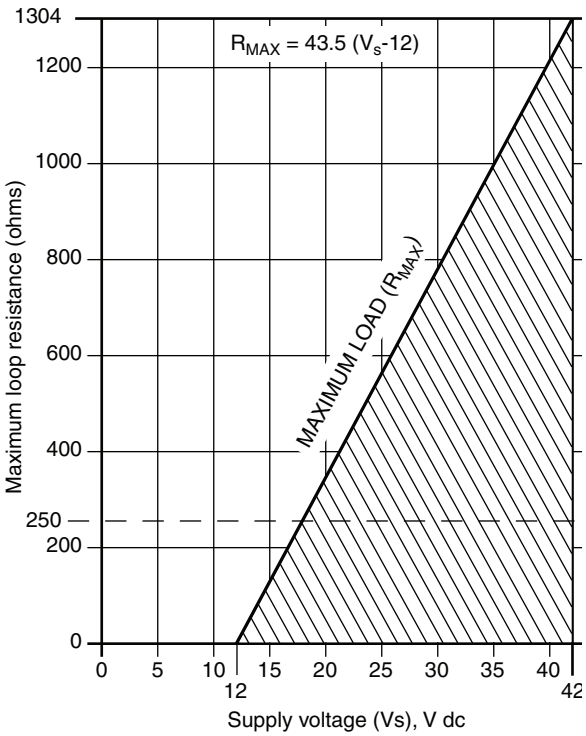


Figure 4. Supply Voltage vs. Output Load

NOTE (See Figure 4)

1. Minimum load with HART communicator or PC-Based Configurator connected is 250 Ω.
2. Connecting PC-based Configurator or HART Communicator while operating below the minimum specified load may cause communication problems.

Output Update Rate
4 to 20 mA: 6 times per second (all output versions)
HART DIGITAL: 2 times per second

Input Response Time
With minimum damping, the 90% response time for an 80% input step is 1.2 seconds.

Isolation
500 V ac, rms

RFI Protection
Susceptibility radiated
- In metal housing
  30 V/m Peak; 26-1000 MHz; 80% A @ 1k Hz
  30 V/m Peak; 900 MHz; 50% duty cycle;
  200 Hz repetition rate
- basic transmitter
  10 V/m Peak; 26-1000 MHz; 80% A @ 1k Hz
  10 V/m Peak; 900 MHz; 50% duty cycle;
  200 Hz repetition rate

Two-Wire Transmitter
The same two wires are used for input power, output signal, and remote communication.

Turn On Time
TWO-WIRE SENSOR: 3.5 seconds
THREE- AND FOUR-WIRE SENSORS: 7 seconds

Minimum Power Supply Current
35 mA

Electronic Damping
4 to 20 mA VERSION:
1.2 seconds
HART VERSION:
Damping is set as a floating decimal point value between 0 and 32 seconds.

Tagging - Hardware and Software
The permanently embossed stainless steel data plate and the transmitter electronic tag number are factory configured, at no charge, using the customer supplied tagging information.

Configurators
4 TO 20 mA VERSION CODE -I:
All configurable parameters can only be changed using the optional one-line or three-line indicator/configurators (Option Code -L1 or -L3).

HART VERSION CODE -T:
All parameters are configurable via the HART Communicator or the Foxboro PC-Based Configurator. The integral indicator/configurators (Option -L3) can also be used to reconfigure the common parameters. Refer to MI 020-461 for details on the optional indicator/configurator.

Configurable Parameters (by the User)

DESCRIPTORS

- Tag Number
- Tag Name
- Location
- Device Name
- Message

OUTPUT

- Output Type
- Engineering Units (EGU)(1)
- Burst Mode (HART Only)
- Linearization Mode

INPUT

- Input Type (Refer to Table 2)(1)
- Lower Range Value (LRV)(1)
- Upper Range Value (URV)(1)
- Cold Junction
- Cold Junction EGU

OTHER

- Sensor Fault Detection (On/Off)(1)
- Failsafe (On/Off)(1)
- Failsafe direction (Upscale/Downscale)(1)
- Failsafe Value
- Failsafe Reset (Auto/Locked) (HART Only)
- Power Supply Frequency (50/60 Hz)
- Power Supply Filter (Standard/High)
- Damping
- Sensor Validation
- Intelligent Smoothing Time
- Calibrator's Initials
- mA Output Calibration(1)

INTEGRAL LCD INDICATOR/CONFIGURATOR

- Pushbuttons (Enable/Disable)
- Language(1)
- Output Display Units (EGU, %, mA, Alternating EGU/mA, or Alternating %/mA)

RTT20 Transmitter Functional Block Diagram

Refer to Figure 5.

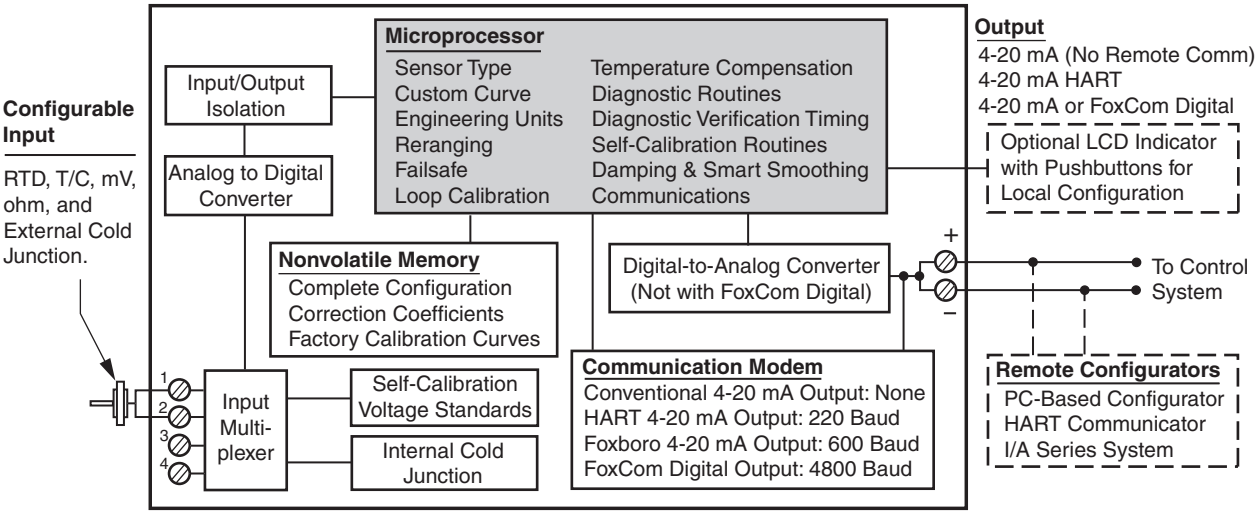


Figure 5. RTT20 Transmitter Functional Block Diagram

(1) Accessible with the Optional LCD Indicator/Configurator.

ELECTRICAL SAFETY SPECIFICATIONS

Testing Laboratory, Type of Protection, and Area Classification	With Package Config. Codes	Application Conditions	Electrical Safety Design Code
ATEX (FM) flameproof, II 1/2 G, Ex d, IIC.	S, T, L, M	Temperature Class T6. Ta = -40 to +70°C	ED
ATEX (FM) flameproof, II 2 G, Ex d, IIC.	W, Y	Temperature Class T6. Ta = -40 to +70°C	
ATEX (FM) flameproof, II 2 D.	S, T, L, M, W, Y	T85°C, Ta = -40 to 70°C maximum ambient.	
CENELEC (KEMA) intrinsically safe EEx ia, IIC, Zone 0.	All	Temperature Class T4 - T6.	EA
CENELEC (KEMA) Nonsparking/nonincendive, Ex N IIC	All	Temperature Class T4 - T6.	KN
CSA intrinsically safe, Class I, Division 1, Groups A, B, C, and D.	B	Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.	CA
CSA intrinsically safe, Class I, Division 1, Groups A, B, C, and D; dust-ignitionproof, Class II, Division 1, Groups E, F, and G; and Class III, Division 1.	S, T, L, M, W, Y	Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.	
CSA Class I, Division 2, Groups A, B, C, and D.		Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.	
CSA explosionproof, Class I, Division 1, Groups B, C, and D; dust-ignitionproof, Class II, Division 1, Groups E, F, and G: and Class III, Division 1.	S, T, L, M, W, Y	Connect to source not exceeding 42 V. Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.	CD (a)
CSA Class I, Division 2, Groups A, B, C, and D.		Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.	
CSA Class I, Division 2, Groups A, B, C, and D.	All	Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.	CN
FM intrinsically safe, Class I, Division 1, Groups A, B, C, and D.	B	Temperature Class T6; T4 at 85°C maximum ambient.	FA
FM intrinsically safe, Class I, Division 1, Groups A, B, C, and D; dust-ignitionproof, Class II, Division 1, Groups E, F, and G; and Class III, Division 1.	S, T, L, M, W, Y	Temperature Class T6; T4 at 85°C maximum ambient.	
FM nonincendive, Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2.		Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.	
FM explosionproof, Class I, Division 1, Groups B, C, and D: dust-ignitionproof, Class II, Division 1, Groups E, F, and G; and Class III, Division 1.	S, T, L, M, W, Y	Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.	FD (a)
FM nonincendive, Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2.		Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.	
FM nonincendive, Class I, Division 2, Groups A, B, C, and D.	B	Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.	FN
FM nonincendive, Class I, Division 2, Groups A, B, C, and D; Class II, Division 2, Groups F and G; and Class III, Division 2.	S, T, L, M, W, Y	Temperature Class T4 at 85°C and T6 at 40°C maximum ambient.	
IECEx flameproof, Ex d IIC.	S, T, L, M, W, Y	Temperature Class T6 at 70°C.	VV

(a) FM approval and CSA certification of the Model RTT20 for the explosionproof rating listed above included pressure piling tests with various lengths of conduit to ensure that conduit seals per NEC 501-5(a)1 within 457 mm (18 inches) of the housing are not required.

MODEL CODES

Model Code - Basic Unit Transmitter - Remote Sensors not provided with these Transmitters

Description	**Model**
I/A Series Intelligent Temperature Transmitter	RTT20
Output Signal and Communication Protocol	
4 to 20 mA only; no Remote Communication (a)	–I
4 to 20 mA with HART Communication (b)	–T
Input Configuration	
Single Input Channel	1
Package Configuration and Housing Material (Remote Mounted Sensor)	
Basic Unit (used for Panel Mount, DIN Rail, or Replacement)	B
Sensor Length	
None (Not Applicable to Transmitters with Remote Mounted Sensors)	N
Measurement Input Type (Software Selectable)	
None - Specified Factory Default to Code Q	X
Thermocouple, Type B, Platinum - 30% Rhodium vs. Platinum - 6% Rhodium	B
Thermocouple, Type C, Tungsten - 5% Rhenium vs. Tungsten - 26% Rhenium	C
Thermocouple, Type E, Nickel-Chromium vs. Copper-Nickel (Chromel-Constantan)	E
Thermocouple, Type J, Iron vs. Copper-Nickel (Iron-Constantan)	J
Thermocouple, Type K, Nickel-Chromium vs. Nickel-Aluminum (Chromel-Alumel)	K
Thermocouple, Type L, Iron vs. Copper-Nickel	L
Thermocouple, Type N, Nicrosil vs. Nisil (Nicrosil-Nisil)	N
Thermocouple, Type R, Platinum - 13% Rhodium vs. Platinum	R
Thermocouple, Type S, Platinum - 10% Rhodium vs. Platinum	S
Thermocouple, Type T, Copper vs. Copper-Nickel (Copper-Constantan)	T
Thermocouple, Type U, Copper vs. Copper-Low Nickel	U
RTD, Platinum, DIN, 100 Ω, IEC 751 (ASTM-B Standard Accuracy)	Q
RTD, Platinum, DIN, 100 Ω, IEC 751 (ASTM-A High Accuracy)	A
RTD, Platinum, 100 Ω, SAMA	P
RTD, Nickel, 200 Ω, Foxboro NR 226/227	D
RTD, Nickel, 120 Ω, Minco	G
RTD, Nickel, 100 Ω, DIN 43760	I
RTD, Copper, 10 Ω, Foxboro CR 228/229	F
Millivolt Input	M
Ohms Input	O
Dew Point Input	W
Custom Input	Z
Electrical Safety (Also see "Electrical Safety Specifications" section for further details)	
CSA, Intrinsically Safe	CA
CSA, Division 2	CN
CENELEC (KEMA) Intrinsically Safe	EA
FM, Intrinsically Safe and nonincendive	FA
FM, Nonincendive	FN
CENELEC (KEMA) nonsparking/nonincendive	KN
Optional Selections	
Refer to "Optional Selections" Codes further in document	

(a) With Output Code "-I", transmitter adjustment and output reconfiguration is possible only via an LCD Indicator/Configurator (Optional Selection "-L3") which is easily transportable between transmitters. Remote communication is not available.

(b) Remote configuration with HART Communicator, Foxboro PC-based Configurator, and/or Foxboro ABO991 software.

MODEL CODES (CONT.)

Model Code - Surface or Pipe Mount Transmitter - Remote Sensors not provided with these Transmitters

Description	**Model**
I/A Series Intelligent Temperature Transmitter	RTT20
Output Signal and Communication Protocol	
4 to 20 mA only; no Remote Communication (a)	–I
4 to 20 mA with HART Communication (b)	–T
Input Configuration	
Single Input Channel	1
Package Configuration and Housing Material (Remote Mounted Sensor)	
Surface or Pipe Mount, Aluminum Housing with 1/2 NPT Conduit Thread (Explosionproof)	S
Surface or Pipe Mount, 316 ss Housing with 1/2 NPT Conduit Thread (Explosionproof)	T
Sensor Length	
None (Not Applicable to Transmitters with Remote Mounted Sensors)	N
Measurement Input Type (Software Selectable)	
None - Specified Factory Default to Code Q	X
Thermocouple, Type B, Platinum - 30% Rhodium vs. Platinum - 6% Rhodium	B
Thermocouple, Type C, Tungsten - 5% Rhenium vs. Tungsten - 26% Rhenium	C
Thermocouple, Type E, Nickel-Chromium vs. Copper-Nickel (Chromel-Constantan)	E
Thermocouple, Type J, Iron vs. Copper-Nickel (Iron-Constantan)	J
Thermocouple, Type K, Nickel-Chromium vs. Nickel-Aluminum (Chromel-Alumel)	K
Thermocouple, Type L, Iron vs. Copper-Nickel	L
Thermocouple, Type N, Nicrosil vs. Nisil (Nicrosil-Nisil)	N
Thermocouple, Type R, Platinum - 13% Rhodium vs. Platinum	R
Thermocouple, Type S, Platinum - 10% Rhodium vs. Platinum	S
Thermocouple, Type T, Copper vs. Copper-Nickel (Copper-Constantan)	T
Thermocouple, Type U, Copper vs. Copper-Low Nickel	U
RTD, Platinum, DIN, 100 Ω, IEC 751 (ASTM-B Standard Accuracy)	Q
RTD, Platinum, DIN, 100 Ω, IEC 751 (ASTM-A High Accuracy)	A
RTD, Platinum, 100 Ω, SAMA	P
RTD, Nickel, 200 Ω, Foxboro NR 226/227	D
RTD, Nickel, 120 Ω, Minco	G
RTD, Nickel, 100 Ω, DIN 43760	I
RTD, Copper, 10 Ω, Foxboro CR 228/229	F
Millivolt Input	M
Ohms Input	O
Dew Point Input	W
Custom Input	Z
Electrical Safety (Also see "Electrical Safety Specifications" section for further details)	
CSA, Intrinsically Safe	CA
CSA, Explosionproof	CD
CSA, Division 2	CN
CENELEC (KEMA) Intrinsically Safe	EA
ATEX, flameproof	ED
FM, Intrinsically Safe and nonincendive	FA
FM, Explosionproof	FD
FM, Nonincendive	FN
CENELEC (KEMA) nonsparking/nonincendive	KN
IECEx flameproof, Ex D IIC	VV
Optional Selections	
Refer to "Optional Selections" Codes further in document	

(a) With Output Code "-I", transmitter adjustment and output reconfiguration is possible only via an LCD Indicator/Configurator (Optional Selection "-L3") which is easily transportable between transmitters. Remote communication is not available.

(b) Remote configuration with HART Communicator, Foxboro PC-based Configurator, and/or Foxboro ABO991 software.

MODEL CODES (CONT.)

Model Code - Transmitter with Integrally Mounted Bare Sensor

Description	**Model**
I/A Series Intelligent Temperature Transmitter	RTT20
Output Signal and Communication Protocol (a)	
4 to 20 mA only; no Remote Communication (a)	–I
4 to 20 mA with HART Communication (b)	–T
Input Configuration	
Single Input Channel	1
Package Configuration and Housing Material (Integrally Mounted Bare Sensor)	
Bare Sensor Mounted to Aluminum Housing; 1/2 NPT Conduit Threads (Explosionproof)	W
Bare Sensor Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)	Y
Sensor Length	
2 in (50 mm)	A
2.5 in (64 mm)	B
3 in (76 mm)	C
3.5 in (89 mm)	D
4 in (102 mm)	E
4.5 in (114 mm)	F
5 in (127 mm)	G
5.5 in (140 mm)	H
6 in (152 mm)	J
7 in (178 mm)	K
8 in (203 m)	L
9 in (229 mm)	M
10 in (254 mm)	P
11 in (279 mm)	Q
12 in (305 mm)	R
18 in (457 mm)	S
24 in (610 mm)	T
30 in (762 mm)	U
36 in (914 mm)	V
Custom Length per Sales Order – 120 in (3 m) maximum	X
Measurement Input Type (Software Selectable)	
Thermocouple, Type E	E
Thermocouple, Type J	J
Thermocouple, Type K	K
Thermocouple, Type T	T
RTD, Platinum, DIN, 100 Ω, IEC 751 (ASTM-B Standard Accuracy)	Q
RTD, Platinum, DIN, 100 Ω, IEC 751 (ASTM-A High Accuracy)	A
RTD, Platinum, 100 Ω, SAMA	P
Electrical Safety (Also see "Electrical Safety Specifications" Section for further details)	
CSA, Intrinsically Safe	CA
CSA, Explosionproof	CD
CSA, Division 2	CN
CENELEC (KEMA) Intrinsically Safe	EA
ATEX, flameproof	ED
FM, Intrinsically Safe, ia	FA
FM, Explosionproof, d	FD
FM, Nonincendive, n	FN
CENELEC (KEMA) nonsparking/nonincendive	KN
IECEx flameproof, Ex d IIC	VV
Optional Selections	
Refer to "Optional Selection" Codes further in document	

(a) With Output Code "-I", transmitter adjustment and output reconfiguration is possible only via an LCD Indicator/Configurator (Optional Selection "-L3") which is easily transportable between transmitters. Remote communication is not available.

(b) Remote configuration with HART Communicator, Foxboro PC-based Configurator, and/or Foxboro ABO991 software.

MODEL CODES (CONT.)

Model Code - Transmitter with Thermowell Mount - Integrally Mounted Sensors

Description	**Model**
I/A Series Intelligent Temperature Transmitter	RTT20
Output Signal and Communication Protocol (a)	
4 to 20 mA only; no Remote Communication (a)	–I
4 to 20 mA with HART Communication (b)	–T
Input Configuration	
Single Input Channel	1
Package Configuration and Housing Material (Integrally Mounted Sensor in Thermowell)	
Thermowell Mounted to Aluminum Housing; 1/2 NPT Conduit Threads (Explosionproof)	L
Thermowell Mounted to 316 ss Housing; 1/2 NPT Conduit Threads (Explosionproof)	M
Sensor Length	
2 in (50 mm)	A
2.5 in (64 mm)	B
3 in (76 mm)	C
3.5 in (89 mm)	D
4 in (102 mm)	E
4.5 in (114 mm)	F
5 in (127 mm)	G
5.5 in (140 mm)	H
6 in (152 mm)	J
7 in (178 mm)	K
8 in (203 m)	L
9 in (229 mm)	M
10 in (254 mm)	P
11 in (279 mm)	Q
12 in (305 mm)	R
18 in (457 mm)	S
24 in (610 mm)	T
30 in (762 mm)	U
36 in (914 mm)	V
Custom Length per Sales Order – 120 in (3 m) maximum	X
Measurement Input Type (Software Selectable)	
Thermocouple, Type E	E
Thermocouple, Type J	J
Thermocouple, Type K	K
Thermocouple, Type T	T
RTD, Platinum, DIN, 100 Ω, IEC 751 (ASTM-B Standard Accuracy)	Q
RTD, Platinum, DIN, 100 Ω, IEC 751 (ASTM-A High Accuracy)	A
RTD, Platinum, 100 Ω, SAMA	P
Electrical Safety (Also see "Electrical Safety Specifications" Section for further details)	
CSA, Intrinsically Safe	CA
CSA, Explosionproof (c)	CD
CSA, Division 2	CN
CENELEC (KEMA) Intrinsically Safe	EA
ATEX, flameproof (c)	ED
FM, Intrinsically Safe, ia	FA
FM, Explosionproof, d (c)	FD
FM, Nonincendive, n	FN
CENELEC (KEMA) nonsparking/nonincendive	KN
IECEx flameproof, Ex d IIC (c)	VV
Optional Selections	
Refer to "Optional Selection" Codes further in document	

(a) With Output Code "-I", transmitter adjustment and output reconfiguration is possible only via an LCD Indicator/Configurator (Optional Selection "-L3") which is easily transportable between transmitters. Remote communication is not available.

(b) Remote configuration with HART Communicator, Foxboro PC-based Configurator, and/or Foxboro ABO991 software.

(c) Must have Options -D2 with all explosionproof and flameproof approvals/certifications.

MODEL CODES (CONT.)

Optional Selection Codes

Option Description	Used with Package Configuration Code:							Option Code
	B	S	T	W	Y	L	M	
Custody Transfer Lock and Seal	–	Yes	Yes	Yes	Yes	Yes	Yes	-A1
PG 13.5 Conduit Thread (in lieu of 1/2 NPT) (a)	–	Yes	–	–	–	–	–	-A2
Metric Conduit Adapter (1/2 NPT to M20) (b)	–	Yes	Yes	–	–	–	–	-A3
Custom Database Configuration	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-C2
DIN Rail Mounting Hardware (c)	Yes	–	–	–	–	–	–	-D1
Ship with Thermowell Attached (d)	–	–	–	–	–	Yes	Yes	-D2
Retrofit Kit - Adapts RTT20 to older Transmitters (e)	Yes	–	–	–	–	–	–	-D3
Thermowell, 3/4 NPT (Foxboro Std.); Supplied by User (f)	–	–	–	–	–	Yes	Yes	-D4
Stainless Steel Union Coupling	–	–	–	–	–	Yes	Yes	-H2
Delete Instruction Book	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-K1
Three-Line LCD Indicator/Configurator	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-L3
Mounting Set, Epoxy-Coated Steel	–	Yes	Yes	–	–	–	–	-M1
Mounting Set, 316 ss (g)	–	Yes	Yes	–	–	–	–	-M2
Inconel Sheath on RTDs or TCs	–	–	–	Yes	Yes	Yes	Yes	-S1
Dual Element Sensor (h)	–	–	–	Yes	Yes	Yes	Yes	-S2
4-Wire RTD Sensor	–	–	–	Yes	Yes	Yes	Yes	-S4
Examples: RTT20-D1SNJFA-A1C1C2M1; RTT20-T1WLPCA-A1S1S4; RTT20-D1LPEFD-C1C3D2S2								

(a) PG 13.5 Conduit Thread not available with Option "-A3".

(b) Not available with Electrical Safety Codes CD or FD. Also not available with Option "-A2".

(c) Hardware only; DIN rail is provided by user.

(d) Required selection with Electrical Safety Codes CD or FD when Package Code L or M is used.

(e) The optional "-D3" retrofit kit provides an adapter plate and hardware to substitute an RTT20 into installations currently using an older type RTT10, 893, E93, and E94 Temperature Transmitter.

(f) Not available with Electrical Safety Codes CD or FD.

(g) For mounting transmitter to surface, or DN 50 or 2-in pipe.

(h) Two 2-wire RTDs in one sheath. Available with Output Codes "-D" and "-T" only, and with Sensor Input Types "Q" and "P".

NOTE

For further information relating to options, accessories, and services available with the RTT20 Temperature Transmitter, refer to PSS 2A-1Z9 F.

SUGGESTED RFQ SPECIFICATIONS

The manufacturer shall provide a microprocessor-based temperature transmitter with 4 to 20 mA or digital output which is linear to the measured temperature as follows:

Electronics:	Sealed Against Moisture
Sensors:	All Popular RTDs and Thermocouples
Self Calibration:	Automatic with No Prompt Required
Span Rangeability:	At Least 200:1
Enclosure:	Suitable for Remote or Integral Sensor Mounting (NEMA Type 4X and IP65)
Electrical Classification:	Intrinsically Safe or Explosionproof
Communications:	Must Not Interfere with Output
Configurators:	Integral and Remote Required
LCD Indicator:	Must Display Faults and Tag Number, and have Configuration Pushbuttons
Accuracy:	0.1°C for a 100 W Pt RTD at 0 to 100°C Span
Model Code:	Foxboro Model RTT20, or Equivalent

ALTERNATE SUGGESTED RFQ SPECIFICATIONS

The vendor shall furnish the following instrument for sensing temperature and transmitting a 4 to 20 mA or digital output signal. The instrument shall measure a temperature of ____ to ____°C using a thermocouple or RTD. Range is to be fully adjustable with span rangeability of at least 200:1 for each sensor. The transmitter shall be microprocessor-based with automatic self-calibration to virtually eliminate drift and ambient temperature errors. All diagnostic messages must be automatic and transmitted to a local display or remote configurators.

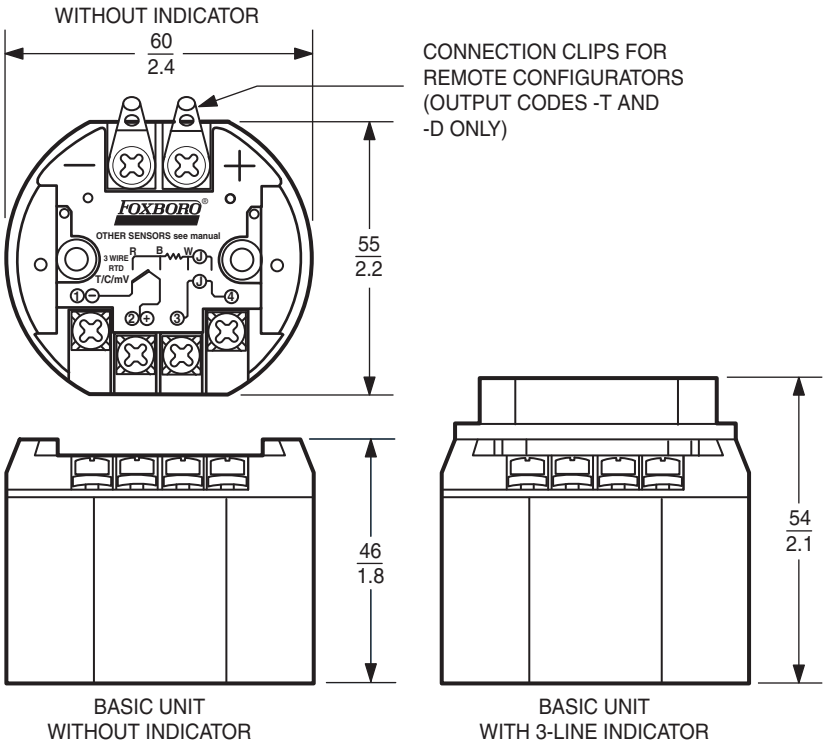
The transmitter housing should be suitable for integral or remote mounting of the sensor and shall be approved for use in hazardous locations (intrinsically safe and/or explosionproof). The basic transmitter shall be sealed and protected against moisture and other contaminants. The transmitter shall be a Foxboro I/A Series Temperature Transmitter, Model RTT20, or approved equivalent.

DIMENSIONS – NOMINAL

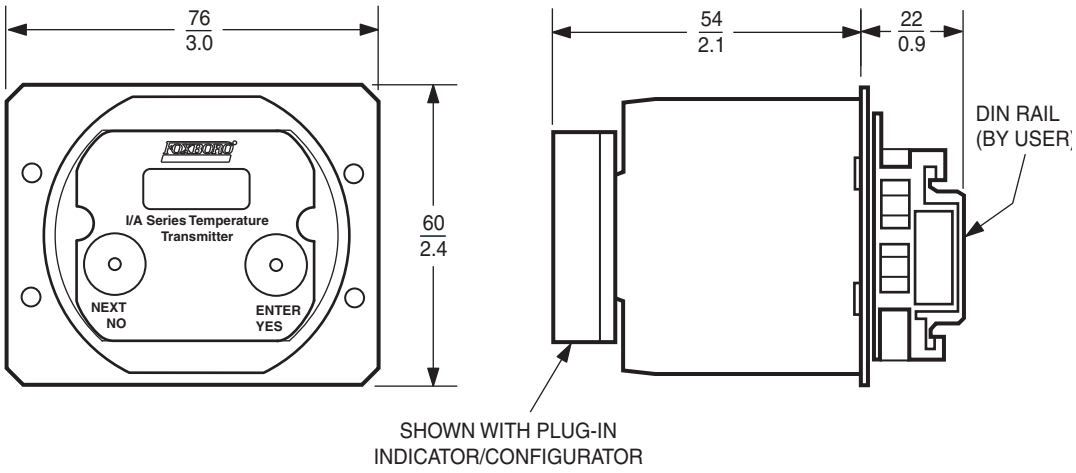
mm
in

NOTE: For additional details, refer to Dimensional Print (DP 020-460).

BASIC UNIT - PACKAGE CONFIGURATION CODE "B"



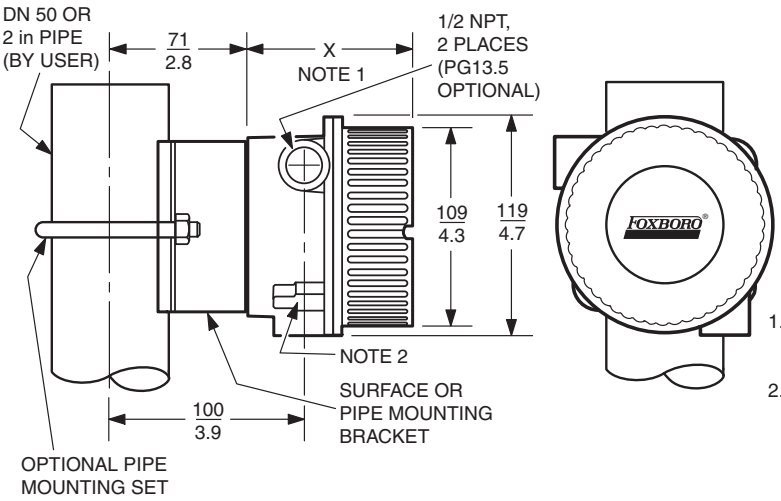
BASIC UNIT WITH DIN MOUNTING HARDWARE



DIMENSIONS – NOMINAL

mm
in

SURFACE OR PIPE MOUNT TRANSMITTER WITH REMOTE SENSOR (PACKAGE CODE "S OR T")

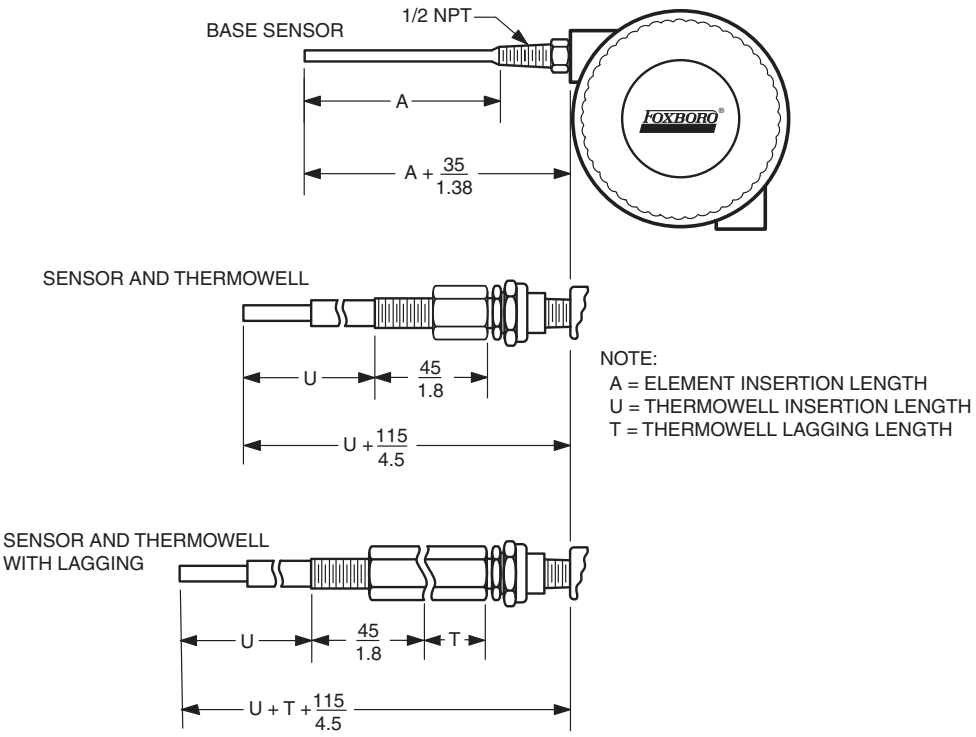


HOUSING MATERIAL	DIMENSION X (NOTE 1)	
	WITHOUT INDICATOR	WITH INDICATOR
316 ss	87 / 3.4	99 / 3.9
ALUMINUM	87 / 3.4	112 / 4.4

NOTES

1. ALLOW 51 mm (2 in) CLEARANCE FOR COVER REMOVAL.
2. EXTERNAL COVER LOCK AND GROUND SCREW LOCATION, WHEN APPLICABLE.

TRANSMITTER WITH INTEGRAL SENSOR (PACKAGE CODE "L, M, W, OR Y")



NOTE:
A = ELEMENT INSERTION LENGTH
U = THERMOWELL INSERTION LENGTH
T = THERMOWELL LAGGING LENGTH

ORDERING INSTRUCTIONS

1. Model Number
2. Calibrated Range
3. Thermowell Part Number or Model, if required.
   (See PSS 3-3C1 A for W-Series Wells, and
   PSS 3-3D1 A for T-Series Wells)
4. Remote Configurator, if required
   HART Communicator
   Foxboro ABO991 Software (HART)
5. Tag Information

OTHER M&I PRODUCTS

Invensys provides a broad range of measurement and instrument products, including solutions for pressure, flow, analytical, positioners, temperature, controlling and recording. For a listing of these offerings, visit the Invensys Operations Management website at:

www.iom.invensys.com

Invensys Operations Management
5601 Granite Parkway Suite 1000
Plano, TX 75024
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MB 010 0811

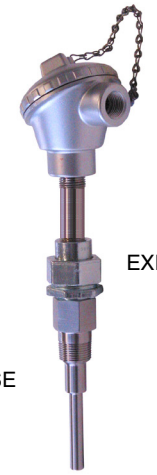
FIELD DEVICES - TEMPERATURE
Product Specifications

INVENSYS PROCESS SYSTEMS

PSS 1-1B1 A

PR Series RTDs
Platinum Resistance Temperature Detectors

WEATHERPROOF/GENERAL PURPOSE
CONNECTION HEAD
WITH BARE SENSOR



WEATHERPROOF/GENERAL PURPOSE
CONNECTION HEAD
WITH COUPLER AND
THERMOWELL

EXPLOSIONPROOF/FLAMEPROOF
CONNECTION HEAD
WITH BARE SENSOR

EXPLOSIONPROOF/FLAMEPROOF
CONNECTION HEAD
WITH COUPLER AND
THERMOWELL

The Foxboro® brand PR Series RTDs are available from Invensys Process Systems (IPS). These RTDs are sensors whose electrical resistance changes with a change in temperature. They measure temperatures from -200 to +650°C (-320 to +1200°F) and are calibrated to either ASTM (IEC, DIN) or SAMA standard curves. The resistance output from the element may be directly connected to a variety of resistance temperature measurement instruments.

WIDE TEMPERATURE RANGE

Platinum RTDs are an ideal selection in applications having a wide temperature range. These PR Series sensors have a wider temperature rangeability than any other conventional resistance temperature measuring device.

USABLE WITH MANY TYPES OF FIELD DEVICES

RTDs may be directly connected to a variety of Foxboro instruments such as transmitters, controllers, compensated totalizers, converters, or system input modules.

FOXBORO

A VARIETY OF CONFIGURATIONS

The PR Series can accommodate either a single or dual RTD element. They are available as either bare sheath or well type assemblies. In either configuration, the sensor is protected with a full length moisture resistant sheath of either AISI Type 316 stainless steel (316 ss) or Inconel 600, depending upon the temperature or process material being measured. An excellent selection of specially engineered wells is available to further protect the RTD from physical damage or from corrosive or damaging process media. RTD insertion lengths are available in lengths from 51 to 914 mm (2 to 36 in) in 12.7 mm (1/2 in) increments. Custom lengths are also available from 37 through 300 inches in whole inch increments. Weatherproof (IEC IP65, NEMA Type 4) terminal connection heads are offered for general purpose applications, and explosionproof/flameproof (IEC IP65, NEMA Type 4X) terminal connection heads are offered for corrosive or hazardous area installations.

SPRING LOADED CONSTRUCTION WITH WELLS

When wells are used, a spring loading device is used to provide positive tip contact between the element and thermowell bottom. This ensures a reliable temperature measurement.

LONG LIFE, LOW MAINTENANCE

The use of protective sheathing and wells increases the life of the sensor while ensuring low heat loss and suitable thermal response. When wells are used, the spring-loaded RTD can be easily removed without process shutdown. Longer sensor life results in lower maintenance costs and reduced spare parts inventory.

MANY AGENCY APPROVALS/CERTIFICATIONS

Approved/Certified by FM, FMc, and CSA for Explosionproof locations; and certified for Flameproof locations by ATEX and IECEx.

PERFORMANCE SPECIFICATIONS

Accuracy

ASTM-A CALIBRATION SENSORS

±0.13 + 0.0017(T)°C, where T = °C temperature, absolute value. (Better than IEC-A calibration accuracy.)

ASTM-B CALIBRATION SENSORS

±0.25 + 0.0042(T)°C, where T = °C temperature, absolute value. (Better than DIN and IEC-B calibration accuracy.)

SAMA CALIBRATION SENSORS

±0.26°C (±0.5°F) or ±0.25% of temperature reading, whichever is larger, for 480°C (900°F) and below; ±0.5% of temperature reading between 480 and 650°C (900 and 1200°F).

Reproducibility

±0.125°C (±0.25°F) for 480°C (900°F) and below; ±0.25°C (±0.5°F) for above 480°C (900°F).

Operational Stability

Less than ±0.06°C (±0.1°F) shift from initial calibration in one year.

Response Time

5 seconds maximum for a 63% recovery; based on a step change in temperature of the bare sensor starting at an ambient room temperature of 25°C (77°F) to being immersed in 100°F) (212°F) water stirred at 1 m/s (3 ft/s).

FUNCTIONAL SPECIFICATIONS

Temperature Limits

The maximum temperature limit is determined by the lowest upper range limit (URL) of the element, connection head, or sheath.

ELEMENT

-200 and +650°C (-330 and +1200°F)

CONNECTION HEAD

-40 and +105°C (-40 and +220°F)

316 ss SHEATH

-200 and +480°C (-320 and +900°F)

INCONEL SHEATH

-200 and +650°C (-320 and +1200°F)

Vibration

A detector, with 76 mm (3 in) of its sheathed length unsupported or overhanging, will withstand 250 m/s^2 (25 “g”) vibration from 20 to 2000 Hz in any axis for 25 minutes without damage.

External Pressure

The detector sheath can be exposed to an external pressure of 21 MPa (3000 psi) without a change in resistance of more than the amount equivalent to 0.05°C (0.1°F). There will be no permanent change in the resistance at the ice point after this exposure.

ASTM Calibration

Per ASTM E1137-87. Resistance at 0°C (32°F) is as follows (also conform to DIN and IEC calibrations):

- for ASTM-B, 100.00 ± 0.10 Ω
- for ASTM-A, 100.00 ± 0.05 Ω

Refer to TI 005-028. Alpha is 0.00385 Ω/Ω/°C.

SAMA Calibration

SAMA Standard RC 21-4-1966. Curves PR 279 (°C) and PR 278 (°F). Alpha is 0.003923 Ω/Ω/°C. Resistance of 98.129 ±0.1 Ω at 0°C (32°F). Refer to TI 5-27a.

PHYSICAL SPECIFICATIONS

RTD Configurations

See Figure 1. Three configurations are offered. A well-type assembly with a nipple coupler; a well-type assembly with a nipple and union coupler; and a bare element-type assembly. The bare element-type assembly has a hex-head nipple with 1/2 NPT external thread welded on sensor for process mounting and mounting to connection head.

Sensor Type

Single or dual platinum resistance temperature sensor, strain free, fully annealed, with three-lead configuration. Four-wire RTDs are available on request.

Sensor Wires

Three leads are color coded white, and two red. White for the one leg of the detector, and the two reds for the two legs to the other side of the detector. Stranded 0.50 mm^2 or 22 AWG wire with ptfe insulation.

Sensitive Length

40 mm (1.6 in) minimum, measured from closed end.

Internal Insulation

Glass fiber over sensitive length, high-purity aluminum oxide powder packed over remaining length.

Sheath Sealant

Epoxy compound applied at open end of sheath to prevent entry of moisture.

Sheath Outside Diameter (O.D.)

6.35 mm (0.250 in). Note that a well inside diameter (I.D.) of 6.60 mm (0.260 in) is required.

Insertion Length

Refer to Model Code.

Construction

All welded and moisture sealed. 316 ss for temperature up to 480°C (900°F), Inconel 600 for temperatures up to 650°C (1200°F).

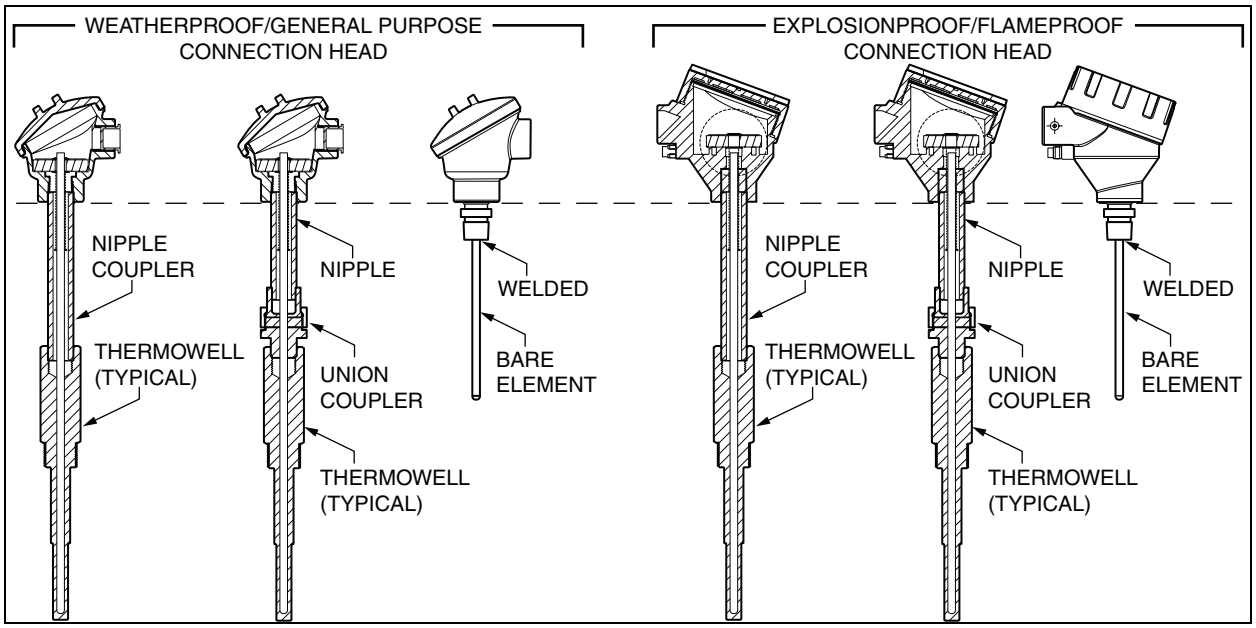


Figure 1. PR Series RTD Configurations

PHYSICAL SPECIFICATIONS (CONT.)

Weatherproof/General Purpose Connection Head

This connection head when used with a well, contains a compression spring to maintain RTD tip contact. Diecast aluminum alloy with O-ring gasketed cover. A 1/2 NPT conduit connection (or optionally an M20 conduit thread adapter) is provided for field wiring to a ceramic terminal block within the connection head. The assembly meets IEC IP65, provides the environmental protection of NEMA Type 4. See Figure 1.

Explosionproof/Flameproof Connection Head

This connection head is used to protect conductors in conduit systems within hazardous areas. The head contains a compression spring to maintain RTD tip contact. Diecast low copper aluminum alloy, painted, with an O-ring gasketed cover. A 1/2 NPT conduit connection is provided for field wiring to a ceramic terminal block within the connection head. The assembly meets IP65 and provides the environmental and corrosion resistance protection of NEMA Type 4X. See Figure 1.

Thermowells

Foxboro wells isolate the process and separate the temperature-measuring sensitive portion of the thermocouple from potentially corrosive or damaging process media. These wells permit ready removal of the sensor without process shutdown. A selection of plain or lagged, threaded or flanged, solid, welded or tapered wells is available in a variety of sizes and materials. The wells are machined from industry standard 316 ss, and a polished finish assures maximum corrosion resistance. They are manufactured in accordance with applicable ASME, ASTM, and ANSI standards. Refer to PSS 3-3D1 A for T Series Wells, and to PSS 3-3C1 A for W Series Wells. Also see Figure 2.

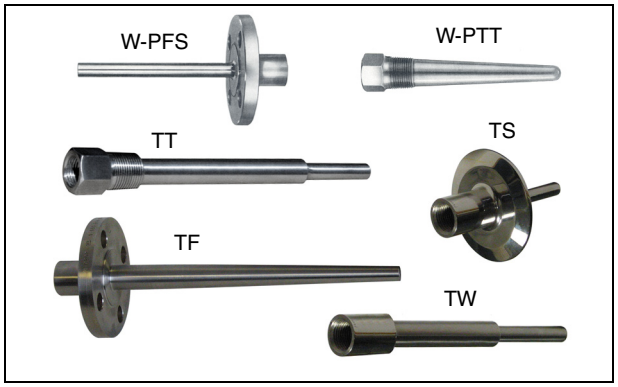


Figure 2. Typical W-Series and T-Series Wells

Terminal Block

As mentioned previously, a terminal block is located within the connection head. Field wires enter through the 1/2 NPT conduit connection (or optional M20 conduit thread adapter) in the head and terminate under screw terminals on the block. The terminal block accommodates either a single or dual element sensor. Refer to Figure 3.

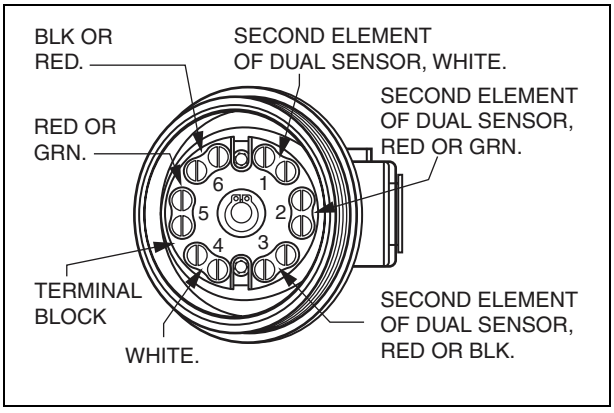


Figure 3. Terminal Block Configuration

Dimensions

See Dimensions-Nominal section.

PRODUCT SAFETY SPECIFICATIONS

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions (a)	Connection Head Code (a)
FM and **FMc** explosionproof for Class I, Division 1, Groups B, C, and D; Dust-ignitionproof for Class II, Division 1, Groups E, F, and G; and Class III, Division 1.	Temperature Class T5; Ta = -50 to +85°C	4
CSA explosionproof for Class I, Division 1, Groups B, C, and D; Dust-ignitionproof for Class II, Division 1, Groups E, F, and G; and Class III, Division 1.	Temperature Class T5; Ta = -40 to +85°C	5
ATEX flameproof; II 1/2 G, Ex d IIC; or II 2 G, Ex d IIC; or II 2 D.	Construction Types N, P, W, and B only. Temperature Class: ▸ T5 (100°C), Ta = -40 to +85°C ▸ T6 (85°C), Ta = -40 to +75°C	6
IECEx flameproof; Ex d IIC	Construction Types N, P, W, and B only. Temperature Class: ▸ T5, Ta = -40 to +85°C ▸ T6, Ta = -40 to +75°C	7

(a) Refer to Model Code for descriptions of Construction Codes and Certifications Codes.

NOTE

These RTDs have been designed to meet the product safety descriptions listed above. For detailed information, or status of testing laboratory approvals/certifications, contact IPS.

OPTIONAL SELECTIONS AND ACCESSORIES

Accessory: Platinum Replacement Element Assemblies

Specify part number if known, calibration standard, sheath material, and single or dual sensor. Also for well type construction, additionally specify the “S” length (length of sensor sheath). And for bare element assemblies, also specify the “A” length (see Dimensions - Nominal section).

Accessory: RTD to Instrument Cable

Three wires, stranded copper, 1.0 mm^2 or 18 AWG. Polyethylene insulation is 8.4 mm (0.33 in). Temperature limit is 90°C (195°F). Specify Part Number R0101LY and desired length.

Option -A3: Metric Conduit Thread Adapter

An 1/2 NPT to M20 X 1.5 metric conduit thread adapter is provided for Connection Head Codes 6 and 7. Select Option -A3.

Option -C1: Calibration Certificate

3-point RTD calibration. For standard or special calibration curves. Select Option -C1.

Options -C2, -C3, and -C4: Cryogenic Calibrations

Option	Cryogenic Calibration
-C2	-40 to -75°C (-40 to -100°F)
-C3	-75 to -130°C (-100 to -200°F)
-C4	-130 to -200°C (-200 to -320°F)

Option -C5: Oxygen Service

The RTD is cleaned and prepared for Oxygen Service. Select Option -C5.

OPTIONAL SELECTIONS AND ACCESSORIES (CONT.)

Options -T1, -T2, and -T3: Packing Type Couplers (With Bare Element Code B only)

With user-supplied wells only. Available in 1/2, 3/4, or 1 NPT sizes, and an "E" length of 100 mm (4 in). See table below and Figure 4.

Packing Type Couplers

Option	NPT	"E" Length	Part Number
-T1	1/2	100 mm (4 in)	B0184HX
-T2	3/4	100 mm (4 in)	B0184HY
-T3	1	100 mm (4 in)	B0184HZ

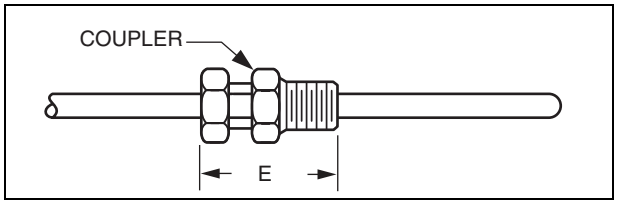


Figure 4. Packing Type Coupler

Options -T4 and -T5: Bare Sheath Type Couplers (With Bare Element Code B only)

Used for spring loading with user-supplied wells only. Available in 1/2 and 3/4 NPT sizes, and an "E" length of 38 mm (1.50 in). See table below and Figure 5.

Bare Sheath Type Couplers

Option	NPT	"E" Length	Part Number
-T4	1/2	38 mm (1.50 in)	E0127CX
-T5	3/4	38 mm (1.50 in)	Z0000361

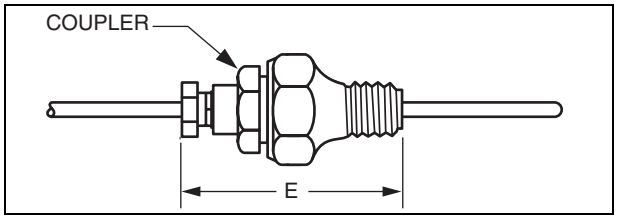


Figure 5. Bare Sheath Type Coupler

Options -T6 and -T7: Compression Type Couplers (With Bare Element Code B only)

With user-supplied wells only. Available in 1/4 and 1/2 NPT sizes, and an "E" length of 32 mm (1.25 in). See table below and Figure 6.

Compression Type Couplers

Option	NPT	"E" Length	Mat'l	Part No.
-T6	1/4	32 mm (1.25 in)	Brass	K0106NE
		32 mm (1.25 in)	316 ss	X0171SY
-T7	1/2	32 mm (1.25 in)	Brass	X0172ZB
		32 mm (1.25 in)	316 ss	X0172ZC

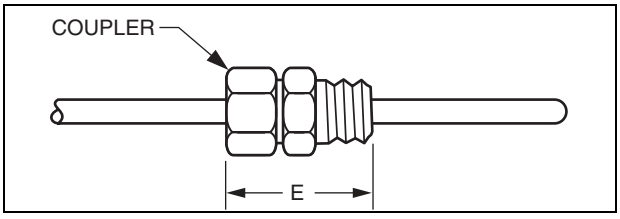


Figure 6. Compression Type Coupler

MODEL CODE

Description	Model
Platinum RTD	PR
Sensor Type (a)	
Single Element	-1
Dual Element	-2
Connection Head (a)	
Weatherproof/General Purpose	3
Explosionproof and Weatherproof, FM and FMc Approvals (f)	4
Explosionproof and Weatherproof, CSA Certification (f)	5
Flameproof and Weatherproof, ATEX Certification (f)(g)	6
Flameproof and Weatherproof, IECEx Certification (f)(g)	7
Construction (a)	
Well Type, Nipple Coupler, steel (for connection to Well) (d)	N
Well Type, Nipple Coupler, 316 ss (for connection to Well) (d)	P
Well Type, Union Coupler, steel (for connection to Well) (d)(g)	U
Well Type, Union Coupler, 316 ss (for connection to Well) (d)	W
Bare Element with 316Lss threaded hex fitting (1/2 NPT external thread) welded on to sensor	B
Calibration Curve (b)	
ASTM-B (Standard - same as DIN and IEC-B calibration curves)	B
ASTM-A (High Accuracy selection; same as IEC-A calibration curve)	A
SAMA - 3-Wire	S
Sheath - 6.35 mm (0.25 in) O.D.	
316 ss	S
Inconel	I
Length "U" or "U + T" Dimension (c)	
51 mm (2.0 in)	-002
76 mm (3.0 in)	-00A
90 mm (3.5 in)	-003
102 mm (4 in)	-004
127 mm (5 in)	-005
152 mm (6 in)	-006
178 mm (7 in)	-007
203 mm (8 in)	-008
229 mm (9 in)	-009
254 mm (10 in)	-010
279 mm (11 in)	-011
305 mm (12 in)	-012
330 mm (13 in)	-013
356 mm (14 in)	-014
381 mm (15 in)	-015
406 mm (16 in)	-016
432 mm (17 in)	-017
457 mm (18 in)	-018
483 mm (19 in)	-019
508 mm (20 in)	-020

Model Code continued on next page

MODEL CODE (CONT.)

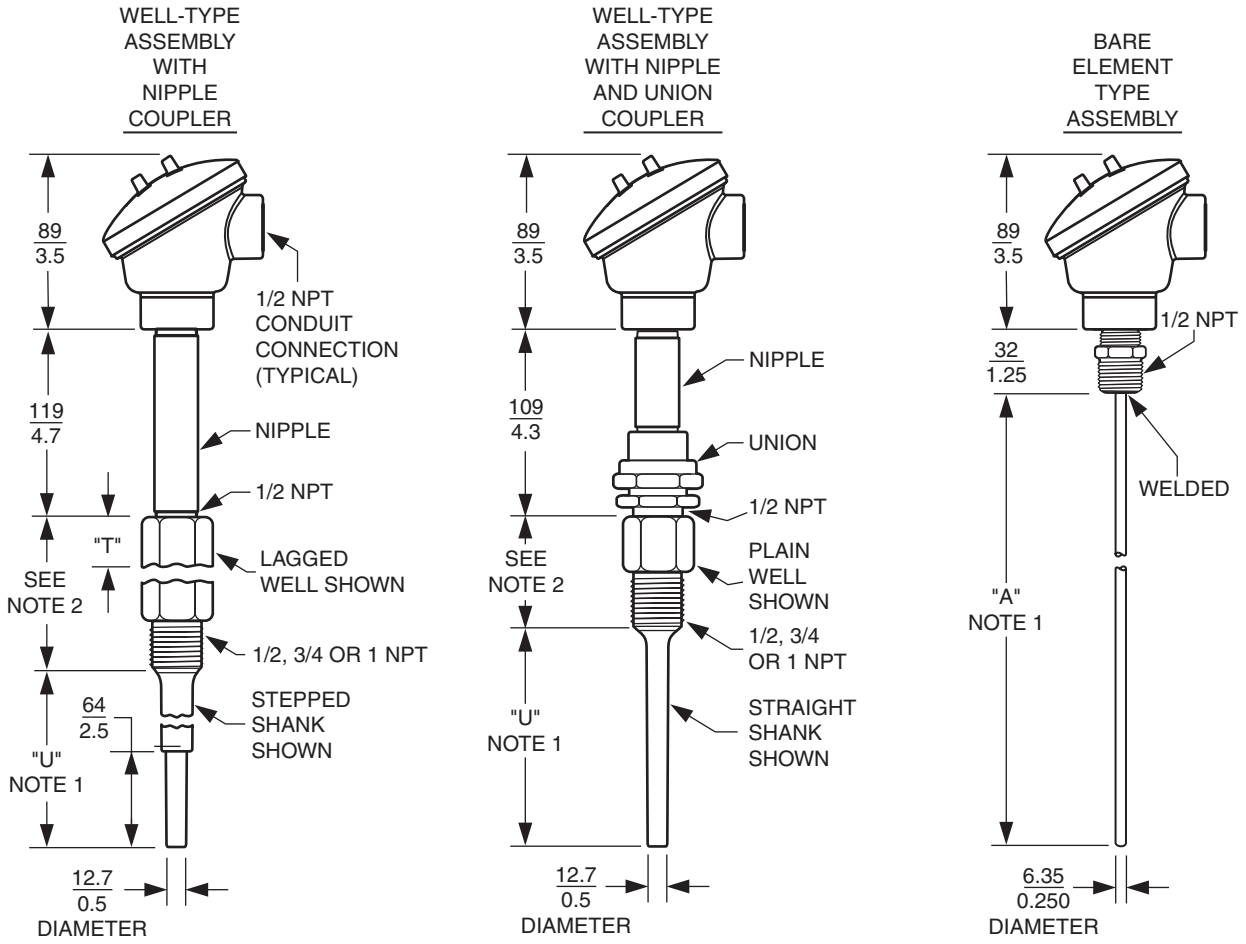
Length "U" or "U & T" Dimension (Cont.) (c)	Model
533 mm (21 in)	-021
559 mm (22 in)	-022
584 mm (23 in)	-023
610 mm (24 in)	-024
635 mm (25 in)	-025
660 mm (26 in)	-026
686 mm (27 in)	-027
711 mm (28 in)	-028
737 mm (29 in)	-029
762 mm (30 in)	-030
787 mm (31 in)	-031
813 mm (32 in)	-032
838 mm (33 in)	-033
864 mm (34 in)	-034
889 mm (35 in)	-035
914 mm (36 in)	-036
Nonstandard length are whole inches from 37 through 300 inches; specify desired length by substituting numerical values for Xs; e.g., -048 = 48 inches	-XXX
Optional Selections	
Sensor Length 0.5 in longer than the specified length; (not available with Length Codes 00A or 003)	-H
Shipped without Thermowell; for customer to install thermowell (e)	-W
Thermowell other than the Standard -T Series Wells	-X
Threaded Coupler Options for Bare Elements - Code B	
Packing Type, 1/2 NPT	-T1
Packing Type, 3/4 NPT	-T2
Packing Type, 1 NPT	-T3
Spring Loading Type, 1/2 NPT	-T4
Spring Loading Type, 3/4 NPT	-T5
Compression Type, 1/4 NPT	-T6
Compression Type, 1/2 NPT	-T7
Other Options	
Metric Conduit Thread Adapter (1/2 NPT by M20 X 1.5) (h)	-A3
Three Point Calibration with Certificate	-C1
Cryogenic Calibration; -40 to -75°C (-40 to -100°F)	-C2
Cryogenic Calibration; -75 to -130°C (-100 to -200°F)	-C3
Cryogenic Calibration; -130 to -200°C (-200 to -320°F)	-C4
Cleaned and Prepared for Oxygen Service	-C5
Examples: PR-13NBS-012-C1; PR-14BSS-024-T1C1	

(a) See Figure 1 and DIMENSIONS-NOMINAL section for RTD assembly configurations.
(b) See Performance Specifications section for Calibration Curve Accuracy.
(c) With a bare sheath assembly, the "U" or "U + T" dimension is identified as the "A" dimension. See DIMENSIONS-NOMINAL section.
(d) For Well Type construction, the well must be specified separately. Refer to PHYSICAL SPECIFICATIONS section.
(e) No Agency electrical safety certifications apply.
(f) Thermowells for Explosionproof/Flameproof atmospheres are only available in the following materials: carbon steel C-1018, 316 ss, 316L ss, 304 ss, 304L ss, Alloy 20 Cb-3, Hastelloy B, Hastelloy C-276, Inconel 600, R-Monel 405, K-Monel 500, Nickel 200, Titanium, and Cr/Moly steels.
(g) ATEX and IECEx, d, not available with Construction Code U, carbon steel union coupler.
(h) Option -A3 is only available with Connection Head Codes 6 and 7.

DIMENSIONS - NOMINAL

mm
in

WEATHERPROOF/GENERAL PURPOSE CONNECTION HEAD



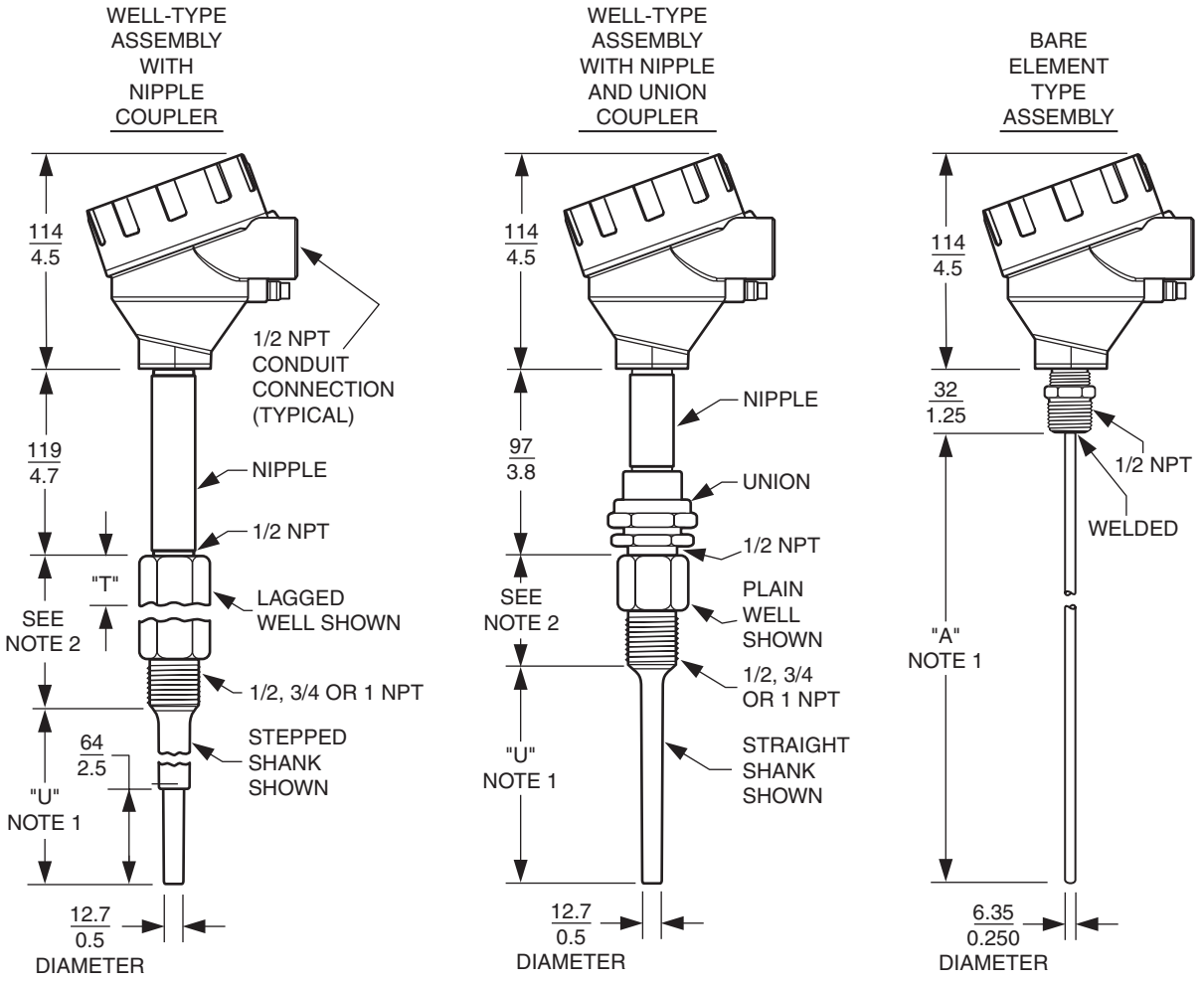
NOTES

1. U = Insertion Length (with well); and A = Bare Sensor Length (without well).
2. A lagged well has a lagging length, T, that is in addition to the length of a plain well, as shown in the two well-type assembly illustrations. The dimension indicated varies depending on the lagging length. This dimension without lagging is nominally 51 mm (2.0 in). For a lagged well, the nominal dimension is 51 mm (2.0 in) plus lagging length T.

DIMENSIONS - NOMINAL

mm
in

EXPLOSIONPROOF/FLAMEPROOF CONNECTION HEAD



NOTES

1. U = Insertion Length (with well); and A = Bare Sensor Length (without well).
2. A lagged well has a lagging length, T, that is in addition to the length of a plain well, as shown in the two well-type assembly illustrations. The dimension indicated varies depending on the lagging length. This dimension without lagging is nominally 51 mm (2.0 in). For a lagged well, the nominal dimension is 51 mm (2.0 in) plus lagging length T.

ORDERING INSTRUCTIONS

1. Model Number
2. Thermowell, if required:
   For “T” Series Wells, see PSS 3-3D1 A
   For “W” Series Wells, see PSS 3-3C1 A
3. Accessories
4. User Tag Data

OTHER FOXBORO TEMPERATURE MEASUREMENT SENSORS

PSS 1-1B3 A	DB Series Nickel RTDs
PSS 1-1B6 A	MT Series MINOX™ Thermocouples
PSS 1-1B7 A	WT Series Wire-Type Thermocouples
PSS 3-3A1 A	Filled Thermal Systems

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MB 010 Printed in U.S.A. 0909

MODEL RTT30 Intelligent Temperature Transmitter with HART Communication Protocol

The Foxboro® brand Model RTT30 is a microprocessor based, full featured, high performance, 2-wire temperature transmitter. It receives input signals from thermocouples, RTDs, resistance (ohm), or voltage (mV) sources. It is offered with HART Communication Protocol.

FEATURES

- Field-proven microprocessor-based transmitter ensures accurate measurement and performance.
- Remote Communication with HART Communicator or PC-based Configurator.
- Dual, independent sensor input capability for difference/average measurement, or sensor backup.
- Backlit indicator with measured value, bar graph, and fault indication displays designed for ease of reading.
- Drift alarm, sensor backup, and sensor corrosion detection enhances reliable operation.
- Sensor input-to-output galvanic isolation of 2 kV.
- Operation voltage monitoring for high measurement performance.
- Compact, dual compartment enclosure with fully potted electronics. Enclosure meets IP67 and NEMA 4X ratings.
- The stainless steel enclosure meets IP66/IP68 and NEMA 4x and NEMA 6P ratings.
- Aluminum or 316L ss housing offered to meet user's specific requirements.
- Approved/Certified by many testing agencies for use in hazardous area installations.
- Stainless steel mounting bracket sets offered for surface and nominal DN 50 or 2-in pipe mounting.
- Standard 2-year warranty.

GENERAL DESCRIPTION

The Model RTT30 Intelligent Temperature transmitter is a universal and configurable temperature field transmitter with either one or two temperature sensor inputs for resistance thermometers (RTD), thermocouples (TC) and resistance and voltage transmitters. It is a full-featured, 2-wire transmitter with HART communication protocol. Digital output signals are provided in addition to an analog 4 to 20 mA output signal. Remote communication is provided with a HART Communicator or PC-based configurator. Input signals are received from RTDs and thermocouples, and also from resistance and millivolt sources. There can be two measuring inputs in 2-, 3-, or 4-wire connections (i.e., two 3-wire RTDs, or one 4-wire RTD and one TC), and the transmitter is mounted in a remote location. A backlit LCD Indicator can be provided that shows the current value digitally and as a bar graph with an indicator for alarms. See Figure 1 for typical installations, and also see the Backlit LCD Indicator paragraph and Figure 3 further in this document.

DIGITAL HART AND 4 to 20 mA dc PROTOCOL

Configurable for either 4 to 20 mA or multidrop. Digital communication is based upon the FSK technique which alternately superimposes one of two different frequencies on the uninterrupted current carried by the two signal/power wires. Allows direct analog connection to common receivers while still providing full intelligent digital communications using a HART Communicator or PC-based configurator.

2-CHANNEL FUNCTIONS

These functions increase the reliability and availability of the process values, as follows:

- Hot Sensor Backup - Transmitter switches to redundant sensor if primary sensor fails.
- Temperature dependent switching between sensors, which have advantages in different ranges.
- Drift alert or alarm if sensor 1 and 2 deviate from one another.

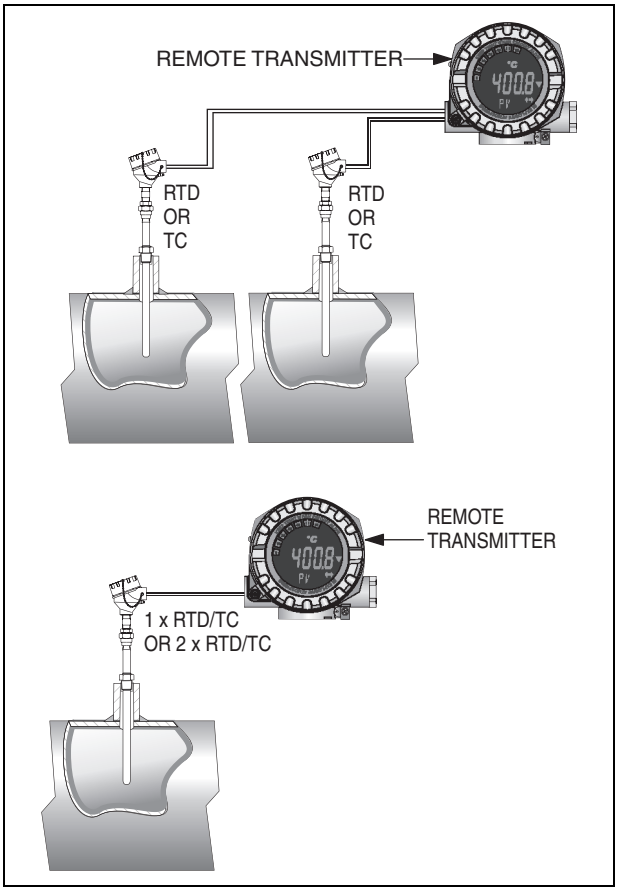


Figure 1. Typical Installations

INPUT TYPES

This RTT30 Transmitter can be used with a wide variety of temperature sensors, including 2-, 3-, and 4-wire RTDs, most popular thermocouples, and other resistance and millivolt input devices. The following is a general list of transmitter input types:

- Platinum RTDs, 2-, 3-, and 4-wire
- Copper RTDs
- Nickel RTDs
- Thermocouples
- Millivolt Sources
- Ohm Sources

EFFICIENT AND DURABLE

Industrial-grade integrated circuits and sealed electronics combine to make this microprocessor-based transmitter an efficient and durable device.

HOUSING CONFIGURATIONS

The enclosure can be provided with an aluminum housing or with a stainless steel housing, each with or without an LCD indicator. Selections are offered for installations that require flameproof, explosionproof, intrinsically safe, and nonincendive certifications. Brackets are provided for remote mounting the enclosure. See paragraph below.

MOUNTING BRACKET CONFIGURATIONS

The RTT30 can be supplied with either of two different mounting bracket configurations. A U-shaped bracket can be provided when only pipe mounting the enclosure to a nominal DN 50 or 2-in pipe is required; and an L-shaped bracket can be provided for use with either surface or pipe mounting the enclosure. The bracket material is stainless steel. See Figure 2.

CORROSION DETECTION

Corrosion of the sensor connections can lead to corruption of the measured value. The transmitter is able to detect corrosion on thermocouples and RTDs with a 4-wire connection before measured value corruption occurs. The transmitter avoids false measurement readings and is also able to indicate a warning or error on the display when wire resistance exceeds reasonable values.

LOW VOLTAGE DETECTION

Low voltage detection prevents the device from continuously outputting an incorrect analog output value (i.e. damaged/incorrect power supply or a damaged signal cable). If the required supply voltage is less than the low range limit, the analog output value drops < 3.6 mA for approximately 3 s. An error message appears on the display. Afterwards the device tries to output the normal analog output value again. If the supply voltage is still too low, the analog output value drops again to < 3.6 mA.

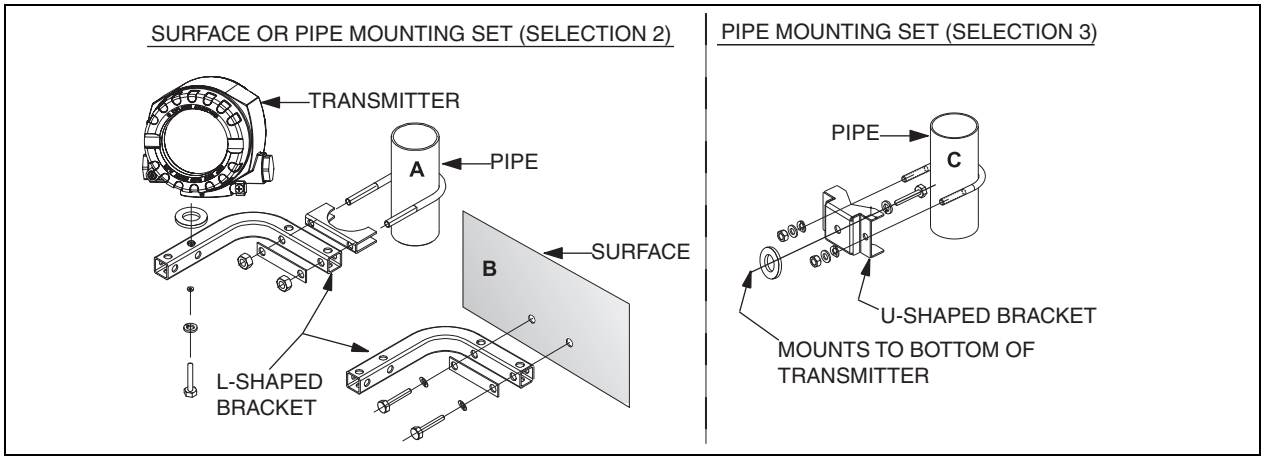


Figure 2. Transmitter Pipe or Surface Mounting Sets

BACKLIT LCD INDICATOR

The indicator assembly with a backlit display can be plugged into the electronics compartment at 90° intervals. This allows flexibility in indicator orientation depending on transmitter installation. The engineering units display is in either K, °F, °C, or %. The measured value display character height is 20.5 mm (0.81 in). The display elements are shown in Figure 3 and described in Table 1.

Table 1. Indicator Display Elements

Display Elements	Description (a)
Bar Graph Display	In 10% increments with overrange and underrange marks. Display flashes when an error occurs.
WARNING Display	This is displayed whenever an error or WARNING is given.
Engineering Unit Display (EGU): K, °F, °C, or %	Measured value displayed in selected Engineering Units.
Measured Value Display: 20.5 mm (0.81 in) Character Height.	Displays measured value. If a WARNING is present, the display alternates between measured value and WARNING Code. In the event of an error, the Error Code is displayed rather than the measured value.
Status and Information Display	Indicates which value currently appears on the display. In the event of an error or warning, relevant error/warning information is displayed.
Communication Display	This communication icon appears and indicates that HART communication is active.
Configuration Locked Display	This icon is displayed when the configuration is locked via a hardware jumper.

(a) Refer to applicable Operation Manual for more specific details.

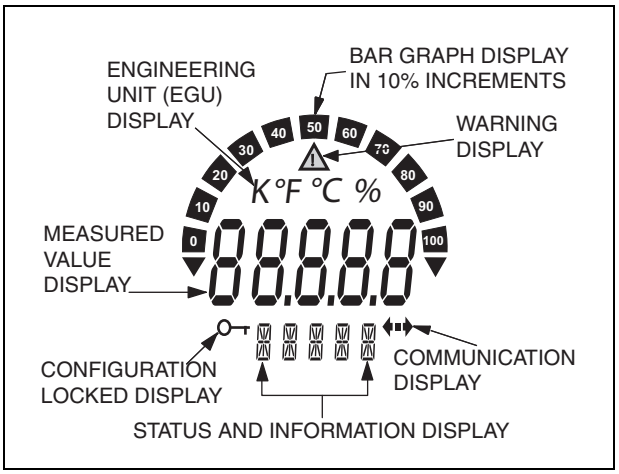


Figure 3. Indicator Display Elements

USABLE IN HAZARDOUS AREA LOCATIONS

The Model RTT30 Temperature Transmitter meets the requirements of many certifying agencies for use in hazardous area locations. Refer to the ELECTRICAL SAFETY SPECIFICATIONS section for further details.

EMI AND NAMUR COMPATIBILITY

Complies with the Electromagnetic Compatibility requirements of European EMC Directive 2004/108/EC, and also NAMUR Standards NE 21 and NE 43. See PERFORMANCE SPECIFICATIONS section.

OPERATING, STORAGE, AND TRANSPORTATION CONDITIONS

Influence	Reference Operating Conditions	Operative Limits	Storage and Transportation Limits
Ambient Temperature ▸ Without Integral Indicator ▸ With Integral Indicator	▸ 25 ±5°C (77 ±9°F) ▸ 25 ±5°C (77 ±9°F)	▸ -40 and + 85°C (a) (-40 and +185°F) (a) ▸ -20 and + 80°C (a)(b) (-4 to +176°F) (a)(b)	▸ -40 and +100°C (-40 and +212°F) ▸ -40 and +80°C (-40 and +176°F)
Relative Humidity	50 ±10%	0 and 100% (c)	0 and 100% (c)
Supply Voltage (d) ▸ HART with Indicator ▸ HART without Indicator	▸ 24 ±0.5 V dc ▸ 24 ±0.5 V dc	▸ 18 and 40 V dc (e) ▸ 11 and 40 V dc (e)(f)	N/A
Altitude	Sea Level	Up to 2000 m (6560 ft)	N/A
Shock and Vibration Resistance	Negligible	0 and 30 m/s^2 (0 and 3 “g”) from 2 to 150 Hz (g)	107 mm (42 in) Drop in Shipping Container

(a) Refer to Electrical Safety Specifications section for a restriction in ambient temperature with certain agency approvals and certifications.
(b) The LCD Indicator display may react slowly at temperatures below -20°C (below -4°F); Readability of the display cannot be guaranteed at temperatures below -30°C (below -22°F).
(c) Condensation permitted.
(d) Supply voltage values listed are with reverse polarity protection.
(e) Minimum load required with HART Communicator or PC-based Configurator is 250 Ω Operating below the 250 Ω requirement may cause communication problems. See Figure 4.
(f) For units without an Indicator, the supply voltage can be reduced to 8 V dc by means of a jumper in the electronics compartment.
(g) Per IEC 60068-2-6.

PERFORMANCE SPECIFICATIONS
Under Reference Operating Conditions unless Otherwise Specified

Measurement Accuracy

Sensor Type	Sensor Designation	Measurement Accuracy	
		Digital	D/A (a)
RTD	Cu100, Ni100, Ni120, Pt100 Cu50, Ni1000, Pt50, Pt1000 Pt500 Cu10, Pt200	0.1°C (0.18°F) 0.2°C (0.36°F) 0.3°C (0.54°F) 1.0°C (1.8°F)	0.02% 0.02% 0.02% 0.02%
Thermocouple	Types E, J, K, L, T, U Types N, C, D Types B, R, S	0.25°C (0.45°F) (b) 0.5°C (0.9°F) (b) 1.0°C (1.8°F) (b)	0.02% 0.02% 0.02%

Input Source	Measurement Range	Measurement Accuracy	
		Digital	Analog (a)
Voltage Transmitter	-20 to +100 mV	±10 µV	±0.02%
Resistance Transmitter	10 to 400 Ω 10 to 2000 Ω	±0.04 Ω ±0.08 Ω	0.02% 0.02%

(a) The % relates to the set span. For the 4 to 20 mA analog output, Accuracy = Digital Accuracy + D/A Accuracy.
(b) Thermocouple Digital Accuracies listed are typical values.

PERFORMANCE SPECIFICATIONS (CONT.)

Response Time

1 second per channel

Repeatability

±0.0015% of the input range of the sensors. See Table 2 for the sensor input range with each sensor type.

Long Term Stability

≤0.1°C (≤0.18°F) per year; or
≤0.05% per year (relates to set span).

NOTE

Stability is the larger of the temperature or percent (%) values specified above.

Ambient Temperature Effect (Temperature Drift)

Ambient temperature effect values listed below are for a 1°C (1.8°F) change in ambient temperature within operative limits.

- 10 to 400 Ω Input: Typical, 0.001% of measured value, with a minimum value of 1 mΩ
- 10 to 2000 Ω Input: Typical, 0.001% of measured value, with a minimum value of 10 mΩ
- -20 to +100 mV Input: Typical, 0.001% of measured value, with a minimum value of 0.2 µV.
- -5 to +30 mV Input: Typical, 0.001% of measured value, with a minimum value of 10 µV.
- 4 to 20 mA Output: 0.001% of span, typical; with a Maximum Value of 1.5 x Typical Value.

NOTE

Total temperature drift = input temperature drift + output temperature drift.

Sensitivity

See Table 3 for typical sensitivity of RTDs, and see Table 4 for typical sensitivity of thermocouples.

Table 2. Sensor Input Range

Sensor Type	Input Range
RTD: Cu10, Cu50, Cu100, Ni100, Ni120, Pt50, Pt100	10 to 400 Ω
RTD: Ni1000, Pt200, Pt500, Pt1000	10 to 2000 Ω
Thermocouple: Types B, R, S, T	-5 to +30 mV
Thermocouple: Types C, D, E, J, K, L, N, U	-20 to +100 mV

Table 3. Typical Sensitivity of RTDs

RTD Type	Typical Sensitivity (a)
Pt	(0.00385) (Rnominal/K)
Cu	(0.0043) (Rnominal/K)
Ni	(0.00617) (Rnominal/K)

(a) For example, for Pt100 RTD;
Typical Sensitivity = (0.00385)(100 Ω/K) = 0.385 Ω/K.

Table 4. Typical Sensitivity of Thermocouples

Typical Sensitivity			
TC Type	Sensitivity	TC Type	Sensitivity
B	10 µV/K	K	40 µV/K
R	12 µV/K	T	50 µV/K
S	12 µV/K	J	55 µV/K
C	20 µV/K	L	55 µV/K
D	20 µV/K	U	60 µV/K
N	35 µV/K	E	75 µV/K

Supply Voltage Effect

DIGITAL SIGNAL

None

4 to 20 mA SIGNAL

≤±0.005% per V change within the specified voltage range.

PERFORMANCE SPECIFICATIONS (CONT.)

Compliance with European Union Directives

The transmitter, when installed in accordance with the applicable installation instruction (MI), complies with the EMC requirements of European EMC Directive 2004/108/EC by conforming to the following EN and IEC Standards: EN 61326-1, IEC 61000-4 (as listed below), and NAMUR Standards NE 21 and NE 43 (as listed below).

- Electrostatic Discharge per IEC 61000-4-2:
  6 kV Cont., 8 kV air.
- Radiated RF Immunity per IEC 61000-4-3:
  - 0.08 to 2.0 GHz; 10 V/m
  - 80 to 750 MHz: 30 V/m
  - 1.4 to 2 GHz: 30 V/m
- High Frequency Transient per IEC 61000-4-4:
  2 kV
- Switching and Indirect Lightning Transient (Surge) per IEC 61000-4-5:
  0.5 kV symmetrical
- Conducted RF Immunity per IEC 61000-4-6:
  0.01 to 80 MHz; 10 V
- Interference Immunity requirements per NAMUR NE 21.
- Analog Output Over-range and Under-range Annunciations per NAMUR NE 43.

Measuring Category

Measuring Category II per IEC 61010-1. The measuring category is provided for measurements at circuits with a direct electrical connection to the low voltage supply.

Installation Category

Installation Category 1 to IEC 61010.

Pollution Degree

Pollution degree 2 per IEC 61010.

Climate Class

Climate Class per IEC 60654-1, Class C.

FUNCTIONAL SPECIFICATIONS

Span and Range Limits

RTD INPUT
See Table 3

THERMOCOUPLE INPUT
See Table 4

VOLTAGE INPUT
See Table 5

RESISTANCE INPUT
See Table 5

Table 5. RTD Input - Span and Range Limits

RTD Designation and Description	Measurement Range Limits	Minimum Span
Cu10 alpha = 0.004274; To Edison Copper Winding No. 15	-100 and +260°C (-148 and +500°F)	10°C (18°F)
Cu50 alpha = 0.004278; To GOST	-200 and +200°C (-328 and +392°F)	10°C (18°F)
Cu100 alpha = 0.004278; To GOST	-200 and +200°C (-328 and +392°F)	10°C (18°F)
Ni100 alpha = 0.006180; To DIN 43760	-60 and +250°C (-76 and +482°F)	10°C (18°F)
Ni120 alpha = 0.006720; To Edison Curve	-70 and +270°C (-94 and +518°F)	10°C (18°F)
Ni1000 alpha = 0.006180; To DIN 43760	-60 and +150°C (-76 and +302°F)	10°C (18°F)
Pt50 alpha = 0.003911; To GOST	-200 and +1100°C (-328 and +2012°F)	10°C (18°F)
Pt100 alpha = 0.003916; To JIS C1604-81	-200 and +649°C (-328 and +1200°F)	10°C (18°F)
Pt100 alpha = 0.003911; To GOST	-200 and +850°C (-328 and +1562°F)	10°C (18°F)
Pt100 alpha = 0.00385; To IEC 60751	-200 and +850°C (-328 and +1562°F)	10°C (18°F)
Pt200 alpha = 0.00385; To IEC 60751	-200 and +850°C (-328 and +1562°F)	10°C (18°F)
Pt500 alpha = 0.00385; To IEC 60751	-200 and +250°C (-328 and 482°F)	10°C (18°F)
Pt1000 alpha = 0.00385; To IEC 60751	-200 and +250°C (-328 and +482°F)	10°C (18°F)

FUNCTIONAL SPECIFICATIONS (CONT.)

Table 6. Thermocouple Inputs - Span and Range Limits

Thermocouple Designation and Description	Measurement Range Limits	Minimum Span
Type T Cu-CuNi; IEC 584-1	-270 and +400°C (-454 and +752°F)	50°C (90°F)
Type E NiCr-CuNi; IEC 584-1	-270 and +1000°C (-454 and +1832°F)	50°C (90°F)
Type N NiCrSi-NiSi; IEC 584-1	-270 and +1300°C (-454 and 2372°F)	50°C (90°F)
Type K NiCr-Ni; IEC 584-1	-270 and +1372°C (-454 and +2501°F)	50°C (90°F)
Type J Fe-CuNi; IEC 584-1	-210 and +1200°C (-346 and +2192°F)	50°C (90°F)
Type U Cu-CuNi; IEC 43710	-200 and +600°C (-328 and +1112°F)	50°C (90°F)
Type L Fe-CuNi; DIN 43710	-200 and +900°C (-328 and +1652°F)	50°C (90°F)
Type R PtRh13-Pt; IEC 584-1	-50 and +1768°C (-58 and +3214°F)	500°C (900°F)
Type S PtRh10-Pt; IEC 584-1	-50 and +1768°C (-58 and +3214°F)	500°C (900°F)
Type B (a)(b) PtRh30-PtRh6; IEC 584-1	0 and 1820°C (32 and 3308°F)	500°C (900°F)
Type C W5Re-W26Re; ASTM E988	0 and 2320°C (32 and 4208°F)	500°C (900°F)
Type D W3Re-W25Re; ASTM E988	0 and 2495°C (32 and 4523°F)	500°C (900°F)

(a) The measuring error (see Table 1) will increase for temperatures lower than 300°C (572°F).
(b) When operation conditions are based on a large temperature range, the RTT30 offers the ability to split the range. For example, a Type S or R thermocouple can be used for the low range, while a Type B can be used for the upper range.

Table 7. Voltage and Resistance Inputs - Span and Range Limits

Input Source	Measurement Range Limits	Minimum Span
Voltage Transmitter	-20 and +100 mA	5 mV
Resistance Transmitter	10 and 400 Ω	10 Ω
Resistance Transmitter	10 and 2000 Ω	100 Ω

FUNCTIONAL SPECIFICATIONS (CONT.)

Output Signal

- Analog Output: 4 to 20 mA or 20 to 4 mA. Requires a minimum loop load of 250 Ω for proper communication.
- Signal Encoding: Digital Communications provided based upon the FSK (Frequency Shift Keying) technique; ± 0.5 mA via the current signal.
- Data Transmission Rate: 1200 baud
- Galvanic Isolation: 2 kV ac (Input/Output)

Fault Information (Per NAMUR NE 43)

- Underrange: Linear drop to 3.8 mA
- Overrange: Linear rise to 20.5 mA
- Failure (e.g., sensor break or short circuit): ≤ 3.6 mA low, or ≥ 21 mA high; selectable. The high alarm is adjustable between 21.6 and 23 mA, thus allowing for flexibility when working with control system requirements.

Current Consumption

- Basic Current: 3.6 to 22 mA
- Current Consumption limits: 3.5 and 23 mA.

Filter

1st order digital filter: 0 to 60 s

Warm-Up Time

4 s during switch-on operation; $I_a \leq 3.8$ mA

Write Protect Function

This function locks out all configurators from making transmitter configuration changes. This makes transmitter suitable for Safety Shutdown System Applications that require this feature. This feature is activated by a jumper in the electronics compartment.

Supply Voltage Requirements and External Loop Load Limitations

Nominal supply voltage is 11 to 40 V dc. Also, with an LCD Indicator, the minimum voltage increases to 18 V dc. A minimum loop load of 250 Ω is required when a HART Communicator or PC-based Configurator is used. See Figure 5.

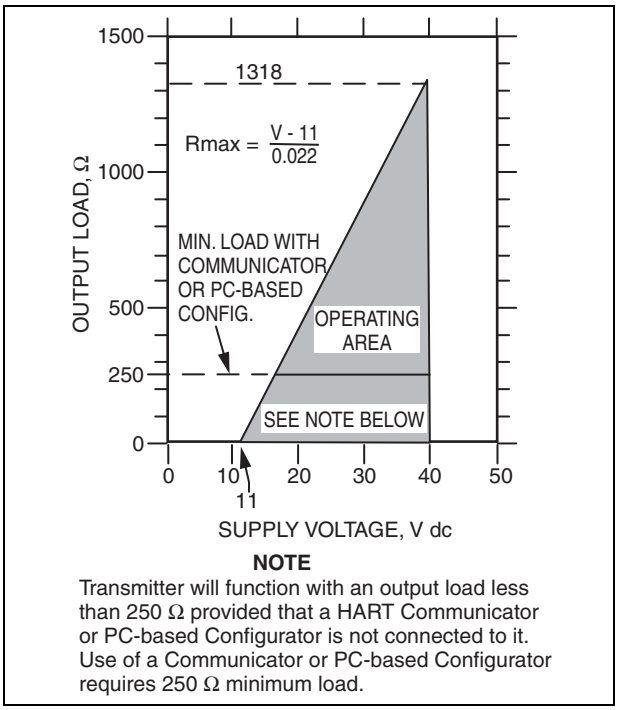


Figure 4. HART 4 to 20 mA Analog Output, Supply Voltage vs Output Load

Reduced Supply Voltage

For transmitters without an LCD Indicator, the supply voltage can be reduced from 11 to 8 V dc. A jumper is provided in the electronics compartment for this purpose.

PHYSICAL SPECIFICATIONS

Enclosure Material

- Die-cast aluminum housing with a powder coating on a polyester base.
- 316L stainless steel housing.

Enclosure Construction

A dual compartment enclosure, one for the electronics and one for the cable entry and electrical connections. The compartment covers are threaded and include O-rings to seal the enclosure. Cover clamp kits are provided to prevent cover rotation.

Enclosure Mounting

Surface or pipe mounting brackets can be provided with the enclosure. An L-shaped 304 ss bracket is offered for either surface or pipe mounting the transmitter. The bracket is 25 mm (1 in) square tubing with one leg 163 mm (6.4 in) long, and the other leg 183 mm (7.2 in) long. A U-shaped 316L ss bracket is offered for pipe mounting only. Either bracket is for attaching to a nominal DN 50 or 2-in pipe using a U-bolt.

Electronics Assembly

Fully potted electronics provide environmental protection.

LCD Indicator

The indicator is located in the electronics compartment, and can be plugged in at 90° intervals. This allows flexibility in display orientation, depending on the transmitter's installation location.

Electrical Connections

Two 1/2 NPT or M20 threaded connections are provided on the housing for cable or wire entry. Also an external grounding connection is located at the lower surface of the housing.

Sensor Installation

The thermocouple or RTD is typically installed in a remote location. Contact Invensys if direct fitting of the sensor to the transmitter is desired.

Environmental Protection

The enclosure has the dusttight and weatherproof rating of IP67 as defined by IEC 60529, and provides the environmental and corrosion resistant protection rating of NEMA 4X.

The stainless steel housing has a rating for hygienic applications of IP66/IP68 and provides environmental and corrosion resistant protection rating of NEMA 4x, and NEMA 6P.

Approximate Weight

ALUMINUM HOUSING WITH INDICATOR

1.4 kg (3.1 lb)

316L ss HOUSING WITH INDICATOR

4.2 kg (9.3 lb)

Dimensions

Refer to DIMENSIONS-NOMINAL section.

ELECTRICAL SAFETY SPECIFICATIONS

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Elec. Safety Design Code
None - Instrument in a nonhazardous area location.		A
FM intrinsically safe and nonincendive; Class I, Divisions 1 and 2, Groups A, B, C, and D. Also Class I, Zone 0 AEx ia IIC, and Class I, Zone 2 AEx nA.	Temperature Class T4; Ta = -40 to +85°C	C
FM explosionproof, nonincendive, and dust-ignitionproof; Class I, II, III, Divisions 1 and 2, Groups A to G. Also Class I, Zone 1 AEx d IIC, and Class I, Zone 2 AEx nA.	Temperature Class T6; Ta = -40 to +55°C Temperature Class T5; Ta = -40 to +70°C Temperature Class T4; Ta = -40 to +85°C	F
FM explosionproof, dust-ignitionproof, intrinsically safe, and nonincendive; Class I, II, III, Divisions 1 and 2, Groups A to G. Also Class I, Zone 1 AEx d IIC, Class I, Zone 0 AEx ia IIC, and Class I, Zone 2 AEx nA.	Temperature Class T6; Ta = -40 to +55°C Temperature Class T5; Ta = -40 to +70°C Temperature Class T4; Ta = -40 to +85°C	J
CSA for use in Ordinary (General Purpose) locations.	– – –	O
CSA intrinsically safe and nonincendive; Class I, Divisions 1 and 2, Groups A, B, C, and D. Also Class I, Zone 0, Ex ia IIC, and Class I, Zone 2 Ex nA.	Temperature Class T6; Ta = -40 to +55°C Temperature Class T5; Ta = -40 to +70°C Temperature Class T4; Ta = -40 to +85°C	D
CSA explosionproof, nonincendive, and dust-ignitionproof; Class I, II, III, Divisions 1 and 2, Groups A to G. Also Class I, Zone 1 Ex d iIC, and Class I, Zone 2 Ex nA.	Temperature Class T6; Ta = -40 to +55°C Temperature Class T5; Ta = -40 to +70°C Temperature Class T4; Ta = -40 to +85°C	G
CSA explosionproof, dust-ignitionproof, intrinsically safe, and nonincendive; Class I, II, III, Divisions 1 and 2, Groups A to G. Also Class I, Zone 1 Ex d IIC, Class I, Zone 0 Ex ia IIC, and Class I, Zone 2 Ex nA.	Temperature Class T6; Ta = -40 to +55°C Temperature Class T5; Ta = -40 to +70°C Temperature Class T4; Ta = -40 to +85°C	K
ATEX intrinsically safe; II 1 G, EEx ia IIC.	Temperature Class T6; Ta = -40 to +55°C Temperature Class T5; Ta = -40 to +70°C Temperature Class T4; Ta = -40 to +85°C	B
ATEX flameproof; II 2 G, EEx d IIC.	Temperature Class T6; Ta = -40 to +55°C Temperature Class T5; Ta = -40 to +70°C Temperature Class T4; Ta = -40 to +85°C	E
ATEX flameproof and intrinsically safe; EEx d and EEx ia.	See Codes B and E above	H
ATEX nonincendive; II 3 G, EEx nA nL IIC. See footnote (a).	Temperature Class T6; Ta = -40 to +55°C Temperature Class T5; Ta = -40 to +70°C Temperature Class T4; Ta = -40 to +85°C (a)	L
ATEX II 1/2 D; IP66/67.	Maximum Surface Temperature = 110°C	N
ATEX II 1/2 GD and EEx ia IIC.	Temperature Class T6; Ta = -40 to +55°C Temperature Class T5; Ta = -40 to +70°C Temperature Class T4; Ta = -40 to +85°C	T

(a) With ATEX II 3 G, EEx nL IIC, T4 = -40 to + 70°C (not +85°C) when an LCD Indicator is used.

MODEL CODE

Description	Model
Intelligent Temperature Transmitter with Two Signal Inputs	RTT30
Communication Protocol	
Digital HART and 4 to 20 mA dc	-A
Housing	
Aluminum Housing; No Indicator	1
Aluminum Housing; With Indicator	2
316L ss Housing; No Indicator	3
316L ss Housing; With Indicator	4
Cable Entry	
1/2 NPT Threaded Connection	1
M20 x 1.5 Threaded Connection (a)	2
Mounting Sets	
None - Not Required	1
L-Shaped 304 ss Bracket, for Surface or Nominal DN 50 or 2-in Pipe Mounting	2
U-Shaped 316L ss Bracket, for Nominal DN 50 or 2-in Pipe Mounting	3
Electrical Safety (Also see Electrical Safety Specifications section) (c)	
None - Not used in Hazardous Areas	A
FM IS, NI I/1+2/ABCD; also Class I, Zones 0 and 2.	C
FM XP, NI, DIP, I, II, III/1+2/A-G, also Class I, Zone 1 and 2. (a)	F
FM XP, DIP, IS, NI I, II, III/1+2/A-G; also Class I, Zones 0, 1, and 2. (a)	J
CSA for use in Ordinary/General Purpose locations	O
CSA IS, NI I/1+2/ABCD; also Class I, Zones 0 and 2.	D
CSA XP, NI, DIP, I, II, III/1+2/A-G; also Class I, Zones 1 and 2.	G
CSA XP, DIP, IS, NI I, II, III/1+2/A-G; also Class I, Zones 0, 1, and 2.	K
ATEX II 1 G, EEx ia IIC, T4/T5/T6	B
ATEX II 2 G, EEx d IIC, T4/T5/T6	E
ATEX EEx d, EEx ia, T4/T5/T6	H
ATEX II 3 G, EEx nA nL IIC, T4/T5/T6	L
ATEX II 1/2 D; IP66/67	N
ATEX II 1/2 GD; EEx ia IIC, T4/T5/T6	T
Device Setup	
Factory Default Setup	A
Setup according to Configuration Sheet	B
Optional Selections	
Works Calibration Certificate; 6 Point Calibration, 60 Hz Filter (b)	-F1
Marking - Tag on Metal Plate; Information based on submitted Configuration Sheet	-Z1
Example: RTT30–A213CB–F1Z1	

(a) The M20 threaded connection is not available with FM explosionproof approval Codes F and J.

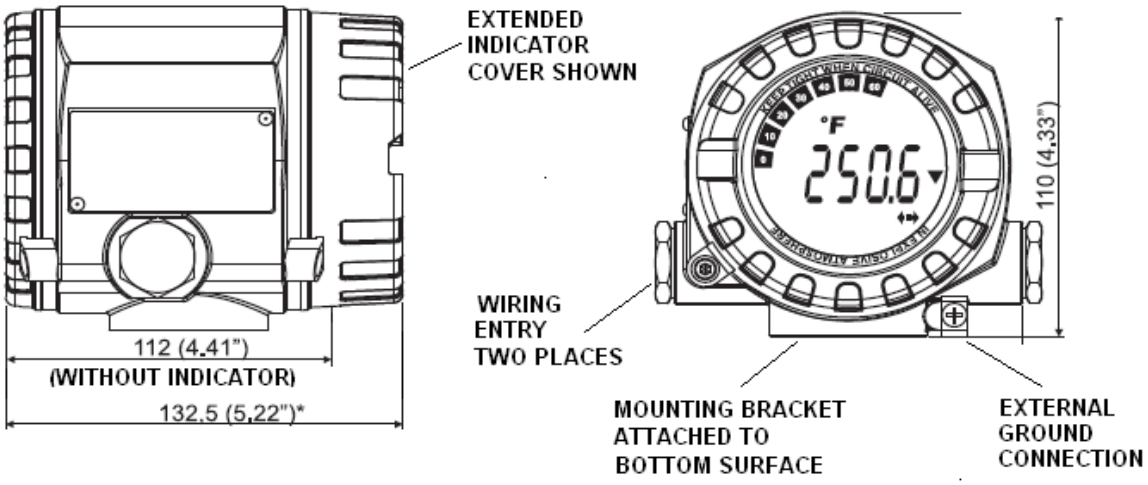
(b) The Works Calibration Certificate is an evaluation and documentation of 6 fixed resistance values over the complete measuring range.

(c) Contact Invensys for a listing of electrical approvals and certifications available at this time.

DIMENSIONS - NOMINAL

mm
in

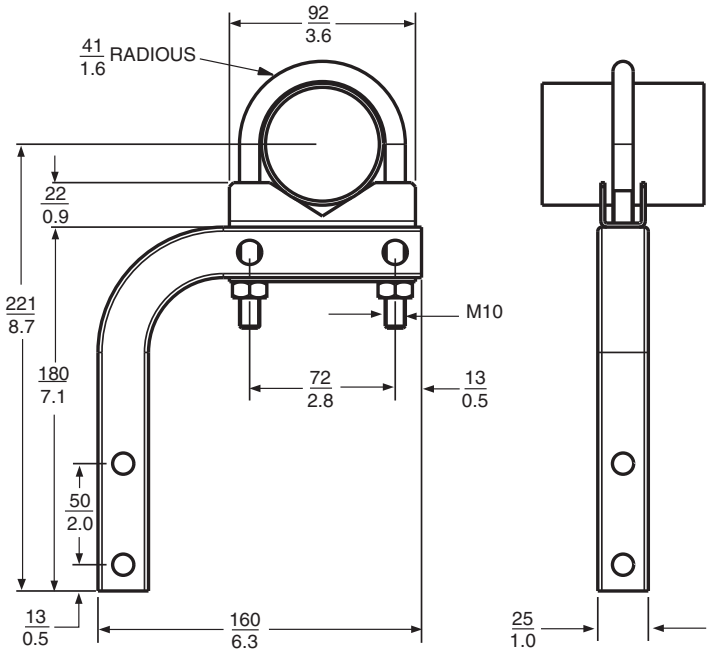
ALUMINUM AND 316L SS HOUSING



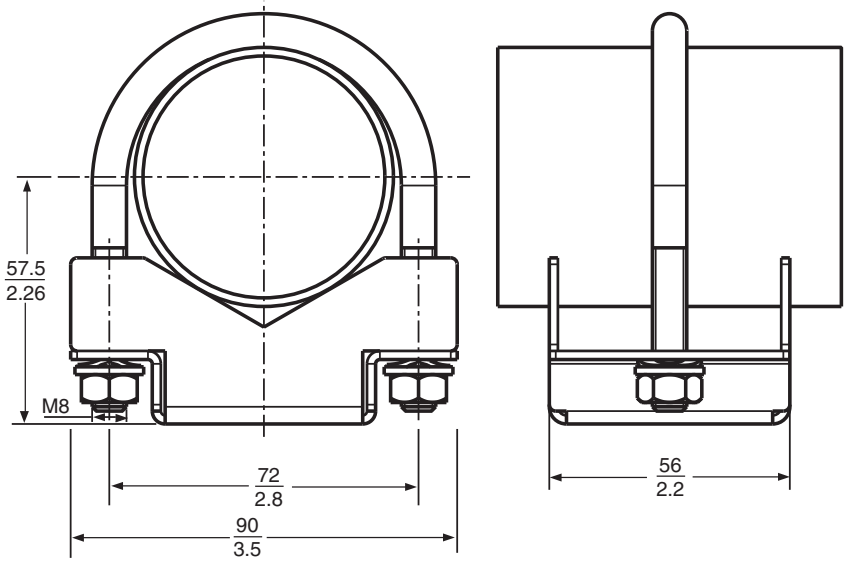
DIMENSIONS - NOMINAL (CONT.)

mm
in

L-SHAPED MOUNTING BRACKET



U-SHAPED MOUNTING BRACKET



ORDERING INSTRUCTIONS

1. Transmitter Model Number.
2. Tag and Application.

OTHER M&I PRODUCTS

Invensys provides a broad range of measurement and instrument products, including solutions for pressure, flow, analytical, positioners, temperature, controlling and recording. For a listing of these offerings, visit the Invensys Operations Management web site at:

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FOXBORO®

Instruction

MI 020-460
October 1996

RTT20
I/A Series® Temperature Transmitter

Operation, Configuration, and Calibration Using a HART Communicator

SIEBE®
A Siebe Group Company

Contents

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Introduction

General Description

The RTT20-T Temperature Transmitter with HART communications may be configured, operated, and calibrated using the HART Model 275 Communicator (Foxboro Model HT991).

The HART Communicator is used in two environments: Offline (not connected to a transmitter) and Online (connected to a transmitter). The Main menu (shown in Figure 1) is displayed when not connected to a transmitter. The Online Menu (shown in Figure 2) is displayed when connected to a transmitter.

Reference Documents

This document contains information on configuration, calibration, and operation of the RTT20-T Temperature Transmitter using a HART Communicator. Additional information about the transmitter and the communicator is contained in the following documents:

- MI 020-453: *RTT20 I/A Series Temperature Transmitter, Installation, Configuration, Operation, Calibration, and Maintenance*.
- MAN 4250: HART Communicator Product Manual
  (Booklet supplied with the communicator).

Top Level Menu Overview

Figure 1 shows the Main menu structure of the HART Communicator. Figure 2 shows the top level Online menu for the RTT20-T Transmitter.

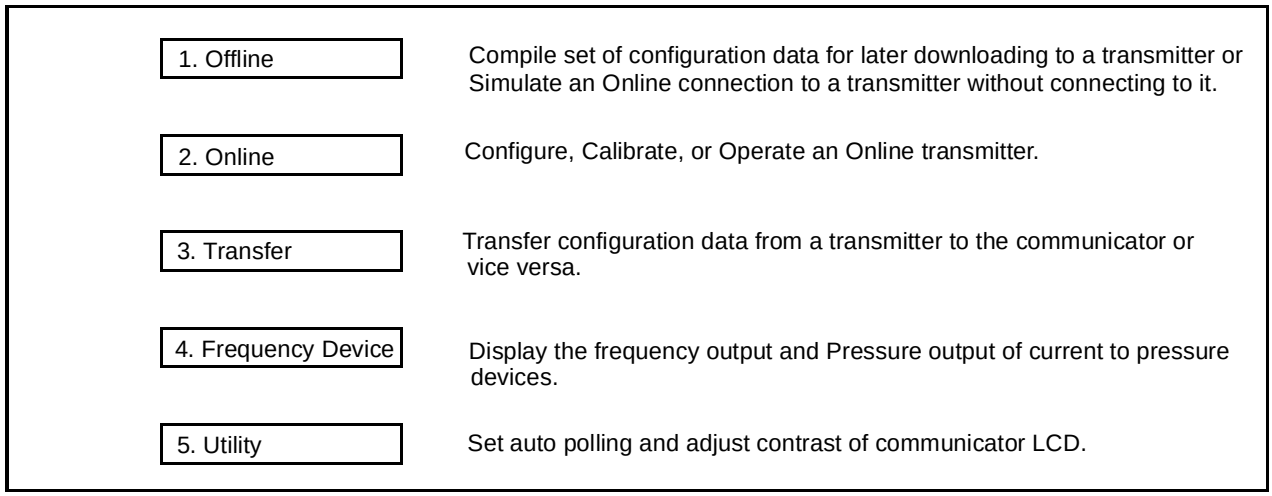

Figure 1. HART Communicator Main Menu

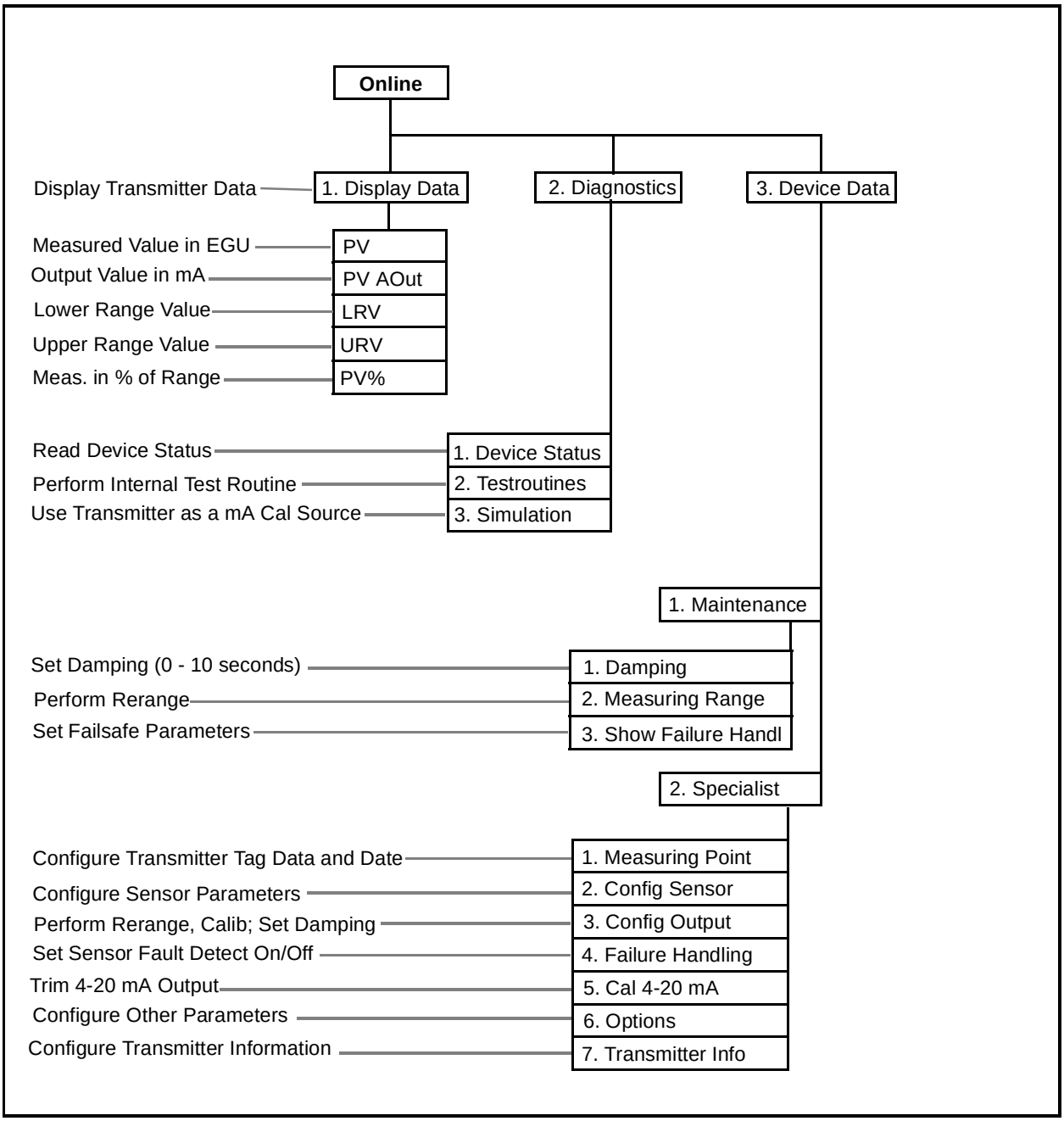

Figure 2. RTT20 Temperature Transmitter Top Level Online Menu

Connecting the Communicator to the Transmitter

Connect the communicator to the transmitter as shown in MI 020-453, supplied with the transmitter, and in MAN 4250, supplied with the communicator.

Communicator Keyboard and Display

Refer to MAN 4250 supplied with the communicator.

Operation

To display the measurement (Process Variable or PV) on the Communicator, select *2. Online* from the Main menu. Then select *1. Display Data* from the Online menu. The display will show:

PV	The measured value in engineering units.
PV AOut	The output value in mA.
LRV	The lower range value.
URV	The upper range value.
PV%	The measured value in percent of range.

Configuration

The most common practice is to configure your RTT20 Transmitter online. However, in some cases, you may wish to configure one set of data offline in your communicator and then download it to any number of RTT20 transmitters. Even though the configuration flowchart is presented in a different order for offline configuration than for online configuration, the procedure is similar to that explained below.

To configure your online transmitter with the Communicator:

1. Select *2. Online* from the Main menu.
2. Select *3. Device Data* from the Online menu.
3. Select *2. Specialist* from the next menu.
4. Follow Figure 3 and Figure 4 to access and set/change various parameters. See text in this section for an explanation of each parameter.

Online Configuration Flowcharts

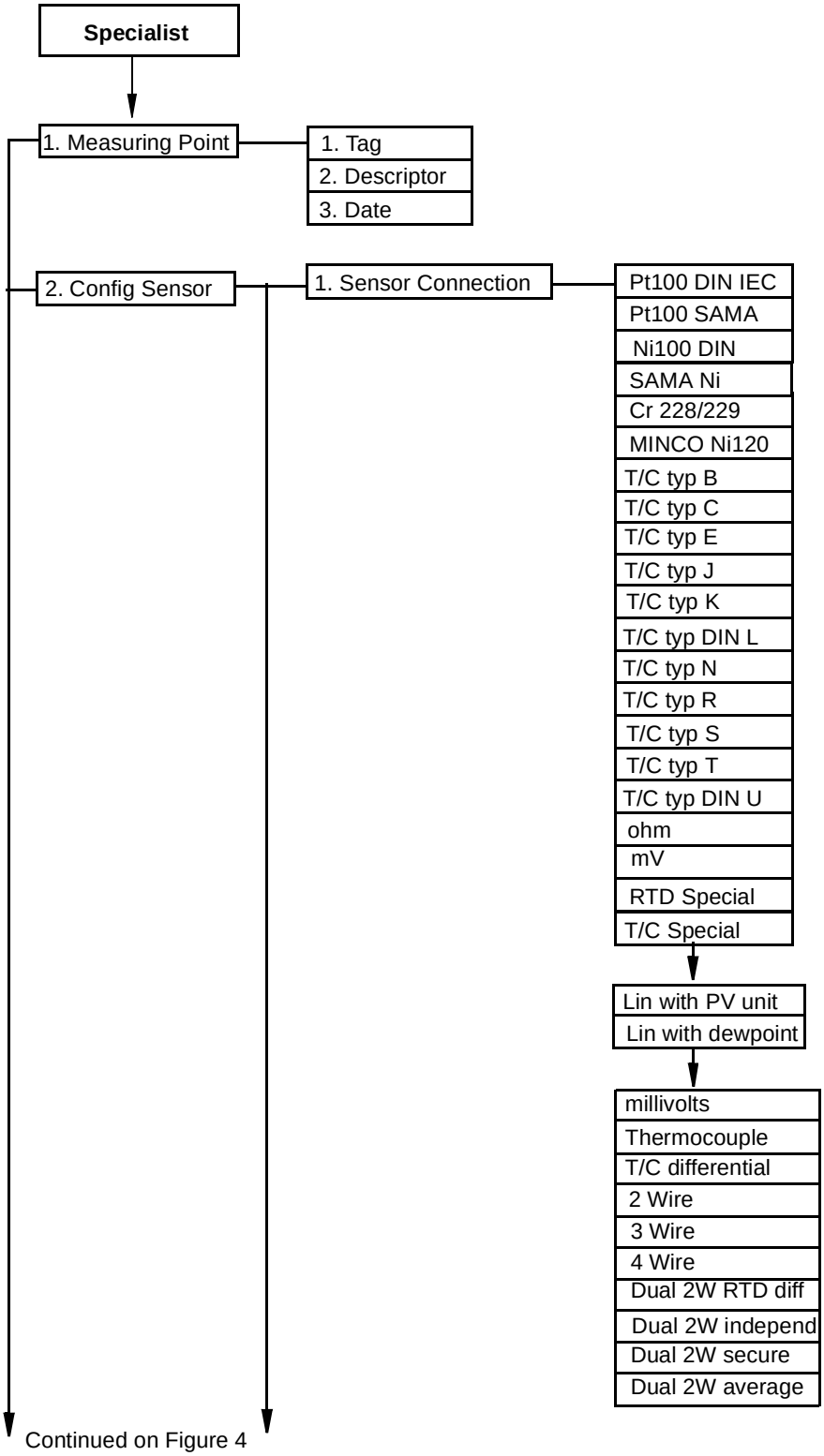

Figure 3. Online Configuration Flowchart

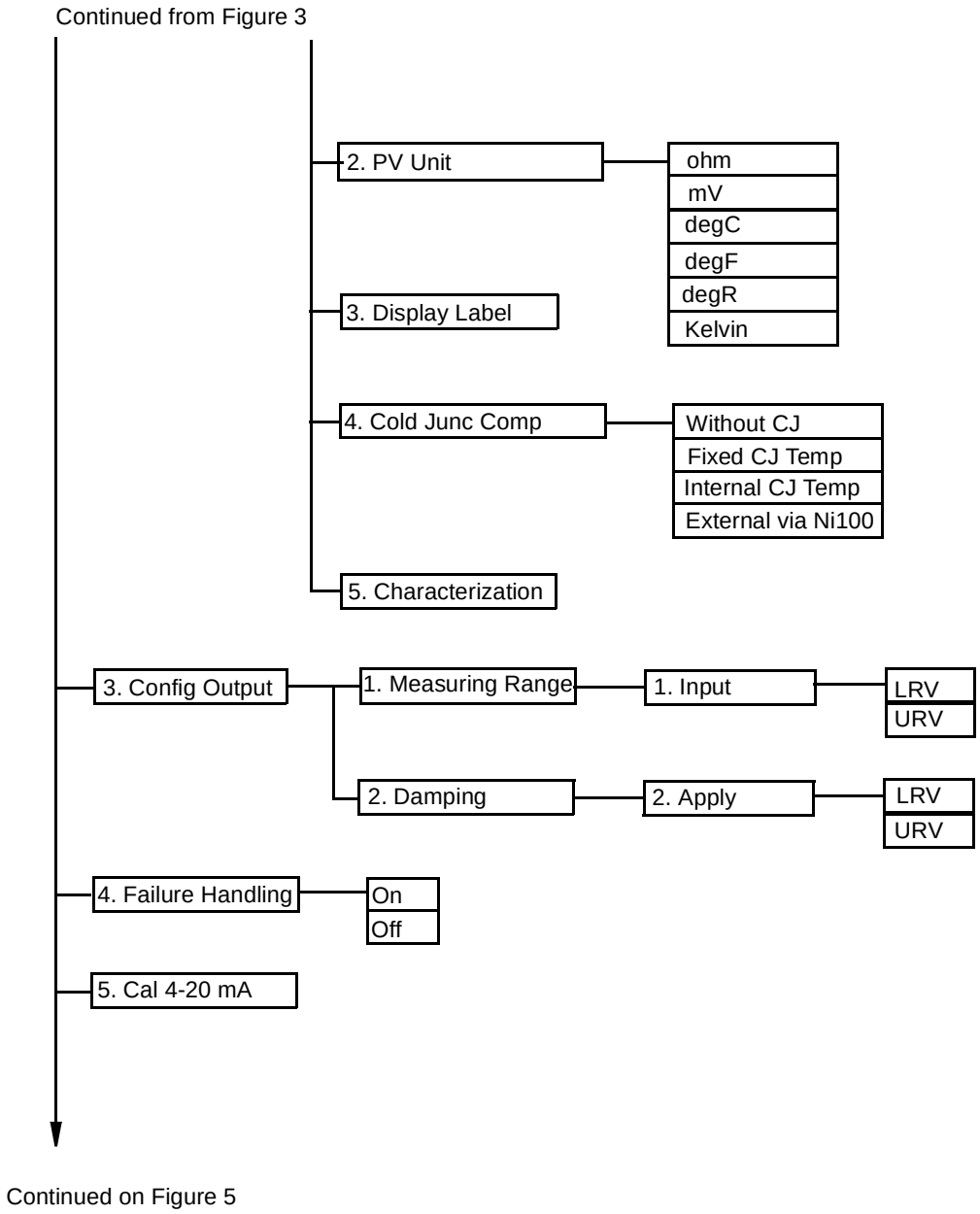

Figure 4. Online Configuration Flowchart (Continued)

Continued from Figure 4

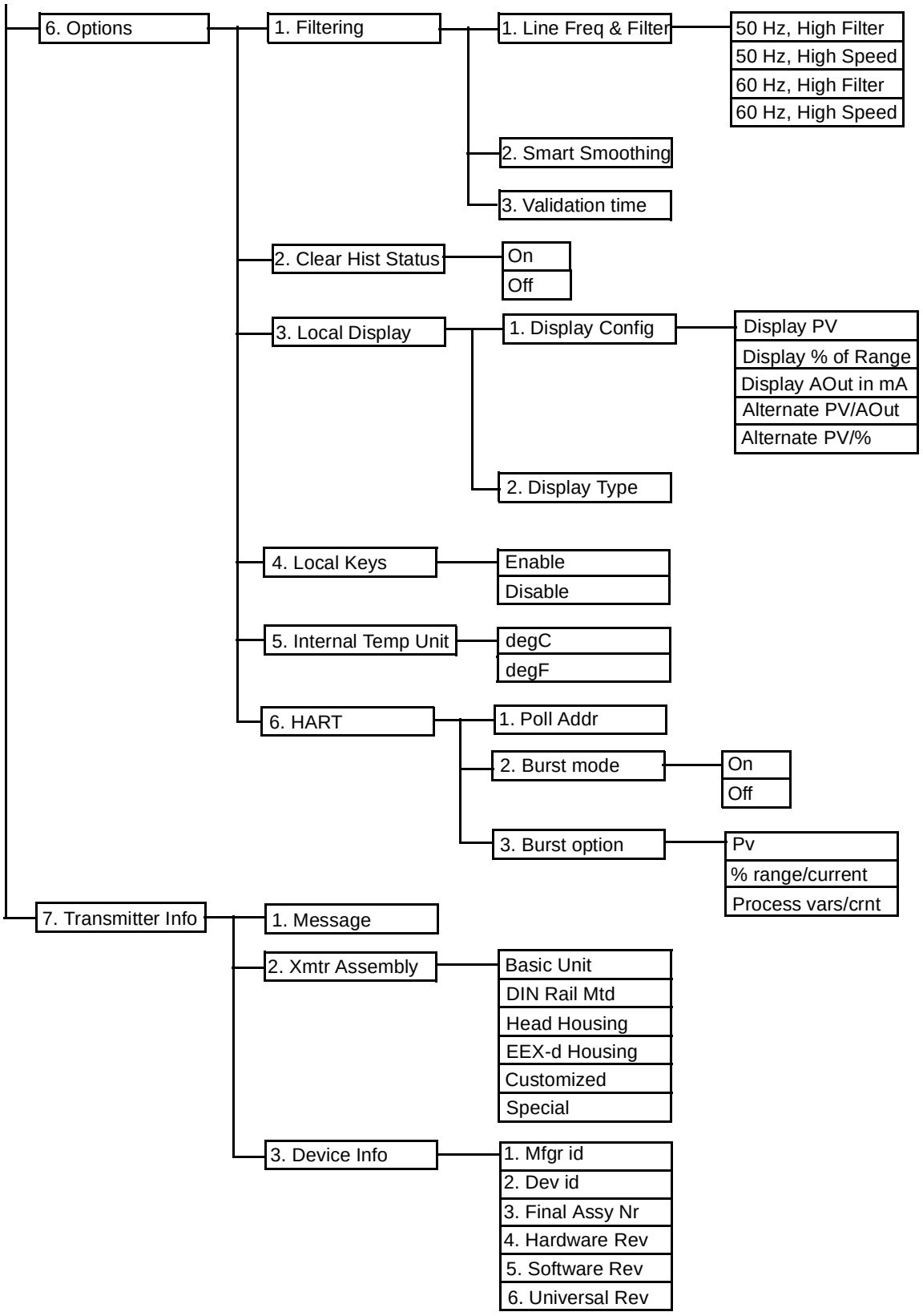

Figure 5. Online Configuration Flowchart (Continued)

Explanation of Parameters

Measuring Point

Tag	Normally configured to the plant tag number. The Tag Number is the primary identifier when communicating with a transmitter using the HART Communicator.
Description	Normally configured as the Tag Name.
Date	The date entered in the form mm/dd/yy.

Config Sensor

Sensor Conn	The input: type of thermocouple, type of RTD, mV, or ohm.
PV Unit	The process variable (ohm, mV, degC, degF, degR, Kelvin).
Display Label	The label on the third line of the optional display. Seven characters maximum.
Cold Junc Comp	Cold Junction Compensation is used with a thermocouple input only. Specify *Without CJ, Fixed CJ Temp, Internal CJ Temp,* or *External via Ni100*.
Characterization	For a calibration, specify the number of points on the curve between 2 and 22. Then specify their coordinates.

Config Output

Measuring Range	Specify *Input* to rerange the transmitter without calibration equipment or *Apply* to perform a calibration. Then specify the lower and upper range value (*LRV* and *URV*).
Damping	Damping may be specified between 0 and 30 seconds. Foxboro recommends increasing the *Smoothing* and/or *Validation time* before increasing the damping value.

Failure Handling

Specify the Sensor Fault Detection feature as *On* or *Off*.

Cal 4-20 mA

Trim the 4 and 20 mA Output by connecting a digital voltmeter and precision resistor in the output loop (see MI 020-453) and adjusting the output with this configuration parameter. This procedure should be performed only if the actual current value in the loop as measured by an accurate milliammeter does not agree with the mA value being displayed on the HART Communicator or the integral indicator (-L1 or -L3 option). This procedure should only be done after recalibrating the transmitter using accurate equipment.

Options

Filtering	*Line Freq & Filter*: Specify the ac frequency of the power supply (*50* or *60* Hz) and the ability to help eliminate noise from the power supply. Set to *High Filter* unless you require extremely fast response with damping set for 0 seconds. In that case only, set to *High Speed*. *Smart Smoothing*: Process or electrical noise is minimized by a digital filtering algorithm and is smoothed by averaging the input over an adjustable time period. Specify the time period from 0 to 30 seconds. *Validation Time*: Specify the lag time that the microprocessor holds and compares the input to past inputs. This is adjustable from 0 to 10 seconds.
Clear Historical Status	Specify *Yes* or *No*.
Local Display	*Display Config*: Specify the reading on the transmitter optional local display as Display PV, Display % of Range, Display AOut in mA, Alternate PV/AOut, and Alternate PV/%. *Display Type*: Indicates type (one line or three line) of local display (if any) that is attached to transmitter.
Local Keys	Allows you to *Enable* or *Disable* keys on the optional local indicator.
Int Temp Unit	Cold junction compensation units. Specify C or F.
HART	*Poll Addr*: Address of 0 allows the transmitter to operate in the standard point to point, two-wire 4-20 mA mode. If transmitter is to be multidrop wired, specify an address from 1 to 15. *Burst Mode*: Burst cannot be used with multidrop wiring. Therefore, specify *Off* unless the Poll Address is set to 0. *Burst Option*: Select PV, % range/current, or vars/crnt.

Calibration

The RTT20 Transmitter has an advanced self-calibration routine that greatly extends the time between recalibrations. Every three seconds, the transmitter checks the zero and full scale output against highly accurate and stable internal voltage signals that are referenced back to the factory calibration stored in nonvolatile EEPROM memory. Any adjustments are made automatically without interrupting the output signal.

Trimming 4-20 mA Output

If you have a 4-20 mA output, you may trim the output at 4 mA and 20 mA by connecting a digital voltmeter and precision resister in the output loop (see MI 020-453) and adjusting the output with the Communicator. See *Cal 4-20 mA* in previous section.

Custom Curve Calibration

Your transmitter may be calibrated to a standard or custom curve using the Communicator. See *Characterization* in previous section and follow prompts on Communicator display.

ISSUE DATES
OCT 1996

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N-TRON
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300 Series
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Installation
Guide

Industrial Ethernet Switch Installation Guide

302MC-XX
302MCE-XX-YY
304TX
305FX-XX
305FXE-XX-YY
306TX
306FX2-XX
306FXE2-XX-YY
308TX
Where: XX = ST or SC and YY = -15, -40, or -80

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Warning

Do not perform any services on the unit unless qualified to do so. Do not substitute unauthorized parts or make unauthorized modifications to the unit.

Do not operate the unit with the top cover removed, as this could create a shock or fire hazard.

Do not block the air vents on the sides or the top of the unit.

Do not operate the equipment in the presence of flammable gasses or fumes. Operating electrical equipment in such an environment constitutes a definite safety hazard.

Safety Warnings

ELECTRICAL SAFETY

WARNING: Explosion hazard, do not disconnect while circuits is live unless area is known to be non-hazardous.

WARNING: Disconnect the power cable before removing the enclosure top.

WARNING: Do not operate the unit with the top cover removed.

WARNING: Properly ground the unit before connecting anything else to the unit. Units not properly grounded may result in a safety risk and could be hazardous and may void the warranty. See the grounding technique section of this user manual for proper ways to ground the unit.

WARNING: Do not work on equipment or cables during periods of lightning activity.

WARNING: Do not perform any services on the unit unless qualified to do so.

WARNING: Do not block the air vents.

WARNING: Observe proper DC Voltage polarity when installing power input cables. Reversing voltage polarity can cause permanent damage to the unit and void the warranty.

Power must be supplied by an isolating source, and a 3.3 A maximum rated UL Recognized fuse must be installed immediately before the unit.

LASER SAFETY (FXE Products Only)

CAUTION: CLASS 1 LASER PRODUCT. Do not stare into the laser!)

Hazardous Location Installation Requirements

1. **WARNING:** Do not disconnect while circuit is live, unless area is known to be non-hazardous.

2. **WARNING:** Install only in accordance with Local & National Codes of Authorities Having Jurisdiction.

3. Class I, Div 2 Installations require that power connections must be current limited at the power source with an in-line fuse rated at 0.5A.

4. Class I, Div 2 installations require that all devices connected to this product must be UL approved for the area in which it is installed.

5. Only UL approved wiring with temperature ratings greater than 90°C permitted for Class I, Div 2 installations operating at temperatures up to70°C ambient.

6. Limited Operating Voltage: 12-30V for Class I, Div 2 installations.

300 Series Industrial Ethernet Switches

The 300 Series Unmanaged Industrial Ethernet Switches support high speed layer 2 switching between ports. All N-TRON 300 Series switches are housed in a ruggedized steel enclosure, and provide Category-5 compliant 10/100-BaseT connections for high performance network design, and hub/repeater upgrades.

The 302MC/MCE is a 2 port unmanaged media converter that converts 10/100BaseTX copper to 100BaseFX full duplex fiber.

The 304TX, 306TX, and 308TX are affordable and share a small footprint. Each switch is capable of auto negotiating 10/100 Mb and half/full duplex communications.

The 305FX and 306FX2 switches are unmanaged and have 4 ports similar to the 304TX, plus an additional multimode fiber optic up-link port(s), capable of 2 Kilometers of 100 Mb communications without the use of repeaters.

The 305FXE and 306FXE2 switches are unmanaged and similar to the 305FX and 306FX2, respectively. However, these models use singlemode transceivers with extended range capability. The N-TRON FXE products utilize singlemode fiber transceiver(s) that are capable of 15, 40, and up to 80 Kilometers of 100 Mb full duplex communications.

All fiber products utilize the IEEE compliant SC or ST duplex connectors for fiber optic communications. All 10/100Base-TX ports utilize the RJ45 shielded connectors.

Key Features

- Full IEEE 802.3 & 100Base-FX Compliance
- Full IEEE 1613 Compliance (Communications Networking Devices in Electric Power Stations)
- NEMA TS1/TS2 Compliance (Traffic Control Systems)
- American Bureau of Shipping (ABS) Type Approval (Maritime and Offshore Applications)
- Extended Environmental Specifications
- Support for Full/Half Duplex Operation
- LED Link/Activity Status Indication
- Autonegotiation, Autosensing Speed, Duplex, and Flow Control
- Up to 1.8 Gb/s Maximum Throughput
- Industry Standard 35mm DIN-Rail Mounted Enclosure

PACKAGE CONTENTS

Please make sure the Ethernet Switch package contains the following items:

1. 300 Series Unit
2. N-Tron Product CD

Contact your carrier if any items are damaged.

INSTALLATION

Read the following warning before beginning the installation:

WARNING

FXE units contain a class 1 laser. Do not stare into the laser beam (fiber optic connector) when installing or operating the product.

Never install or work on electrical equipment or cabling during periods of lightning activity.

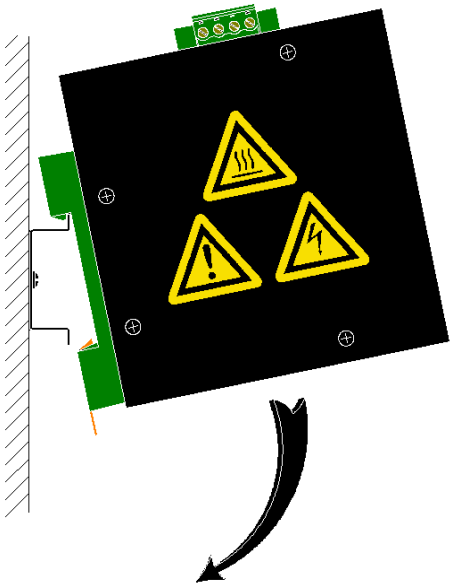
Disconnect the power cable before removing the enclosure top.
Do not operate the unit with the top cover removed

UNPACKING

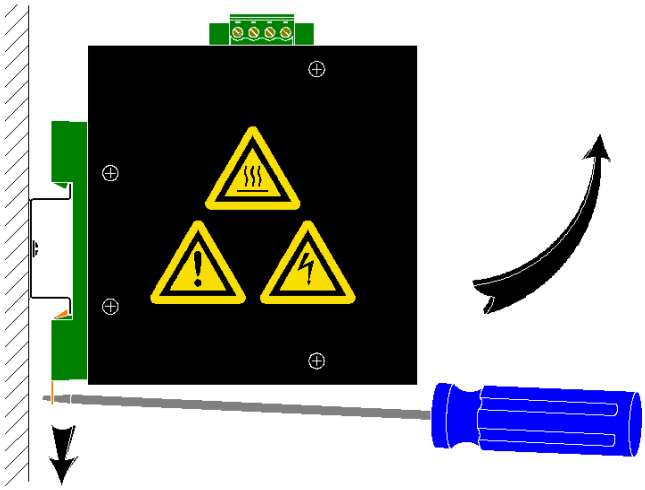
Remove all the equipment from the packaging, and store the packaging in a safe place. File any damage claims with the carrier.

DIN-Rail Mounting

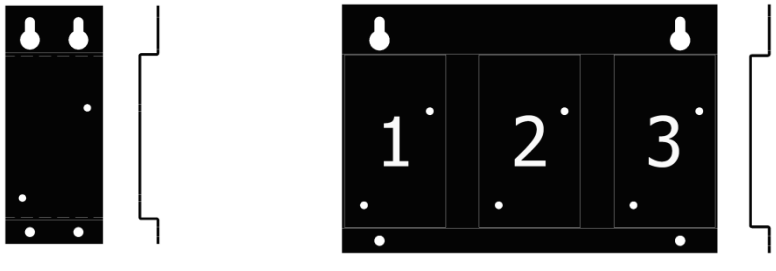
Install the unit in a standard DIN-Rail. Recess the unit to allow at least 5” of horizontal clearance for fiber optic cable bend radius (2” for TX models).



To install the unit to 35mm industrial DIN-Rail, place the top edge of the included mounting bracket on the back of the unit against the DIN-Rail at a 15° angle as shown. Rotate the bottom of the unit to the back (away from you) until it snaps into place.

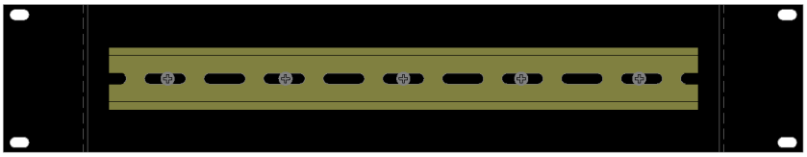


To remove the unit from the 35mm industrial DIN-Rail, place a flat head screwdriver into the orange release clip found at the bottom of the unit, and apply downward force on the clip until it disengages from the bottom of the unit from the DIN-Rail. Rotate the bottom of the unit towards you and up at an approximate 15° upward angle to completely remove the unit.



300-PM **900-PM**

URMK



With the exception of the 524TX and 526FX2, all N-Tron™ products are designed to be mounted on industry standard 35mm DIN-Rail. However, DIN-Rail mounting may not be suitable for all applications. We offer three alternative mounting solutions: Our 300 Panel Mount Assembly (P/N: 300-PM) may be used to mount a single 300 Series unit to a panel or other flat surface. Our 900 Panel Mount Assembly (P/N: 900-PM) may be used to securely mount our 100, 200, 300, 400, 500, or 900 Series products to a panel or other flat surface; Our Universal Rack Mount Kit (P/N: URMK) may be used to mount our products to

standard 19" racks.

FRONT PANEL

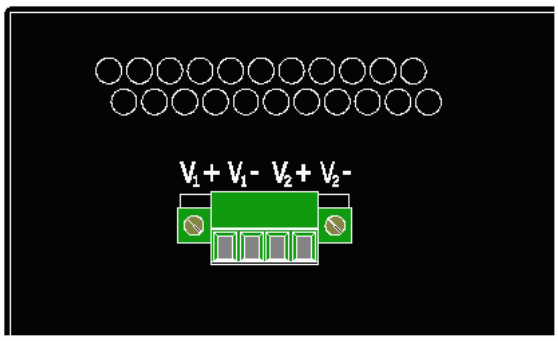
LNK	Link LED for Fiber Optic Ports
TX	Fiber Optic Transmit Ports
RX	Fiber Optic Receive Ports
ACT	Activity LED for Fiber Optic Ports
RJ45 Ports	Ports 1-4 Auto sensing 10/100BaseT Connections
⏻	Green LED lights when Power is connected

NOTE: Each RJ45 data port has two LED's for each connector. The lower LED indicates LINK status, and the upper LED indicates ACTIVITY.

LED's: The table below describes the operating modes:

LED	Color	Description
⏻	GREEN	Power is Applied
	OFF	Power is OFF
LNK	GREEN	Link between ports established
	OFF	No Link between ports
ACT	GREEN	Data is active between ports
	OFF	Data is inactive between ports

APPLYING POWER (Top View)



Unscrew & Remove the DC Voltage Input Plug from the top header.
Install the DC Power Cables into the Plug (observing polarity on unit).
Plug the Voltage Input Plug back into the top header.
Tightening torque for the terminal block power plug is **0.22 Nm/0.162 Pound Foot**.
All LED's will flash ON Momentarily
Verify the Power LED stays ON (GREEN).

Note: Either V1 or V2 can be connected to power for minimal operation. For redundant power operation, V_1 and V_2 plugs must be connected to separate DC Voltage sources. Use wire sizes of 16-28 gauge. The power cord should be limited to less than 10 meters in order to ensure optimum performance.

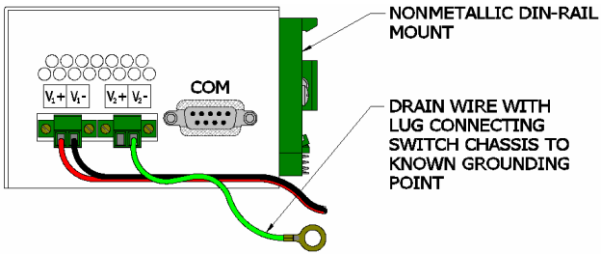
Recommended 24V DC Power Supplies, similar to

100VAC/240VAC:

N-Tron's NTPS-24-1.3, DC 24V/1.3A

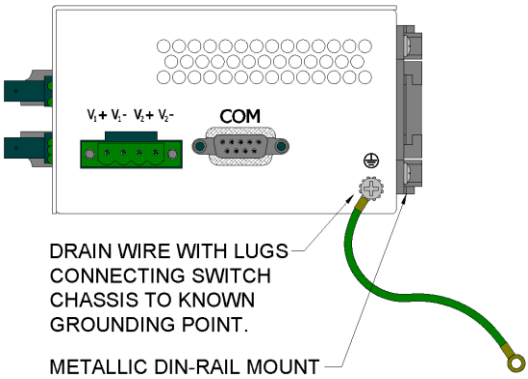
N-TRON SWITCH GROUNDING TECHNIQUES

The grounding philosophy of any control system is an integral part of the design. N-Tron switches are designed to be grounded, but the user has been given the flexibility to float the switch when required. The best noise immunity and emissions (i.e. CE) are obtained when the N-Tron switch chassis is connected to earth ground via a drain wire. Some N-Tron switches have metal din-rail brackets that can ground the switch if the din-rail is grounded. In some cases, N-Tron switches with metal brackets can be supplied with optional plastic brackets if isolation is required.



Both V- legs of the power input connector are connected to chassis internally on the PCB. Connecting a drain wire to earth ground from one of the V- terminal plugs as shown here will ground the switch and the chassis. The power leads from the power source should be limited to 3 meters or less in length.

As an alternate, users can run a drain wire & lug from any of the Din-Rail screws or empty PEM nuts on the enclosure. When using an unused PEM nut to connect a ground lug via a machine screw, care should be taken to limit the penetration of the outer skin by less than 1/4 in. Failure to do so may cause irreversible damage to the internal components of the switch.



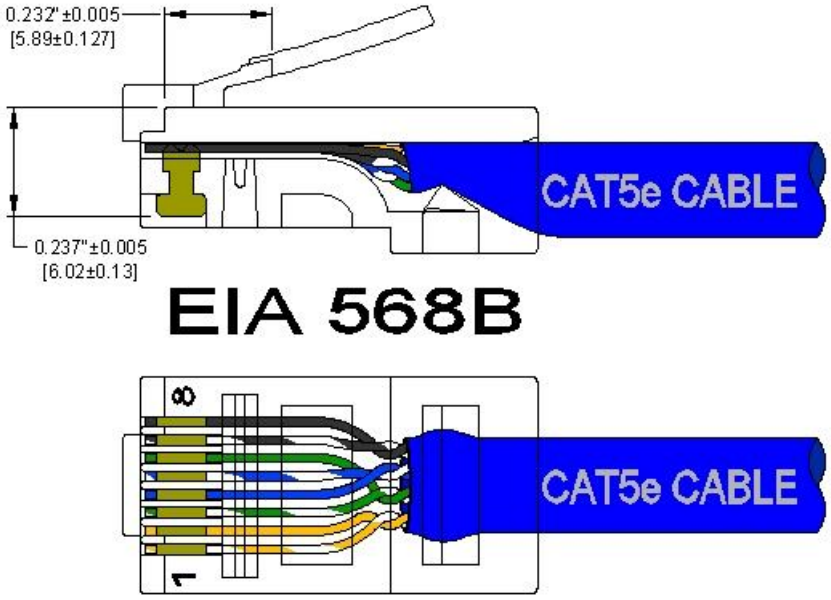
Note: Before applying power to the grounded switch, you must use a volt meter to verify there is no voltage difference between the power supply's negative output terminal and the switch chassis grounding point.

If the use of shielded cables is required, it is generally recommended to only connect the shield at one end to prevent ground loops and interfere with low level signals (i.e. thermocouples, RTD, etc.). Cat5e cables manufactured to EIA-568A or 568B specifications are required for use with N-Tron Switches.

In the event all Cat5e patch cable distances are small (i.e. All Ethernet devices are located the same local cabinet and/or referenced to the same earth ground), it is permissible to use fully shielded cables terminated to chassis ground at both ends in systems void of low level analog signals.

RJ45 CONNECTOR CRIMP SPECIFICATIONS

Please reference the illustration below for your Cat5 cable specifications:



CONNECTING THE UNIT

For 300 Series fiber units, remove the dust cap from the fiber optic connectors and connect the fiber optic cables. For Fiber Optic ports, the TX port on the near station should be connected to the RX port of the far end station, and the RX port should be connected to the TX port of the far end station.

For 10Base-T ports, plug a Category 3 (or greater) twisted pair cable into the RJ45 connector. For 100Base-T ports, plug a Category 5 (or greater) twisted pair cable into the RJ45 connector. Connect the other end to the far end station. Verify that the LNK LED's are ON once the connection has been completed. To connect any other port to another Switch or Repeater, use a standard Cat5 straight through or crossover cable.

Warning: Creating a port to port connection on the same switch (i.e. loop) is an illegal operation and will create a broadcast storm which will crash the network!

Note: For units which have the **N-View Option**, you can validate that all ports are working correctly by installing the N-View OPC Server software. The software is freely distributed on the ProductCD and our website (http://www.n-tron.com/pdf/setup_nviewopc.zip)Once the software is installed, you should view the Ports Counter page to remotely monitor each connected port. You may find it helpful to copy [Alt]+[Print Screen] the Port Counter information for each port and paste [Control]+[V] into a Windows document for further review. Please consult your N-View OPC Server Manual for additional information.

TROUBLESHOOTING

1. Make sure the ⏻ (Power LED) is ON.
2. Verify that Link LED's are ON for connected ports.
3. Verify cabling used between stations.
4. Verify that cabling is Category 5 (or greater) for 100Mbit Operation.
5. Verify TX is connected to far end RX and vise versa (fiber optic units only).

SUPPORT

Contact N-TRON Corp. at:
TEL: 251-342-2164
FAX: 251-342-6353
www.n-tron.com
N-TRON_Support@n-tron.com

FCC STATEMENT

This product complies with Part 15 of the FCC-A Rules.
Operation is subject to the following conditions:
(1) This device may not cause harmful Interference
(2) This device must accept any interference received, including interference that may cause undesired operation.

KEY SPECIFICATIONS

Physical	**302MC**	**304TX**	**305FX**	**306FX2**	**306TX**	**308TX**
Height:	2.97”	3.06”	3.46”	3.46”	3.06”	3.46”
Width:	2.01”	2.01”	2.01”	2.01”	2.01”	2.01”
Depth:	3.17”	3.38”	3.38”	3.38”	3.39”	3.38”
Weight:	0.75 lbs	0.75 lbs	0.75 lbs	0.75 lbs	0.75 lbs	0.75 lbs

Electrical

Input Voltage:	10-30 VDC (Regulated)
Input Current:	230mA max. @ 24VDC (Steady State)
Inrush Current:	9.0Amp/0.5 ms max. @ 24VDC
Input Ripple:	Less than 100 mV
Input Wire Size:	16-28 AWG

Environmental

Operating Temperature:	-40°C to 70°C
Storage Temperature:	-40°C to 85°C
Operating Humidity:	10% to 90% (Non Condensing)
Operating Altitude:	0 to 10,000 ft.

Network Media

10BaseT:	> Cat-3 Cable
100BaseT:	> Cat-5 Cable
100BaseFX:	Multimode: 50-62.5/125µm Fiber Singlemode: 7-10/125µm Fiber

Fiber Transceiver Characteristics

Fiber Length:	*2km**	*15km***	*40km***	*80km***
TX Power Min	*-19dBm*	*-15dBm*	*-5dBm*	*-5dBm*
RX Sensitivity Max:	*-31dBm*	*-31dBm*	*-34dBm*	*-34dBm*
Wavelength:	*1310nm*	*1310nm*	*1310nm*	*1550nm*

**=Multimode ** =Singlemode*

Connectors

10/100BaseT: RJ45 UTP Ports
100BaseFX: SC or ST Duplex Port(s) (if equipped)

Recommended Minimum Wiring Clearance:

Front: 2" (5.08 cm) for 304TX, 306TX, & 308TX models
4” (10.16 cm) for 302MC, 305FX, & 306FX2 models
Side: 1" (2.54 cm)

Regulatory Approvals

Safety: Suitable for use in Class I, Division 2, Groups A, B, C and D Hazardous Locations, or Nonhazardous Locations only.

EMI: EN61000-6-4, EN55011 - Class A
FCC Title 47, Part 15, Subpart B - Class A
EMS: EN61000-6-2
EN61000-4-2 (ESD)
EN61000-4-3 (RS)
EN61000-4-4 (EFT)
EN61000-4-5 (Surge)
EN61000-4-6 (Conducted Disturbances)

Conducted Low Frequency: IEC60533

Shock: IEEE 1613 (250 mm)
Vibration: IEEE 1613 (V.S.4 150mm/s)
IEC60068-2-6 (Test Fc)
Cold: IEC60068-2-1
Dry Heat: IEC60068-2-2
Damp Heat: IEC60068-2-30 (Test Db)

GOST- R Certified.

Warranty: Effective January 1, 2008, all N-TRON products carry a 3 year limited warranty from the date of purchase.

N-TRON Limited Warranty

N-TRON, Corp. warrants to the end user that this hardware product will be free from defects in workmanship and materials, under normal use and service, for the applicable warranty period from the date of purchase from N-TRON or its authorized reseller. If a product does not operate as warranted during the applicable warranty period, N-TRON shall, at its option and expense, repair the defective product or part, deliver to customer an equivalent product or part to replace the defective item, or refund to customer the purchase price paid for the defective product. All products that are replaced will become the property of N-TRON. Replacement products may be new or reconditioned. Any replaced or repaired product or part has a ninety (90) day warranty or the remainder of the initial warranty period, whichever is longer. N-TRON shall not be responsible for any custom software or firmware, configuration information, or memory data of customer contained in, stored on, or integrated with any products returned to N-TRON pursuant to any warranty.

OBTAINING WARRANTY SERVICE: Customer must contact N-TRON within the applicable warranty period to obtain warranty service authorization. Dated proof of purchase from N-TRON or its authorized reseller may be required. Products returned to N-TRON must be pre-authorized by N-TRON with a Return Material Authorization (RMA) number marked on the outside of the package, and sent prepaid and packaged appropriately for safe shipment. Responsibility for loss or damage does not transfer to N-TRON until the returned item is received by N-TRON. The repaired or replaced item will be shipped to the customer, at N-TRON's expense, not later than thirty (30) days after N-TRON receives the product. N-TRON shall not be responsible for any software, firmware, information, or memory data of customer contained in, stored on, or integrated with any products returned to N-TRON for repair, whether under warranty or not.

ADVANCE REPLACEMENT OPTION: Upon registration, this product qualifies for advance replacement. A replacement product will be shipped within three (3) days after verification by N-TRON that the product is considered defective. The shipment of advance replacement products is subject to local legal requirements and may not be available in all locations. When an advance replacement is provided and customer fails to return the original product to N-TRON within fifteen (15) days after shipment of the replacement, N-TRON will charge customer for the replacement product, at list price.

WARRANTIES EXCLUSIVE: IF AN N-TRON PRODUCT DOES NOT OPERATE AS WARRANTED ABOVE, CUSTOMER'S SOLE REMEDY FOR BREACH OF THAT WARRANTY SHALL BE REPAIR, REPLACEMENT, OR REFUND OF THE PURCHASE PRICE PAID, AT N-TRON'S OPTION. TO THE FULL EXTENT ALLOWED BY LAW, THE FOREGOING WARRANTIES AND REMEDIES ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER WARRANTIES, TERMS, OR CONDITIONS, EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, INCLUDING WARRANTIES, TERMS, OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, SATISFACTORY QUALITY, CORRESPONDENCE WITH DESCRIPTION, AND NON-INFRINGEMENT, ALL OF WHICH ARE EXPRESSLY DISCLAIMED. N-TRON NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH THE SALE, INSTALLATION, MAINTENANCE OR USE OF ITS PRODUCTS. N-TRON SHALL NOT BE LIABLE UNDER THIS WARRANTY IF ITS TESTING AND EXAMINATION DISCLOSE THAT THE ALLEGED DEFECT OR MALFUNCTION IN THE PRODUCT DOES NOT EXIST OR WAS CAUSED BY CUSTOMER'S OR ANY THIRD PERSON'S MISUSE, NEGLECT, IMPROPER INSTALLATION OR TESTING, UNAUTHORIZED ATTEMPTS TO OPEN, REPAIR OR MODIFY THE PRODUCT, OR ANY OTHER CAUSE BEYOND THE RANGE OF THE INTENDED USE, OR BY ACCIDENT, FIRE, LIGHTNING, POWER CUTS OR OUTAGES, OTHER HAZARDS, OR ACTS OF GOD.

LIMITATION OF LIABILITY: TO THE FULL EXTENT ALLOWED BY LAW, N-TRON ALSO EXCLUDES FOR ITSELF AND ITS SUPPLIERS ANY LIABILITY, WHETHER BASED IN CONTRACT OR TORT (INCLUDING NEGLIGENCE), FOR INCIDENTAL, CONSEQUENTIAL, INDIRECT, SPECIAL, OR PUNITIVE DAMAGES OF ANY KIND, OR FOR LOSS OF REVENUE OR PROFITS, LOSS OF BUSINESS, LOSS OF INFORMATION OR DATA, OR OTHER FINANCIAL LOSS ARISING OUT OF OR IN CONNECTION WITH THE SALE, INSTALLATION, MAINTENANCE, USE, PERFORMANCE, FAILURE, OR INTERRUPTION OF ITS PRODUCTS, EVEN IF N-TRON OR ITS AUTHORIZED RESELLER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, AND LIMITS ITS LIABILITY TO REPAIR, REPLACEMENT, OR REFUND OF THE PURCHASE PRICE PAID, AT N-TRON'S OPTION. THIS DISCLAIMER OF LIABILITY FOR DAMAGES WILL NOT BE AFFECTED IF ANY REMEDY PROVIDED HEREIN SHALL FAIL OF ITS ESSENTIAL PURPOSE.

DISCLAIMER: Some countries, states, or provinces do not allow the exclusion or limitation of implied warranties or the limitation of incidental or consequential damages for certain products supplied to consumers, or the limitation of liability for personal injury, so the above limitations and exclusions may be limited in their application to you. When the implied warranties are not allowed to be excluded in their entirety, they will be limited to the duration of the applicable written warranty. This warranty gives you specific legal rights which may vary depending on local law.

GOVERNING LAW: This Limited Warranty shall be governed by the laws of the State of Delaware, U.S.A.

N-TRON
THE INDUSTRIAL NETWORK COMPANY

305FX-N

The N-TRON® 305FX is an unmanaged, five port Industrial Ethernet Switch. It is housed in a ruggedized DIN-RAIL enclosure and is designed for use in industrial data acquisition, control, and Ethernet I/O applications.

PRODUCT FEATURES

- Compact Size, Small Footprint
- Full IEEE 802.3 and 1613 Compliance
- NEMA TS1/TS2 Compliance
- American Bureau of Shipping (ABS) Type Approval
- Extended Environmental Specifications
- Four 10/100 BaseTX RJ-45 Ports
- One 100BaseFX Port ST (shown) or SC
- RJ-45 Ports Support Full/Half Duplex Operation
- LED Link/Activity Status Indication
- Store-and-Forward Technology
- Auto Sensing Duplex, Speed and MDIX (RJ-45)
- Up to 1.0 Gb/s Maximum Throughput
- Rugged Industrial DIN-RAIL Enclosure
- Redundant Power Inputs (10-30 VDC)
- N-View™ OPC Switch Monitoring Option

PRODUCT OVERVIEW

N-Tron's 305FX Industrial Network Switch is designed to meet and exceed the most demanding industrial communication requirements while providing high throughput and minimum downtime.

The 305FX provides four RJ-45 auto sensing 10/100BaseTX ports, plus a fiber based Fast Ethernet uplink port. All TX ports are full/half duplex capable, using state-of-the-art Ethernet switching technology. The 305FX auto-negotiates the speed and flow control capabilities of the four TX port connections, and configures itself automatically. The fiber optic port utilizes industry standard ST or SC duplex connectors and is configured for full duplex operation. Both multimode and singlemode fiber models are available.

The TX ports of the 305FX are auto sensing, so there will be no need to make extensive wiring changes due to future upgrades of host computers, plant systems, or Ethernet I/O modules. The switching fabric simply scales up or down automatically to match network environments.

The 305FX supports up to 4,000 MAC addresses, enabling these products to support extremely sophisticated and complex network architectures.

The 305FX is a candidate for upgrading existing hubs and repeaters to increase bandwidth and determinism by virtually eliminating network collisions. The product provides a cost effective solution while maintaining the plug & play simplicity of an unmanaged hub.

The 305FX can simplify plant wiring by eliminating the need to bring data acquisition and control network connections back to a climate controlled environment. The 305FX has extended operating environmental specifications to meet the harsh needs of the industrial environment. For cost savings and convenience the 305FX can be DIN-Rail mounted alongside Ethernet I/O or other industrial equipment.

The unique compact size provides a small footprint, conserving space in the most critical dimension. The 305FX can also be panel mounted if desired.

To increase reliability, the 305FX includes redundant power inputs. LED's are provided to display the link status and activity of each port, as well as power on/off status.

N-VIEW OPC PORT MONITORING (With -N Option Only)

The N-TRON N-View OLE for Process Control (OPC) server software can be combined with popular HMI software packages to add network traffic monitoring, trending and alarming to any application using N-TRON switches configured with the N-View option. N-TRON's N-View OPC Server collects 41 different traffic variables per port and 5 system level variables per switch. This information can provide a complete overview of the network load, service quality, and packet traffic. OPC client software can use N-View OPC Server data to resolve network problems quickly and improve system reliability.

SPECIFICATIONS

Case Dimensions

Height:	3.5"	(8.9 cm)
Width:	2.1"	(5.4 cm)
Depth:	3.4"	(8.7 cm)
Weight:	0.75 lbs	(0.34 kg)

Electrical

Input Voltage:	10-30 VDC
Input Current:	250 mA@24V
BTU/hr:	20.5@24 VDC
Inrush:	10Amp/0.9ms@24V

Environmental

Operating Temperature:	-40°C to 70°C
Storage Temperature:	-40°C to 85°C
Operating Humidity:	10% to 95% (Non Condensing)
Operating Altitude:	0 to 10,000 ft.

Shock and Vibration (bulkhead mounting)

Shock:	200g @ 10ms
Vibration/Seismic:	50g, 5-200Hz, Triaxial

Network Media

10BaseT:	≥Cat3 Cable
100BaseTX:	≥Cat5 Cable
100BaseFX:	
Multimode	50-62.5/125µm
Singlemode	7-10/125µm

Connectors

10/100BaseTX:	Four (1) RJ-45 TX Ports
100BaseFX:	One (1) ST or SC Duplex Port

Recommended Wiring Clearance

Front:	4" (10.16 cm)
Top:	1" (2.54 cm)

Fiber Transceiver Characteristics

Fiber Length	*2km**	*15km***	*40km***	*80km***
TX Power Min	*-19dBm*	*-15dBm*	*-5dBm*	*-5dBm*
RX Sensitivity Max	*-31dBm*	*-31dBm*	*-34dBm*	*-34dBm*
Wavelength	*1310nm*	*1310nm*	*1310nm*	*1550nm*

* Multimode Fiber Optic Cable
** Singlemode Fiber Optic Cable

BENEFITS

Industrial Network Switch

- Compact Size, Small Footprint
- High Reliability/Availability
- Extended Environmental Specifications
- Ruggedized DIN-Rail Enclosure
- High Performance
- High MTBF >2M Hours (measured)

Ease of Use

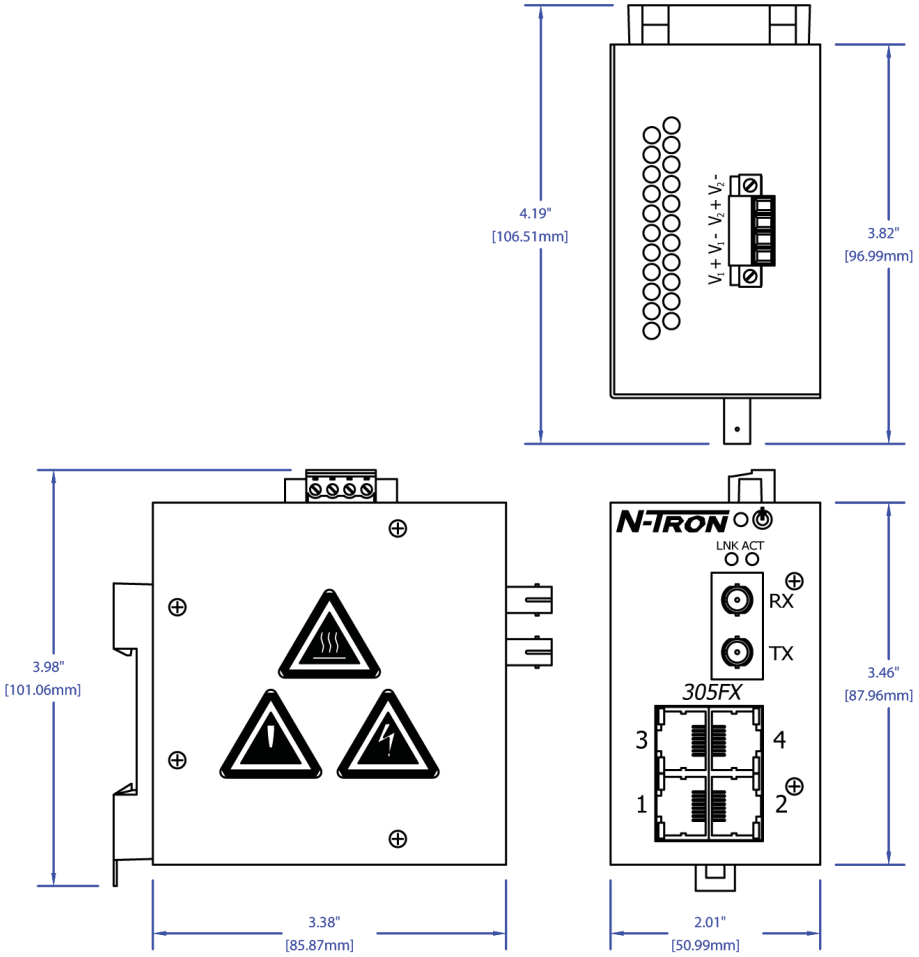
- Plug & Play Operation
- Four Auto Sensing 10/100BaseTX RJ-45 Ports
- Auto Sensing Duplex, Speed and Cable Type
- Unmanaged Operation
- Compact DIN-Rail Package

Increased Performance

- Full Wire Speed Capable
- 100BaseFX Fiber Uplink
- Full Duplex Capable
- Eliminates Network Collisions
- Increases Network Determinism
- N-View Switch Viewing Option

Regulatory Approvals

FCC Part 15 Class A
UL Listed 1604 (US and Canada)
CLASS I, DIV 2, GROUPS A,B,C,D,T4A
CE: EN61000-6-2,4, EN55011, EN61000-4-2,3,4,5,6
ABS Type Approval for Shipboard Applications
IEEE 1613 for Electric Utility Substations
GOST-R Certified
RoHS Compliant


4.19"
[106.51mm]
3.82"
[96.99mm]
V1 + V1 - V2 + V2 -
3.98"
[101.06mm]
3.38"
[85.87mm]
N-TRON
LNK ACT
RX
TX
305FX
3
4
1
2
3.46"
[87.96mm]
2.01"
[50.99mm]

ORDERING INFORMATION

PART NUMBER	DESCRIPTION
305FX-XX	5-port (4 10/100BaseTX, 1 100Base Fiber Uplink) Industrial Ethernet Switch, DIN-Rail
305FX-N-XX	5-port (4 10/100BaseTX, 1 100Base Fiber Uplink) Industrial Ethernet Switch, DIN-Rail with N-View Firmware Option
305FXE-XX-YY	5-port (4 10/100BaseTX, 1 100Base Fiber Uplink) Industrial Ethernet Switch, DIN-Rail
305FXE-N-XX-YY	5-port (4 10/100BaseTX, 1 100Base Fiber Uplink) Industrial Ethernet Switch, DIN-Rail with N-View Firmware Option

Where: N = N-View Firmware Option
E = Singlemode
XX = ST for ST style fiber connector, SC for SC style fiber connector
YY = Segment length:
15 for 15km max. fiber segment length
40 for 40km max. fiber segment length
80 for 80km max. fiber segment length

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QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
ISO 9001:2008

CATALOG

air prep

FLEXIBLOK® FRL Series

EMERSON
Industrial Automation

numatics®

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numatics

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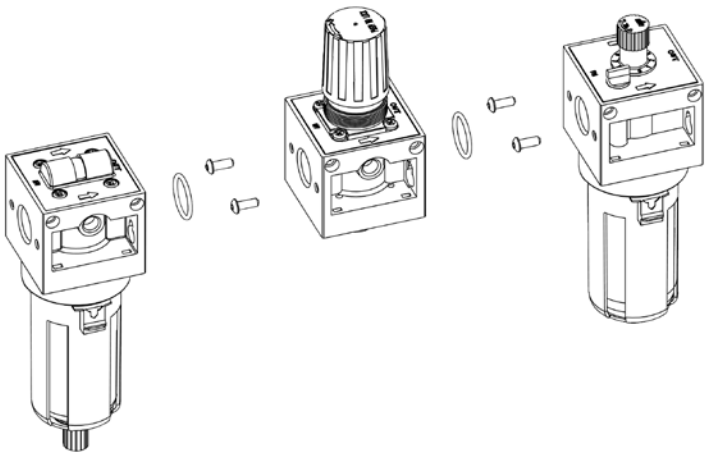
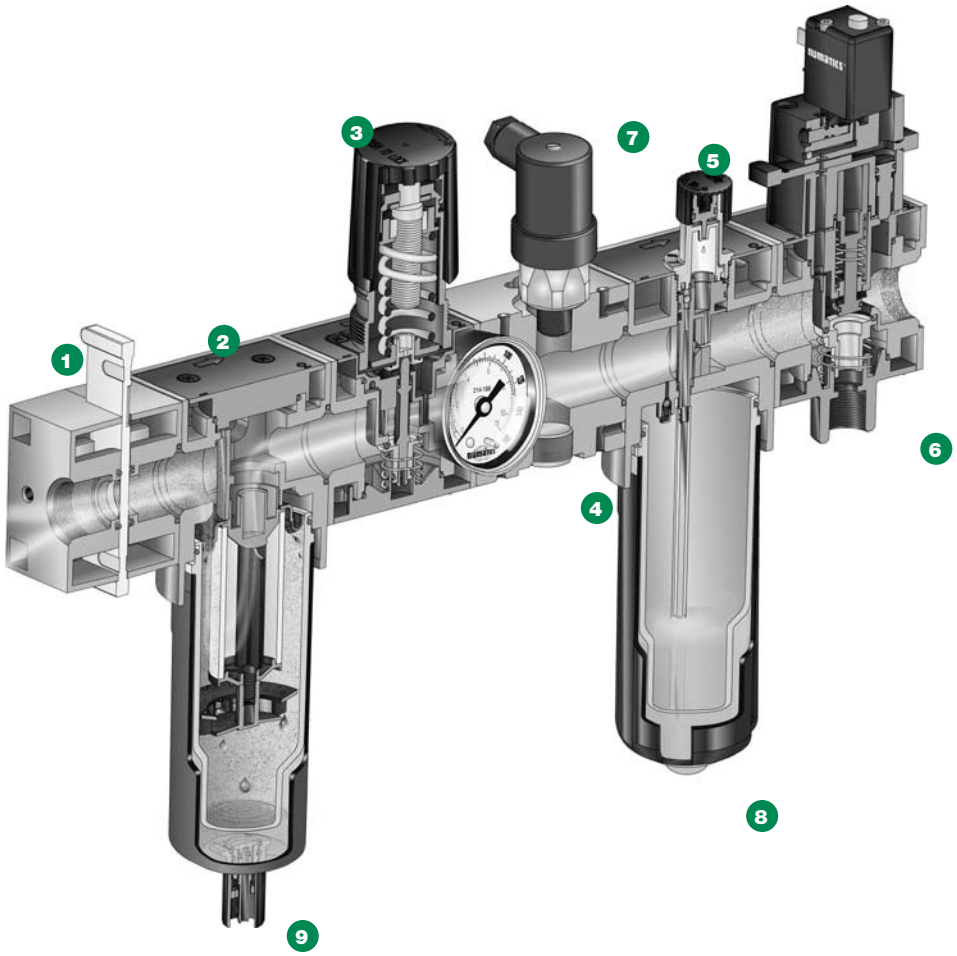
Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.



The Numatics FLEXIBLOK® FRL line leads the industry in ease of assembly. While many competitors rely on special brackets, mounting kits, port connectors, and component connectors for assembly - which are not only costly but are awkward and difficult to use - FLEXIBLOK® components use only a single o-ring and two screws to connect together. Integrated mounting holes eliminate the need for mounting brackets. The need for end plates are eliminated, as the in/out ports of all components are tapped so that any unit can be used as a stand alone unit.

By eliminating the need for additional special components, the Numatics FLEXIBLOK® line keeps costs down and maintenance and assembly quick and easy.



1. Shutoff Valve
- Relieving/Non-Relieving

2. Filter
- 5 Micron particulate
- Three Coalescing Grades
- Adsorbing Grade

3. Regulator
- Multiple Pressure Ranges
- Relieving/Non-Relieving

4. Diverter Block
- Provides Versatility

5. Lubricator
- Siphon Tube Design Provides Accurate Oil Metering

6. Solenoid Soft Start Quick Exhaust Valve
- Solenoid Quick Exhaust and Air Pilot Versions

7. Pressure Switch
- Field Installable Connector or 12 mm Micro Styles

8. Bowls
- Polycarbonate, metal, CircleVision

9. Drains
- 6 Styles

StockBlok®

FRLs in standard combinations

StockBlok® assemblies utilize one model number for standard configurations, complete with gauges. Each component is factory assembled and tested.

Each of the standard **StockBlok®** combinations is a complete assembly. Bowl, drain, and fill options are available where applicable. Additional options are not available and, if required, components can be ordered as a **ModuBlok™** combination (see page 9).

To order any of the **StockBlok®** models without the Shut-Off Valve, replace the “V” in the part number with an “X” (i.e. M22-03XFCXX).

See individual component pages for specifications and dimensions.

*All **StockBlok®** model # assemblies on the next few pages are called out as NPT. For BSPP models replace the "-" with a "G". For BSPT models replace "-" with an "R"

Shut Off/Particulate Filter/Regulator/Lubricator w/ Gauge

* To order this **StockBlok®** model without a shutoff valve, replace the "V" in the model number with an "X" (ie. M42-08XFRLX).

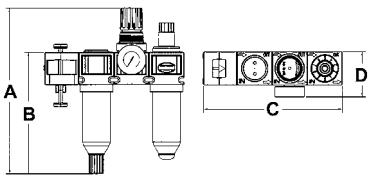
Components

MODEL #	SHUT OFF	PARTICULATE FILTER	REGULATOR	LUBRICATOR	WEIGHT LBS.	WEIGHT KGS
M14-01VFRLX	VS14-01	F14B-01	R14R-01G	L14L-01	2.55	1.17
M14-02VFRLX	VS14-02	F14B-02	R14R-02G	L14L-02	2.55	1.17
M22-02VFRLX	VS22-02	F22B-02	R22R-02G	L22L-02	2.38	1.08
M22-03VFRLX	VS22-03	F22B-03	R22R-03G	L22L-03	2.38	1.08
M22-04VFRLX	VS22-04	F22B-04	R22R-04G	L22L-04	2.38	1.08
M32-04VFRLX	VS32-04	F32B-04	R32R-04G	L32L-04	4.78	2.17
M32-06VFRLX	VS32-06	F32B-06	R32R-06G	L32L-06	4.78	2.17
M42-06VFRLX	VSL42-06	F42B-06	R42R-06G	L42L-06	16.65	7.55
M42-08VFRLX	VSL42-08	F42B-08	R42R-08G	L42L-08	16.65	7.55

Options (*see page 36* for Drain Options)

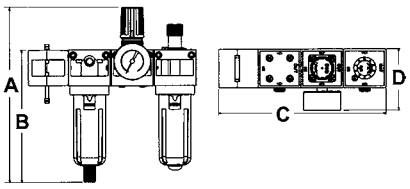
A = Auto Drain (22, 32, 42 Series only)
B = Flexible Drain
C = CircleVision™ Sight Bowl
E = Endplates (42 Series only)
J = External Pulse Drain
M = Metal Bowls w/ Sight Glass
F = Lubricator Quick Fill
Q = Metal Manual Drain
R = Manual Lever Drain

14 Series



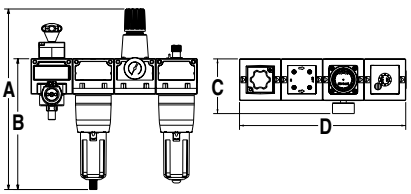
A 7.90 (200) **B** 5.84 (148) **C** 6.72 (172) **D** 3.1 (74)

22/32 Series



22 Series:
A 10.02 (255) **B** 7.62 (194) **C** 9.32 (237) **D** 3.42 (87)
32 Series:
A 12.32 (313) **B** 9.12 (232) **C** 11.25 (286) **D** 4.10 (104)

42 Series



A 17.4 (442) **B** 12.6 (320) **C** 5.3 (135) **D** 16.0 (406)

Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

Shut Off/Filter-Regulator/Diverter Block/Lubricator w/ Gauge

* To order this STOCKBLOK® model without a shutoff valve, replace the "V" in the model number with an "X" (ie. M42-08VPDLX).

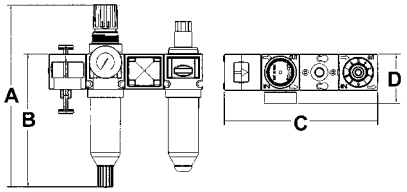
Components

MODEL #	SHUT OFF	FILTER/ REGULATOR	DIVERTER BLOCK	LUBRICATOR	WEIGHT LBS.	KGS
M14-01VPDLX	VS14-01	P14B-01G	DK14-02	L14L-01	2.50	1.13
M14-02VPDLX	VS14-02	P14B-02G	DK14-02	L14L-02	2.50	1.13
M22-02VPDLX	VS22-02	P22B-02G	DK22-03	L22L-02	2.26	1.03
M22-03VPDLX	VS22-03	P22B-03G	DK22-03	L22L-03	2.26	1.03
M22-04VPDLX	VS22-04	P22B-04G	DK22-03	L22L-04	2.26	1.03
M32-04VPDLX	VS32-04	P32B-04G	DK32-04	L32L-04	4.86	2.21
M32-06VPDLX	VS32-06	P32B-06G	DK32-04	L32L-06	4.86	2.21
M42-06VPDLX	VSL42-06	P42B-06G	DK42-06	L42L-06	15.85	7.19
M42-08VPDLX	VSL42-08	P42B-08G	DK42-08	L42L-08	15.85	7.19

Options (*see page 36* for Drain Options)

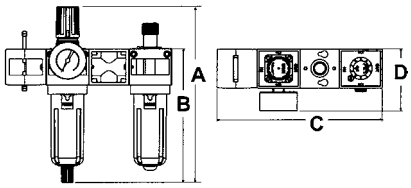
A = Auto Drain (22,32,42 Series only)
B = Flexible Drain
C = CircleVision™ Sight Bowl
E = Endplates (42 Series only)
J = External Pulse Drain
M = Metal Bowls w/ Sight Glass
F = Lubricator Quick Fill
Q = Metal Manual Drain
R = Manual Lever Drain

14 Series



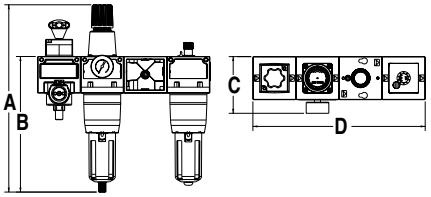
A 7.90 (200) **B** 5.84 (148) **C** 6.72 (172) **D** 3.1 (79)

22/32 Series



22 Series:
A 9.93 (252) **B** 7.62 (194) **C** 9.11 (231) **D** 3.41 (87)
32 Series:
A 12.32 (313) **B** 9.12 (232) **C** 11.25 (286) **D** 4.10 (104)

42 Series



A 17.4 (442) **B** 12.6 (320) **C** 5.3 (135) **D** 16.0 (406)

Shut Off/Particulate Filter/Coalescing Filter/Regulator w/ Gauge

* To order this STOCKBLOK® model without a shutoff valve, replace the "V" in the model number with an "X" (ie. M42-08XFFRX).

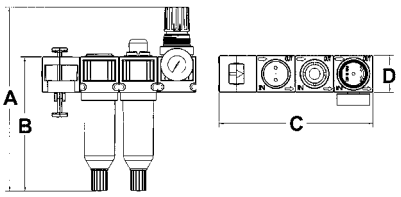
Components

MODEL #	SHUT OFF	PARTICULATE FILTER	COALESCING FILTER	REGULATOR	WEIGHT LBS.	KGS
M14-01VFFRX	VS14-01	F14B-01	F14D-01	R14R-01G	2.60	1.20
M14-02VFFRX	VS14-02	F14B-02	F14D-02	R14R-02G	2.60	1.20
M22-02VFFRX	VS22-02	F22B-02	F22D-02	R22R-02G	2.38	1.08
M22-03VFFRX	VS22-03	F22B-03	F22D-03	R22R-03G	2.38	1.08
M22-04VFFRX	VS22-04	F22B-04	F22D-04	R22R-04G	2.38	1.08
M32-04VFFRX	VS32-04	F32B-04	F32D-04	R32R-04G	4.90	2.23
M32-06VFFRX	VS32-06	F32B-06	F32D-06	R32R-06G	4.90	2.23
M42-06VFFRX	VSL42-06	F42B-06	F42D-06	R42R-06G	16.65	7.55
M42-08VFFRX	VSL42-08	F42B-08	F42D-08	R42R-08G	16.65	7.55

Options (*see page 36* for Drain Options)

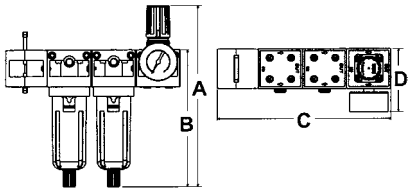
A = Auto Drain (22,32,42 Series only)
B = Flexible Drain
C = CircleVision™ Sight Bowl
E = Endplates (42 Series only)
J = External Pulse Drain
M = Metal Bowls w/ Sight Glass
Q = Metal Manual Drain
R = Manual Lever Drain

14 Series



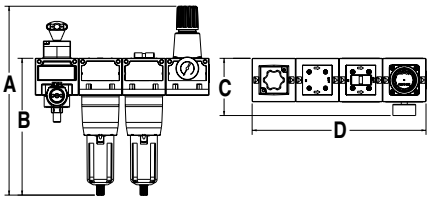
A 7.90 (200) **B** 5.84 (148) **C** 6.72 (172) **D** 3.1 (79)

22/32 Series



22 Series:
A 10.02 (255) **B** 7.62 (194) **C** 9.30 (237) **D** 3.42 (87)
32 Series:
A 12.32 (313) **B** 9.12 (232) **C** 11.25 (286) **D** 4.10 (104)

42 Series



A 17.4 (442) **B** 12.6 (320) **C** 5.3 (135) **D** 16.0 (406)

Shut Off/Coalescer-Regulator/Lubricator w/ Gauge

Components

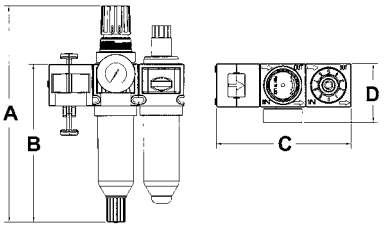
MODEL #	SHUT OFF	COALESCER/ REGULATOR	LUBRICATOR	WEIGHT LBS.	KGS
M14-01VCLXX	VS14-01	C14D-01G	L14L-01	2.10	0.94
M14-02VCLXX	VS14-02	C14D-02G	L14L-02	2.10	0.94
M22-02VCLXX	VS22-02	C22D-02G	L22L-02	1.96	0.89
M22-03VCLXX	VS22-03	C22D-03G	L22L-03	1.96	0.89
M22-04VCLXX	VS22-04	C22D-04G	L22L-04	1.96	0.89
M32-04VCLXX	VS32-04	C32D-04G	L32L-04	3.93	1.79
M32-06VCLXX	VS32-06	C32D-06G	L32L-06	3.93	1.79
M42-06VCLXX	VSL42-06	C42D-06G	L42L-06	13.70	6.21
M42-08VCLXX	VSL42-08	C42D-08G	L42L-08	13.70	6.21

Options (*see page 36* for Drain Options)

A = Auto Drain (22, 32, 42 Series only)
B = Flexible Drain
C = CircleVision™ Sight Bowl
D = 3 Micron Internal Prefilter
E = Endplates (42 Series only)
J = External Pulse Drain
M = Metal Bowls w/ Sight Glass
F = Lubricator Quick Fill
Q = Metal Manual Drain
R = Manual Lever Drain

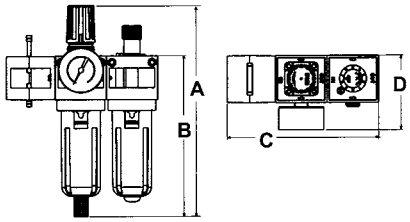
* To order this STOCKBLOK® model without a shutoff valve, replace the "V" in the model number with an "X" (ie. M42-08XFRLX).

14 Series



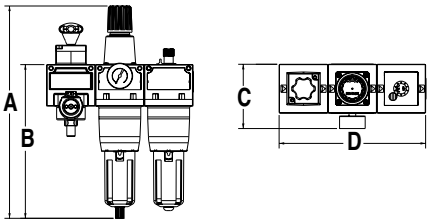
A 7.90 (200) **B** 5.84 (148) **C** 5.04 (129) **D** 3.1 (79)

22/32 Series



22 Series:
A 7.93 (252) **B** 7.62 (194) **C** 6.95 (177) **D** 3.42 (87)
32 Series:
A 12.32 (313) **B** 9.12 (232) **C** 8.25 (210) **D** 4.10 (103)

42 Series



A 17.4 (442) **B** 12.6 (320) **C** 5.3 (135) **D** 12.0 (305)

Shut Off/Particulate Filter/Regulator/Diverter Block/Lubricator w/ Gauge

Components

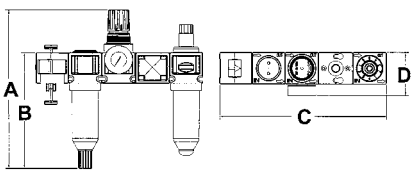
MODEL #	SHUT OFF	PARTICULATE FILTER	REGULATOR	DIVERTER BLOCK	LUBRICATOR	WEIGHT LBS.	KGS
M14-01VFRDL	VS14-01	F14B-01	R14R-01G	DK14-02	L14L-01	3.00	1.37
M14-02VFRDL	VS14-02	F14B-02	R14R-02G	DK14-02	L14L-02	3.00	1.37
M22-02VFRDL	VS22-02	F22B-02	R22R-02G	DK22-03	L22L-02	2.69	1.22
M22-03VFRDL	VS22-03	F22B-03	R22R-03G	DK22-03	L22L-03	2.69	1.22
M22-04VFRDL	VS22-04	F22B-04	R22R-04G	DK22-03	L22L-04	2.69	1.22
M32-04VFRDL	VS32-04	F32B-04	R32R-04G	DK32-04	L32L-04	5.72	2.60
M32-06VFRDL	VS32-06	F32B-06	R32R-06G	DK32-04	L32L-06	5.72	2.60
M42-06VFRDL	VSL42-06	F42B-06	R42R-06G	DK42-06	L42L-06	18.80	8.53
M42-08VFRDL	VSL42-08	F42B-08	R42R-08G	DK42-08	L42L-08	18.80	8.53

Options (*see page 36* for Drain Options)

A = Auto Drain (22, 32, 42 Series only)
B = Flexible Drain
C = CircleVision™ Sight Bowl
E = Endplates (42 Series only)
J = External Pulse Drain
M = Metal Bowls w/ Sight Glass
F = Lubricator Quick Fill
Q = Metal Manual Drain
R = Manual Lever Drain

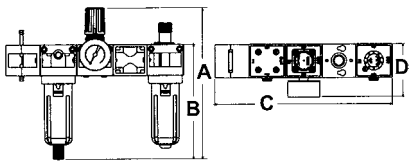
* To order this STOCKBLOK® model without a shutoff valve, replace the "V" in the model number with an "X" (ie. M42-08XFRLX).

14 Series



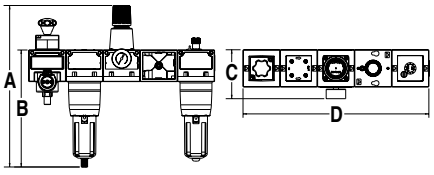
A 7.90 (200) **B** 5.84 (148) **C** 8.4 (215) **D** 3.1 (79)

22/32 Series



22 Series
A 10.02 (255) **B** 7.62 (193) **C** 11.50 (292) **D** 3.42 (87)
32 Series
A 12.32 (313) **B** 9.12 (232) **C** 14.25 (362) **D** 4.10 (103)

42 Series



A 17.4 (442) **B** 12.6 (320) **C** 5.3 (135) **D** 20.0 (508)

Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

Shut Off/Particulate Filter/Diverter Block/Coalescer-Regulator w/ Gauge

* To order this **StockBlok**® model without a shutoff valve, replace the "V" in the model number with an "X" (ie. M42-08XFDCX).

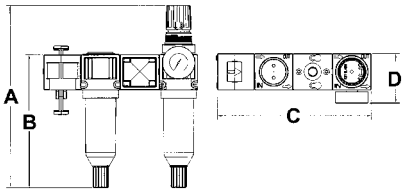
Components

MODEL #	SHUT OFF	PARTICULATE FILTER	DIVERTER BLOCK	COALESCER/ REGULATOR	WEIGHT LBS.	KGS
M14-01VFDCX	VS14-01	F14B-01	DK14-02	C14D-01G	2.55	1.15
M14-02VFDCX	VS14-02	F14B-02	DK14-02	C14D-02G	2.55	1.15
M22-02VFDCX	VS22-02	F22B-02	DK22-03	C22D-02G	2.26	1.03
M22-03VFDCX	VS22-03	F22B-03	DK22-03	C22D-03G	2.26	1.03
M22-04VFDCX	VS22-04	F22B-04	DK22-03	C22D-04G	2.26	1.03
M32-04VFDCX	VS32-04	F32B-04	DK32-04	C32D-04G	4.87	2.21
M32-06VFDCX	VS32-06	F32B-06	DK32-04	C32D-06G	4.87	2.21
M42-06VFDCX	VSL42-06	F42B-06	DK42-06	C42D-06G	15.85	7.19
M42-08VFDCX	VSL42-08	F42B-08	DK42-08	C42D-08G	15.85	7.19

Options (*see page 36* for Drain Options)

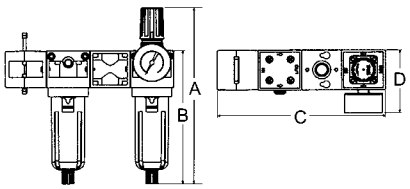
A = Auto Drain (22, 32, 42 Series only)
B = Flexible Drain
C = CircleVision™ Sight Bowl
E = Endplates (42 Series only)
F = Lubricator Quick Fill (42 Series only)
J = External Pulse Drain
M = Metal Bowls w/ Sight Glass
Q = Metal Manual Drain
R = Manual Lever Drain

14 Series



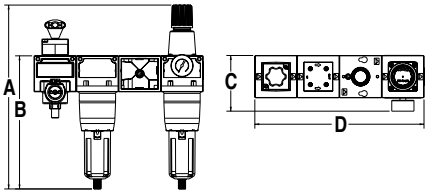
A 7.90 (200) **B** 5.84 (148) **C** 6.72 (172) **D** 3.1 (79)

22/32 Series



22 Series:
A 9.93 (252) **B** 7.61 (193) **C** 9.11 (231) **D** 3.42 (87)
32 Series:
A 12.32 (313) **B** 9.12 (232) **C** 11.25 (286) **D** 4.10 (104)

42 Series



A 17.4 (442) **B** 12.6 (320) **C** 5.3 (135) **D** 16.0 (406)

Shut Off/Filter-Regulator/Lubricator w/ Gauge

* To order this **StockBlok**® model without a shutoff valve, replace the "V" in the model number with an "X" (ie. M42-08XPLXX).

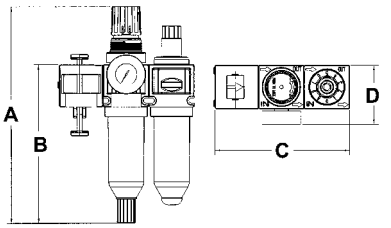
Components

MODEL #	SHUT OFF	PARTICULATE/ REGULATOR	LUBRICATOR	WEIGHT LBS.	KGS
M14-01VPLXX	VS14-01	P14B-01G	L14L-01	2.05	0.93
M14-02VPLXX	VS14-02	P14B-02G	L14L-02	2.05	0.93
M22-02VPLXX	VS22-02	P22B-02G	L22L-02	1.95	0.89
M22-03VPLXX	VS22-03	P22B-03G	L22L-03	1.95	0.89
M22-04VPLXX	VS22-04	P22B-04G	L22L-04	1.95	0.89
M32-04VPLXX	VS32-04	P32B-04G	L32L-04	3.92	1.78
M32-06VPLXX	VS32-06	P32B-06G	L32L-06	3.92	1.78
M42-06VPLXX	VSL42-06	P42B-06G	L42L-06	13.70	6.21
M42-08VPLXX	VSL42-08	P42B-08G	L42L-08	13.70	6.21

Options (*see page 36* for Drain Options)

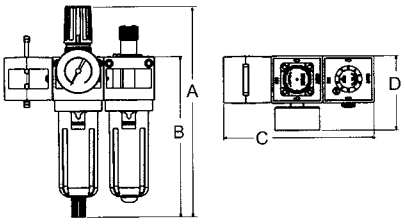
A = Auto Drain (22, 32, 42 Series only)
B = Flexible Drain
C = CircleVision™ Sight Bowl
E = Endplates (42 Series only)
J = External Pulse Drain
M = Metal Bowls w/ Sight Glass
F = Lubricator Quick Fill
Q = Metal Manual Drain
R = Manual Lever Drain

14 Series



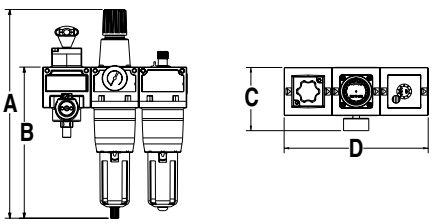
A 7.90 (200) **B** 5.84 (148) **C** 5.04 (129) **D** 3.1 (79)

22/32 Series



22 Series:
A 9.93 (252) **B** 7.62 (193) **C** 6.95 (177) **D** 3.42 (87)
32 Series:
A 12.32 (313) **B** 9.12 (232) **C** 8.25 (210) **D** 4.10 (104)

42 Series



A 17.4 (442) **B** 12.6 (320) **C** 5.3 (135) **D** 12.0 (305)

Shut Off/Particulate Filter/Diverter Block/Regulator/Lubricator w/ Gauge

* To order this STOCKBLOK® model without a shutoff valve, replace the "V" in the model number with an "X" (ie. M42-08XFDRL).

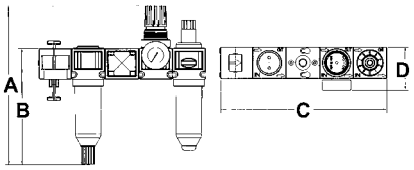
Components

MODEL #	SHUT OFF	PARTICULATE FILTER	DIVERTER BLOCK	REGULATOR	LUBRICATOR	WEIGHT LBS.	WEIGHT KGS
M14-01VFDRL	VS14-01	F14B-01	DK14-02	R14R-01G	L14L-01	3.00	1.37
M14-02VFDRL	VS14-02	F14B-02	DK14-02	R14R-02G	L14L-02	3.00	1.37
M22-02VFDRL	VS22-02	F22B-02	DK22-03	R22R-02G	L22L-02	2.69	1.22
M22-03VFDRL	VS22-03	F22B-03	DK22-03	R22R-03G	L22L-03	2.69	1.22
M22-04VFDRL	VS22-04	F22B-04	DK22-03	R22R-04G	L22L-04	2.69	1.22
M32-04VFDRL	VS32-04	F32B-04	DK32-04	R32R-04G	L32L-04	5.72	2.60
M32-06VFDRL	VS32-06	F32B-06	DK32-04	R32R-06G	L32L-06	5.72	2.60
M42-06VFDRL	VSL42-06	F42B-06	DK42-06	R42R-06G	L42L-06	18.80	8.53
M42-08VFDRL	VSL42-08	F42B-08	DK42-08	R42R-08G	L42L-08	18.80	8.53

Options (*see page 36* for Drain Options)

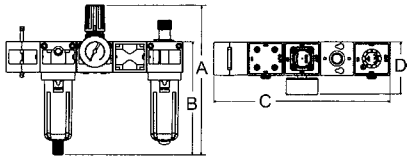
A = Auto Drain (22, 32, 42 Series only)
B = Flexible Drain
C = CircleVision™ Sight Bowl
E = Endplates (42 Series only)
J = External Pulse Drain
M = Metal Bowls w/ Sight Glass
F = Lubricator Quick Fill
Q = Metal Manual Drain
R = Manual Lever Drain

14 Series



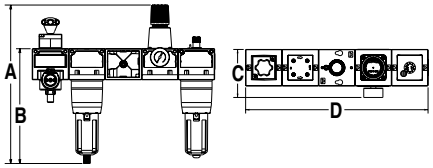
A 7.90 (200) **B** 5.84 (148) **C** 8.4 (215) **D** 3.1 (79)

22/32 Series



22 Series:
A 10.02 (255) **B** 7.62 (194) **C** 11.50 (292) **D** 3.42 (87)
32 Series:
A 12.32 (313) **B** 9.12 (232) **C** 14.25 (362) **D** 4.10 (104)

42 Series



A 17.4 (442) **B** 12.6 (320) **C** 5.3 (135) **D** 20.0 (508)

Shut Off/Particulate Filter/Coalescer-Regulator w/ Gauge

* To order this STOCKBLOK® model without a shutoff valve, replace the "V" in the model number with an "X" (ie. M42-08XFCXX).

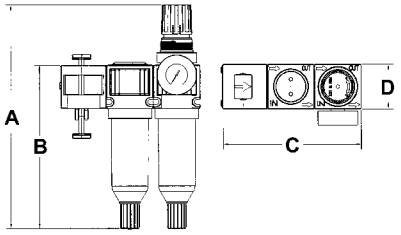
Components

MODEL #	SHUT OFF	PARTICULATE FILTER	COALESCER/ REGULATOR	WEIGHT LBS.	WEIGHT KGS
M14-01VFCXX	VS14-01	F14B-01	C14D-01G	2.10	0.95
M14-02VFCXX	VS14-02	F14B-02	C14D-02G	2.10	0.95
M22-02VFCXX	VS22-02	F22B-02	C22D-02G	1.95	0.89
M22-03VFCXX	VS22-03	F22B-03	C22D-03G	1.95	0.89
M22-04VFCXX	VS22-04	F22B-04	C22D-04G	1.95	0.89
M32-04VFCXX	VS32-04	F32B-04	C32D-04G	3.93	1.79
M32-06VFCXX	VS32-06	F32B-06	C32D-06G	3.93	1.79
M42-06VFCXX	VSL42-06	F42B-06	C42D-06G	13.70	6.21
M42-08VFCXX	VSL42-08	F42B-08	C42D-08G	13.70	6.21

Options (*see page 36* for Drain Options)

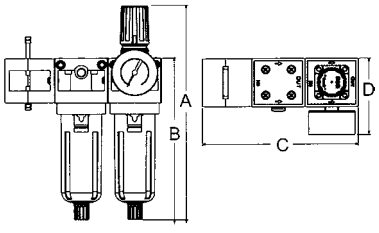
A = Auto Drain (22,32,42 Series only)
B = Flexible Drain
C = CircleVision™ Sight Bowl
E = Endplates (42 Series only)
J = External Pulse Drain
M = Metal Bowls w/ Sight Glass
Q = Metal Manual Drain
R = Manual Lever Drain

14 Series



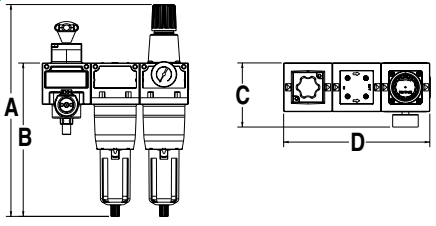
A 7.90 (200) **B** 5.84 (148) **C** 5.04 (129) **D** 3.1 (79)

22/32 Series



22 Series
A 9.93 (252) **B** 7.62 (193) **C** 6.95 (177) **D** 3.42 (87)
32 Series
A 12.32 (313) **B** 9.12 (232) **C** 8.25 (210) **D** 4.10 (104)

42 Series



A 17.4 (442) **B** 12.6 (320) **C** 5.3 (135) **D** 12.0 (305)

Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

MODUBLOK™

Combination models

MOD22-08

STATION POSITION	DESCRIPTION	MODEL NUMBER
1	Shut-Off Valve	VS22-03
2	Particulate Filter	F22B-03
3	Coalescer w/ metal bowl and pulse drain	F22D-03JM
4	Diverter Block	DK22-03
4T	Regulator	R22R-03
4B	Pressure Switch	PS180CAN02
5	Regulator w/ gauge	R22R-03G
6	Lubricator	L22L-03

NEED MORE PARTS AND INFORMATION?

- *See page 36* for more information on available drain options.
- *See page 37 and 38* for information on ordering replacement parts.

About MODUBLOK™ *Assemblies*

The FLEXIBLOK® modular system is designed to connect individual components into a complete assembly. Sometimes it is necessary to order an assembly using additional or non-standard components or combinations. The MODUBLOK™ system makes it easy to order non-standard combinations.

As with all other components and combinations, all modular assemblies come factory tested and approved and assembled complete. For more information on flow, dimensions, options, and accessories, see individual component pages.

Because of the many possible combinations when utilizing modular systems, it is recommended that complex stations include a schematic drawing. When ordering, specify all components at each station, based on the example to the left.

How to label diverter blocks

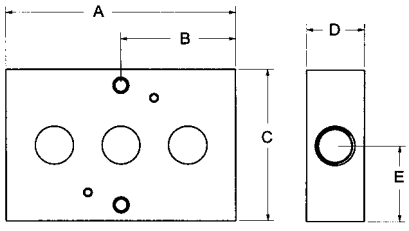
When using a diverter block, indicate all units at that station before continuing. If additional units are mounted above the diverter block, use the letter 'T' (for 'top') as well as a letter sequence (TA, TB, TC, etc.) starting from the diverter block, and continuing out. If units are placed below the diverter block, begin the two letter alphabetic sequence with the letter 'B' (for bottom) as well as a letter sequence (BA, BB, BC, etc.) starting with the diverter block and continuing outward. Continue in this pattern until all units are placed correctly.

Reducing Bushings

Reducing bushings may be required to connect some components (i.e. pressure switches, etc).

SERIES	SIZE
22	3/8 to 1/4 *or* 3/8 to 1/8
32	1/2 to 1/4 *or* 1/2 to 1/8
42	Not necessary as diverter block has 1/4 indicator ports.

L1 AND L2 Series Air Prep to Valve Adapter



Dimensions

Model #	A	B	C	D	E
L1A22	2.5 (64)	1.25 (32)	2 (51)	1 (25)	.75 (19)
L2A22	3 (76)	1.5 (38)	2 (51)	1 (52)	.75 (19)
L1A32	3 (76)	1.5 (38)	3 (76)	1.5 (38)	.75 (19)
L2A32	3 (76)	1.5 (38)	3 (76)	1.5 (38)	.75 (19)

Application

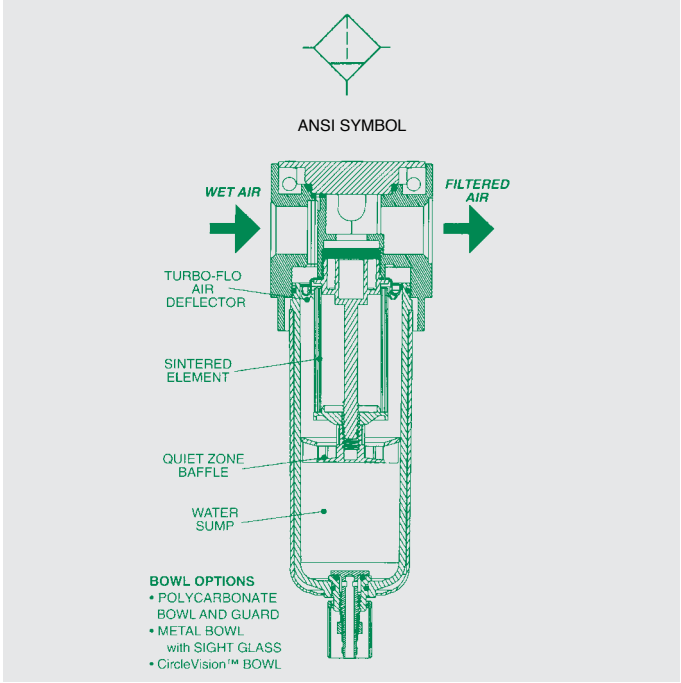
The Numatics L1 and L2 Series Valve Adapters, when used with a coalescing regulator ('piggyback') equipped with a pleated prefilter coalescing element and the specified valve, provides a low-cost, complete control package. This design eliminates fittings and potential air leaks - thus reducing cost, space, and installation time.

Features

- Modular adaptable to 22 or 32 Series FLEXIBLOK® products.
- Easy installation and service.

How to Order

MODEL NUMBER	DESCRIPTION
L1A22	L1 Series valve adapter for use with 22 Series air preparation products
L2A22	L2 Series valve adapter for use with 22 Series air preparation products
L1A32	L1 Series valve adapter for use with 32 Series air preparation products
L2A32	L2 Series valve adapter for use with 32 Series air preparation products



Particulate Filter

F14B, F22B, F32B, F42B Series

- Four convenient sizes
- 5 micron sintered elements standard
- Can be installed as modular or individual unit
- Includes screws and o-rings for modular connection
- Manual or automatic drain
- Polycarbonate bowl standard
- Optional metal bowl with sight glass
- Optional **CircleVision™** sight bowl
- Bowl seal held captive (22, 32 and 42 Series)

Specifications

BOWL	POLYCARBONATE BOWL	CIRCLEVISION™ BOWL	METAL BOWL
Temperature Range (°F)	40-120	40-120	40-120
Temperature Range (°C)	4-50	4-50	4-50
Max. Pressure (PSIG)	150	250	200
Max. Pressure (BAR)	10	17	14
14 Series (Weight, lbs.)	.60	.80	.65
14 Series (Weight, kg)	.28	.36	.30
22 Series (Weight, lbs.)	.65	.86	1.25
22 Series (Weight, kg)	.30	.39	.57
32 Series (Weight, lbs.)	1.3	1.7	2.5
32 Series (Weight, kg)	.59	.77	1.14
42 Series (Weight, lbs.)	3.70	4.15	4.80
42 Series (Weight, kg)	1.68	1.88	2.18

How to Order

F 22 B – 04 AC

Model
F = Filter

Series
14 = 1.5 oz Bowl
22 = 3.8 oz Bowl
32 = 8.5 oz Bowl
42 = 8.5 oz Bowl

Element
B = 5 Micron Element

Threads
– = NPTF
G = G Tap (BSPP) (Conforms to ISO Standards 1179-1 and 228-1)
R = PT (BSPT)

Options
A = Auto Drain (22, 32 and 42 Series)
B = Flexible Drain
C = CircleVision™ Sight Bowl
J = External Pulse Drain
M = Metal Bowl with Sight Glass
Q = Metal Manual Drain
R = Manual Lever Drain
U = Dp Indicator

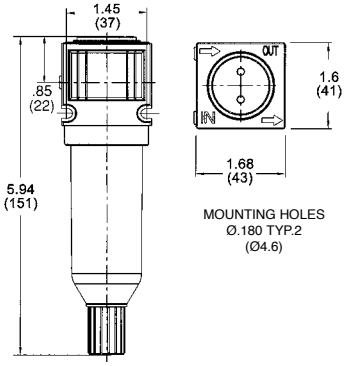
Port Size
01 = 1/8 (14 Series only)
02 = 1/4 (14 or 22 Series only)
03 = 3/8 (22 Series only)
04 = 1/2 (22 or 32 Series only)
06 = 3/4 (32 or 42 Series only)
08 = 1 (42 Series only)

NEED MORE PARTS AND INFORMATION?

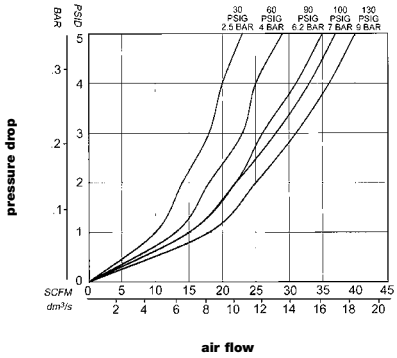
- *See page 36* for more information on available drain options.
- *See pages 37 & 38* for information on ordering replacement parts.

Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

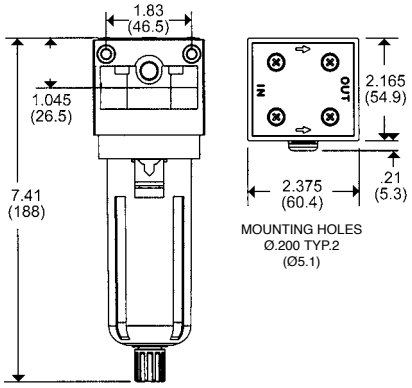
14 Series Particulate



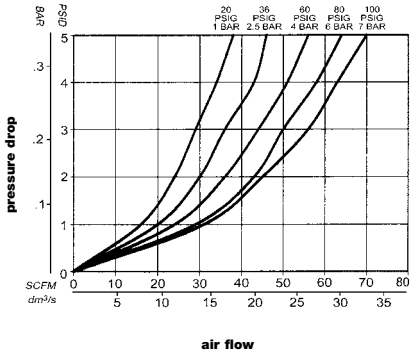
F14B-02 (5 micron particulate)



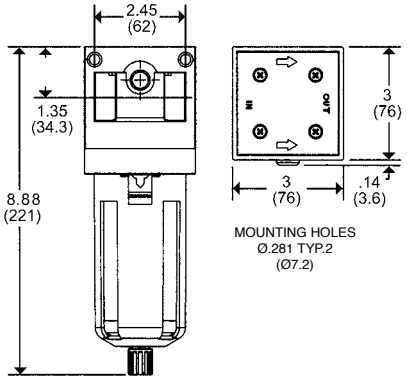
22 Series Particulate



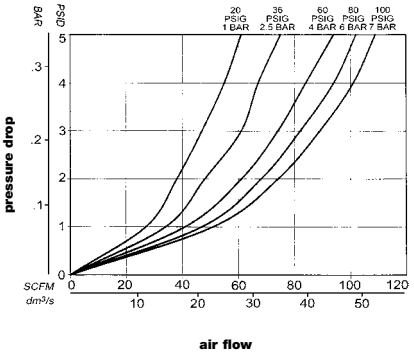
F22B-04 (5 micron particulate)



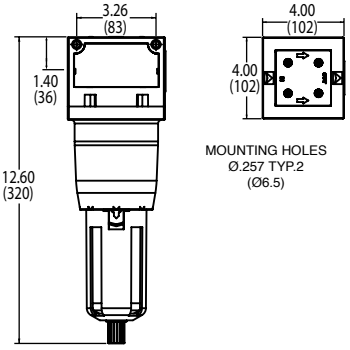
32 Series Particulate



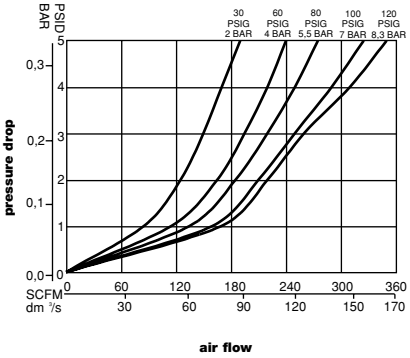
F32B-06 (5 micron particulate)

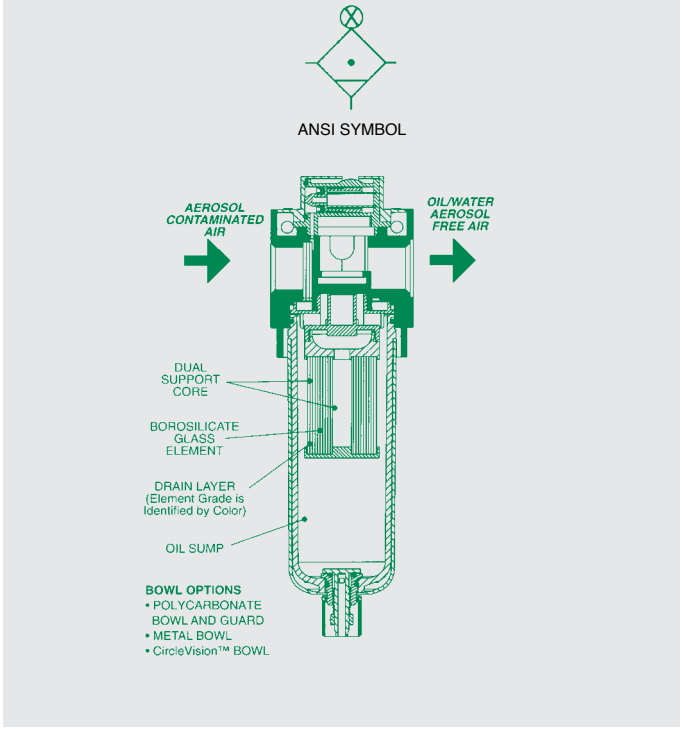


42 Series Particulate



F42B-08 (5 micron particulate)





Coalescing Filter

F14, F22, F32, F42 Series

- Four convenient sizes
- Cartridge element design
- Inner and outer support cores prevent element from crushing in either flow direction
- Available with manual or automatic drain
- Optional **CircleVision™** sight bowl
- Dp indicator standard on 14, 22, 32 and 42 Series

Recommended Uses

C grade element, identified by its blue drain layer, is a coarse filter for large amounts of water, rust, pipe scale, and liquid hydrocarbons. Excellent for environments that have severe contamination. Can be used for lubricated or 'dry' systems. Ideal for mainline filtration of plant air.
D grade element, identified by its green drain layer, is a fine filter for cylinder or valves - especially when the circuit is being run without lubrication ('dry'). Excellent filter for desiccant or regenerative style dryers.
E grade element, identified by its red drain layer, is an ultra fine filter for oil-free instrumentation air, blow molding, food and drug packaging, electronics applications, and other applications requiring maximum contamination removal.
F grade element, identified by its white drain layer, is an adsorbing filter that utilizes activated carbon to capture hydrocarbon vapor and deodorize compressed air. Typically it is used to protect worker environments, food and drug applications, breathing air, and instrumentation for analytical instruments. Life expectancy is approximately 3 months at rated flow.

Specifications

BOWL	POLYCARBONATE BOWL	CIRCLEVISION™ BOWL	METAL BOWL
Temperature Range (°F)	40-120	40-120	40-120
Temperature Range (°C)	4-50	4-50	4-50
Max. Pressure (PSIG)	150	250	200
Max. Pressure (BAR)	10	17	14
14 Series (Weight, lbs.)	0.65	.82	0.70
14 Series (Weight, kg)	0.30	.37	0.32
22 Series (Weight, lbs.)	0.66	0.89	1.28
22 Series (Weight, kg)	0.30	0.40	0.58
32 Series (Weight, lbs.)	1.42	1.83	2.56
32 Series (Weight, kg)	0.65	0.83	1.16
42 Series (Weight, lbs.)	3.70	4.15	4.80
42 Series (Weight, kg)	1.68	1.88	2.18

How to Order

F 14 D - 02 AC

Model
F = Filter

Series
14 = 1.5 oz Bowl
22 = 3.8 oz Bowl
32 = 8.5 oz Bowl
42 = 8.5 oz Bowl

Element
C = 0.7 Micron Coarse Coalescer
D = 0.3 Micron Fine Coalescer
E = 0.01 Micron Ultra Fine Coalescer
F = Vapor adsorber

Threads
- = NPTF
G = G Tap (BSPP) (Conforms to ISO Standards 1179-1 and 228-1)
R = PT (BSPT)

Options
A = Auto Drain (22, 32 and 42 Series)
B = Flexible Drain
C = Circlevision™ Sight Bowl
D = 3 Micron, Internal Pleated Prefilter
J = External Pulse Drain
M = Metal Bowl With Sight Glass
Q = Metal Manual Drain
R = Manual Lever Drain
U = No Dp Indicator

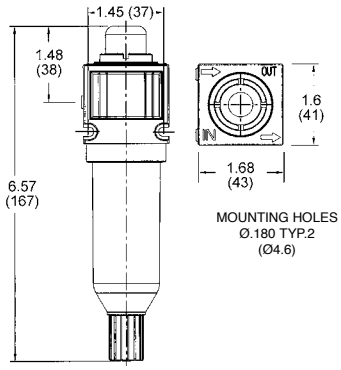
Port Size
01 = 1/8 (14 Series Only)
02 = 1/4 (14 or 22 Series Only)
03 = 3/8 (22 Series Only)
04 = 1/2 (22 or 32 Series Only)
06 = 3/4 (32 or 42 Series Only)
08 = 1 (42 Series Only)

NEED MORE PARTS AND INFORMATION?

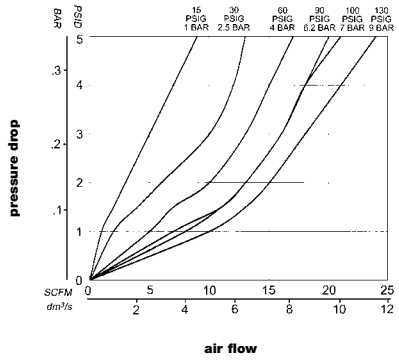
- *See page 36* for more information on available drain options.
- *See pages 37 & 38* for information on ordering replacement parts.

Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

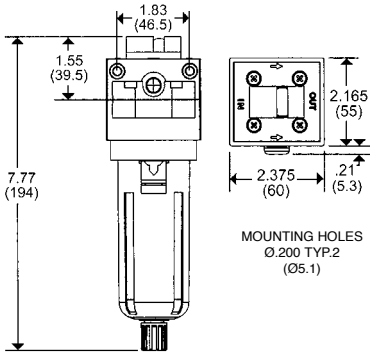
14 Series Coalescer



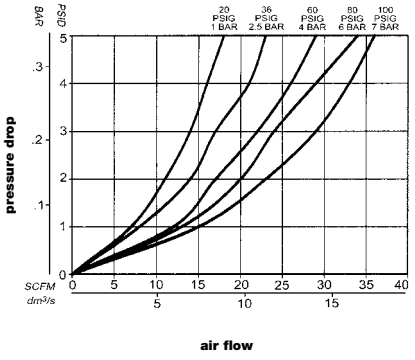
F14D-02 (0.3 micron coalescer)



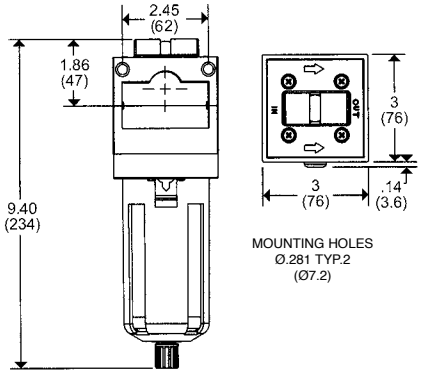
22 Series Coalescer



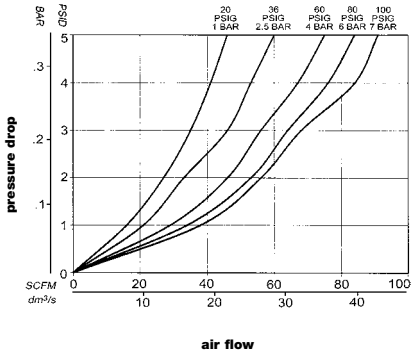
F22D-04 (0.3 micron coalescer)



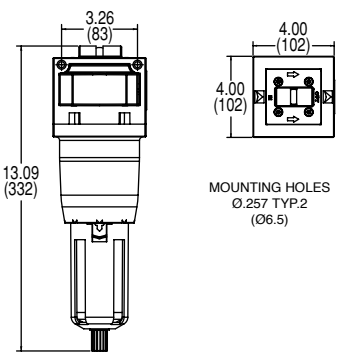
32 Series Coalescer



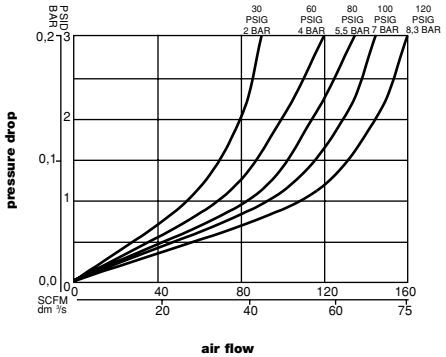
F32D-06 (0.3 micron coalescer)

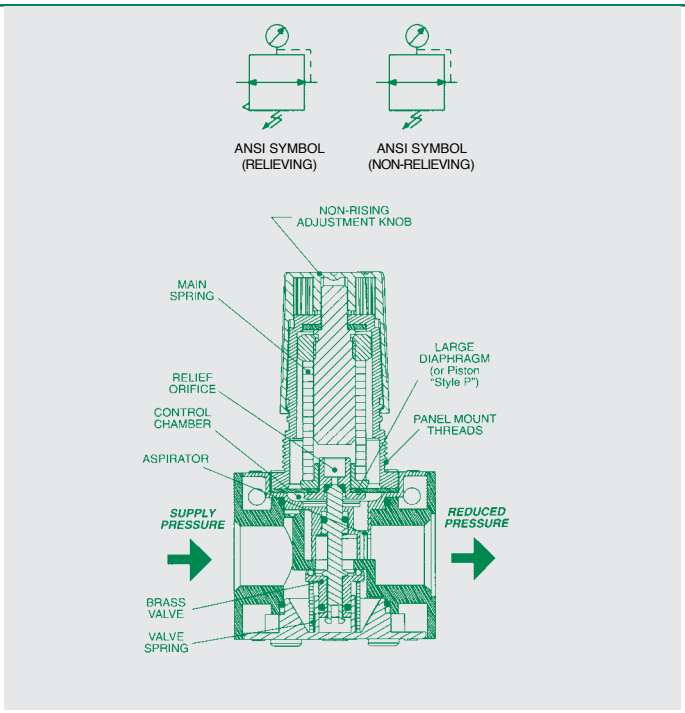


42 Series Coalescer



F42D-08 (0.3 micron coalescer)





Regulator

R14, R22, R32, R42 Series

- Four convenient sizes
- High flow in compact size
- Locking adjustment knob
- Four different pressure ratings available
- Relieving or non-relieving models
- Can be installed as modular or individual unit
- Standard output pressure 0-125 PSIG

Specifications

	14 SERIES	22 SERIES	32 SERIES	42 SERIES
Temperature Range (°F)	40-120	40-120	40-120	40-120
Temperature Range (°C)	4-50	4-50	4-50	4-50
Max. Pressure (PSIG)	250	200	250	250
Max. Pressure (BAR)	17	14	14	17
Weight (lbs.)	0.65	0.69	1.37	4.30
Weight (kg)	0.30	0.31	0.62	1.95
Body Material	Zinc	Aluminum	Aluminum	Aluminum

How to Order

R 32 R - 04 GP

Model
R = Regulator

Series
14
22
32
42

Style
R = Relieving
N = Non-Relieving
K = Internal Check (22, 32, and 42 Series)
P = Piston Operator (22, 32 and 42 Series)

Threads
- = NPTF
G = G Tap (BSPP) (Conforms to ISO Standards 1179-1 and 228-1)
R = PT (BSPT)

Options
G = Gauge
H = 0-200 PSIG Output (22, 32 or 42 Series)
I = 0-25 PSIG Output
L = 0-60 PSIG Output
P = Panel Mount Nut (14, 22, 32 Series)
S = Steel T Handle (42 Series)
T = Tamper Resistant

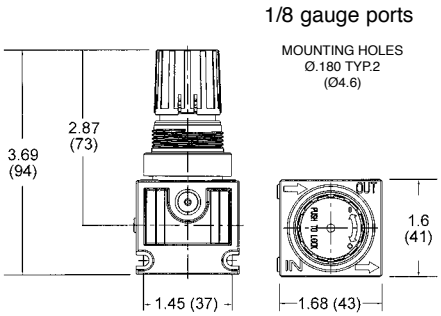
Port Size
01 = 1/8 (14 Series Only)
02 = 1/4 (14 or 22 Series Only)
03 = 3/8 (22 Series Only)
04 = 1/2 (22 or 32 Series Only)
06 = 3/4 (32 or 42 Series Only)
08 = 1 (42 Series Only)

Notes:
- 42 Series "H" spring comes standard with Steel "T" Handle.
- "T" option tamper resistant cannot be used with high pressure "H" option with 42 Series.

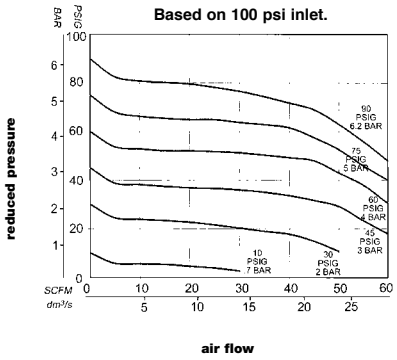
NEED MORE PARTS AND INFORMATION?
- *See pages 37 & 38* for information on ordering replacement parts.

Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

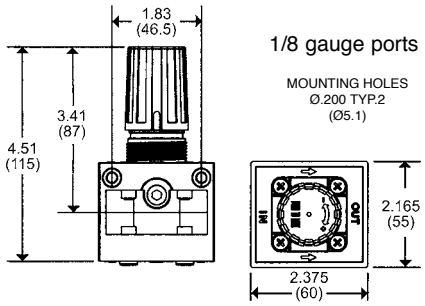
14 Series Regulator



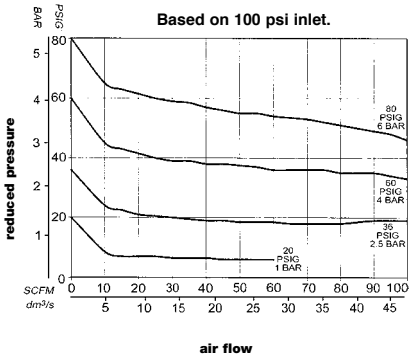
R14R-02 (14 Series Regulator)



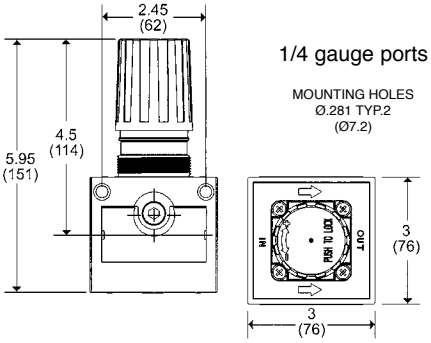
22 Series Regulator



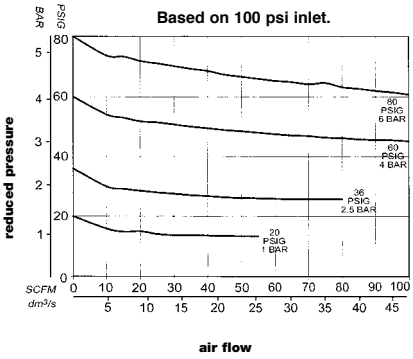
R22R-04 (22 Series Regulator)



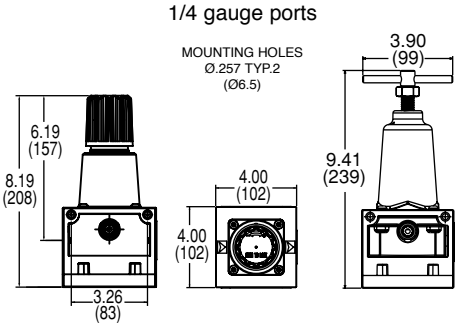
32 Series Regulator



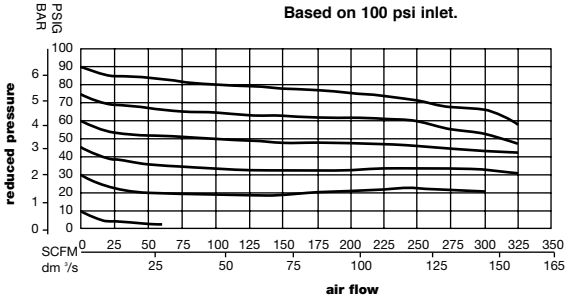
R32R-06 (32 Series Regulator)



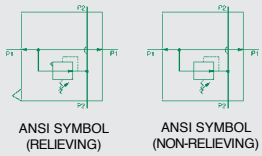
42 Series Regulator

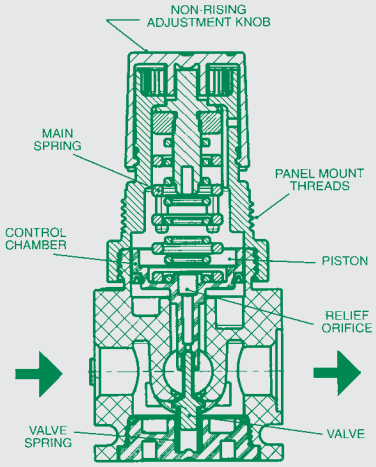


R42R-08 (42 Series Regulator)



Steel "T" Handle Option





Manifold Regulator

MR14 Series

The 14 Series Manifold Regulator allows several regulators to be chained together while maintaining a constant primary pressure to each regulator. This regulator features a dual spring design which covers any possible outlet setting without the need to indicate a specific spring, eliminating confusing options and part numbers. The regulator uses the inner spring for more precise, lower pressures, and the outer spring for middle to high pressures. As the smaller, inner spring is compressed, the larger, outer spring takes over for higher pressures.

Regulators consist of a piston which floats between the main springs (top) and a valve stem (bottom). By turning the adjustment knob clockwise, the main spring is forced onto the piston which, in turn, is pressed onto the valve stem. When the spring force becomes greater than the force of the air pressure in the control chamber below the piston, the valve is forced down and flow begins. As flow continues, the pressure begins to build and air, via the aspirator tube, fills the control chamber. When the underside piston force is greater than the main spring force, the piston is forced upward, causing the main valve to close. The cycle continues in a balanced process of reducing or increasing flow based upon the downstream pressure.

- High flow in compact size
- Locking adjustment knob
- Single pressure range suits any application
- Relieving or non-relieving models
- Can be installed as modular or individual unit
- Standard output pressure 0-125 PSIG

Specifications

	14 SERIES
Temperature Range (°F)	40-120
Temperature Range (°C)	4-50
Max. Pressure (PSIG)	250
Max. Pressure (BAR)	17
Weight (lbs.)	0.60
Weight (kg)	0.27
Body Material	Zinc

How to Order

MR 14 R - 02 GT

Model
MR= Manifold Regulator

Series
14

Style
R = Relieving
N = Non-Relieving

Threads
- = NPTF
G = G Tap (BSPP) (Conforms to ISO Standards 1179-1 and 228-1)
R = PT (BSPT)

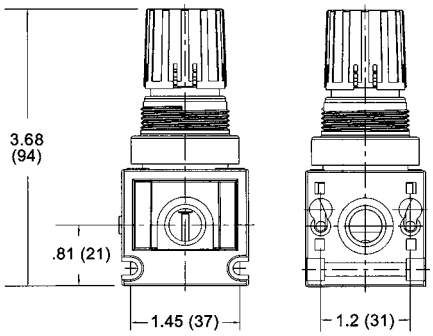
Port Size
02 = 1/4

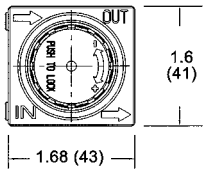
Options
G = Gauge
I = 0-25 PSIG Output
L = 0-60 PSIG Output
P = Panel Mount Nut
T = Tamper Resistant

NEED MORE PARTS AND INFORMATION?
- *See pages 37 & 38* for information on ordering replacement parts.

Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

14 Series Manifold Regulator

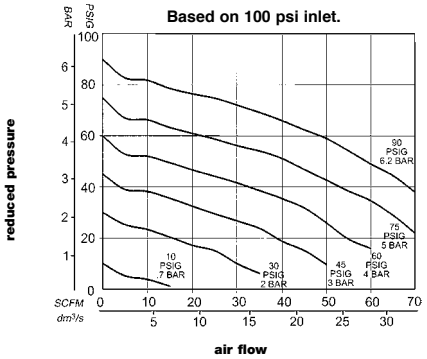




1/4 gauge ports

MOUNTING HOLES
Ø.300 TYP.2 (Ø7.6)

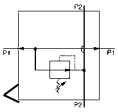
MR14R-02 (14 Series Manifold Regulator)



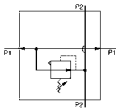
Miniature Manifold Regulator

MR02 Series

MR02R-01G pictured
shown assembled and individually



ANSI
SYMBOL
(Relieving)



ANSI
SYMBOL
(Non-Relieving)

Application

The MR02 Series Miniature Manifold Regulator offers the flexibility necessary for many of today's applications. The MR02 Series allows several regulators to be chained together while maintaining a constant primary pressure to each regulator.

A system equipped with the Miniature Manifold Regulator can help reduce operation costs by reducing unnecessary downstream pressures and improve efficiencies by keeping them in one, convenient location for easy adjustment.

Features

- Can be installed as an individual or manifold unit
- Standard output pressure 0 -125 PSIG
- 3 available outlet/gauge ports (one in front, one in back, and one in the bottom)
- Integral mounting holes allow for easy panel mounting
- Connects easily without adapters or independent manifold system
- Standard 5 mm tamper resistant adjustment
- High flow capability in relation to compact size (2.7" height x 1" square)
- Relieving or non-relieving models

Specifications

P1 Ports: 1/8 NPTF
Outlet/Gauge Ports: 10-32 UNF
Temperature Range: 40 -120 F (4-50 C)
Max Inlet Pressure: 200 PSIG (14 Bar)
Weight: .15 lbs (68 grams)
**SCFM w/100 PSI inlet set @ 75: 5 scfm
**SCFM w/100 PSI inlet set @ 60: 4 scfm
**SCFM w/100 PSI inlet set @ 40: 3 scfm
Body material: Aluminum

** based on a 25% pressure drop from set

Optional Accessories

ITEM	PART NO.
23mm Gauge "G" Option	NG23-M
10-32 - 1/8 NPTF Adapter	134-034
10-32 - 1/8 O.D Barb Fitting	134-236
10-32 - 1/4 O.D Barb Fitting	134-234

Each Regulator includes an R02K assembly kit which includes (1) 10-32 pipe plug, (1) 1/8 pipe plug, (1) P1 port o-ring, (2) connector screws

How to Order

MR 02 R - 01 G

Model
MR = Manifold Regulator

Series
02

Style
R = Relieving
N = Non-Relieving

Options
G = Gauge
I = 0-25 PSI
L = 0-60 PSI

Port Size
01 = 1/8
P1 ports are 1/8,
outlet/gauge ports are 10-32

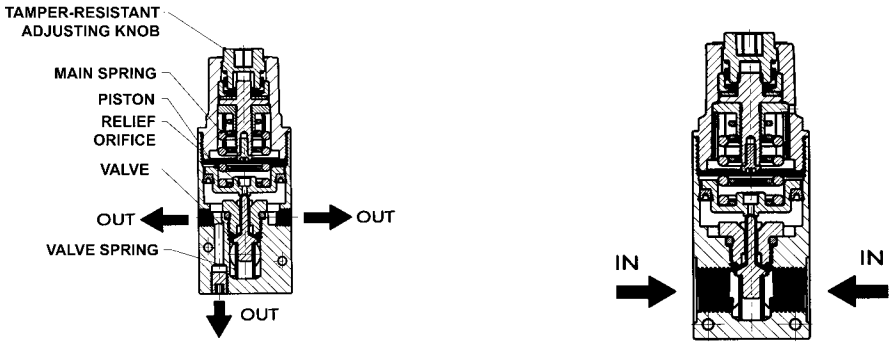
Threads
- = NPTF
G = G Tap (BSPP)
R = PT (BSPT)

Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

Miniature Manifold Regulator

MR02 Series

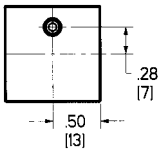
Product Cross Section

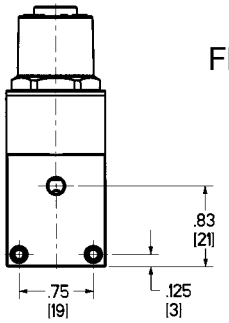


Dimensions

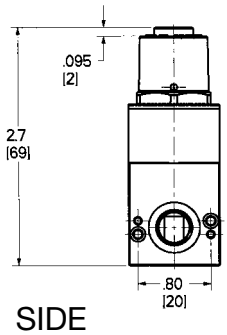
TOP

BOTTOM



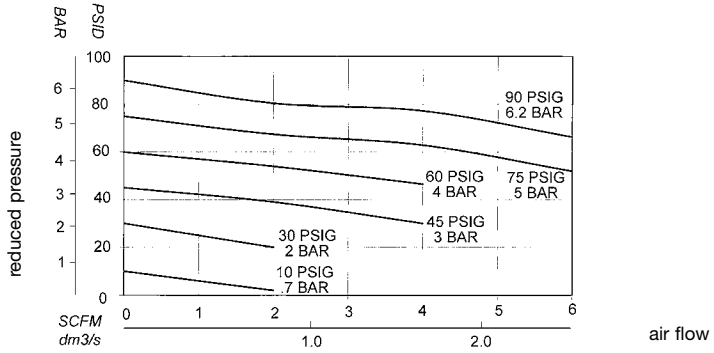


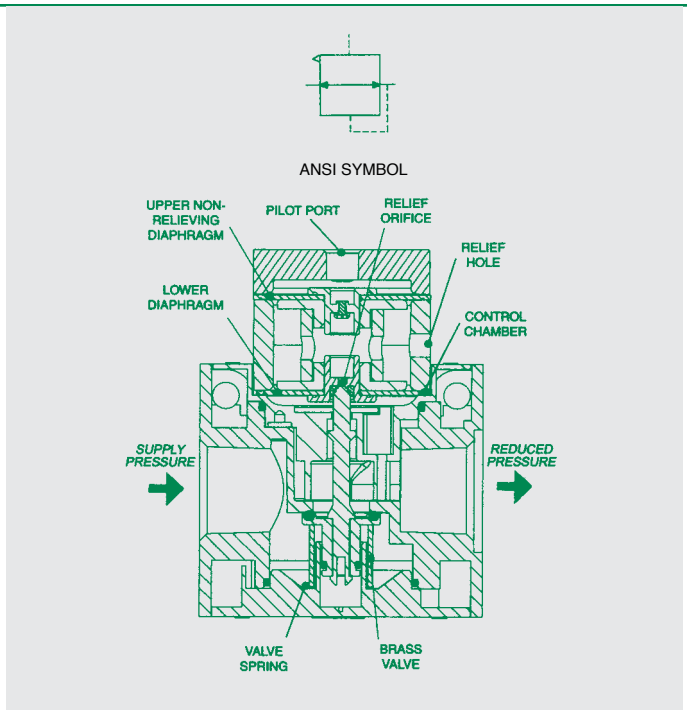
FRONT



SIDE

Flow Ratings





Regulator - Pilot Operated

R22, R32, R42 Series

- Three convenient sizes
- High flow in compact size
- Can be installed as modular or individual unit
- Standard output pressure 0-125 PSIG
- Relieving or non-relieving models

Specifications

	22 SERIES	32 SERIES	42 SERIES
Temperature Range (°F)	40-120	40-120	40-120
Temperature Range (°C)	4-50	4-50	4-50
Min. Pilot Pressure (PSI)	15	15	15
Min. Pilot Pressure (BAR)	1	1	1
Max.-Pilot Pressure (PSI)	150	150	200
Max. Pilot Pressure (BAR)	10.2	10.2	14
Max. Supply Pressure (PSI)	150	150	250
Max. Supply Pressure (BAR)	10.2	10.2	17.2
Weight (lbs.)	0.66	1.35	3.85
Weight (kg)	0.25	0.50	1.75
Body Material	Aluminum	Aluminum	Aluminum

How to Order

R 32 W - 04 G

Model
R = Regulator

Series
22
32
42

Style
W = All Pilot Operated Regulators

Threads
- = NPTF
G = GTap (BSPP) (Conforms to ISO Standards 1179-1 and 228-1)
R = PT (BSPT)

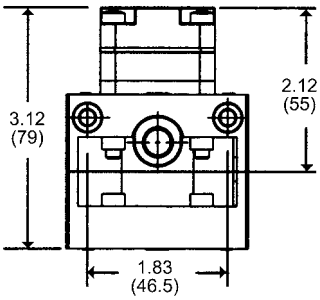
Port Size
02 = 1/4 (22 Series Only)
03 = 3/8 (22 Series Only)
04 = 1/2 (22 or 32 Series Only)
06 = 3/4 (32 and 42 Series Only)
08 = 1 (42 Series Only)

Options
G = Gauge
N = Non-Relieving

NEED MORE PARTS AND INFORMATION?
- *See pages 37 & 38* for information on ordering replacement parts.

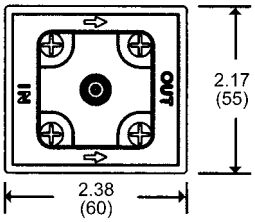
Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

22 Series Pilot Operated Regulator

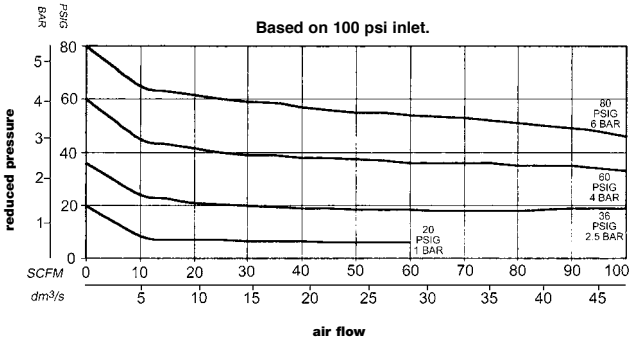


1/8 pilot port
1/8 gauge ports

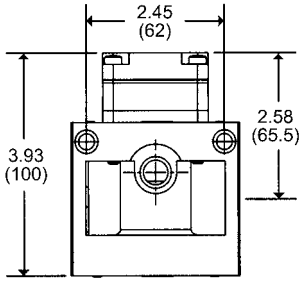
MOUNTING HOLES
Ø.200 TYP.2
(Ø5.1)



R22W-04 (Air Pilot Regulator)

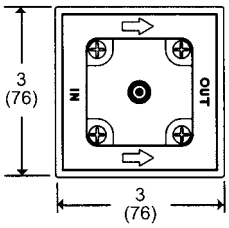


32 Series Pilot Operated Regulator

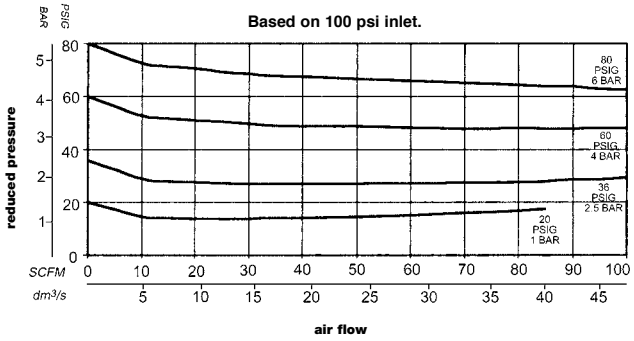


1/8 pilot port
1/4 gauge ports

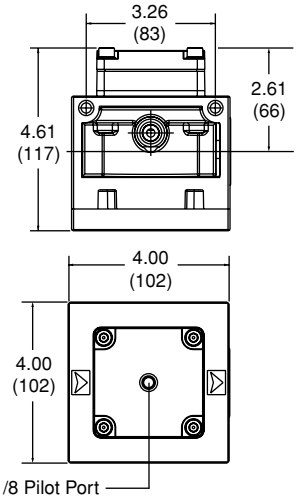
MOUNTING HOLES
Ø.281 TYP.2
(Ø7.2)



R32W-06 (Air Pilot Regulator)



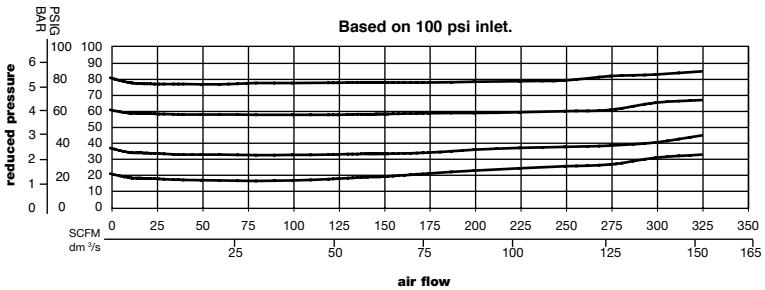
42 Series Pilot Operated Regulator

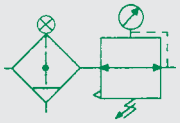


1/8 pilot port
1/4 gauge ports

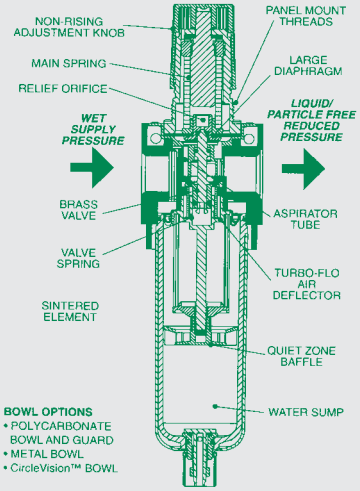
MOUNTING HOLES
Ø.257 TYP.2
(Ø6.5)

R42W-08 (Air Pilot Regulator)





ANSI SYMBOL



Particulate Filter/Regulator

P14B, P22B, P32B, P42B Series

- Four convenient sizes
- 5 micron element standard
- Can be installed as individual or modular unit
- Non-rising knob
- Optional **CircleVision**™ sight bowl
- Optional metal bowl with sight glass
- Standard output pressure 0-125 PSIG
- Bowl seal held captive (22, 32, and 42 Series)

Specifications

BOWL	POLYCARBONATE BOWL	CIRCLEVISION™ BOWL	METAL BOWL
Temperature Range (°F)	40-120	40-120	40-120
Temperature Range (°C)	4-50	4-50	4-50
Max. Pressure (PSIG)	150	250	200
Max. Pressure (BAR)	10	17	14
14 Series (Weight, lbs.)	0.75	0.90	0.80
14 Series (Weight, kg)	0.34	0.40	0.37
22 Series (Weight, lbs.)	0.91	1.20	1.50
22 Series (Weight, kg)	0.41	0.55	0.68
32 Series (Weight, lbs.)	1.81	2.34	2.94
32 Series (Weight, kg)	0.82	1.06	1.34
42 Series (Weight, lbs)	5.05	5.50	6.15
42 Series (Weight, kg)	2.29	2.49	2.79

How to Order

P 14 B - 02 GIP

Model
P = Particulate/Regulator

Series
14 = 1.5 oz Bowl
22 = 3.8 oz Bowl
32 = 8.5 oz Bowl
42 = 8.5 oz Bowl

Element
B = 5 Micron Element

Threads
- = NPTF
G = G Tap (BSPP) (Conforms to ISO Standards 1179-1 and 228-1)
R = PT (BSPT)

Port Size
01 = 1/8 (14 series only)
02 = 1/4 (14 or 22 series only)
03 = 3/8 (22 series only)
04 = 1/2 (22 or 32 series only)
06 = 3/4 (32 or 42 series only)
08 = 1 (42 series only)

Options
A* = Auto Drain (22, 32, and 42 Series)
B = Flexible Drain
C = CircleVision™ Sight Bowl
G = Gauge
H* = 0-200 PSIG Output (22, 32 and 42 Series)
I = 0-25 PSIG Output
J = External Pulse Drain
L = 0-60 PSIG Output (22, 32 and 42 Series)
M = Metal Bowl with Sight Glass
N = Non-Relieving
P = Panel Mount Nut (14, 22, and 32 Series)
Q = Metal Manual Drain
R = Manual Lever Drain
T = Tamper Resistant
S = Steel T Handle (42 Series)
V = Shut off valve

*"A" and "H" options cannot be used together.

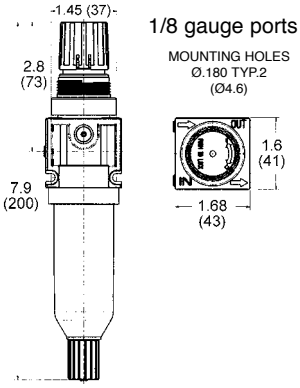
Notes:
- To order a piston style particulate filter/regulator, add "P" to the model number.(example: P32BP-04GIP)
- "T" option tamper resistant cannot be used with high pressure "H" option with 42 Series.

NEED MORE PARTS AND INFORMATION?

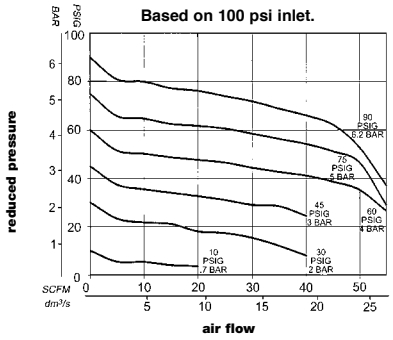
• *See pages 37 & 38* for information on ordering replacement parts. • *See page 36* for more information on available drain options.

Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

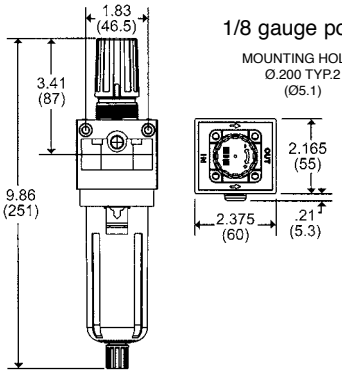
14 Series Filter/Regulator



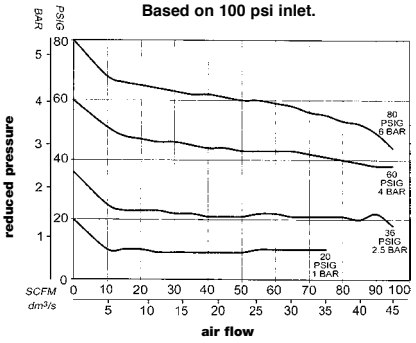
P14B-02 (5 micron particulate)



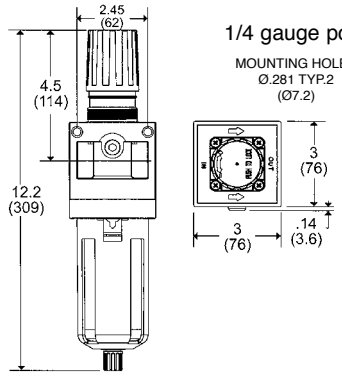
22 Series Filter/Regulator



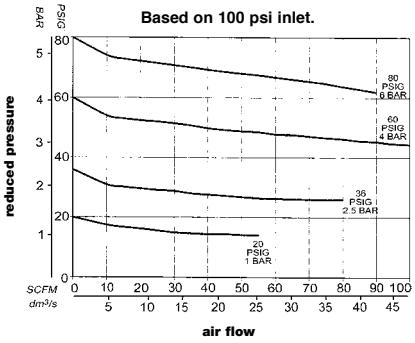
P22B-04 (5 micron particulate)



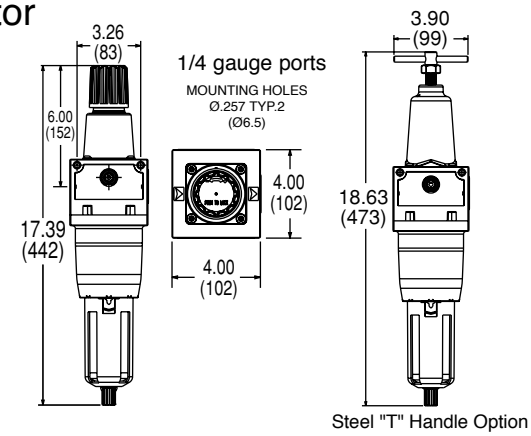
32 Series Filter/Regulator



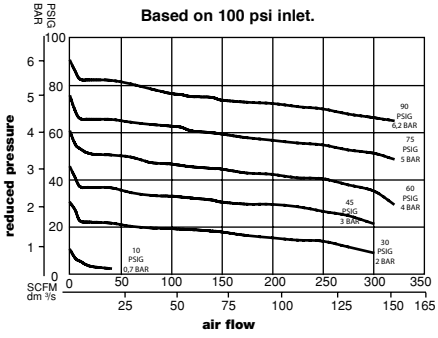
P32B-06 (5 micron particulate)

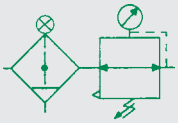


42 Series Filter/Regulator

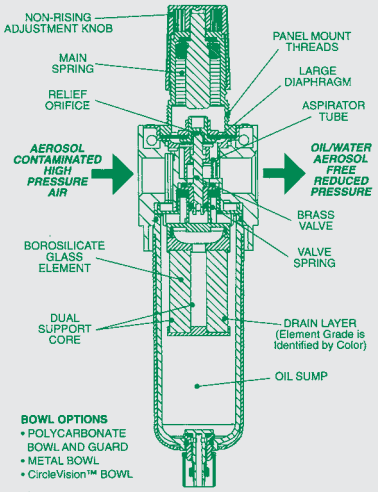


P42B-08 (5 micron particulate)





ANSI SYMBOL



Coalescing Filter/Regulator

C14, C22, C32, C42 Series

- Four convenient sizes
- Cartridge element design
- Inner/outer support cores prevent element from crushing in either flow direction
- Connects easily to FLEXIBLOK® Modular system
- Four element grades available

Recommended Uses

C grade element, identified by its blue drain layer, is a coarse filter for large amounts of water, rust, pipe scale, and liquid hydrocarbons. Excellent for environments that have severe contamination. Can be used for lubricated or 'dry' systems. Ideal for mainline filtration of plant air.
D grade element, identified by its green drain layer, is a fine filter for cylinder or valves - especially when the circuit is being run without lubrication ('dry'). Excellent filter for desiccant or regenerative style dryers.
E grade element, identified by its red drain layer, is an ultra fine filter for oil-free instrumentation air, blow molding, food and drug packaging, electronics applications, and other applications requiring maximum contamination removal.
F grade element, identified by its white drain layer, is an adsorbing filter that utilizes activated carbon to capture hydrocarbon vapor and deodorize compressed air. Typically it is used to protect worker environments, food and drug applications, breathing air, and instrumentation for analytical instruments. Life expectancy is approximately 3 months at rated flow.

Specifications

BOWL	POLYCARBONATE BOWL	CIRCLEVISION™ BOWL	METAL BOWL
Temperature Range (°F)	40-120	40-120	40-120
Temperature Range (°C)	4-50	4-50	4-50
Max. Pressure (PSIG)	150	250	200
Max. Pressure (BAR)	10	17	14
14 Series (Weight, lbs.)	0.80	0.95	0.85
14 Series (Weight, kg)	0.35	0.43	0.38
22 Series (Weight, lbs.)	0.92	1.20	1.60
22 Series (Weight, kg)	0.42	0.55	0.73
32 Series (Weight, lbs.)	1.82	2.35	2.95
32 Series (Weight, kg)	0.83	1.07	1.34
42 Series (Weight, lbs.)	5.05	5.50	6.15
42 Series (Weight, kg)	2.29	2.49	2.79

How to Order

C 32 C - 06 AGNQ

Model
C = Coalescer/Regulator

Series
14 = 1.5 oz Bowl
22 = 3.8 oz Bowl
32 = 8.5 oz Bowl
42 = 8.5 oz Bowl

Element
C = 0.7 Micron Coarse Coalescer
D = 0.3 Micron Fine Coalescer
E = 0.01 Micron Ultra Fine Coalescer
F = Vapor Adsorber

Threads
- = NPTF
G = G Tap (BSPP) (Conforms to ISO Standards 1179-1 and 228-1)
R = PT (BSPT)

Port Size
01 = 1/8 (14 series only)
02 = 1/4 (14 or 22 series only)
03 = 3/8 (22 series only)
04 = 1/2 (22 or 32 series only)
06 = 3/4 (32 or 42 series only)
08 = 1 (42 series only)

Options
A* = Auto Drain (22, 32, and 42 series)
B = Flexible Drain
C = CircleVision™ Sight Bowl
D = 3 Micron, Internal Pleated Filter
G = Gauge
H* = 0-200 PSIG Output
I = 0-25 PSIG Output
J = External Pulse Drain
L = 0-60 PSIG Output
M = Metal Bowl with Sight Glass
N = Non-Relieving
P = Panel Mount Nut
Q = Metal Manual Drain
R = Manual Lever Drain
S = Steel T Handle (42 Series)
T = Tamper Resistant
V = Shut Off Valve

*'A' and 'H' options cannot be used together.

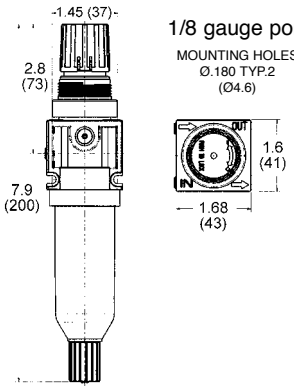
Note: To order a piston style coalescing/regulator, add "P" to the model number. (ie: C32CP-06AGQ)

NEED MORE PARTS AND INFORMATION?

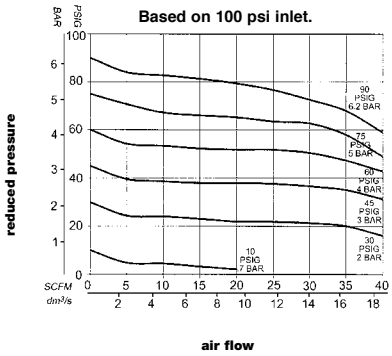
• *See page 36 for* more information on available drain options.
• *See pages 37 & 38 for information on ordering replacement parts.*

Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

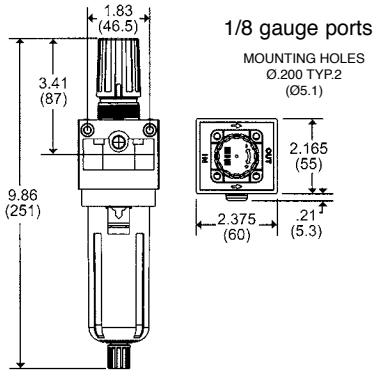
14 Series Coalescer/Regulator



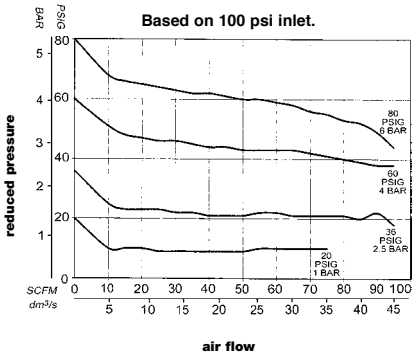
C14D-02 (0.3 micron coalescing)



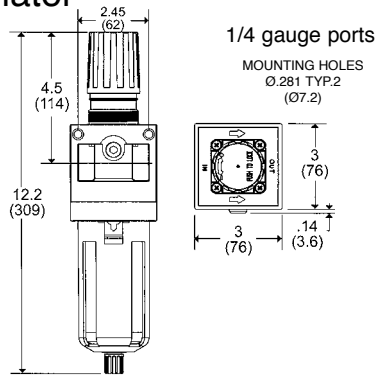
22 Series Coalescer/Regulator



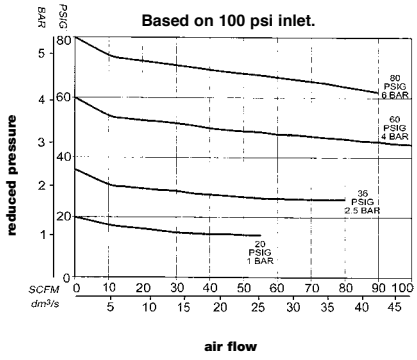
C22D-04 (0.3 micron coalescing)



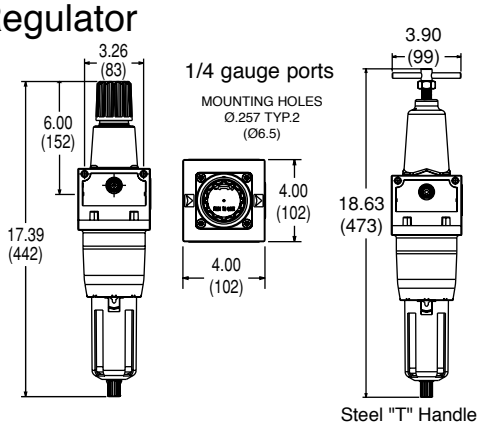
32 Series Coalescer/Regulator



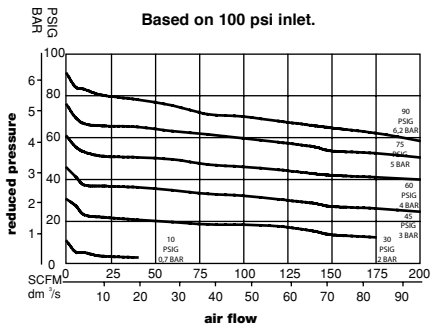
C32D-06 (0.3 micron coalescing)

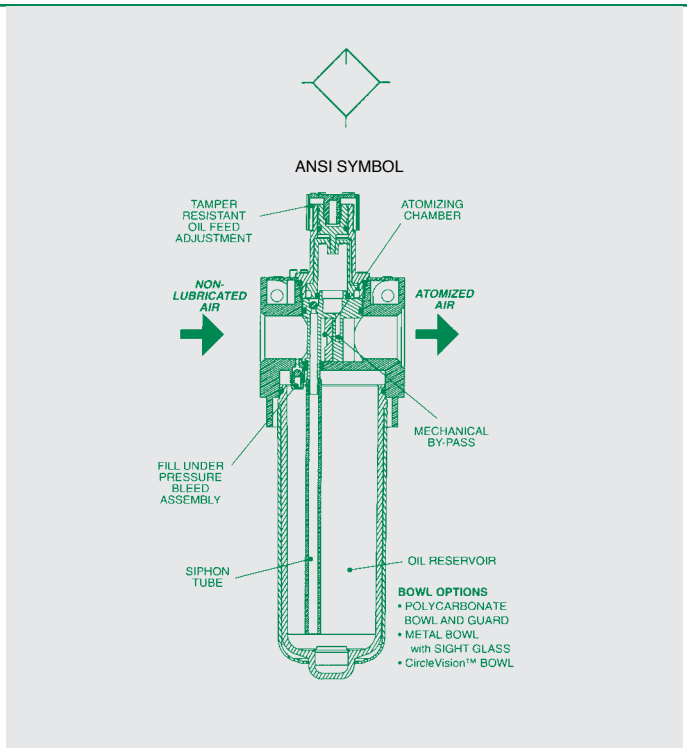


42 Series Coalescer/Regulator



C42D-08 (0.3 micron coalescing)





Lubricator

L14L, L22L, L32L, L42L Series

- Four convenient sizes
- Lubrication to begin at 2 SCFM
- Can be filled under pressure (32 and 42 series only)
- Tamper-resistant knob standard
- Optional CircleVision™ sight bowl
- Optional metal bowl with sight glass
- Can be mounted as individual or modular unit
- Button head fill optional on all sizes
- Atomizing chamber develops longer life aerosols

Specifications

	14 SERIES	22 SERIES	32 SERIES	42 SERIES
Temperature Range (°F)	40-120	40-120	40-120	40-120
Temperature Range (°C)	4-50	4-50	4-50	4-50
Max. Pressure (PSIG)	200	200	200	200
Max. Pressure (BAR)	14	14	14	14
Weight (lbs.)	0.60	0.69	1.37	4.15
Weight (kg)	0.27	0.31	0.62	2.18
Body Material	Zinc	Aluminum	Aluminum	Aluminum

How to Order

L 22 L - 02 CF

Model
L = Lubricator

Series
14 = 1.5 oz Bowl
22 = 3.8 oz Bowl
32 = 8.5 oz Bowl
42 = 8.5 oz Bowl

Style
L = Standard Lubricators

Threads
- = NPTF
G = G Tap (BSPP) (Conforms to ISO Standards 1179-1 and 228-1)
R = PT (BSPT)

Options
C = CircleVision Sight Bowl
F = Button Head Fill
K = Drain on Bowl
M = Metal Bowl with Sight Glass

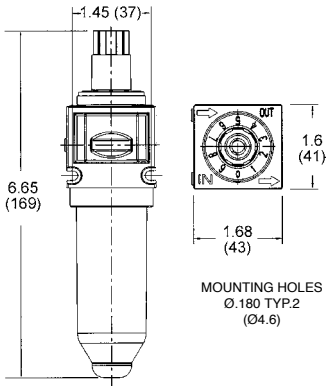
Port Size
01 = 1/8 (14 series only)
02 = 1/4 (14 or 22 series only)
03 = 3/8 (22 series only)
04 = 1/2 (22 or 32 series only)
06 = 3/4 (32 or 42 series only)
08 = 1 (42 series only)

Note: F and K options cannot be used together.

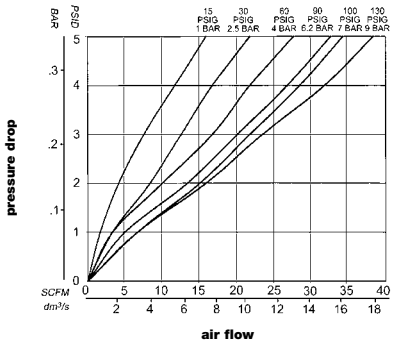
NEED MORE PARTS AND INFORMATION?
- *See pages 37 & 38* for information on ordering replacement parts.

Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

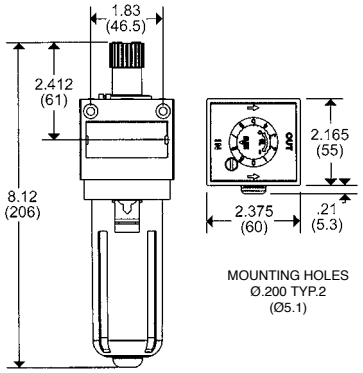
14 Series Lubricator



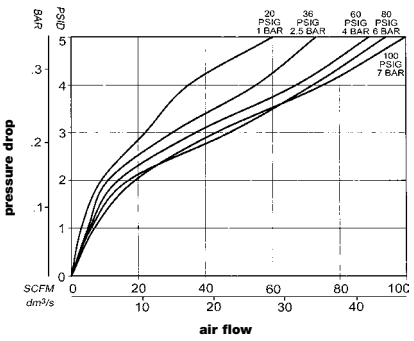
L14L-02 (14 Series Lubricator)



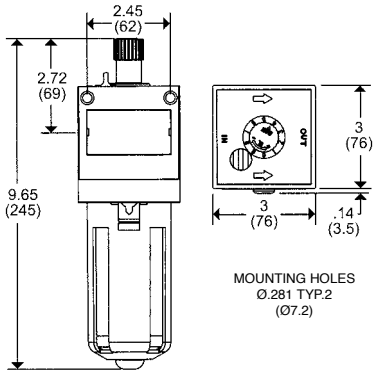
22 Series Lubricator



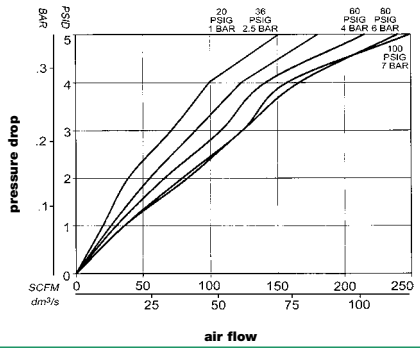
L22L-04 (22 Series Lubricator)



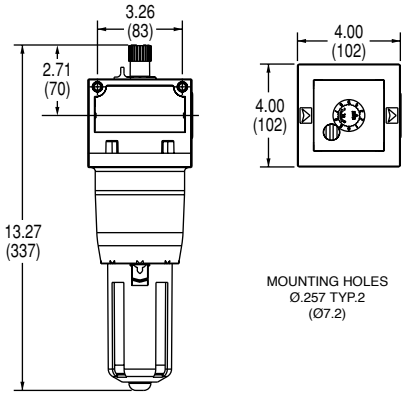
32 Series Lubricator



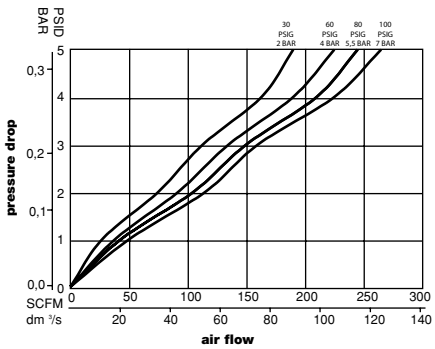
L32L-06 (32 Series Lubricator)

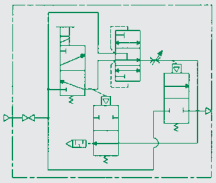


42 Series Lubricator

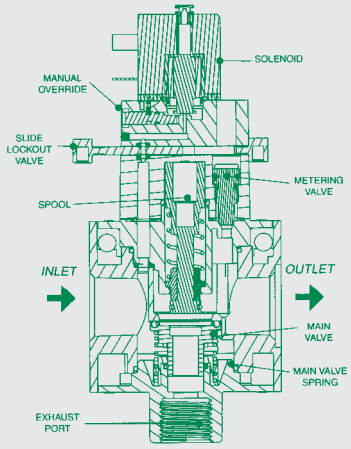


L42L-06 (42 Series Lubricator)





ANSI SYMBOL



Solenoid Soft Start Quick Exhaust Valve

S22C, S32C, S42C Series

- Three convenient sizes
- Lockout feature prevents unauthorized pressurization of system
- High exhaust capacity for quick depletion of pressure
- High inlet to outlet flow capability
- Connects easily to FlexiBlok® Modular system
- Incorporated metering valve controls how quickly downstream pressure is reached, which controls the slow start feature

Specifications

	22 SERIES	32 SERIES	42 SERIES
Exhaust Ports (NPTF)	1/2	1/2	3/8 (3 exh. ports)
Gauge Ports (NPTF)	1/8	1/4	1/4
Temperature Range (°F)	40-120	40-120	40-120
Temperature Range (°C)	4-50	4-50	4-50
Min. Pressure (PSI)	60	60	20
Min. Pressure (BAR)	4	4	1.38
Max.-Pressure (PSI)	150	150	150
Max. Pressure (BAR)	10	10	10
Weight, lbs. (kg.)	0.94 (0.43)	1.56 (0.71)	4.35 (1.97)
Body Material	Aluminum	Aluminum	Aluminum

Cv in-out/out-exh (22 Series, 1/4)	2 / 1.2
Cv in-out/out-exh (22 Series, 3/8)	2.87 / 1.38
Cv in-out/out-exh (22 Series, 1/2)	3.62 / 1.32
Cv in-out/out-exh (32 Series, 1/2)	5.24 / 3.01
Cv in-out/out-exh (32 Series, 3/4)	6.47 / 3.14
Cv in-out/out-exh (42 Series, 3/4)	7.5 / 5.0
Cv in-out/out-exh (42 Series, 1)	8.0 / 5.0

WATTAGE AND AMPERAGE	
110V AC	1.42 watts / 0.022 amps
230V AC	2.00 watts / 0.016 amps
24V AC	2.00 watts / 0.011 amps
24V DC	2.00 watts / 0.080 amps

How to Order

S 32 C - 06 BFGLM

Model
S = Solenoid Soft Start

Series
22
32
42

Style
C = Standard Solenoid Soft Start

Threads
- = NPTF
G = G Tap (BSPP) (Conforms to ISO Standards 1179-1 and 228-1)
R = PT (BSPT)

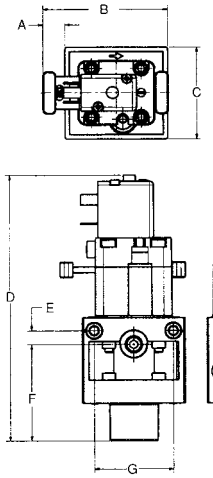
Options
B = Revision Level
E = 110V AC 50/60 Hz
F = 230V AC 50/60 Hz
G = Gauge
J = 24V AC 50/60 Hz Coil
K = 24V DC Coil
L = Plug with Light
M = Muffler
N = No manual Override
P = Black Plug Assembly
Q = 4 Pin Micro Connector
X = No Slide

Port Size
02 = 1/4 (22 Series Only)
03 = 3/8 (22 Series Only)
04 = 1/2 (22 or 32 Series)
06 = 3/4 (32 or 42 Series Only)
08 = 1 (42 Series Only)

NEED MORE PARTS AND INFORMATION?
- *See pages 37 & 38* for information on ordering replacement parts.

Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

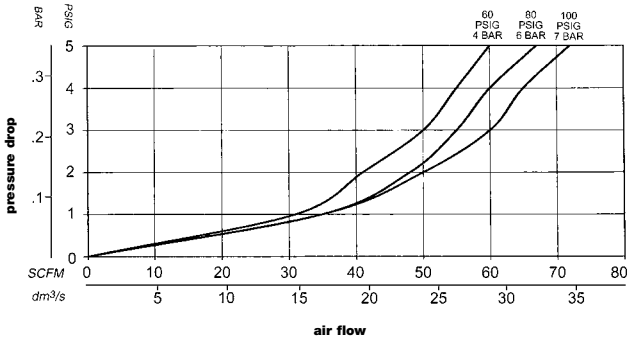
22 Series Solenoid Soft Start



1/8 gauge ports

MOUNTING HOLES
Ø.200 TYP.2
(Ø5.1)

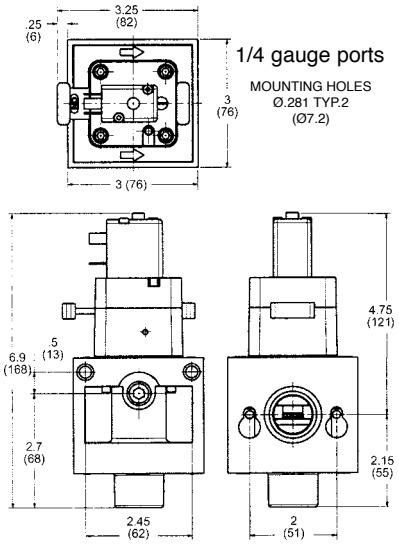
S22C-04B (22 Series Solenoid Soft Start Quick Exhaust Valve)



Dimensions

	A	B	C	D	E	F	G	H	I	J
22 Series	.51 (13)	2.9 (73)	2.1 (65)	6.3 (160)	.32 (8)	2.2 (58)	1.8 (46)	4.4 (112)	1.9 (48)	1.5 (40)

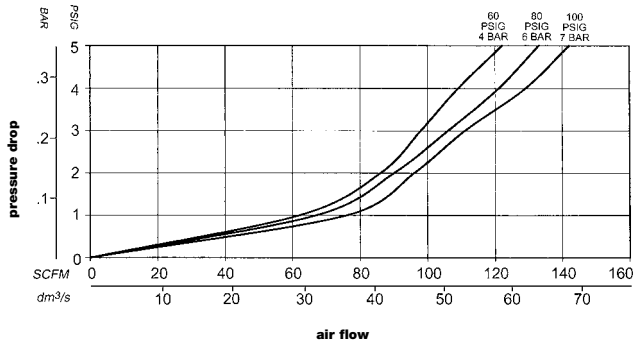
32 Series Solenoid Soft Start



1/4 gauge ports

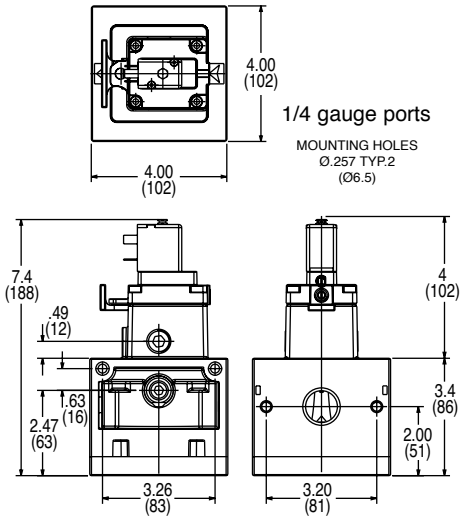
MOUNTING HOLES
Ø.281 TYP.2
(Ø7.2)

S32C-06B (32 Series Solenoid Soft Start Quick Exhaust Valve)



42 Series Solenoid Soft Start

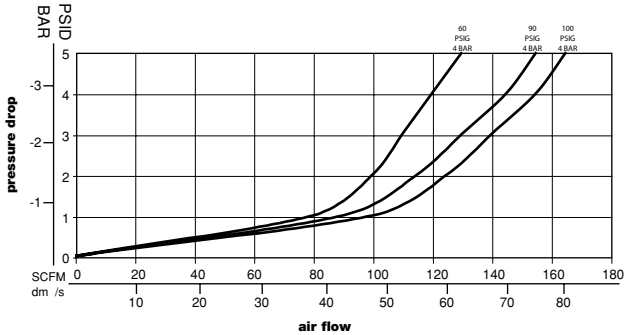
* Muffler and plug not included

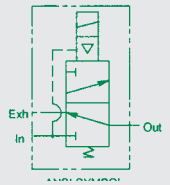


1/4 gauge ports

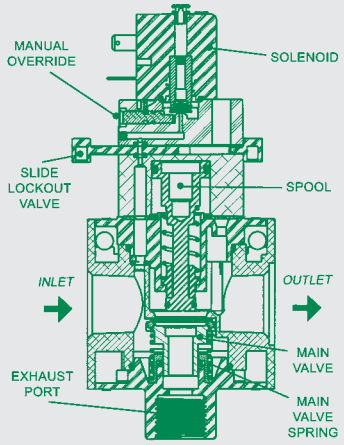
MOUNTING HOLES
Ø.257 TYP.2
(Ø6.5)

S42C-08B (42 Series Solenoid Soft Start Quick Exhaust Valve)





ANSI SYMBOL



Solenoid Quick Exhaust Valve

S14E, S22E, S32E, S42E Series

- Four convenient sizes
- Lockout feature (located in slide valve) prevents unauthorized pressurization of system (22, 32, and 42 Series)
- Standard manual override (or with no manual override option)
- Low-wattage coil prevents high-temperatures
- High exhaust capacity for quick depletion of pressure
- High inlet to outlet flow capability
- Connects easily to FLEXIBLOK® Modular system

Specifications

	14 SERIES	22 SERIES	32 SERIES	42 SERIES
Exhaust Ports (NPTF)	1/8	1/2	1/2	3/4
Gauge Ports (NPTF)	10-32 UNF	1/8	1/4	1/4
Temperature Range (°F)	40-120	40-120	40-120	40-120
Temperature Range (°C)	4-50	4-50	4-50	4-50
Min. Pressure (PSI)	40	40	40	20
Min. Pressure (BAR)	2.76	2.76	2.76	1.38
Max.-Pressure (PSI)	150	150	150	150
Max. Pressure (BAR)	10	10	10	10
Weight, lbs. (kg.)	1.25 (0.57)	1.15 (0.53)	1.75 (0.79)	3.45 (1.56)
Body Material	Zinc	Aluminum	Aluminum	Aluminum

Cv in-out/out-exh (14 Series,1/8)	1.15 / 1.10
Cv in-out/out-exh (14 Series, 1/4)	1.55 / 1.10
Cv in-out/out-exh (22 Series,1/4)	2 / 1.2
Cv in-out/out-exh (22 Series, 3/8)	2.87 / 1.38
Cv in-out/out-exh (22 Series, 1/2)	3.62 / 1.32
Cv in-out/out-exh (32 Series, 1/2)	5.24 / 3.01
Cv in-out/out-exh (32 Series, 3/4)	6.47 / 3.14
Cv in-out/out-exh (42 Series, 3/4)	7.5 / 5.0
Cv in-out/out-exh (42 Series, 1)	8.0 / 5.0

WATTAGE AND AMPERAGE	
110V AC	1.42 watts / 0.022 amps
230V AC	2.00 watts / 0.016 amps
24V AC	2.00 watts / 0.011 amps
24V DC	2.00 watts / 0.080 amps

How to Order

S 32 E - 04 BFGLM

Model
S = Solenoid Quick Exhaust

Series
14
22
32
42

Style
E = Standard Solenoid Quick Exhaust Valve

Threads
- = NPTF
G = G Tap (BSPP (Conforms to ISO Standards 1179-1 and 228-1))
R = PT (BSPT)

Options
B = Revision Level
E = 110V AC 50/60 Hz
F = 230V AC 50/60 Hz
G = Gauge
J = 24V AC 50/60 Hz Coil
K = 24V DC Coil
L = Plug with Light
M = Muffler
N = No manual Override
P = Standard Black Plug Assembly
Q = 4 Pin Micro Connector
X = No Slide

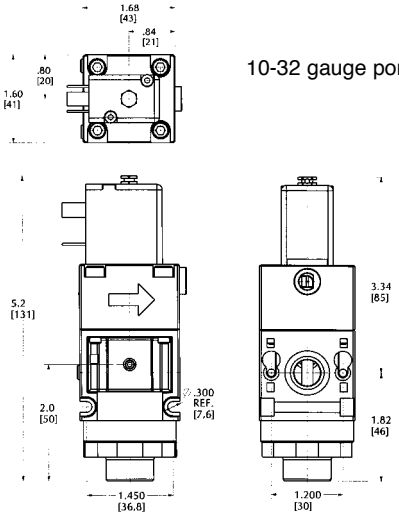
Port Size
01 = 1/8 (14 Series Only)
02 = 1/4 (14 or 22 Series)
03 = 3/8 (22 Series Only)
04 = 1/2 (22 or 32 Series)
06 = 3/4 (32 or 42 Series Only)
08 = 1 (42 Series Only)

NEED MORE PARTS AND INFORMATION?

• *See pages 37 & 38* for information on ordering replacement parts.

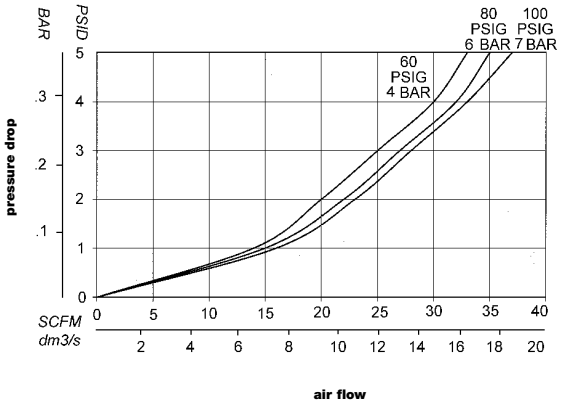
Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

14 Series Solenoid Quick Exhaust

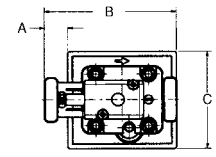


10-32 gauge ports

S14E-04B (14 Series Solenoid Quick Exhaust Valve)

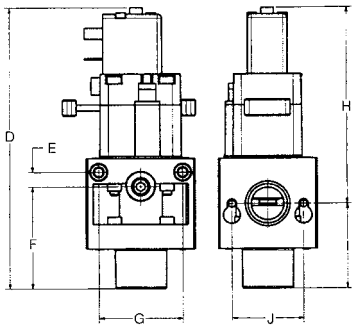


22 and 32 Series Solenoid Quick Exhaust

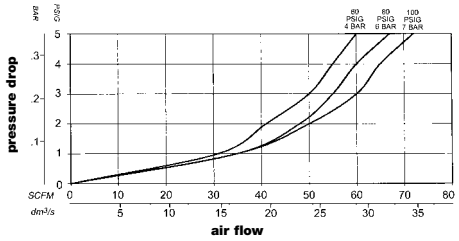


22: 1/8 gauge ports
32: 1/4 gauge ports

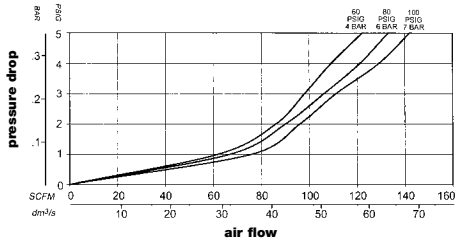
MOUNTING HOLES
22: Ø.200 TYP.2
(Ø5.1)
32: Ø.281 TYP.2
(Ø7.2)



S22E-04B (22 Series Solenoid Quick Exhaust Valve)



S32E-06B (32 Series Solenoid Quick Exhaust Valve)

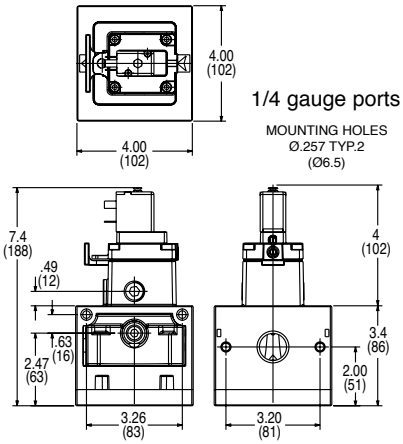


Dimensions

	A	B	C	D	E	F	G	H	I	J
22 Series	.51 (13)	2.9 (73)	2.1 (65)	6.3 (160)	.32 (8)	2.2 (58)	1.8 (46)	4.4 (112)	1.9 (48)	1.5 (40)
32 Series	.25 (6)	3.2 (82)	3.0 (76)	6.9 (168)	.5 (13)	2.7 (68)	2.4 (61)	4.7 (121)	2.1 (55)	2.0 (51)

42 Series Solenoid Quick Exhaust

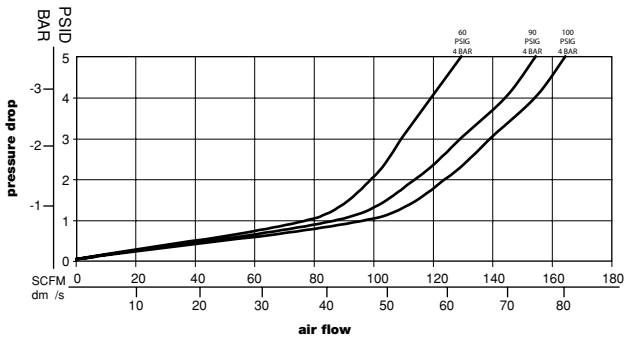
* Muffler and plug not included

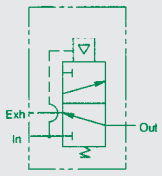


1/4 gauge ports

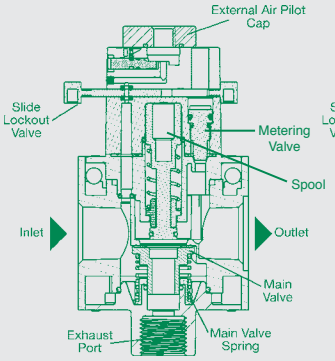
MOUNTING HOLES
Ø.257 TYP.2
(Ø6.5)

S42E-08B (42 Series Solenoid Soft Start Quick Exhaust Valve)

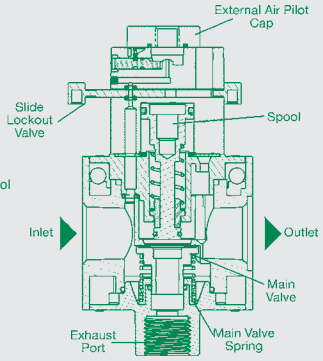




ANSI SYMBOL



Air Piloted Soft Start Quick Exhaust Valve



Air Piloted Quick Exhaust Valve

Internally/Externally Pilot Operated Quick Exhaust Valves

Pilot Operated "Soft Start" Quick Exhaust Valves

External Pilot - Style "C" – Available three series S22, S32 , S42 only

Pilot Operated "Soft Start" Quick Exhaust Valves

Internal Pilot - Style "P" – Available three series S22, S32 , S42 only

Pilot Operated "Quick Exhaust" Valves

External Pilot - Style "E" – Available four series S14, S22, S32 , S42

- Lockout feature (located in yellow slide valve) prevents unauthorized system pressurization. Available three series S22, S32 , S42 only
- High flow capacity Inlet to Outlet
- High exhaust capacity for quick depletion of downstream pressure
- Connects easily to FLEXIBLOK® Modular FRL systems

Specifications

	14 SERIES	22 SERIES	32 SERIES	42 SERIES
Exhaust Ports (NPTF)	1/4	1/2	1/2	3/4
Gauge Ports (NPTF)	10-32 UNF	1/8	1/4	1/4
Temperature Range (°F)	40-120	40-120	40-120	40-120
Temperature Range (°C)	4-50	4-50	4-50	4-50
Min. Pressure (PSI)	40	40	40	20
Min. Pressure (BAR)	2.76	2.76	2.76	1.38
Max.-Pressure (PSI)	150	150	150	150
Max. Pressure (BAR)	10	10	10	10
Weight, lbs. (kg.)	1.25 (0.57)	1.15 (0.53)	1.75 (0.79)	3.45 (1.56)
Body Material	Zinc	Aluminum	Aluminum	Aluminum

Cv in-out/out-exh (14 Series,1/8)	1.15 / 1.10
Cv in-out/out-exh (14 Series, 1/4)	1.55 / 1.10
Cv in-out/out-exh (22 Series,1/4)	2 / 1.2
Cv in-out/out-exh (22 Series, 3/8)	2.87 / 1.38
Cv in-out/out-exh (22 Series, 1/2)	3.62 / 1.32
Cv in-out/out-exh (32 Series, 1/2)	5.24 / 3.01
Cv in-out/out-exh (32 Series, 3/4)	6.47 / 3.14
Cv in-out/out-exh (42 Series, 3/4)	7.5 / 5.0
Cv in-out/out-exh (42 Series, 1)	8.0 / 5.0

How to Order

S 22 E - 04 BGMW

Model
S = Internally or Externally Pilot Operated Quick Exhaust Valves

Series
14
22
32
42

Style
C = Soft Start Quick Exhaust Valves (External Pilot 22, 32, 42 Series Only)
P = Soft Start Quick Exhaust Valves (Internal Pilot 22, 32, 42 Series Only)
E = Quick Exhaust Valves (External Pilot 14, 22, 32, 42 Series)

Threads
- = NPTF
G = G Tap (BSPP) (Conforms to ISO Standards 1179-1 and 228-1)
R = PT (BSPT)

Port Size
01 = 1/8 (14 Series Only)
02 = 1/4 (14 or 22 Series)
03 = 3/8 (22 Series Only)
04 = 1/2 (22 or 32 Series)
06 = 3/4 (32 and 42 Series Only)
08 = 1 (42 Series Only)

Options
B = Revision Level
G = Gauge
M = Muffler
W = External Air Pilot (Use for styles "C & E")
X = No Slide on Valve

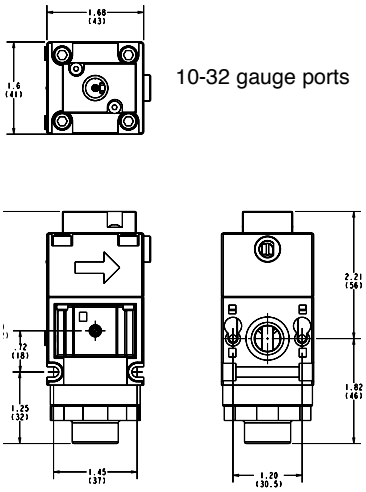
NEED MORE PARTS AND INFORMATION?

- *See pages 37 & 38* for information on ordering replacement parts.

Note: How to order examples for the three different models:
"C" Externally Piloted Soft Start Quick Exhaust Valve: eg S22C-04BW
"P" Internally Piloted Soft Start Quick Exhaust Valve: eg S22P-04
"E" Externally Piloted Quick Exhaust Valve: eg S22E-04BW
" C & E "externally pilot operated valves are not field convertible to solenoid operated. Consult factory.

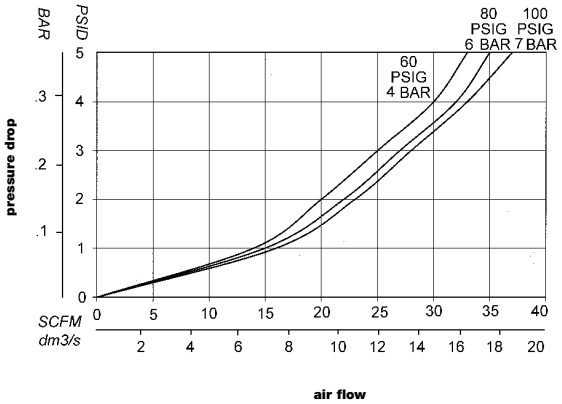
Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

14 Series Internally/Externally Piloted Quick Exhaust Valve

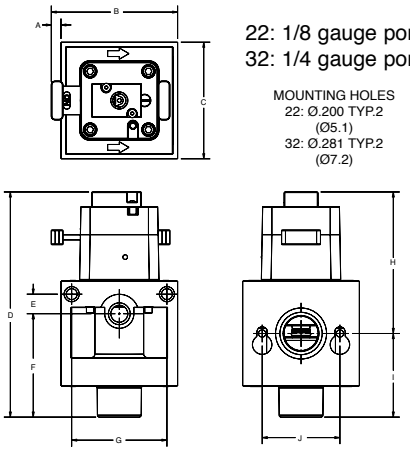


10-32 gauge ports

S14*-04BW (14 Series Pilot Operated Quick Exhaust Valve)



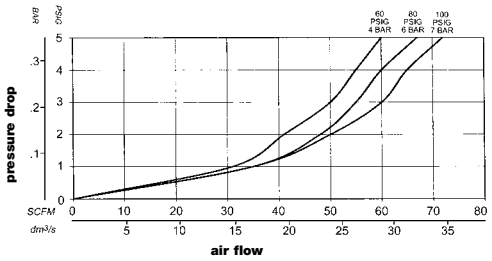
22 and 32 Series Internally/Externally Piloted Quick Exhaust Valve



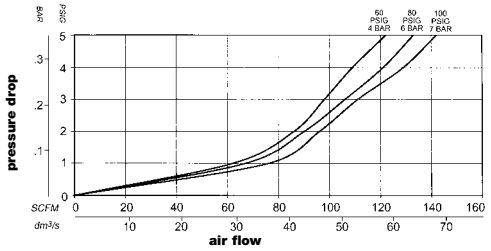
22: 1/8 gauge ports
32: 1/4 gauge ports

MOUNTING HOLES
22: Ø.200 TYP.2
(Ø5.1)
32: Ø.281 TYP.2
(Ø7.2)

S22*-04BW (22 Series Pilot Operated Soft Start Quick Exhaust Valve)



S32*-06BW (32 Series Pilot Operated Soft Start Quick Exhaust Valve)

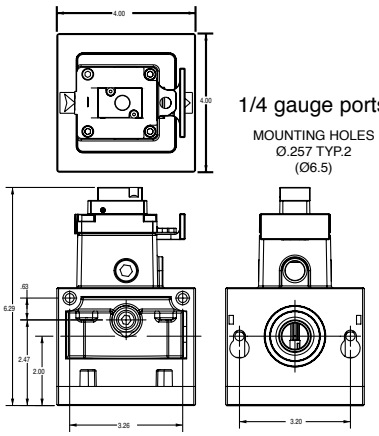


Dimensions

	A	B	C	D	E	F	G	H	I	J
22 Series	.51 (13)	2.9 (73)	2.1 (65)	5.2 (132)	.32 (8)	2.2 (58)	1.8 (46)	3.3 (84)	1.9 (48)	1.5 (38)
32 Series	.25 (6)	3.2 (82)	3.0 (76)	5.8 (147)	.5 (13)	2.7 (68)	2.4 (61)	3.6 (93)	2.6 (55)	2.0 (51)

42 Series Internally/Externally Piloted Quick Exhaust Valve

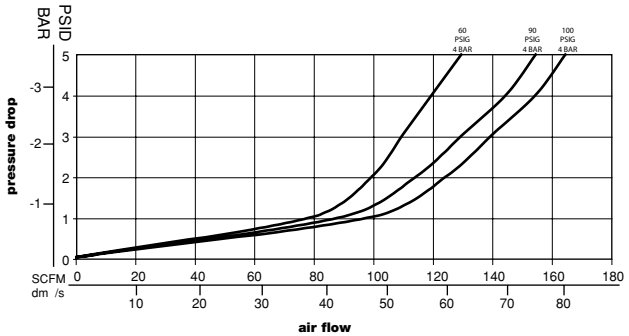
* Muffler not included



1/4 gauge ports

MOUNTING HOLES
Ø.257 TYP.2
(Ø6.5)

S42*-08BW (42 Series Pilot Operated Soft Start Quick Exhaust Valve)



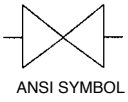
Shut-Off Valve

VS14, VS22, VS32, VSL42 Series

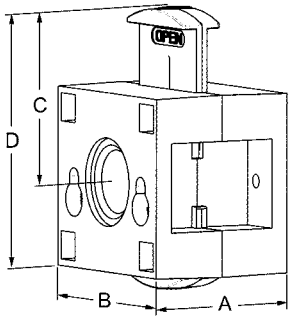
The FLEXIBLOK® Shut-Off Valve is an easy and inexpensive way to add shut off capability to an FRL. The valve includes a lockout feature designed for a padlock to prevent unauthorized downstream pressurization during maintenance. The shut off valve is usually mounted first in the assembly.

Max. inlet pressure: 200 PSI (13.7 bar)
250 PSI (17 bar) - 42 Series

- Relieves downstream pressure when closed
- Lockout feature prevents unauthorized pressurization of system
- Easy modular connection
- Can be used as individual component



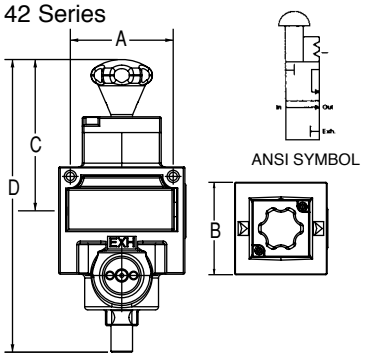
14, 22, 32 Series



	MODEL #S			DIMENSIONS				
	NPTF	BSPP	BSPT	A	B	C	D	PORTS
14	VS14-01	VS14G01	VS14R01	1.63 (41)	1.6 (41)	1.6 (41)	3 (76)	1/8
	VS14-02	VS14G02	VS14R02	1.63 (41)	1.6 (41)	1.6 (41)	3 (76)	1/4
22	VS22-02	VS22G02	VS22R02	2.0 (50)	2.16 (55)	1.86 (47)	3.1 (79)	1/4
	VS22-03	VS22G03	VS22R03	2.0 (50)	2.16 (55)	1.86 (47)	3.1 (79)	3/8
	VS22-04	VS22G04	VS22R04	2.0 (50)	2.16 (55)	1.86 (47)	3.1 (79)	1/2
32	VS32-04	VS32G04	VS32R04	2.25 (57)	3.0 (76)	2.57 (65)	4.2 (107)	1/2
	VS32-06	VS32G06	VS32R06	2.25 (57)	3.0 (76)	2.57 (65)	4.2 (107)	3/4
42	VSL42-06	VSL42G06	VSL42R06	3.2 (83)	4.0 (102)	4.8 (122)	9.3 (236)	3/4
	VSL42-08	VSL42G08	VSL42R08	3.2 (83)	4.0 (102)	4.8 (122)	9.3 (236)	1

NOTE: Add "N" to end of model number for non-relieving model (i.e. VS14-01***N***)
(Not available on 42 series models)

42 Series



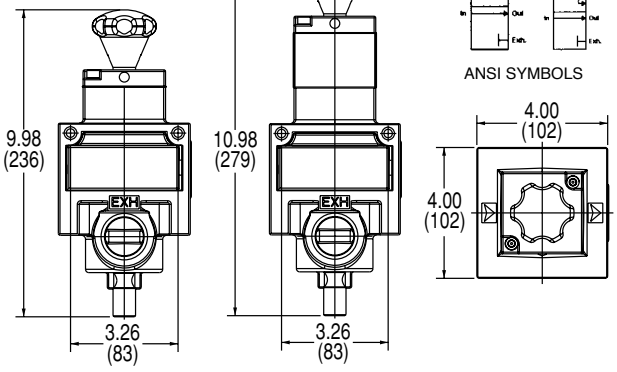
Quick Exhaust Lockout Valve

MVL42/MVT42 Series

- Rugged all metal design
- Placed last in an air preparation assembly. To be used as a system quick exhaust valve.

Specifications

Temperature Range: 40-120°F (4-50°C)
Max. Pressure: 250 PSIG (17 bar)
Weight: 4.95 lbs (2.25 kg)



CV Ratings

MODEL #	CV IN/OUT	CV OUT/EXH
MVL42-06Y	11.5	9
MVL42-08Y	12.5	10
MVT42-06Y	11.5	9
MVT42-08Y	12.5	10

MVL 42 – 08Y

Model
MVL = Standard
MVT = Slo-Start™ Feature

Series
42

Options
A = Metal Muffler (ie MVT42-08AY)
B = Scissor Lockout (ie MVT42-08BY)

Port Size
06 = 3/4
08 = 1

Threads
– = NPTF
G = G Tap (BSPP)
(Conforms to ISO Standards 1179-1 and 228-1)
R = PT (BSPT)

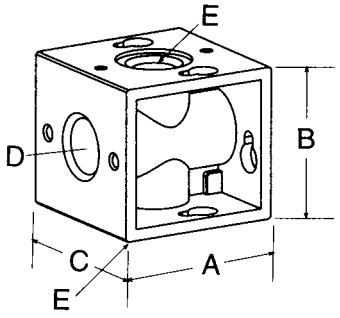
Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

Diverter Block

DK14, DK22, DK32, DK42 Series

Designed to give FLEXIBLOK® components total versatility, the diverter block mounts directly inline with the FRL combination. Additional components can then be manifold mounted in a compact manner that doesn't cause excessive pressure drop. There are two available ports per unit; both are tapped for standard service.

Max. inlet pressure: 200 PSI (13.7 bar) (14, 22, 32 Series)
250 PSI (17 bar) (42 Series)



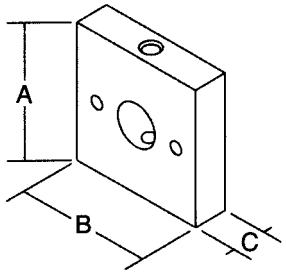
	MODEL #			DIMENSIONS					
SERIES	NPTF	BSPP	BSPT	A	B	C	D	E	PORTS
14	DK14-02	DK14G02	DK14R02	1.72 (44)	1.54 (39)	1.6 (41)	1/4	1/8	Tapped 1/4 NPTF In & Out with two 1/8 NPTF branches
22	DK22-03	DK22G03	DK22R03	2.16 (55)	2.00 (50)	2.16 (55)	1/2	3/8	Tapped 1/2 NPTF in & out with two 3/8 NPTF branches
32	DK32-04	DK32G04	DK32R04	3.00 (76)	2.70 (69)	3.00 (76)	3/4	1/2	Tapped 3/4 NPTF in & out with two 1/2 NPTF branches
42	DK42-06	DK42G06	DK42R06	4.00 (102)	3.40 (87)	4.00 (102)	3/4	3/4	In & Out and branches 3/4 with two 3/4 NPTF branches
42	DK42-08	DK42G08	DK42R08	4.00 (102)	3.40 (87)	4.00 (102)	1	1	In & Out and branches 1 with two 1 NPTF branches

Diverter Plates

HK14, HK22, HK32 Series

Diverter plates are designed to provide air signals in a compact space. Used individually or in combination, they can be used with gauges or switches to determine a pressure or Δ pressure signal.

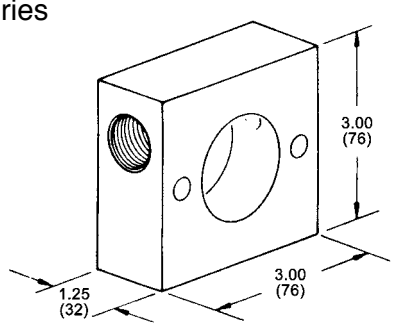
Max. inlet pressure: 200 PSI (13.7 bar)



	MODEL #			DIMENSIONS			OUTLET	
SERIES	NPTF	BSPP	BSPT	A	B	C	PORT	APPLICATION
14	HK14-01	HK14G01	HK14R01	1.54 (39)	1.50 (38)	.75 (19)	1/8	Mounts between two units
22	HK22-01	HK22G01	HK22R01	2.00 (51)	2.15 (55)	.75 (19)	1/8	Mounts between two units
32	HK32-01	HK32G01	HK32R01	3.00 (76)	3.00 (76)	.75 (19)	1/8	Mounts between two units

Rear-Ported End Plates

MR32 Series



Available only in the 32 Series, the Rear-Ported End Plate allows an FRL to be mounted flush with a surface and the piping to exit the rear of the combination.

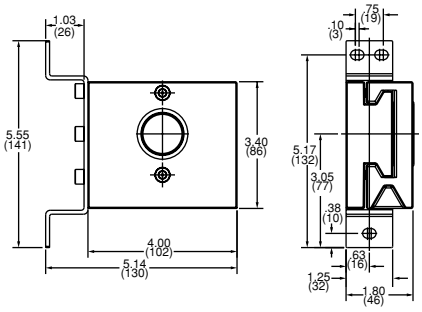
Max. inlet pressure: 200 PSI (13.7 bar)

How to Order

MODEL NUMBER	STYLE	NPTF	DESCRIPTION
MR32A	A	1/2	Left rear porting
MR32B	B	1/2	Right side rear porting
MR32AB	A/B	1/2	Both rear ported plates

End Plates

MK42 Series



The 42 series easy slide end plate and mounting bracket kit is a unique option allowing a full assembly to be quickly added or removed, giving the customer even greater versatility in its popular compact space.

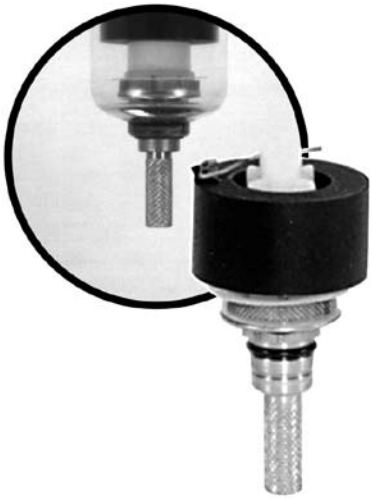
Max. inlet pressure: 250 PSI (17 bar)

How to Order

PORT SIZE	MODEL # NPTF	BSPP	BSPT
3/4	MK42AB-06	MK42ABG06	MK42ABR06
1	MK42AB-08	MK42ABG08	MK42ABR08

Drain Options

Automatic Float Drain - 'A' Option



The Auto Float Drain is installed into the bottom of the filter bowl. As the liquid level inside the bowl increases, the tire-like float lifts, allowing the liquid to drain. This drain should not be used in applications exceeding 175 PSI.

MODEL	FOR SERIES
AKF00	22, 32, 42 Series Autodrain only
AKF02	22, 32, 42 Series (inc. drain, bushing, o-ring)

Flexible Drain - 'B' Option

The Flexible Drain is as easy to use as pushing the stem to one side and allowing contents to expel. A popular option due to low cost and ease of use. This drain should not be used in applications exceeding 125 PSI.

MODEL	FOR SERIES
BKF02	14, 22, 32, 42 Series (inc. flexible rubber exterior and inner stem)

External Pulse Drain - 'J' Option

The External Pulse Drain is designed for use in the 12, 14 and 42 Series bowl but also works with the 22 and 32 Series. This inexpensive and reliable drain features an incorporated barbed fitting which fits 3/16 ID tubing for easy drainage of liquid and contaminant.

MODEL	FOR SERIES
JKF02	12,14, 22, 32, 42 Series (includes bushing kit)
IDF-01	drain only

Metal Manual Drain - 'Q' Option

The Metal Manual Drain is a newer drain option for the FlexiBlok® line. Simply turn the drain counter-clockwise to expel bowl contents. Standard on 50 and 70 Series.

MODEL	FOR SERIES
QKF02	14, 22, 32, 42 Series (inc. drain, retaining clip, bushing, o-ring)

Manual Lever Drain - 'R' Option

The Manual Lever Drain allows for convenience and ease of use. Press down on the white lever to manually drain bowl contents. Available for all FlexiBlok® filters.

MODEL	FOR SERIES
RKF02	14, 22, 32, 42 Series Filters (inc. drain, bushing, clip, o-ring)

Information subject to change without notice. For ordering information or regarding your local sales office visit www.numatics.com.

FlexiBlok® Coalescing Filter

➤ Element Replacement Kits Filter/Regulators

includes filter element only

kit #	description
14 SERIES	
EKF12C	14 Series, 0.7 micron element
EKF12CD	14 Series, 0.7 micron element with prefilter
EKF12D	14 Series, 0.3 micron element
EKF12DD	14 Series, 0.3 micron element with prefilter
EKF12E	14 Series, 0.1 micron element
EKF12ED	14 Series, 0.1 micron element with prefilter
EKF12F	14 Series, adsorbing element
22 SERIES	
EKF22C	22 Series, 0.7 micron element
EKF22CD	22 Series, 0.7 micron element with prefilter
EKF22D	22 Series, 0.3 micron element
EKF22DD	22 Series, 0.3 micron element with prefilter
EKF22E	22 Series, 0.1 micron element
EKF22ED	22 Series, 0.1 micron element with prefilter
EKF22F	22 Series, adsorbing element
32 SERIES	
EKF32C	32 Series, 0.7 micron element
EKF32CD	32 Series, 0.7 micron element with prefilter
EKF32D	32 Series, 0.3 micron element
EKF32DD	32 Series, 0.3 micron element with prefilter
EKF32E	32 Series, 0.1 micron element
EKF32ED	32 Series, 0.1 micron element with prefilter
EKF32F	32 Series, adsorbing element
42 SERIES	
EKF42C	42 Series, .7 micron element
EKF42CD	42 Series, .7 micron element with prefilter
EKF42D	42 Series, .3 micron element
EKF42DD	42 Series, .3 micron element with prefilter
EKF42E	42 Series, .1 micron element
EKF42ED	42 Series, .1 micron element with prefilter
EKF42F	42 Series, adsorbing element

➤ Bowl Replacement Kits Filter/Regulators

includes bowl and o-ring

kit #	description
14 SERIES	
BKF12	14 Series, polycarbonate bowl
BKF12M	14 Series, metal bowl
22 SERIES	
BKF22	22 Series, polycarbonate bowl
BKF22C	22 Series, CircleVision™ bowl
BKF22M	22 Series, metal bowl
32 SERIES	
BKF32	32 Series, polycarbonate bowl
BKF32C	32 Series, CircleVision™ bowl
BKF32M	32 Series, metal bowl
42 SERIES	
BKF32	32 Series, polycarbonate bowl
BKF32C	32 Series, CircleVision™ bowl
BKF32M	32 Series, metal bowl

To order the bowl replacement kit with a drain, specify the drain suffix in the kit number (keeping suffixes in alphabetical order). For example, to order an flexible drain with a BKF12 kit, order as **BKF12B**. To order an external pulse drain with a BKF12M kit, order as **BKF12JM**. Drain suffixes are as follows: B=flexible drain, J=external pulse drain, Q=metal manual drain, R=manual lever drain. *See page 34* for additional drain option information.

➤ Bowl Replacement Kits Lubricated

includes bowl and o-ring

kit #	description
BKL12	14 Series, polycarbonate bowl
BKL12M	14 Series, metal bowl
BKL22	22 Series, polycarbonate bowl
BKL22C	22 Series, CircleVision™ bowl
BKL22M	22 Series, metal bowl
BKL32	32 Series, polycarbonate bowl
BKL32C	32 Series, CircleVision™ bowl
BKL32M	32 Series, metal bowl

To order the bowl replacement kit with a drain or buttonhead fill, specify the appropriate suffix in the kit number (keeping suffixes in alphabetical order). For example, to order a drain with a BKL12 kit, order as **BKF12K**. To order a buttonhead fill with a BKL22M kit, order as **BKL22FM**. Drain suffixes are as follows: F=buttonhead fill, K=drain.

➤ Replacement Drain Kits

kit #	description
AKF02	auto float drain kit (inc. drain, bushing, clip, o-ring)
BKF02	flexible drain (includes drain ass'y)
DKF02	standard drain (inc. drain ass'y)
QKF02	metal manual drain (inc. drain, bushing, clip, o-ring)
JKF02	external pulse drain (inc. drain, bushing, clip, o-ring)
RKF02	manual lever drain (inc. drain, bushing, clip, o-ring)

FlexiBlok® Particulate Filter

➤ Element Replacement Kits Filter/Regulators

includes filter element only

kit #	description
EKF12B	14 Series, 5 micron element
EKF22B	22 Series, 5 micron element
EKF32B	32 Series, 5 micron element
EKF42B	42 Series, 5 micron element

➤ Filter Repair Kits

includes Turbo-Flo, element retainer, quiet zone baffle, deflector retainer

kit #	description
RKF12B	14 Series, 5 micron element
RKF22B	22 Series, 5 micron element
RKF32B	32 Series, 5 micron element
RKF42B	42 Series, 5 micron element

FlexiBlok® Coalescing Filter

➤ DPI Replacement Kits

includes DPI assembly

kit #	description
UK600	14 Series DPI replacement kit
DP122	22 Series DPI replacement kit
DP132	32 Series DPI replacement kit
DPI42	42 Series, DPI replacement kit

FlexiBlok® Regulator - Filter-Regulator

➤ Regulator Repair Cage Kits Filter/Regulators

includes bonnet with main spring (0-125 psi), adjusting screw and adjusting knob

kit #	description
RKC14	14 Series
RKC22	22 Series
RKC32	32 Series
RKC42	42 Series

➤ Diaphragm Repair Kits

includes diaphragm, inner valve assembly and inner valve spring

kit #	description
RKR12R	14 Series, relieving kit
RKR22R	22 Series, relieving kit
RKR32R	32 Series, relieving kit
RKR42R	42 Series, relieving kit
RKR12N	14 Series, non-relieving kit
RKR22N	22 Series, non-relieving kit
RKR32N	32 Series, non-relieving kit
RKR42N	42 Series, non-relieving kit

➤ Piston Repair Kits

includes piston assembly, inner valve assembly and inner valve spring

kit #	description
PKR14R	14 Series, relieving kit
PKR22R	22 Series, relieving kit
PKR32R	32 Series, relieving kit
PKR42R	42 Series, relieving kit
PKR14N	14 Series, non-relieving kit
PKR22N	22 Series, non-relieving kit
PKR32N	32 Series, non-relieving kit
PKR42N	42 Series, relieving kit

➤ Replacement Adjustment Knob Kits

includes adjustment knob only

kit #	description
R12-03	14 Series, adjustment knob
R22-03B	22 Series, adjustment knob
R32-03	32 Series, adjustment knob
R32-03	42 Series, adjustment knob

FlexiBlok® Pilot Operated Regulators

➤ Diaphragm Repair Kits

includes upper & lower diaphragm, inner valve assembly and inner valve spring

kit #	description
RKW22	22 Series, relieving kit
RKW32	32 Series, relieving kit
RKW42	42 Series, relieving kit
RKW22N	22 Series, non-relieving kit
RKW32N	32 Series, non-relieving kit
RKW42N	42 Series, non-relieving kit

FlexiBlok® Lubricator

➤ Lubricator Dome Repair Kits

includes adjustment knob and adjustment assembly

kit #	description
RKL12T	14 Series, lub. dome repair kit or 22 Series, lub. dome repair kit or 32 Series, lub. dome repair kit 42 Series, lub. dome repair kit

➤ Replacement Adjustment Knob Kits

includes adjustment knob only

kit #	description
L32-06	14 Series, adjustment knob or 22 Series, adjustment knob or 32 Series, adjustment knob

FlexiBlok® Shut-Off Valve

➤ Shut-Off Valve Repair Kits

includes slide and 2 o-rings

kit #	description
RKSV14	14 Series, shut-off valve repair kit
RKSV22	22 Series, shut-off valve repair kit
RKSV32	32 Series, shut-off valve repair kit

➤ Mounting Brackets

includes bracket and panel nut

kit #	description
PK12	14 Series mounting bracket
PK22	22Series mounting bracket
PK32	32 Series mounting bracket

FlexiBlok® Sol. Soft Start Quick Exhaust

➤ Solenoid Replacement Kits

includes coil only (fits 22 or 32 Series)

NOTE: Numatics FRL does not recommend the disassembly of a solenoid soft start unit outside of our factory.

kit #	description
S32-44A	110V (22 or 32 Series)
S32-45A	230V (22 or 32 Series)
S32-46A	24V AC (22 or 32 Series)
S32-43A	24V DC (22 or 32 Series)

FlexiBlok® Screws & O-Rings

➤ Screw & O-Ring Replacement Kits

kit #	description
KG14	14 Series, inc. 2 screws, 1 o-ring (M4 x 12mm)
KGB14	14 Series bulk pack, inc. 100 screws, 50 o-rings (M4 x 12mm)
KG22	22 Series, inc. 2 screws, 1 o-ring (M5 x 12mm)
KGB22	22 Series bulk pack, inc. 100 screws, 50 o-rings (M5 x 12mm)
KG32	32 Series, inc. 2 screws, 1 o-ring (M6 x 16mm)
KGB32	32 Series bulk pack, inc. 100 screws, 50 o-rings (M6 x 16mm)➤
KG42	42 Series, inc. 2 screws, 1 o-ring (M8 x 1.25)
KGB42	42 Series bulk pack, inc. 100 screws, 50 o-rings (M8 x 1.25)

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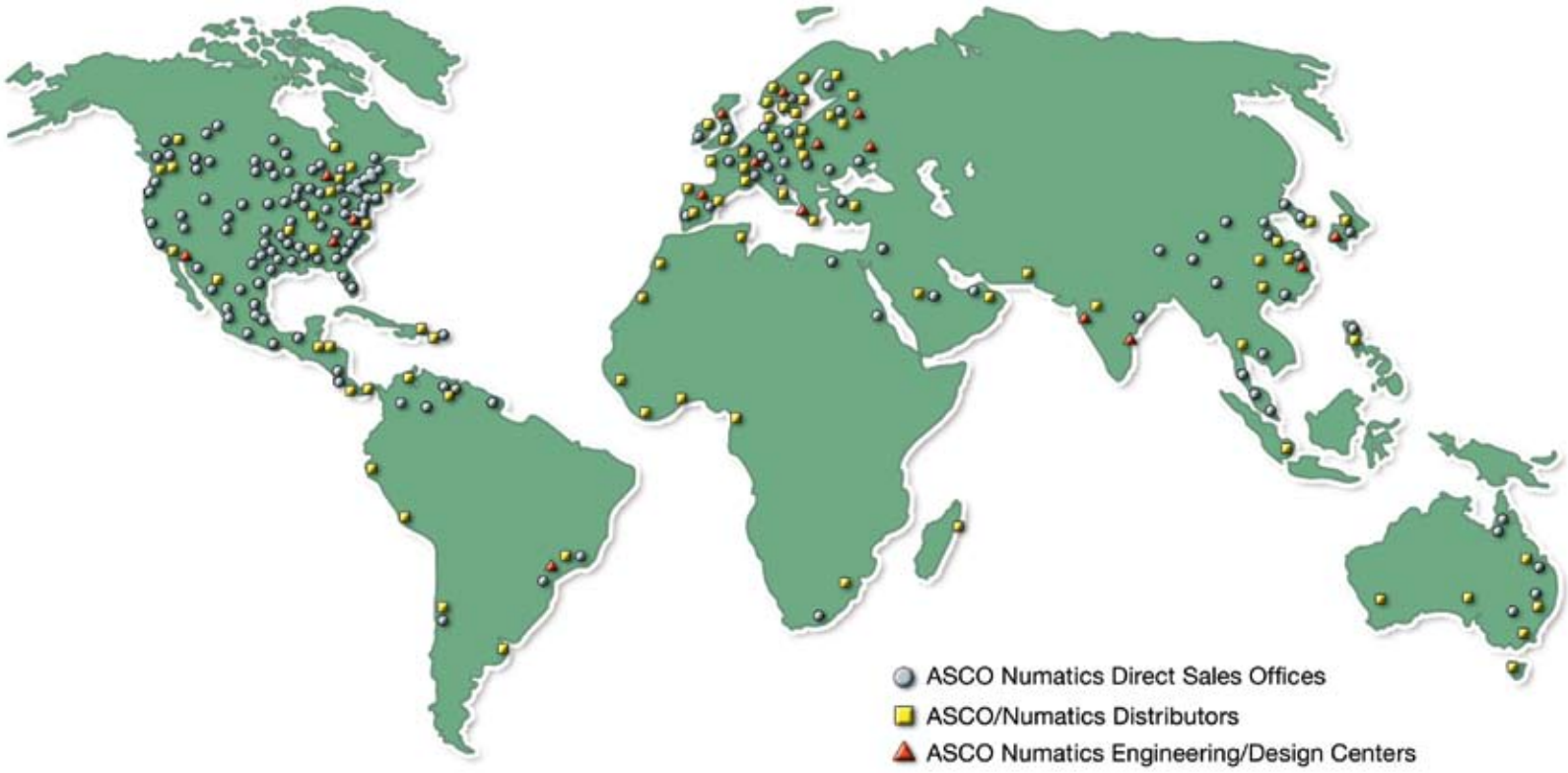
World Class Supplier of Pneumatic Components



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LT-FRLFlexiblok Rev 07/10
10M-TGI-12/08
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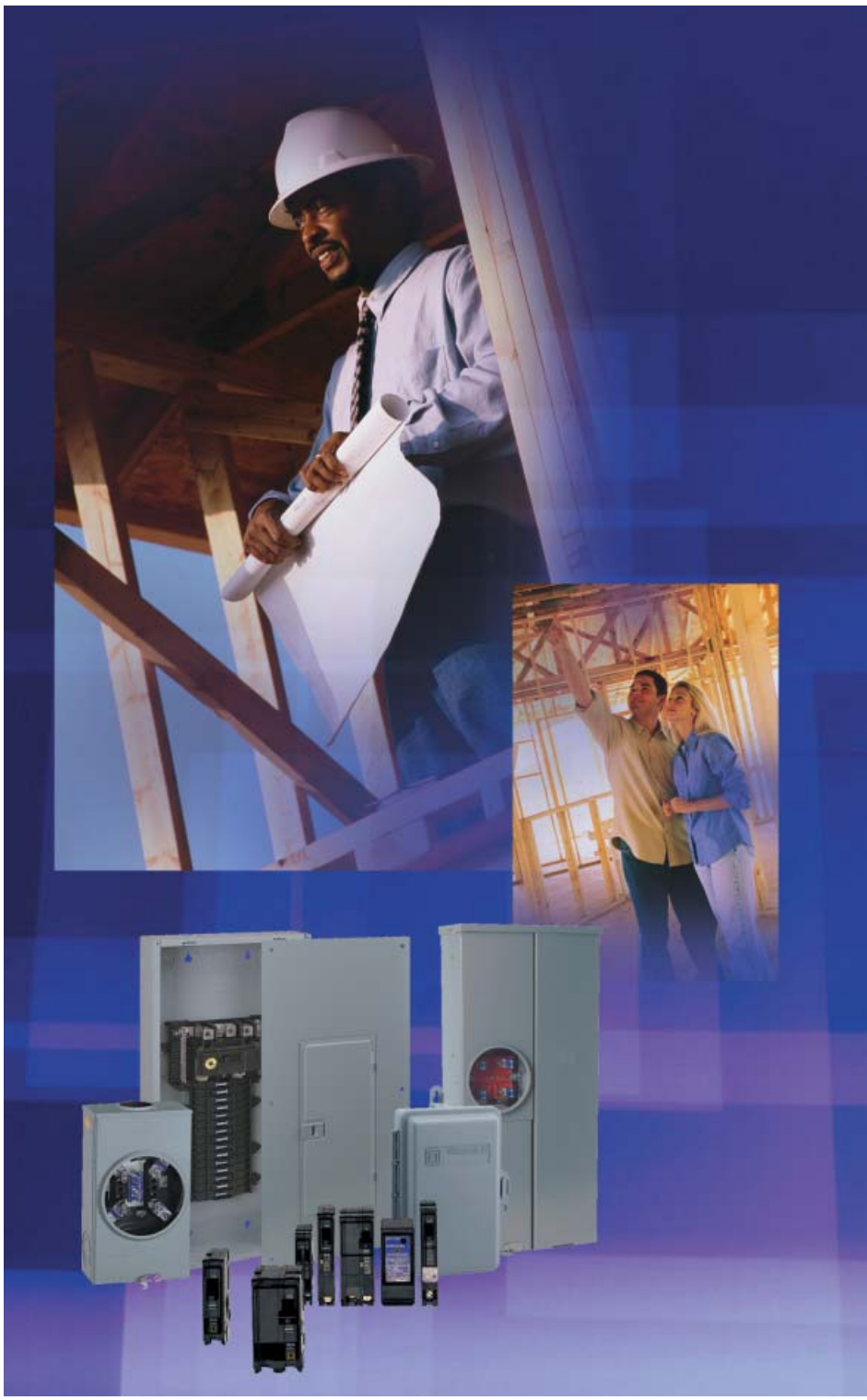
Products Catalog



a brand of Schneider Electric

SQUARE D

Headquartered in Palatine, Ill., the North American Operating Division of Schneider Electric had sales of $2.7 billion in 2002. The North American Operating Division is one of three geographic divisions of Schneider Electric, headquartered in Paris, France, and markets the Merlin Gerin, Square D and Telemecanique brand products to customers in the United States, Canada and Mexico. In the United States, Schneider Electric is best known by its flagship Square D brand, with Telemecanique becoming increasingly known in the industrial control and automation markets and supported by many Square D distributors. For 100 years, Square D has been a market-leading brand of electrical distribution and industrial control products, systems and services. Schneider Electric is a global electrical industry leader with 2003 sales of approximately $9.9 billion. It is the world's leading manufacturer of electrical distribution, industrial control and automation products and systems, and the only electrical manufacturer dedicated solely to the distribution and control of electricity.

RESIDENTIAL PRODUCTS

RESIDENTIAL CONSTRUCTION

Scheider Electric is the leading supplier of electrical equipment for residential construction in the United States, Canada and Mexico. Focused residential sales and marketing teams concentrate on serving residential contractors, single and multi-family home builders, manufactured housing companies, electrical wholesale distributors and home improvement retailers.

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Load Centers &

CIRCUIT BREAKERS

QO® Load Centers and Circuit Breakers

Square D load centers are the leading choice of electrical contractors and electricians. Every feature of the QO Load Center was designed to provide clear advantages. QO Circuit Breakers also have features no other manufacturer can offer. These quality, industry exclusive products keep Square D ahead of the competition and are builders' and electrical contractors' first choice in electrical protection.

Load Center Features:

- Shielded Copper Bus Bar.
- Available in single and three phase.
- Ground Bar is included with all main lugs load centers with three mounting locations.
- Convertible Mains let you meet changing job-site requirements.
- 22,000/10,000 AIR standard series connected rating.
- Tangential main service knockouts.
- Enclosure rotates for top or bottom feed to reduce service cable waste.

QO Circuit Breaker Features:

- Qwik-Open® circuit breaker protection.
- Exclusive Visi-Trip® red indicator.
- Quick make - quick break mechanism.
- Plug-on design, easy to install.

Homeline® Load Centers and Circuit Breakers

Homeline Load Centers and Circuit Breakers are built with the same Square D quality you have come to expect at a price that makes them the best value in their class. Feature for feature, Homeline products outclass the competition.

Features include:

- Straight-In Mains.
- Convertible Mains let you meet changing job-site requirements.
- Split-branch neutral with up to 50% more terminations than required.
- Bus and interior assembly is among the most rugged in the industry.
- Three ground bar mounting locations.
- 22,000/10,000 AIR standard series connected rating.
- Tangential main service knockouts.
- Enclosure rotates for top or bottom feed to reduce service cable waste.

QO® Circuit Breakers
with VISI-TRIP® Indicator
Class 730, 731, 733

QO 1-pole

1 Space Required

QOT 1-pole Tandem

1 Space Required

QO 2-pole

2 Spaces Required

QO Three-pole

3 Spaces Required

QO2200 2-pole 200 A

4 Spaces Required

QO Miniature Circuit Breakers

Square D QO miniature circuit breakers are plug-on products for use in QO load centers.

Plug-On Circuit Breakers—UL Listed Amperes Interrupting Rating (AIR) In Amperes RMS Symmetrical

Amperes Rating▲	1-pole—120/240 Vac		2-pole—120/240 Vac Common Trip		2-pole—240 Vac ■ Common Trip		Three-pole—240 Vac Common Trip	
	Catalog Number	Price	Catalog Number	Price	Catalog Number	Price	Catalog Number	Price
10,000 AIR								
10	QO110	$19.40	QO210	$ 44.70	...	...	QO310	$ 165.00
15	QO115♦★	19.40	QO215♦	44.70	QO215H	$133.00	QO315♦	165.00
20	QO120♦★	19.40	QO220♦	44.70	QO220H	133.00	QO320♦	165.00
25	QO125♦	19.40	QO225♦	44.70	QO225H	133.00	QO325♦	165.00
30	QO130♦	19.40	QO230♦	44.70	QO230H	133.00	QO330♦	165.00
35	QO135♦	19.40	QO235♦	44.70	...	...	QO335♦	165.00
40	QO140♦	19.40	QO240♦	44.70	QO240H	133.00	QO340♦	165.00
45	QO145♦	19.40	QO245♦	44.70	...	...	QO345♦	165.00
50	QO150♦	19.40	QO250♦	44.70	QO250H	133.00	QO350♦	165.00
60	QO160♦	19.40	QO260♦	44.70	QO260H	133.00	QO360♦	165.00
70	QO170♦	44.70	QO270♦	89.00	QO270H	149.00	QO370♦	210.00
80	...	...	QO280♦	126.00	QO280H	210.00	QO380♦	244.00
90	...	...	QO290♦	126.00	QO290H	210.00	QO390♦	244.00
100	...	...	QO2100♦	126.00	QO2100H	210.00	QO3100♦	244.00
110	...	...	QO2110♦	285.00	...	...	...	...
125	...	...	QO2125♦	285.00	...	...	...	...
150	...	...	QO2150♦▼	327.00	...	...	...	...
175	...	...	QO2175♦▼	327.00	...	...	...	...
200	...	...	QO2200♦▼	327.00	...	...	...	...
Molded Case Switch 60 A max.–240 Vac			...	...	QO200	46.90	QO300	165.00
Molded Case Switch 100 A max.–240 Vac			...	...	QO2000△	133.00	QO3000△	244.00
22,000 AIR								
15	QO115VH♦★	$42.30	QO215VH□♦	$ 97.00	...	...	QO315VH□♦	$ 247.00
20	QO120VH♦★	42.30	QO220VH□♦	97.00	...	...	QO320VH□♦	247.00
25	QO125VH♦	48.50	QO225VH□♦	97.00	...	...	QO325VH□♦	247.00
30	QO130VH♦	48.50	QO230VH□♦	97.00	...	...	QO330VH□♦	247.00
40	...	...	QO240VH□♦	97.00	...	...	QO340VH□♦	247.00
50	...	...	QO250VH□♦	97.00	...	...	QO350VH□♦	247.00
60	...	...	QO260VH□♦	97.00	...	...	QO360VH□♦	247.00
70	...	...	QO270VH□♦	149.00	...	...	QO370VH□♦	318.00
80	...	...	QO280VH□♦	210.00	...	...	QO380VH□♦	353.00
90	...	...	QO290VH□♦	210.00	...	...	QO390VH□♦	353.00
100	...	...	QO2100VH□♦	210.00	...	...	QO3100VH□♦	353.00
110	...	...	QO2110VH□◊♦	689.00	...	...	...	...
125	...	...	QO2125VH□◊♦	689.00	...	...	...	...
150	...	...	QO2150VH□♦▼	707.00	...	...	...	...
175	...	...	QO2175VH□♦▼	707.00	...	...	...	...
200	...	...	QO2200VH□♦▼	707.00	...	...	...	...
42,000 AIR								
40	...	...	QOH240♦△	$211.00	...	...	...	...
45	...	...	QOH245♦△	211.00	...	...	...	...
50	...	...	QOH250♦△	211.00	...	...	...	...
60	...	...	QOH260♦△	211.00	...	...	...	...
70	...	...	QOH270♦	352.00	...	...	...	...
80	...	...	QOH280♦	434.00	...	...	...	...
90	...	...	QOH290♦	434.00	...	...	...	...
100	...	...	QOH2100♦	434.00	...	...	...	...
110	...	...	QOH2110♦△	926.00	...	...	...	...
125	...	...	QOH2125♦	926.00	...	...	...	...
65,000 AIR								
15	QH115♦★	$78.00	QH215♦	$195.00	...	...	QH315♦	$338.00
20	QH120♦★	78.00	QH220♦	195.00	...	...	QH320♦	338.00
25	QH125♦△	78.00	QH225♦△	195.00	...	...	QH325♦△	338.00
30	QH130♦	78.00	QH230♦	195.00	...	...	QH330♦	338.00

QOT Tandem Circuit Breakers—10,000 AIR

Ampere Rating▲	1-pole Tandem 120/240 Vac		2-pole Tandem 120/240 Vac	
	Catalog No.	Price	Catalog No.	Price
15 & 15	QOT1515♦	$38.60	Order two QOT1515 or QOT2020 circuit breakers and handle tie Cat. No. QOTHT at **$2.50** for common switching of center two poles.	
15 & 20	QOT1520♦	38.60		
20 & 20	QOT2020♦	38.60		

Replacement Tandem Breakers

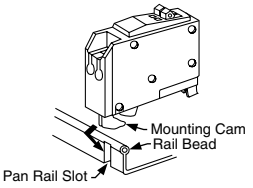
For Use in Old Style Non-Class CTL QO Load Centers—10,000 AIR

Ampere Rating▲	1-pole—120/240 Vac		Two Single-pole Individual Trip 120/240 Vac	
	1 Space Required		2 Spaces Required	
	Catalog No.	Price	Catalog No.	Price
10	....	...	Order Two QO1515 or QO2020 circuit breakers and handle tie Cat. # QOTHT	
15 & 15	QO1515♦	$48.50		
15 & 20	QO1520♦	48.50		
20 & 20	QO2020♦	48.50	....	...
20 & 30	QO2030♦	48.50	QO20303020☆	$89.00
30 & 20	QO3020♦	48.50	....	...
30 & 30	QO3030♦	48.50	....	...

▲ 10–30 A circuit breakers are suitable for use with 60°C or 75°C conductors. 35–125 A circuit breakers are suitable for use with 75°C conductors.
■ UL Listed 5000 AIR on corner grounded Delta systems.
♦ UL Listed as HACR type for use with air conditioning, heating and refrigeration equipment having motor group combinations and marked for use with HACR type circuit breakers.
★ UL Listed as SWD (switching duty) rated. Suitable for switching 120 Vac fluorescent lighting loads.
▼ Requires four spaces (#1–300 kcmil Al/Cu). Not suitable for use in 3-phase panel. Use only in single phase panel rated 150 A or greater.
△ Order only. Contact your nearest Square D/Schneider Electric sales office.
□ UL Listed for use ahead of QO, QO-GFI, QO-EPD, QOT, and QO-PL 10,000 AIR circuit breakers to permit their application at 22,000 A fault level.
◊ 100 A maximum branch mounted opposite.
☆ Includes two circuit breakers (one QO2030 and one QO3020) and handle tie QOTHT.

Circuit Breaker Wire Sizes▲

Breaker Type	Ampere Rating	Wire Size (AWG)	
		Al	Cu
QO 1-pole	10–30	#14–8	#14–8
	10–30	. . .	(2) #14–10
	35–70	#8–2	#8–2
QO 2-pole	10–30	#14–8	#14–8
	10–30	. . .	(2) #14–10
	35–70	#8–2	#8–2
	80–125	#4–2/0	#4–2/0
	150–200	#4–300 kcmil	#4–300 kcmil
QO 3-pole	10–30	#14–8	#14–8
	35–70	#8–2	#8–2
	80–125	#4–2/0	#4–2/0
QOB-VH	110–150	#4–300 kcmil	#4–300 kcmil
QOT	15–20	#12–8	#14–8
QO-AFI, QO-GFI & QO-EPD	15–30	#12–8	#14–8
	40, 50, 60	#12–4	#14–6
QO-PL	10–60	#12–2	#14–2



Circuit Limiting QOT Tandem Breakers
QOT tandem breakers have a mounting cam as shown. Installation into a QO load center can only be made in those positions having a mounting pan rail slot. Meets Par. 408.15 of NEC®. UL Listed as Class CTL.

Additional Infmation
Accessories . . . . . .page 13

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Plug-On Circuit Breakers—UL Listed Amperes Interrupting Rating (AIR) In Amperes RMS Symmetrical

1-pole
QO-AFI

1-pole
QO-GFI

2-pole
QO-GFI

Two-wire
QO-SWN

Three-wire
QO-SWN

QO
1-pole
With Shunt Trip

QO-K Key
Operated

QO-HM High magnetic trip circuit breakers are recommended for applications where high initial inrush may occur and for individual dimmer applications.

Ampere Rating ▲	1-pole	
	Catalog No	Price
120 Vac—10,000 AIR		
15	QO115HM♦★	**$20.40**
20	QO120HM♦★	**20.40**

QO-AFI QO Circuit Breakers with arc fault protection in accordance with UL1699.

Ampere Rating ▲	1-pole 120 Vac		1-pole 120 Vac	
	10,000 AIR		22,000 AIR	
	1 Space Required		1 Space Required	
	Catalog No.	Price	Catalog No.	Price
15	QO115AFI★	**$160.**	QO115VHAFI★	**$331.**
20	QO120AFI★	**160.**	QO120VHAFI★	**331.**

QO-GFI QWIK-GARD® circuit breakers provide overload and short circuit protection, combined with Class A ground fault protection. Class A denotes a ground fault circuit interrupter that will trip when a fault current to ground is 6 milliamperes or more, for people protection. Do not connect to more than 250 feet of load conductor for the total one-way run to prevent nuisance tripping.

Ampere Rating ▲	QWIK-GARD Circuit Breakers With Ground Fault Circuit Interrupter					
	1-pole 120 Vac				2-pole Common Trip 120/240 Vac	
	10,000 AIR		22,000 AIR		10,000 AIR	
	1 Space Required		1 Space Required		2 Spaces Required	
	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price
15	QO115GFI	**$155.**	QO115VHGFI	**$321.**	QO215GFI	**$275.**
20	QO120GFI	**155.**	QO120VHGFI	**321.**	QO220GFI	**275.**
25	QO125GFI	**155.**	QO125VHGFI	**321.**	QO225GFI	**275.**
30	QO130GFI	**155.**	QO130VHGFI	**321.**	QO230GFI	**275.**
40	....	**...**	....	**...**	QO240GFI	**275.**
50	....	**...**	....	**...**	QO250GFI	**275.**
60	....	**...**	....	**...**	QO260GFI■	**275.**

QO-EPD QO-EPD circuit breakers provide overload and short circuit protection combined with Class B ground fault protection. They are designed to provide ground fault protection of equipment at a 30 milliampere level. They are not designed to protect people from electrical shock.

Ampere Rating ▲	1-pole 120 Vac		2-pole Common Trip 120/240 Vac	
	10,000 AIR		10,000 AIR	
	1 Space Required		2 Spaces Required	
	Catalog No.	Price	Catalog No.	Price
15	QO115EPD	**$273.**	QO215EPD	**$440.**
20	QO120EPD	**273.**	QO220EPD	**440.**
25	QO125EPD	**273.**	QO225EPD	**440.**
30	QO130EPD	**273.**	QO230EPD	**440.**
40	....	**...**	QO240EPD	**440.**
50	....	**...**	QO250EPD	**440.**
60	....	**...**	QO260EPD■	**440.**

QO-SWN **Switch Neutral Common Trip 2002 NEC® 514.11**

Ampere Rating ▲	2 Wire 120 Vac		3 Wire 120/240 Vac	
	10,000 AIR		10,000 AIR	
	2 Spaces Required		3 Spaces Required	
	Catalog No.	Price	Catalog No.	Price
10	QO210SWN	**$63.**	QO310SWN	**$95.**
15	QO215SWN	**63.**	QO315SWN	**95.**
20	QO220SWN	**63.**	QO320SWN	**95.**
25	QO225SWN	**63.**	QO325SWN	**95.**
30	QO230SWN	**63.**	QO330SWN	**95.**
40	QO240SWN	**63.**	QO340SWN	**95.**
50	QO250SWN	**63.**	QO350SWN	**95.**

QO-HID **QO-HID Circuit Breakers**
HID circuit breakers are for use on circuits feeding fluorescent and high intensity discharge (HID) lighting systems such as mercury vapor, metal halide, or high pressure sodium. These circuit breakers are physically interchangeable with QO circuit breakers.

Ampere Rating ▲	1-pole 120/240 Vac		2-pole Common Trip 120/240 Vac		3-pole Common Trip 240 Vac	
	10,000 AIR		10,000 AIR		10,000 AIR	
	1 Space Required		2 Spaces Required		3 Spaces Required	
	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price
15	QO115HID♦	**$25.40**	QO215HID	**$58.00**	QO315HID	**$200.00**
20	QO120HID♦	**25.40**	QO220HID	**58.00**	QO320HID	**200.00**
25	QO125HID	**25.40**	QO225HID	**58.00**	QO325HID	**200.00**
30	QO130HID	**25.40**	QO230HID	**58.00**	QO330HID	**200.00**
40	QO140HID	**25.40**	QO240HID	**58.00**	....	**...**
50	QO150HID	**25.40**	QO250HID	**58.00**	....	**...**

QO-K Key operated QO circuit breakers are available in single-pole construction and can be mounted in any single-pole space which will accept a standard QO. These circuit breakers can be turned ON or OFF or to RESET with a special key (Catalog No. QOK10) included with the circuit breaker. These circuit breakers are UL Listed and available as shown in the table.

120 Vac—10,000 AIR (1 Space Required)		
Ampere Rating ▲	Catalog No.	Price
10	QO110K	**$109.**
15	QO115K	**109.**
20	QO120K	**109.**
25	QO125K	**109.**
30	QO130K	**109.**

▲ 10–30 ampere breakers are suitable for use with 60°C or 75°C conductors. 35–60 ampere circuit breakers are suitable for use with 75°C conductors.
■ Suitable only for feeding 240 Vac and 208 Vac 2 wire loads. Does not contain load neutral connection.
♦ UL Listed as SWD (switching duty) rated. Suitable for switching 120 Vac fluorescent lighting loads.
★ UL Listed as HACR type for use with air conditioning, heating and refrigeration equipment having motor group combinations and marked for use with HACR type circuit breakers.

Non-automatic (Standard) Miniature Switches

Miniature non-automatic switches have the same physical packaging as miniature circuit breakers, but open only when the handle is switched to the OFF position.

Non-automatic switches provide no overcurrent protection or short circuit protection. They must not be used on systems that have an available fault current greater than the values listed in the table.

Non-automatic switches are UL Listed per UL 1087 and are CSA certified.

Non-automatic Miniature Switches, 240 Vac 10 kA

Ampere Rating	2-pole		3-pole	
	Catalog No.	Price	Catalog No.	Price
60	QO200	**$ 46.90**	QO300	**$165.00**
100	QO2000	**133.00**	QO3000	**244.00**
60	QOU200	**58.00**	QOU300	**190.00**
100	QOU2000	**164.00**	QOU3000	**277.00**
125	QOU20001	**302.00**	QOU30001	**477.00**

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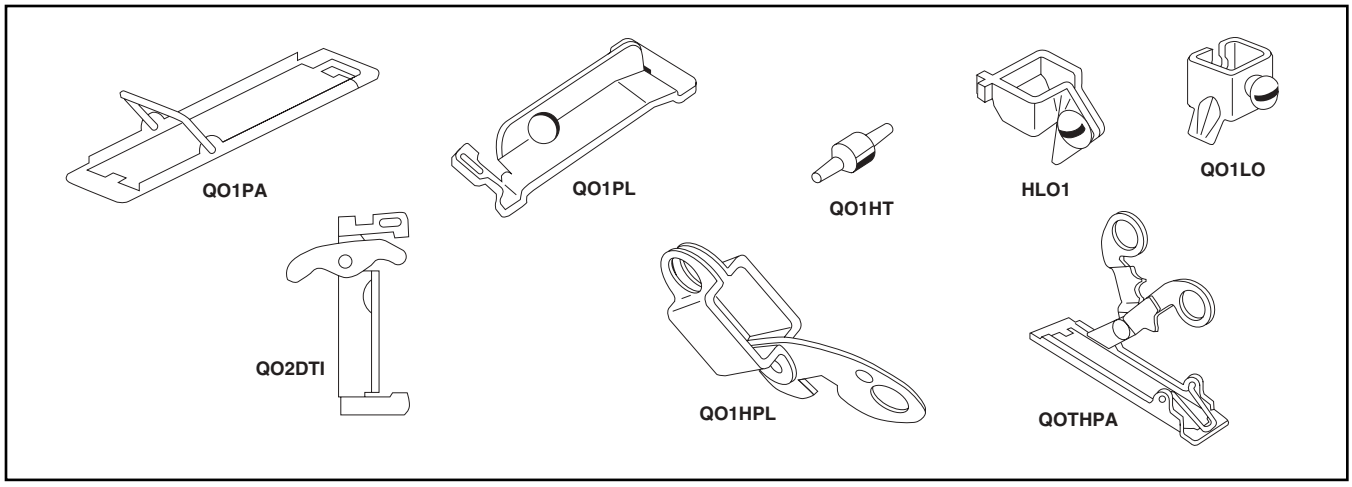
QO® Circuit Breaker Accessories
Class 1130

Accessories for Use with QO Miniature Circuit Breakers

	Description	Catalog Number	Price	Schedule
HANDLE ATTACHMENTS				
Handle Tie:	Converts any two adjacent 120/240 Vac single-pole QO breakers to independent trip 2-pole	QO1HT	$ 2.50	DE2E
	Converts any two adjacent 120/240 Vac single-pole side-by-side QOT breakers to independent trip 2-pole	QOTHT	2.50	DE2E
Handle Clamp:	Clamp for holding QO single-pole handle in "ON" or "OFF" position	QO1LO	2.50	DE2E
	Clamp for holding QO or Q1 either 1, 2 or 3-pole breaker handles in "ON" or "OFF" position	HLO1	6.60	DE2E
Handle Padlock Attachment:	For padlocking single-pole QO breaker in "ON" or "OFF" position			
	Loose attachment	QOHPL	6.30	DE2E
	Fixed attachment	QO1PA	7.10	DE2E
	For padlocking single-pole QO circuit breaker in "OFF" position only, fixed attachment.	QO1PAF	29.00	DE2E
	For padlocking single-pole side-by-side QOT breaker in "ON" or "OFF" position	QOTHPA	7.40	DE2E
	For 2 and 3-pole QO and Q1 breakers which require padlocking in either "ON" or "OFF" position. (Not GFI)			
	Loose attachment	QO1HPL	7.10	DE2E
	Fixed attachment	QO1PL	7.10	DE2E
	For padlocking 2 and 3-pole QO circuit breakers in "OFF" position only, fixed attachment.	QO2PAF	17.20	DE2E
	For padlocking single-pole QO-GFI, QO-AFI and QO-EPD circuit breakers in "OFF" position only, fixed attachment.	QOGFI1PAF	34.00	DE2E
	For padlocking 2-pole QO-GFI in either "ON" or "OFF" position, fixed attachment.	GFI2PA	6.10	DE2A
	For padlocking 2-pole QO-GFI and QO-EPD circuit breakers in "OFF" position only, fixed attachment.	QOGFI2PAF	25.60	DE2E
SUB-FEED LUGS	60 ampere 2-pole plug-on – 2 spaces required (#6–2 Al/Cu)	QO60SL	31.40	DE2A
	125 ampere 2-pole plug-on – 2 spaces required (#12–2/0 Al/Cu)	QO2125SL	91.00	DE2A
	225 ampere 2-pole plug-on – 4 spaces required (#4–300 Al/Cu)	QO2225SL▲	205.00	DE2A
	125 ampere 3-pole plug-on – 3 spaces required (#12–2/0 Al/Cu)	QO3125SL	91.00	DE3
MECHANICAL INTERLOCK ATTACHMENT:	For interlocking the handles of two 2-pole or one 2-pole and one 1-pole QO and Q1 breakers mounted side-by-side so that only one circuit breaker can be "ON" at a time (Not QOU)	QO2DTI	16.60	DE2E
With Retaining Kit:	QO2DTI mechanical interlock attachment with retaining kits for securing two adjacent back-fed circuit breakers in dual power supply applications. Can be used with (2) 2-poles or (1) 2-pole and (1) 1-pole QO circuit breakers in QO816L100 load centers.	QO2DTIM	42.00	DE2E



Factory-installed Accessories for Use with QO Miniature Circuit Breakers

Factory-installed electrical accessories take up an additional pole space on QO®, QO-GFI, QO-EPD and QO-SWN circuit breakers. All AC electrical accessories shown below are rated for 50/60 Hz. Accessories are not available for QOB-VH (2-pole 150 A and 3-pole 110–150 A) circuit breakers or QO molded case switches and the 125, 150 or 200 A QO circuit breakers. QO circuit breakers will accept only one accessory per circuit breaker. Undervoltage trip is not available on miniature circuit breakers.

Accessory	Description	Rated Voltage	Coil Burden	Suffix	List Price Adder
SHUNT TRIP	Trips the circuit breaker from a remote location by means of a trip coil energized from a separate circuit. A 120 Vac shunt trip will operate at 55% or more of rated voltage. All other shunt trips will operate at 75% or more of rated voltage. **Application** • For use with momentary or maintained push button. • Not available on QO-GFI, QO-EPD. • Shunt trip terminals accept (2) #14–#12 AWG Cu.	AC/DC 12	60 VA	-1042	$126.
		AC/DC 24	168 VA	-1042	
		AC 120	72 VA		
		AC 208		-1021	126.
			228 VA	-1021	
		240	288 VA	-1021	

Accessory	Description	Contact Comb.	Max. Voltage	Max. Load	Suffix	List Price Adder
AUXILIARY SWITCHES	Monitors circuit breaker contact status and provides a remote signal indicating the circuit breaker contacts are OPEN or CLOSED. **Application** • Auxiliary switch terminals accept (2) #14–#12 AWG Cu leads. • Leads (EH): Yellow for "A", Blue for "B", Striped common #18 AWG Cu.	1A	AC 120	5 A	-1200	$ 88.
		1B	AC 120	5 A	-1201	88.
ALARM SWITCHES	Used with control circuits and is actuated only when the circuit breaker has tripped. Standard construction includes a normally-open contact. **Application** • Leads: Alarm switch terminals accept (2) #14–#12 AWG Cu leads.	1A	AC 120	5 A	-2100	88.

▲ Not suitable for use in 3-phase panels. Use only in single phase panel rated 150 A or greater.

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QO® Load Centers
Series Rating
Class 1100

The rating of the load center is equal to the lowest interrupting rating of any circuit breaker installed or combination series connected circuit breaker. Additional or replacement circuit breakers MUST have an interrupting and voltage rating equal to or greater than that of the circuit breaker with the lowest interrupting and voltage rating presently installed. See load center interior for circuit breaker types.

Short Circuit Current Rating

Maximum Short Circuit Current Rating (RMS Symmetrical)	Load Center Voltage Rating 240 Vac Max.	Integral or Remote Square D Circuit Breaker or Remote Fuses			Square D Branch Circuit Breaker			
		Fuse Class	Catalog Designation ★	Current Rating Amperes Max.	Catalog Designation ★▼	Current Rating Amperes		
	Systems Voltage					1-pole	2-pole	3-pole
5,000	240 Vac, 3 Phase 3 Wire Grounded "B" phase.	…	…	…	QO-H	…	15–100	…
10,000	120/240 Vac, 1 Phase 3 Wire	…	…	…	QO QOT	10–70 15–30	10–200♦ …	… …
	208Y/120 Vac, 3 Phase 4 Wire	…	…	…	QO	10–70	10–125♦	10–100
	240/120 Vac, 3 Phase 4 Wire Delta ▲	…	…	…	QO-H QO	… 10–70	15–100 10–125♦	… 10–100
	240 Vac, 3 Phase 3 wire Delta	…	…	…	QO-H QO	… …	15–100 …	… 10–100
22,000	120/240 Vac, 1 Phase 3 Wire	…	…	…	QO-VH	15–30	15–200♦	…
	208Y/120 Vac, 3 Phase 4 Wire	…	…	…	QO-VH	15–30	15–125♦	15–100
	240/120 Vac, 3 Phase 4 Wire Delta ■	…	…	…	QO-VH	15–30	15–125♦	15–100
	240 Vac, 3 Phase 3 wire Delta	…	…	…	QO-VH	…	…	10–100
42,000	120/240 Vac, 1 Phase 3 Wire	…	…	…	QOH	…	40–125♦	…
	208Y/120 Vac, 3 Phase 4 Wire	…	…	…	QOH	…	40–125♦	…
65,000	120/240 V ac, 1 Phase 3 Wire	…	…	…	QH	15–30	15–30	…
	208Y/120 Vac, 3 Phase 4 Wire	…	…	…	QH	15–30	15–30	15–30
	240/120 Vac, 3 Phase 4 Wire Delta ■	…	…	…	QH	15–30	15–30	15–30
	240 Vac, 3 Phase 3 wire Delta	…	…	…	QH	…	…	15–30
Series Combination Short Circuit Current Rating								
22,000	120/240 Vac, 1 Phase 3 Wire	…	QOM-VH	225	QO QOT	15–70 15–30	15–200♦ …	… …
	120/240 Vac, 1 Phase 3 Wire	…	QO-VH	200	QO QOT	15–70 15–30	15–200♦ …	… …
	208Y/120 Vac, 3 Phase 4 Wire	…	QO-VH	100	QO	15–70	15–100	15–100
	240/120 Vac, 3 Phase 4 Wire Delta ■	…	QO-VH	100	QO	15–70	15–100	15–100
	240 Vac, 3 Phase 3 wire Delta	…	QO-VH	100	QO	…	…	15–100
25,000	120/240 Vac, 1 Phase 3 Wire	…	QD	225	QO QOT	15–70 15–30	15–200♦ …	… …
	208Y/120 Vac, 3 Phase 4 Wire	…	QD	225	QO QO-VH	15–70 15–30	15–125♦ 15–125♦	15–30 15–100
	240/120 Vac, 3 Phase 4 Wire Delta ▲	…	QD	225	QO-H QO QO-VH	… 15–70 15–30	15–100 15–125♦ 15–125♦	… 15–30 15–100
	240 Vac, 3 Phase 3 wire Delta	…	QD	225	QO-H QO QO-VH	… … …	15–100 … …	… 15–30 15–100
42,000	120/240 Vac, 1 Phase 3 Wire	…	QOH	125	QO QOT	15–70 15–30	15–100 …	… …
65,000	120/240 Vac, 1 Phase 3 Wire	…	QG	225	QO QOT	15–70 15–30	15–200♦ …	… …
	208Y/120 Vac, 3 Phase 4 Wire	…	QG	225	QO QO-VH	15–70 15–30	15–125♦ 15–125♦	15–30 15–100
	240/120 Vac, 3 Phase 4 Wire Delta ▲	…	QG	225	QO-H QO QO-VH	… 15–70 15–30	15–100 15–125♦ 15–125♦	… 15–30 15–100
	240 Vac, 3 Phase 3 wire Delta	…	QG	225	QO-H QO QO-VH	… … …	15–100 … …	… 15–30 15–100
100,000	120/240 Vac, 1 Phase 3 Wire	… …	QJ	225	QO QOT	15–70 15–30	15–200♦	
	208Y/120 Vac, 3 Phase 4 Wire	… …	QJ	225	QO QO-VH	15–70 15–30	15–125♦ 15–125♦	15–30 15–100
	120/240 Vac, 1 Phase 3 Wire	T3	…	200	QO QOT	15–70 15–30	15–200♦ …	… …
	208Y/120 Vac, 3 Phase 4 Wire	T3	…	200	QO	15–70	15–125♦	15–100
	240/120 Vac, 3 Phase 4 Wire Delta ■	T3	…	200	QO	15–70	15–125♦	15–100
	240 Vac, 3 Phase 3 wire Delta	T3	…	200	QO	…	…	15–100

▲ 240 Vac 3 Phase 4 Wire Delta: When wired for Delta system, phase "B" must be 208 V to neutral. Two-pole circuit breakers connected to phase "B" must be rated 240 V (QO-H). Single-pole circuit breakers must not be connected to phase "B".
■ 240 Vac 3 Phase 4 Wire Delta: When wired for Delta system, phase "B" must be 208 V to neutral. For this Short Circuit Current Rating, single-pole and two-pole circuit breakers must not be connected to phase "B".
♦ 100 amperes maximum branch circuit breaker in load centers with 125 A maximum mains rating.
★ See circuit breaker for voltage and interrupting rating.
▼ QO includes suffixes: GFI, EPD, PL, AS and AFI. QO-VH includes suffixes GFI and AFI

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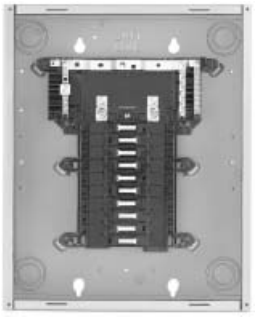
QO® Load Centers
Indoor—Single Phase, Main Lug
Class 736, 1130

Single Phase Three Wire—120/240 Vac—UL Listed
Main Lugs (Order QO, QOT, QO-EPD, QO-GFI and QO-PL branch circuit breakers from pages 3 and 4)

Mains Rating (A)	Spaces	Max. Number Single Pole Circuits▲	Max. Number of Tandem Circuit Breakers	Total Price (Interior, Box & Cover)	Load Center Box and Interior Catalog Number	Load Center Box and Interior Price	Indoor Cover with Door (Order Separately) Flush Catalog No.	Indoor Cover with Door (Order Separately) Surface Catalog No.	Indoor Cover with Door (Order Separately) Price	Main Wire Size AWG/kcmil Al	Main Wire Size AWG/kcmil Cu	Equipment Ground Bar Kit (Order Separately) Catalog No.	Equipment Ground Bar Kit (Order Separately) Price	Box No. See Page 19
INDOOR														
Fixed Mains—Factory-installed Main Lugs—10,000 RMS Sym. Amperes Short Circuit Current Rating■														
30	2	2	0	**$ 27.80**	QO2L30S♦★	**$ 27.80**	Cover Included—Without Door			#12–10	#14–10	PK3GTA-1	**$ 7.60**	1
70	2	4	2	**45.70**	QO24L70F/S▼△	**45.70**				#12–3	#14–4	PK4GTA	**7.20**	2
100	6	12	6	**58.00**	QO612L100F/S▼ □	**58.00**				#8–1		PK7GTA	**7.80**	4
				60.00	QO612L100DF/S▼□ ◊	**60.00**	Cover Included—With Door			#8–1		PK7GTA	**7.80**	4
	8	16	8	**87.00**	QO816L100F/S▼□	**87.00**	Cover Included—Without Door			#8–1		PK7GTA	**7.80**	4
				95.00	QO816L100DF/S▼□ ◊	**95.00**	Cover Included—With Door							
100	6	12	6	**74.00**	QO612L100DFCU/SCU▼□ ◊☆	**74.00**	Cover Included—With Door			#8–1		PK7GTA	**7.80**	4
	8	16	8	**116.00**	QO816L100DFCU/SCU▼□ ◊☆	**116.00**	Cover Included—With Door			#8–1		PK7GTA	**7.80**	4
125	4	8	4	**62.00**	QO148L125GF/S▼▽	**62.00**	Cover Included—Without Door			#12–2/0	#14–2/0	PK7GTA♦		21
Convertible Mains—Factory-installed Main Lugs—65,000 RMS Sym. Amperes Short Circuit Current Rating■ ◒ QOM1 Main Frame Size—Convertible to Main Circuit Breaker—Copper Bus														
125	12	12	0	**$ 131.10**	QO112L125G	**$106.00**	QOC16UF	QOC16US	**$ 25.10**	#6–2/0		PK9GTA♦		6
	12	24	12	**157.10**	QO11224L125G	**132.00**	QOC16UF	QOC16US	**25.10**			PK15GTA♦		6
	16	16	0	**170.10**	QO116L125G	**145.00**	QOC24UF	QOC24US	**25.10**			PK12GTA♦		7
	16	24	8	**200.10**	QO11624L125G	**175.00**	QOC24UF	QOC24US	**25.10**			PK15GTA♦		7
	20	20	0	**181.10**	QO120L125G	**156.00**	QOC24UF	QOC24US	**25.10**			PK15GTA♦		7
	20	24	4	**247.10**	QO12024L125G	**222.00**	QOC24UF	QOC24US	**25.10**			PK15GTA♦		7
	24	24	0	**254.10**	QO124L125G	**229.00**	QOC24UF	QOC24US	**25.10**			PK15GTA♦		7
	32	32	0	**289.40**	QO132L125G	**263.00**	QOC32UF	Use Flush	**26.40**			PK23GTA & LK100AN♦		8
Convertible Mains—Factory-installed Main Lugs—65,000 RMS Sym. Amperes Short Circuit Current Rating■ ◒ QOM2 Main Frame Size—Convertible To Main Circuit Breaker—Copper Bus														
150	20	30	10	**$ 279.00**	QO12030L150G	**$221.00**	QOC30UF	QOC30US	**$ 58.00**	#6–250		PK23GTA & LK100AN♦		9
	24	24	0	**287.00**	QO124L150G	**229.00**	QOC30UF	QOC30US	**58.00**			PK15GTA♦		9
	30	30	0	**291.00**	QO130L150G	**233.00**	QOC30UF	QOC30US	**58.00**			PK23GTA & LK100AN♦		9
200	12	12	0	**235.00**	QO112L200G	**177.00**	QOC30UF	QOC30US	**58.00**	#6–250		PK15GTA♦		9
	24	36	12	**546.00**	QO12436L200TFT✱	**488.00**	QOC40UF	QOC40US	**58.00**			PK23GTA & LK100AN♦		10
	30	30	0	**316.00**	QO130L200G	**271.00**	QOC30UF	QOC30US	**58.00**			PK23GTA & LK100AN♦		9
	30	40	10	**369.00**	QO13040L200G	**311.00**	QOC30UF	QOC30US	**58.00**			PK23GTA & LK100AN♦		9
	40	40	0	**497.00**	QO140L200G	**439.00**	QOC40UF	QOC40US	**58.00**			PK23GTA & LK100AN♦		10
225	42	42	0	**552.00**	QO142L225G	**478.00**	QOC42UF	QOC42US	**74.00**	#6–300		PK23GTA & LK100AN♦		11
Fixed Mains—Factory-installed Main Lugs—65,000 RMS Sym. Amperes Short Circuit Current Rating■ ◒														
400	12	12	0	**$1468.00**	QON12LS400(Int) ◑ MH50 (Box)	**$ 971.00 75.††**	MHC50QVF	MHC50QVS	**$422.††**	(1) #1/0–750 or (2) #1/0–300		PK27GTA✪	**$22.50**	15
400	30	30	0	**1547.00**	QON30LS400(Int) ◑ MH50 (Box)	**1050.00 75.††**	MHC50QVF	MHC50QVS	**422.††**	(1) #1/0–750 or (2) #1/0–300		or		15
400	42	42	0	**1641.00**	QON42LS400(Int) ◑ MH53 (Box)	**1125.00 75.††**	MHC53QVF	MHC53QVS	**441.††**	(1) #1/0–750 or (2) #1/0–300		PK15GTA-6	**35.50**	17

Above listings thru 200 A mains rating meet Federal Specification W-P-115c as Type 1, Class 2.
▲ Maximum number of single pole branch circuits utilizing QO and/or QOT circuit breakers.
■ UL short circuit current rating depends on lowest interrupting rating of circuit breaker installed.
♦ Will not accept QO-EPD or QWIK-GARD® QO-GFI circuit breakers.
★ Mains rated 25 A when Al wire is used.
▼ Order F for flush device or S for surface device.
△ Use #10 maximum size wire for GFI circuit breaker.
□ 70 A Max. branch circuit breaker and 70 A max. back fed main circuit breaker.
◊ No provisions for lock kits.
☆ CU indicates copper bus.
▽ Copper bus.
◒ UL Listed 5000 A short circuit current rating for corner grounded Delta systems. Use QO-H circuit breakers only.
✱ Supplied with feed-thru lugs.
♦ Factory-included.
◑ Interior only, order box separately.
✪ PK27GTA includes a #6–2/0 Al/Cu lug.

QO816L100F or S without cover



QO120L125G

For additional information, reference Catalog #1100CT9901.

Main Circuit Breaker Kits

QOM1 Frame Size 50–125 Amperes

QOM2 Frame Size 100–225 Amperes

Field-installable Main Circuit Breaker (Convertible Load Centers Only)

◪ Main Circuit Breaker Rating (A)	Use With Convertible Load Center Mains Rating	22,000 AIR ♦ Main Circuit Breaker	22,000 AIR ♦ Price	Lug Wire Size ‡ AWG/kcmil Al or Cu
QOM1 Frame Size				
50	100–125	QOM50VH	**$ 93.00**	#12–2/0
60	100–125	QOM60VH	**93.00**	
70	100–125	QOM70VH	**93.00**	
80	100–125	QOM80VH	**134.00**	
90	100–125	QOM90VH	**134.00**	
100	100–125	QOM100VH	**134.00**	
110	125	QOM110VH	**312.00**	
125	125	QOM125VH	**312.00**	
QOM2 Frame Size †				
100	150–225	QOM2100VH	**312.00**	#4–300
125	150–225	QOM2125VH	**312.00**	
150	150–225	QOM2150VH	**312.00**	
175	200–225	QOM2175VH	**312.00**	
200	200–225	QOM2200VH	**312.00**	
225	225	QOM2225VH	**312.00**	

◪ Do not exceed the load center mains rating.
♦ 22,000 AIR main circuit breaker UL Listed for use ahead of QO, QOT and QO-PL 10,000 AIR branch circuit breakers to permit their application on systems with up to 22,000 amperes available fault current.
‡ Wire range listed for QOM circuit breaker kits is the wire range of that circuit breaker. To find out maximum wire size permitted in a particular load center per UL, see pages 7 thru 12 under Main Wire Size.
† Add suffix 1021 for 120, 208 or 240 Vac shunt trip. Add **$126.00**.

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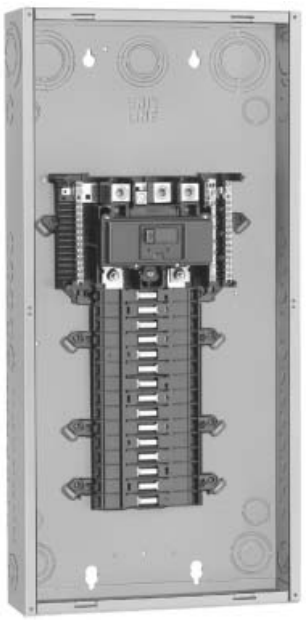
QO® Load Centers

Indoor—Single Phase, Main Circuit Breaker
Class 1130

Single Phase Three Wire—120/240 Vac—UL Listed
Main Circuit Breaker (Order QO, QOT, QO-EPD, QO-GFI, QO-AFI and QO-PL branch circuit breakers from pages 3 and 4.)

	Mains Rating (A)	Spaces	▲Max. Number Single Pole Circuits	Max. Number of Tandem Circuit Breakers	Total Price (Interior, Box & Cover)	Load Center Box and Interior		Indoor Cover with Door (Order Separately)			Main Wire Size AWG/kcmil Al or Cu	Equipment Ground Bar Kit (Order Separately)		Box No. See Page 19
						Catalog Number	Price	Flush Catalog No.	Surface Catalog No.	Price		Catalog No.	Price	
INDOOR	**Convertible Mains —Factory-installed Main Circuit Breaker—22,000 RMS Sym. Amperes Short Circuit Current Rating —Convertible to Main Lugs (see below) or Lower Amperage Main Circuit Breaker (See page 7) ■**													
	QOM1 Main Circuit Breaker Frame Size—Copper Bus													
	100	12	12	0	**$ 226.10**	QO112M100	**$ 201.**	QOC12UF	QOC12US	**$ 25.10**	#6–1	PK9GTA	**$ 8.90**	5
		16	16	0	**253.10**	QO116M100	**228.**	QOC20U100F	QOC20U100S	**25.10**		PK12GTA	**10.50**	6
		20	20	0	**289.10**	QO120M100	**264.**	QOC20U100F	QOC20U100S	**25.10**		PK15GTA	**11.40**	6
		24	24	0	**369.10**	QO124M100	**344.**	QOC24UF	QOC24US	**25.10**	#6–2/0	PK15GTA	**11.40**	7
		32	32	0	**484.10**	QO132M100	**459.**	QOC32UF	Use Flush	**25.10**		PK18GTA	**12.50**	8
	125	24	24	0	**546.10**	QO124M125	**521.**	QOC24UF	QOC24US	**25.10**	#6–2/0	PK15GTA	**11.40**	7
		32	32	0	**694.40**	QO132M125	**668.**	QOC32UF	Use Flush	**26.40**		PK18GTA	**12.50**	8
	Convertible Mains —Factory-installed Main Circuit Breaker—22,000 RMS Sym. Amperes Short Circuit Current Rating —Convertible to Main Lugs (see below) or Lower Amperage Main Circuit Breaker (See page 7)■													
	QOM2 Main Circuit Breaker Frame Size—Copper Bus													
	150	20	30	10	**$ 547.00**	QO12030M150	**$ 489.**	QOC30UF	QOC30US	**$ 58.00**	#4–250	PK18GTA	**$12.50**	9
		24	24	0	**566.00**	QO124M150	**508.**	QOC30UF	QOC30US	**58.00**		PK15GTA	**11.40**	9
		30	30	0	**569.00**	QO130M150	**511.**	QOC30UF	QOC30US	**58.00**		PK18GTA	**12.50**	9
		32	32	0	**646.00**	QO132M150	**588.**	QOC40UF	QOC40US	**58.00**		PK18GTA	**12.50**	10
	200	20	40	20	**547.00**	QO12040M200	**489.**	QOC30UF	QOC30US	**58.00**	#4–250	PK23GTA	**14.20**	9
		24	24	0	**577.00**	QO124M200	**519.**	QOC30UF	QOC30US	**58.00**		PK15GTA	**11.40**	9
		30	30	0	**586.00**	QO130M200	**528.**	QOC30UF	QOC30US	**58.00**		PK18GTA	**12.50**	9
		30	40	10	**638.00**	QO13040M200	**580.**	QOC30UF	QOC30US	**58.00**		PK23GTA	**14.20**	9
		40	40	0	**747.00**	QO140M200	**689.**	QOC40UF	QOC40US	**58.00**		PK23GTA	**14.20**	10
		42	42	0	**813.00**	QO142M200	**739.**	QOC42UF	QOC42US	**74.00**	#4–300	PK23GTA	**14.20**	11
	225	40	40	0	**797.00**	QO140M225	**723.**	QOC42UF	QOC42US	**74.00**		PK23GTA	**14.20**	11
		42	42	0	**835.00**	QO142M225	**761.**	QOC42UF	QOC42US	**74.00**		PK23GTA	**14.20**	11
	Fixed Mains—Factory-installed LAL Main Circuit Breaker—42,000 Fully Rated RMS Sym. Amperes Maximum Short Circuit Current Rating ♦													
	300	42	42	0	**$4686.00**	QON42MS300(Int)★ MH68 (Box)	**$4107. 75.‡**	MHC68VF	MHC68VS	**$504.‡**	(1) #4–500 or (2) #4–3/0	PK27GTA▼ or PK15GTA-6	**$22.50** **35.50**	16
	400	42	42	0	**4686.00**	QON42MS400(Int)★ MH68 (Box)	**4107. 75.‡**	MHC68VF	MHC68VS	**504.‡**	(1) #4–600 or (2) #4–250			16

Above listings thru 200 A mains rating meet Federal Specification W-P-115c as Type 1, Class 2.
▲ Maximum number of single pole branch circuits utilizing QO and/or QOT circuit breakers.
■ 22,000 AIR main circuit breaker UL Listed for use ahead of QO, QOT and QO-PL 10,000 AIR branch circuit breakers to permit their application on systems with up to 22,000 amperes available fault current.
♦ UL short circuit current rating depends on lowest interrupting rating of circuit breakers installed. Also, UL Listed 5000 A short circuit current for corner grounded Delta systems. Use QO-H circuit breakers only.
★ Interior only, order box separately.
▼ PK27GTA includes a #6–2/0 Al/Cu lug.



QO130M150

Main Lug Kits

QOL125

QOL225

Field-installable Main Lugs (Convertible Load Centers Only)

Main Lug △ Ampere Rating	Use On Convertible Load Center With Mains Rating	Catalog Number	Price	Lug Wire Size □ AWG/kcmil Al or Cu
125	100–125	QOL125◊	**$29.40**	#6–2/0
225	150–225	QOL225◊	**69.00**	#6–300

△ Do not exceed the load center mains rating.
□ Wire range listed for QOL lug kits is the wire range of that lug. To find out maximum wire size permitted in a particular load center per UL, see pages 7 thru 12 under main wire size.
◊ If main circuit breaker knockout has been removed from the load center's trim, order appropriate filler plate from page 14.

For additional information, reference Catalog #1100CT9901.

DE3A		‡PE1A		Discount Schedule

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Single Phase Three Wire—120/240 Vac—UL Listed
Main Lugs (Order QO, QOT, QO-GFI, QO-EPD, QO-AFI and QO-PL branch circuit breakers from pages 3 and 4.)

RAINPROOF

Mains Rating (A)	Spaces	Max. Number Single Pole Circuits▲	Max. Number of Tandem Circuit Breakers	Total Price (Interior, Box and Cover)	Load Center Box and Interior		Main Wire Size AWG/kcmil		Equipment Ground Bar Kit (Order Separately)		Box No. See page 20
					Catalog Number	Price	Al	Cu	Catalog No.	Price	
Non-Metallic Enclosure											
Fixed Mains—Factory-installed Main Lugs—10,000 RMS Sym. Amperes Short Circuit Current Rating											
60	2	4	2	**$ 68.00**	QO24L60NRNM	**$ 68.00**	#14–4	#14–4	Factory-incl.		1NM
Metallic Enclosure											
Fixed Mains—Factory-installed Main Lugs—10,000 RMS Sym. Amperes Short Circuit Current Rating											
40	2	2	0	**$ 75.00**	QO2L40RB■	**$ 75.00**	#12–6	#14–6	PK3GTA-1	**$ 7.60**	1R
70	2	4	2	**87.00**	QO24L70RB■	**87.00**	#12–3	#14–4	PK4GTA	**7.20**	1R
100	6	12	6	**95.00**	QO612L100RB♦	**95.00**	#8–1		PK7GTA	**7.80**	2R
	6	12	6	**105.00**	QO612L100TRB♦	**105.00**			Factory-installed	**. . .**	2R
	8	16	8	**154.00**	QO816L100RB♦	**154.00**			PK7GTA	**7.80**	2R
100	6	12	6	**116.00**	QO612L100RBCU♦★	**116.00**	#8–1		PK7GTA	**7.80**	2R
	8	16	8	**186.00**	QO816L100RBCU♦★	**186.00**			PK7GTA	**7.80**	2R
125	4	8	4	**101.00**	QO148L125GRB★	**101.00**	#12–2/0	#14–2/0	PK7GTA Factory-incl.		15R
Convertible Mains—Factory-installed Main Lugs—65,000 RMS Sym. Amperes Maximum Short Circuit Current▼ △ □											
QOM1 Main Frame Size—Convertible to Main Circuit Breaker—Copper Bus											
125	12	12	0	**$190.00**	QO112L125GRB	**$190.00**	#6–2/0		PK9GTA Factory-incl.		3R
	12	24	12	**243.00**	QO11224L125GRB	**243.00**			PK15GTA Factory-incl.		3R
	16	24	8	**290.00**	QO11624L125GRB	**290.00**			PK15GTA Factory-incl.		4R
	24	24	0	**348.00**	QO124L125GRB	**348.00**			PK15GTA Factory-incl.		4R
Convertible Mains—Factory-installed Main Lugs—65,000 RMS Sym. Amperes Maximum Short Circuit Current▼ △ □											
QOM2 Main Frame Size—Convertible to Main Circuit Breaker—Copper Bus											
150	30	30	0	**$391.00**	QO130L150GRB	**$391.00**	#6–250		PK23GTA & LK100AN Factory-incl.		6R
200	12	12	0	**320.00**	QO112L200GRB	**320.00**	#6–250		PK9GTA Factory-incl.		5R
	30	30	0	**444.00**	QO130L200GRB	**444.00**			PK23GTA & LK100AN Factory-incl.		6R
	30	40	10	**476.00**	QO13040L200GRB	**476.00**			PK23GTA & LK100AN Factory-incl.		6R
	40	40	0	**647.00**	QO140L200GRB	**647.00**			PK23GTA & LK100AN Factory-incl.		7R
225	42	42	0	**873.00**	QO142L225GRB	**873.00**	#6–300		PK23GTA & LK100AN Factory-incl.		8R

Single Phase Three Wire—120/240 Vac—UL Listed
Main Circuit Breaker Order QO, QOT, QO-GFI, QO-EPD and QO-PL branch circuit breakers from pages 3 and 4.

RAINPROOF

Mains Rating (A)	Spaces	▲ Max. Number Single Pole Circuits	Max. Number of Tandem Circuit Breakers	Total Price (Interior, Box and Cover)	Load Center Box and Interior		Main Wire Size AWG/kcmil Al or Cu	Equipment Ground Bar Kit (Order Separately)		Box No. See page 20
					Catalog Number	Price		Catalog No.	Price	
Convertible Mains —Factory-installed Main Circuit Breaker—22,000 RMS Sym. Amperes Short Circuit Current Rating —Convertible to Main Lugs (see page 8) or Lower Amperage Main Circuit Breaker (see page 7)◊ □										
QOM1 Main Circuit Breaker Frame Size—Copper Bus										
100	12	12	0	**$307.**	QO112M100RB	**$307.**	#6–2/0	PK9GTA	**$ 8.90**	3R
	16	16	0	**336.**	QO116M100RB	**336.**		PK12GTA	**10.50**	4R
	20	20	0	**368.**	QO120M100RB	**368.**		PK15GTA	**11.40**	4R
125	24	24	0	**636.**	QO124M125RB	**636.**	#6–2/0	PK15GTA	**11.40**	4R
Convertible Mains —Factory-installed Main Circuit Breaker—22,000 RMS Sym. Amperes Short Circuit Current Rating —Convertible to Main Lugs (see page 8) or Lower Amperage Main Circuit Breaker (see page 7) ◊ □										
QOM2 Main Circuit Breaker Frame Size—Copper Bus										
150	20	30	10	**$635.**	QO12030M150RB	**$635.**	#4–250	PK18GTA	**$12.50**	5R
	30	30	0	**748.**	QO130M150RB	**748.**		PK18GTA	**12.50**	6R
200	20	40	20	**636.**	QO12040M200RB	**636.**	#4–250	PK23GTA	**14.20**	5R
	30	30	0	**769.**	QO130M200RB	**769.**		PK18GTA	**12.50**	6R
	40	40	0	**931.**	QO140M200RB	**931.**		PK23GTA	**14.20**	7R
Feed Thru										
Main Circuit Breaker With Feed-Thru Lugs—Copper Bus—22,000 RMS Sym. Amperes Short Circuit Current Rating ◊										
125	6	12	6	**$413.**	QO1612M125FTRB	**$413.**	#4–2/0	PK12GTA	**$10.50**	3R
150	8	16	8	**575.**	QO1816M150FTRB	**575.**	#4–250	PK15GTA-L	**23.30**	6R
200	8	16	8	**575.**	QO1816M200FTRB	**575.**	#4–250	PK15GTA-L	**23.30**	6R

Above listings thru 200 A mains rating meet Federal Specification W-P-115c as Type 1, Class 2.
▲ Maximum number of single pole branch circuits utilizing QO and/or QOT circuit breakers.
■ Use #10 maximum size wire for GFI circuit breaker.
♦ 70 A max. branch circuit breaker and 70 A max. back fed main circuit breaker.
★ Copper bus.
▼ UL short circuit current rating depends on lowest interrupting rating of circuit breakers installed.
△ UL Listed 5000 A short circuit current rating for corner grounded Delta systems. Use QO-H circuit breakers only.
□ Side hinge door device; allow 1¼" on left side for door to open.
◊ 22,000 AIR main circuit breaker UL Listed for use ahead of QO, QOT, QO-GFI, QO-EPD and QOPL 10,000 AIR branch circuit breakers to permit their application on systems up to 22,000 A available fault current.

For additional information, reference Catalog #1100CT9901.

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QO® Load Centers

Three Phase—Main Lugs, Main Circuit Breaker
Class 1130

Three Phase

(Order QO, QO-GFI, QO-AFI, QO-PL branch circuit breakers from pages 3 and 4.)
3 Phase 4 Wire 208Y/120 Vac, 3 Phase 4 Wire 240/120 Vac Delta and 3 Phase 3 Wire 240 Vac Delta—UL Listed.

	Mains Rating (A)	Max. Number of 1-pole QO Breakers	Total Price (Interior, Box and Cover)	Load Center Box and Interior		Indoor Cover with Door (Order Separately)			Main Wire Size AWG/kcmil		Equipment Ground Bar Kit (Order Separately)		Box No. See Pages 19, 20
				Catalog Number	Price	Flush Catalog No.	Surface Catalog No.	Price	Al	Cu	Catalog No.	Price‡	
INDOOR	**Fixed Mains—Factory-installed Main Lugs—Copper Bus—65,000 RMS Symmetrical Amperes Short Circuit Current Rating ▲**												
	60	3	**$ 71.00**	QO403L60NF/S	**$ 71.00**	Cover Included With Load Center			. . .	#10–6	PK4GTA	**$ 7.20**	13
	125	12 20 24	**246.10** **339.10** **385.10**	QO312L125G QO320L125G QO324L125G	**221.00** **314.00** **360.00**	QOC16UF QOC24UF QOC24UF	QOC16US QOC24US QOC24US	**$ 25.10‡** **25.10‡** **25.10‡**	#6–2/0	#6–2/0	Factory-incl.□ Factory-incl.□ Factory-incl.□	. . . .	6 7 7
	200	18 30	**353.00** **471.00**	QO318L200G QO330L200G	**295.00** **413.00**	QOC30UF QOC30UF	QOC30US QOC30US	**58.00‡** **58.00‡**	#6–250	#6–250	Factory-incl.△ Factory-incl.△	. . . . . .	9 9
	225	42	**635.00**	QO342L225G	**561.00**	QOC42UF	QOC42US	**74.00‡**	#6–300	#6–300	Factory-incl.△	. . .	11
	Convertible Mains—Factory-installed QDL Main Circuit Breaker—Copper Bus—25,000 RMS Symmetrical Amperes Maximum Short Circuit Current Rating ■												
	100	27	**$ 705.00**	QO327M100 ♦	**$ 647.00**	QOC30UF	QOC30US	**$ 58.00‡**	#4–2/0	#4–2/0	PK15GTA	**$11.40**	9
	125	30	**1287.00**	QO330MQ125★	**1226.00**	QOC342MQF	QOC342MQS	**61.00**	#4–300	#4–300	PK18GTA	**12.50**	12
	150	30 42	**1287.00** **1412.00**	QO330MQ150★ QO342MQ150★	**1226.00** **1351.00**	QOC342MQF QOC342MQF	QOC342MQS QOC342MQS	**61.00** **61.00**	#4–300	#4–300	PK18GTA PK23GTA	**12.50** **14.20**	12 12
	200	30 42	**1287.00** **1412.00**	QO330MQ200★ QO342MQ200★	**1226.00** **1351.00**	QOC342MQF QOC342MQF	QOC342MQS QOC342MQS	**61.00** **61.00**	#4–300	#4–300	PK18GTA PK23GTA	**12.50** **14.20**	12 12
	225	42	**1412.00**	QO342MQ225★	**1351.00**	QOC342MQF	QOC342MQS	**61.00**	#4–300	#4–300	PK23GTA	**14.20**	12
RAINPROOF	**Fixed Mains—Factory-installed Main Lugs—Copper Bus—65,000 RMS Symmetrical Amperes Short Circuit Current Rating ▲ ▼**												
	60	3	**$ 118.00**	QO403L60NRB	**$ 118.00**	Cover Included			. . .	#10–6	PK4GTA	**$ 7.20**	10R
	125	12 20	**323.00** **419.00**	QO312L125GRB QO320L125GRB	**323.00** **419.00**				#6–2/0	#6–2/0	Factory Incl.□ Factory Incl.□	. . . . . .	3R 4R
	200	18 30	**412.00** **559.00**	QO318L200GRB QO330L200GRB	**412.00** **559.00**				#6–250	#6–250	Factory Incl.△ Factory Incl.△	. . . . . .	6R 6R
	225	42	**996.00**	QO342L225GRB	**996.00**				#6–300	#6–300	Factory Incl.△	. . .	8R
	Convertible Mains—Factory-installed QDL Main Circuit Breaker—Copper Bus—25,000 RMS Symmetrical Amperes Maximum Short Circuit Current Rating ■ ▼												
	100	27	**$ 790.00**	QO327M100RB ♦	**$ 790.00**	Cover Included			#4–2/0	#4–2/0	PK15GTA	**$11.40**	6R
	125	30	**1431.00**	QO330MQ125RB★	**1431.00**				#4–300	#4–300	PK18GTA	**12.50**	14R
	150	30	**1431.00**	QO330MQ150RB★	**1431.00**				#4–300	#4–300	PK18GTA	**12.50**	14R
	200	30 42	**1431.00** **1555.00**	QO330MQ200RB★ QO342MQ200RB★	**1431.00** **1555.00**				#4–300	#4–300	PK18GTA PK23GTA	**12.50** **14.20**	14R 14R
	225	42	**1555.00**	QO342MQ225RB★	**1555.00**				#4–300	#4–300	PK23GTA	**14.20**	14R

Above listings thru 200 A mains rating meet Federal Specification W-P-115C as Type 1, Class 2.
▲ UL short circuit current rating depends on lowest interrupting rating of circuit breaker installed.
■ 25,000 RMS symmetrical amperes short circuit current rating maximum with Square D Type QDL main circuit breaker, or 22,000 RMS symmetrical amperes SCCR maximum with back-fed Type QO-VH main circuit breaker, feeding QO 10,000 AIR branch circuit breakers.
♦ Includes factory-installed back fed QO3100VH main circuit breaker.
★ 65,000 RMS Symmetrical Amperes Short Circuit Current Rating maximum with field-installed Square D type QGL 65,000 AIR minimum main circuit breaker feeding QO and Q1 10,000 AIR minimum branch circuit breakers.
▼ Side hinge door device allow 1¼" on left side for door to open.
△ PK23GTA and LK100AN.
□ PK15GTA.

Three Phase Main Circuit Breakers

Field-installable alternate main circuit breakers for QO three phase main circuit breaker load centers rated 70–225 A. Do not exceed the load center main rating.

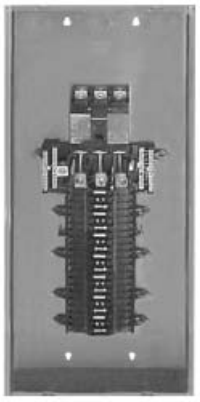
Amperage	25k AIR	65k AIR	100k AIR◊
70	QDL32070	QGL32070	QJL32070
80	QDL32080	QGL32080	QJL32080
90	QDL32090	QGL32090	QJL32090
100	QDL32100	QGL32100	QJL32100
110	QDL32110	QGL32110	QJL32110
125	QDL32125	QGL32125	QJL32125
150	QDL32150	QGL32150	QJL32150
175	QDL32175	QGL32175	QJL32175
200	QDL32200	QGL32200	QJL32200
225	QDL32225	QGL32225	QJL32225
Price	**$1189.00†**	**$1628.00†**	**$1864.00†**

◊ When these 3-pole circuit breakers are used as the main circuit breaker of a three-phase load center, the maximum AIR rating is 65,000 at 240 Vac and 100,000 at 208 Vac.

Three Phase Main Lug Kits

Field-installable main lugs for convertible three phase main circuit breaker load centers.

Main Lug Amperage Rating	Catalog Number	Price	Lug Wire Size AWG/kcmil
125	QOL3125	**$ 44.90**	#6–2/0 Cu/Al
225	QOL3225	**105.00**	#6–300 Cu/Al



QO342MQ200

QO312L125G

For additional information, reference Catalog #1100CT9901.

DE3		‡DE3A		†DE2		Discount Schedule

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Order QO, QOT, QO-EPD, QO-GFI and QO-AFI Branch Circuit Breakers from pages 3 and 4.

Mains Rating (A)	Spaces	Max. Number Single Pole Circuits▲	Max. Number of Tandem Circuit Breakers	Load Center■ Box , Interior, and Cover		Equipment Ground Bar Kit (Order Separately)		Main Wire Size AWG/kcmil		Box No. See page 19
				Catalog Number	Price	Catalog No.	Price	Al	Cu	
INDOOR										
Manufactured Housing 1 Phase—2 Wire 120 Vac—Main Lugs Only—CSA Certified 10,000 RMS Sym. Ampere Short Circuit Current Rating										
30 ♦	2	2	0	QO2L30TTS★	$ 33.90	Factory-installed		#12–10	#14–10	1
50	2	4	2	QO24L50TTS▼	52.00			. . .	#14–6	2
1 Phase—2 Wire 120 Vac—Main Circuit Breaker—CSA Certified—10,000 RMS Sym. Ampere Short Circuit Current Rating										
30	3	5	2	QO35FM30TTF/S	$ 55.00	Factory-installed		△		3
1 Phase—3 Wire 120/240 Vac—Main Lugs Only—CSA Certified—10,000 RMS Sym. Ampere Short Circuit Current Rating										
70	2	4	2	QO24L70TS▼	$ 52.00	Factory Installed		#12–3	#14–4	2
100	6	12	6	QO612L100TF/S□	57.00			#4–1		4
	6	12	6	QO612L100DTF/S□	67.00					4
	8	16	8	QO816L100TF/S□	91.00					4
	8	16	8	QO816L100DTF/S□	106.00					4
Generator Panel 1 Phase—3 Wire 120/240 Vac—Factory-installed Main Circuit Breakers with Mechanical Interlock 10,000 RMS Sym. Amperes Short Circuit Current Rating										
30	4	8	4	QO48M30DSGP	$375.00	PK7GTA	$7.80	#14–8	#14–8	4
60	4	8	4	QO48M60DSGP	375.00	PK7GTA	7.80	#8–2	#8–2	4
Load Center with Cover 1 Phase—3 Wire 120/240 Vac—UL Listed Complete QO Load Center—Box, Interior & Combination Cover—in One Package										
Convertible Mains—Factory-installed Main Lugs—65,000 RMS Sym. Amperes Short Circuit Current Rating ◊ ☆ QOM1 Main Frame Size—Convertible to Main Circuit Breaker (See page 7)—Copper Bus										
125 A	12	12	0	QO112L125GC	$125.00	PK12GTA Incl.		#6–2/0		6
	12	24	12	QO11224L125GC	166.00	PK15GTA Incl.		#6–2/0		6
	20	20	0	QO120L125GC	189.00	PK15GTA Incl.		#6–2/0		7
Convertible Mains—Factory-installed Main Lugs—65,000 RMS Sym. Amperes Short Circuit Current Rating ◊ ☆ QOM2 Main Frame Size—Convertible to Main Circuit Breaker (See page 7)—Copper Bus										
150 A	30	30	0	QO130L150TC	$301.00	PK23GTA & LK100AN Installed		#6–250		9
200 A	30	40	10	QO13040L200GC	383.00	PK23GTA & LK100AN Incl.		#6–250		9
Convertible Mains—Factory-installed Main Circuit Breaker—22,000 RMS Sym. Amperes Short Circuit Current Rating QOM1 Main Frame Size—Convertible to Main Lugs (See page 8 or Lower Amperage Main Circuit Breaker (See page 7)—Copper Bus ▽										
100 A	12	12	0	QO112M100C	$234.00	PK9GTA	$ 8.90	#4–1/0		5
	12	20	8	QO11220M100C	275.00	PK15GTA	11.40	#4–1/0		5
	16	16	0	QO116M100C	263.00	PK12GTA	10.50	#4–1/0		6
	20	20	0	QO120M100C	297.00	PK15GTA	11.40	#4–1/0		6
Convertible Mains—Factory-installed Main Circuit Breaker—22,000 RMS Sym. Amperes Short Circuit Current Rating QOM2 Main Frame Size—Convertible to Main Lugs (See page 8 or Lower Amperage Main Circuit Breaker (See page 7)—Copper Bus ▽										
150 A	20	30	10	QO12030M150C	$562.00	PK18GTA	$12.50	#4–250		9
	30	30	0	QO130M150C	580.00	PK18GTA	12.50	#4–250		9
200 A	20	40	20	QO12040M200C	562.00	PK23GTA	14.20	#4–250		9
	30	30	0	QO130M200C	597.00	PK18GTA	12.50	#4–250		9
	30	40	10	QO13040M200C	649.00	PK23GTA	14.20	#4–250		9
	40	40	0	QO140M200C	758.00	PK23GTA	14.20	#4–250		10

Above listings thru 200 A mains rating meet Federal Specification W-P-115c as Type 1, Class 2.

▲ Maximum number of single pole branch circuits utilizing QO and/or QOT circuit breakers.
■ Order F for flush device or S for surface device.
♦ Mains rating 25 A when Al wire is used.
★ Will not accept QWIK-GARD® QO-GFI circuit breaker.
▼ Use #10 maximum size wire for GFI circuit breakers.
△ Main circuit breaker is a field-installed standard QO single pole circuit breaker. Order separately from page 3.
□ 70 A max. branch circuit breaker and 70 A max. back fed main circuit breaker.
◊ UL short circuit current rating depends on lowest interrupting rating of circuit breaker installed.
☆ UL Listed 5000 A short circuit current rating for corner grounded Delta systems. Use QO-H circuit breakers only.
▽ 22,000 AIR main circuit breaker UL Listed for use ahead of QO, QOT and QO-PL 10,000 AIR branch circuit breakers to permit their application on systems with up to 22,000 A available fault current.

Accessories

Auxiliary Gutter

UL Listed For Use With Standard 1Ø an 3Ø Load Centers For Riser Applications ◒ . For Auxiliary Gutter-Load Center Compatibility, see Catalog 1100CT9901.

Catalog Number	Price	Cover	Conduit Riser Size	Width	Height	Depth
SDAG26	$225.	Flush	1¾, 2, 2½ or ✱ 3	13.50	26.12	3.75

◒ One tap kit required for each riser wire.
✱ When used with B300 bolt-on hubs.

Tap Kits 120/240 Vac—UL Listed For Use With Auxiliary Gutters SDAG26

Catalog Number	Price	Use With Auxiliary Gutter Catalog Number	Riser Wire		Tap Off Wire	
			Lug Type	Al/Cu Wire Size	Lug Type	Al/Cu Wire Size
SDGT30020	$54.00	SDAG26	Mechanical (Included)	(2) #6–300 kcmil	Mechanical (Included)	(1) #6–2/0
SDGT300300	80.00	SDAG26	Mechanical (Included)	(2) #6–300 kcmil	Mechanical (Included)	(1) #6–300 kcmil
SDGT300C10C	33.10	SDAG26	Anderson #VCEL030516H1 (Not included)	(2) #4–300 kcmil	Anderson #VCEL02114S1 (Not Included)	(1) #8–1/0
SDGT300C300C	46.90	SDAG26	Anderson #VCEL030516H1 (Not included)	(2) #4–300 kcmil	Anderson #VCEL030516H1 (Not included)	(1) #4–300 kcmil
QOGL20 Grounding Terminals	27.10	SDAG26	Mechanical (Included)	(2) #6–2/0	. . .	. . .

For additional information, reference Catalog #1100CT9901.

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LOAD CENTERS

Load Center Value Pack

1 Phase, 3 Wire—120/240 Vac—UL Listed—Convertible Mains—Factory-installed Main Circuit Breaker
Complete Load Center (Box, Interior and Cover) and Selected Branch Circuit Breakers

	Mains Rating (A)	Spaces	Max. Number Single Pole Circuits▲	Max. Number of Tandem Circuit Breakers	Load Center Box , Interior, Cover and Branch Circuit Breakers			Equipment Ground Bar Kit (Order Separately)		Main Wire Size AWG/kcmil Al/Cu	Box No. See Pages 19, 20
					Catalog No.	Included Load Center/Circuit Breakers	Price	Catalog No.	Price		
INDOOR	**QO—Copper Bus—Order extra QO, QOT, QO-EPD, QO-GFI, QO-AFI branch circuit breakers from pages 3 and 4.**										
	200	30	40	10	QOVP1	(1) QO13040M200C, (5) QO120	**$735.00**	PK23GTA	**$14.20**	#4–250	9
	100	32	32	0	QOVP2	(1) QO132M100C, (5) QO120	**559.00**	PK18GTA	**12.50**	#4–2/0	8
	HOMELINE—Order extra HOM, HOMT, HOM-GFI, HOM-AFI branch circuit breakers from page 15.										
	200	30	40	10	HOMVP1	(1) HOM3040M200TC, (5) HOM120, (1) HOM230	**722.00**	Included	. . .	#4–250	10
	200	30	40	10	HOMVP2	(1) HOM3040M200TC, (5) HOM115, (1) HOM230	**722.00**	Included	. . .	#4–250	10
	100	20	20	0	HOMVP4	(1) HOM20M100C, (5) HOM115	**352.00**	PK15GTA	**11.40**	#4–2/0	8
	100	20	20	0	HOMVP5	(1) HOM20M100C, (5) HOM120	**352.00**	PK15GTA	**11.40**	#4–2/0	8
	150	30	30	0	HOMVP12	(1) HOM30M150C, (5) HOM120, (1) HOM230	**655.00**	PK23GTA	**14.20**	#4–250	10
	200	30	40	10	HOMVP9	(1) HOM3040M200TC, (6) HOM115, (6) HOM120, (1) HOM230, (1) HOM250	**885.00**	Included	. . .	#4–250	10
	200	30	40	10	HOMVP14	(1) HOM3040M200TC, (12) HOM120, (1) HOM230, (1) HOM250	**885.00**	Included	. . .	#4–250	10
	200	30	40	10	HOMVPL1	(1) HOM3040L200TC, (6) HOM115, (6) HOM120, (1) HOM230, (1) HOM250	**641.00**	Included	. . .	#4–250	10
	125	12	24	12	HOMVPL2	(1) HOM1224L125TC, (5) HOM120	**235.00**	Included	. . .	#6–2/0	6
	HOMELINE—Rainproof										
	200	20	40	20	HOMVPRB1	(1) HOM2040M200RB, (6) HOM115, (6) HOM120, (1) HOM230, (1) HOM250	**835.00**	PK23GTA	**14.20**	#4–250	6R

Above listings thru 200 A mains rating meet Federal Specification W-P-115c as Type 1, Class 2.
▲ Maximum number of single pole branch circuits utilizing QO and/or QOT circuit breakers.

Riser

1 Phase—2 Wire 120/240 Vac—Offset Interior Wide Gutter—50 A Maximum Branch Circuit Breaker■ ♦

	Mains Rating (A)	Spaces	Max. Number Single Pole Circuits▲	Max. Number of Tandem Circuit Breakers	Load Center Box and Interior		Load Center Cover		Equipment Ground Bar Kit (Order Separately)		Main Wire Size AWG/kcmil		Box No. See page 19
					Catalog Number	Price	Catalog Number	Price	Catalog No.	Price	Al	Cu	
INDOOR	**Convertible Mains—Factory-installed Main Lugs—65,000 RMS Sym. Amperes Short Circuit Current Rating** **QOM1 Main Frame Size—Convertible to Main Circuit Breaker (See page 7)—Copper Bus**												
	125	12	24	12	QO11224L125WG	**$225.**	QOC20UFWG	**$35.**	PK15GTA	**$11.40**	#6–2/0		14
	125	20	30	10	QO12030L125WG	**310.**	QOC20UFWG	**35.**	PK15GTA	**11.40**	#6–2/0		14
	Fixed Mains—Factory-installed Main Lugs—65,000 RMS Sym. Amperes Short Circuit Current Rating **Copper Bus**												
	200	30	40	10	QO13040L200WG	**467.**	QOC30UFWG	**68.**	PK23GTA	**14.20**	#4–250		23

Above listings thru 200 A mains rating meet Federal Specification W-P-115c as Type 1, Class 2.
▲ Maximum number of single pole branch circuits utilizing QO and/or QOT circuit breakers.
■ UL short circuit current rating depends on lowest interrupting rating of circuit breaker installed.
♦ UL Listed 5000 A short circuit current rating for corner grounded Delta systems. Use QO-H circuit breakers only.

Panelboard-style Covers for Riser Panels

Mono-Flat® Front available for riser panels as an alternative to standard load center cover listed above. Provides a low-profile, aesthetically pleasing solution for high-traffic areas in upscale multi-family applications. Deadfront included. Lock kit not provided. ★

Mains Rating of Load Center (A)	Catalog Number	Price
125	NQC20FWG	**$ 78.**
200	NQC30FWG	**120.**

★ Order catalog number PK4FL for field installable lock kit.

For additional information, reference Catalog #1100CT9901.

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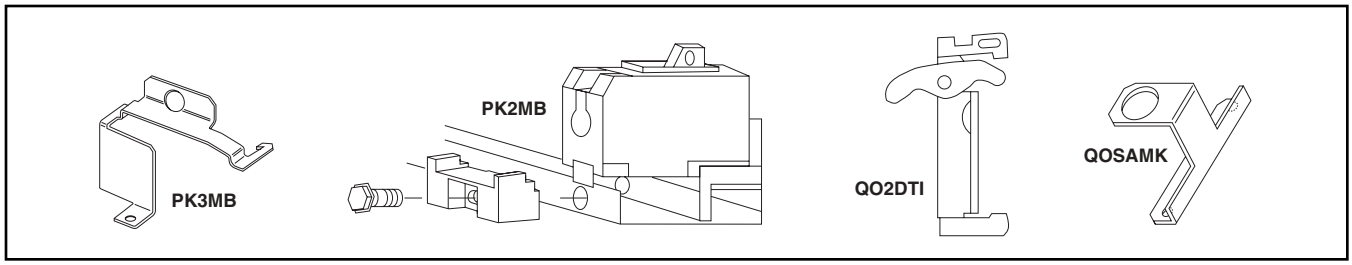
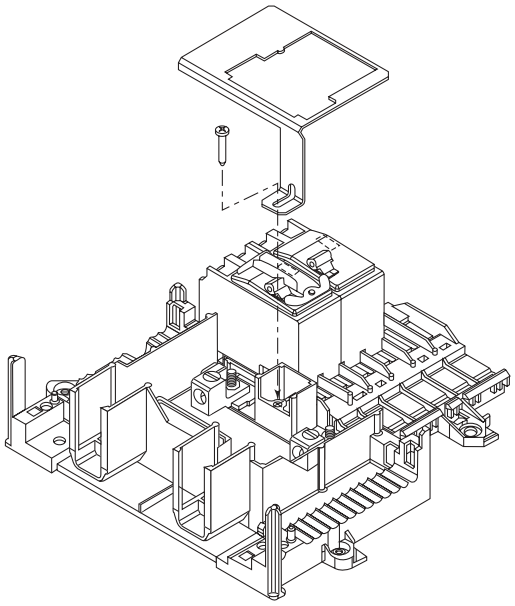
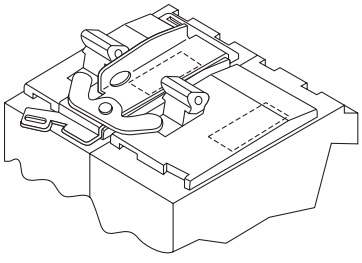
QO Load Center Accessories

	Description	Catalog Number	Price	Schedule
Retaining Kit	Secures circuit breaker to interior when used as a back-fed main. For QO612L100F/S, RB, QO612L100DF/S, QO816L100F/S, RB, QO816L100DF/S and QO148L125GF/S, GRB load centers	PK2MB	**4.80**	DE3A
	Secures circuit breaker to interior when used as a back-fed main. For 3Ø Load Centers	PK3MB	**9.80**	DE3A
	Secures circuit breaker to interior when used as a back-fed main for 2-pole QO 150–200 A circuit breakers.	PK5RK	**9.80**	DE3A
	Secures ONE circuit breaker with or without electrical accessories to right side of interior when used as a back-fed main. For 1Ø 100–125 ampere convertible main load centers. Series S01 and S02.	PK4MB2LA	**9.80**	DE3A
	Secures ONE circuit breaker with or without electrical accessories to right side of interior when used as a back-fed main. For 1Ø 150–225 ampere convertible main load centers. Series S01 and S02.	PK4MB2HA	**9.80**	DE3A
Manual Transfer Equipment Kit	For interlocking the handles of two 2-pole or one 2-pole and one 1-pole QO and Q1 circuit breakers mounted side-by-side so that only one circuit breaker can be "ON" at a time	QO2DTI	**16.60**	DE2E
	QO2DTI mechanical interlock attachment with retaining kits for securing two adjacent back-fed circuit breakers in dual power supply applications. Can be used with (2) 2-poles or (1) 2-pole and (1) 1-pole QO circuit breakers in QO816L100 load centers.	QO2DTIM	**42.00**	DE2E
	Secures TWO 2-pole circuit breakers to right side of interior when used as back-fed mains, a QO2DTI Kit included for back-up power supply applications. For 1Ø 100–125 ampere convertible main load centers. Series S01 and S02.	PK4DTIM4LA	**68.00**	DE3A
	Secures TWO 2-pole circuit breakers to right side of interior when used as back-fed mains, a QO2DTI Kit included for back-up power supply applications. For 1Ø 150–225 ampere convertible main load centers. Series S01 and S02.	PK4DTIM4HA	**68.00**	DE3A
	Secures TWO 2-pole circuit breakers to left side of interior when used as back-fed mains, a QO2DTI Kit included for back-up power supply applications. For 1Ø 100–125 ampere convertible main load centers. Series S01 and S02.	PK4DTIM4LAL	**68.00**	DE3A
Generator Circuit Breaker Interlock Kit	For use on "G" and "S" Series NEMA 1 and "G" and "S1" Series NEMA 3R load centers. Interlocks a QOM2 2-pole main circuit breaker of a load center (150–225 A) with a QO 2-pole (15–125 A) branch circuit breaker. Includes a retaining kit.	QOCGK2	**70.00**	DE3A
	For use on "S2" Series NEMA 3R load centers. Interlocks a QOM2 2-pole main circuit breaker of a load center (150–225 A) with a QO 2-pole (15–125 A) branch circuit breaker. Includes a retaining kit.	QORBGK2	**70.00**	DE3A
Miscellaneous				
Cover Sealing Strap:	Provides means of sealing trim mounting screws on QO load center covers	QO1SE	**2.40**	DE3A
Surge Arresters:	For use on 1Ø3W, 150 Vac maximum.	SDSA1175	**61.00**	DE1B
	For use on 3Ø4W, 650 Vac maximum.	SDSA3650	**165.00**	DE1B
	QO SURGEBREAKER cULus Listed Secondary Surge Arrester 150 Vac line-to-ground maximum.	QO2175SB	**106.00**	DE1B
	HOMELINE SURGEBREAKER cULus Listed Secondary Surge Arrester 150 Vac line-to-ground maximum.	HOM2175SB	**106.00**	DE1B
Surge Arrester Mounting Kit:	UL Listed for mounting SDSA1175 surge arrester into ground bar mounting holes on 1Ø convertible main circuit breaker load centers	QOSAMK	**7.60**	DE3A

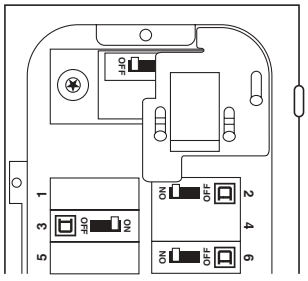




PK4DTIM4HA



QO2DTI Installed



QOCGK2 Installed

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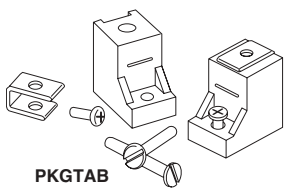
QO Load Center Accessories

	Description	Catalog Number	Price	Schedule
Filler Plates	Fills opening in covers if twistout is removed in error	QOFP	**$ 2.40**	DE3A
	Fills main circuit breaker opening in convertible load center covers. . . . . 100–125 A.	QOM1FP	**13.50**	DE3A
	Fills main circuit breaker opening in convertible load center covers. . . . . 150–225 A.	QOM2FP	**13.50**	DE3A
	Fills main circuit breaker opening in three phase load center covers (S01 and S02 Series).	KFP	**13.50**	DE3A
	Fills main circuit breaker opening in "Q" style three phase load center covers (S03 Series).	Q2FP	**13.50**	DE3A
Lock Kits	Use with convertible mains, 1Ø and 3Ø 100–225 A, and fixed mains, 3Ø 125–225 A indoor load centers	PK6FL▲	**62.00**	DE3A
	Use with 300 and 400 ampere indoor load centers.	PK4FL	**60.00**	PE1A
Neutral / Ground Lugs	Field-installed for #12 to 2 Al or #14 to 4 Cu wire	LK70AN	**6.70**	DE3A
	Field-installed for #6 to 2/0 Al/Cu wire	LK100AN	**7.20**	DE3A
	Field-installed for #14 to 2/0 Al/Cu wire	LK125AN	**14.70**	DE3A
	Field-installed for #2 to 3/0 Al/Cu wire	LK150AN	**21.60**	DE3A
	Field-installed for #4 to 300 kcmil Al/Cu wire. Use in Series S, 150–225 A QO or HOM load center	LK225AN	**22.10**	DE3A
Ground Bar Kits	Standard PK15GTA with a #1 to 4/0 Al/Cu Lug	PK15GTAL	**23.30**	DE3A
	Standard PK18GTA with a #1 to 4/0 Al/Cu Lug	PK18GTAL	**25.20**	DE3A
	Standard PK23GTA with a #1 to 4/0 Al/Cu Lug	PK23GTAL	**27.10**	DE3A
	Insulator Kit for PK7GTA thru PK27GTA	PKGTAB	**29.20**	DE3A
Handle Padlock Attachment:	For padlocking main circuit breakers in convertible load centers, "OFF" . . . . . 50–125 A, QOM1 Frame Size	QOM1PA	**7.30**	DE2E
	100–225 A, QOM2 Frame Size	QOM2PA	**7.30**	DE2E

▲ QO612L100DF/S, QO816L100DF/S, QO612L100DFCU/SCU, QO816L100DFCU/SCU and QO403L60NF/S DO NOT have provisions for field-installed lock.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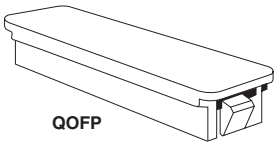
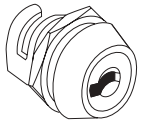
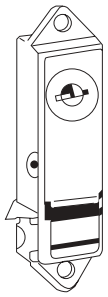

QOFP


PK6FL


PK4FL

HOMELINE Load Center Accessories

	Description		Catalog Number	Price	Schedule
Handle Padlock Attachment:	For padlocking main circuit breakers in convertible load center, "OFF"	50–125 A	QOM1PA	**$ 7.30**	DE2E
		100–225 A	QOM2PA	**7.30**	DE2E
Filler Plates	Fills opening in covers if twistout is removed in error		HOMFP	**2.10**	DE3C
	Fills main circuit breaker opening in convertible load centers	100–125 A	QOM1FP	**13.50**	DE3A
		150–225 A	QOM2FP	**13.50**	DE3A
Neutral Lugs	Field-installed for #14 to 2 Al or #14 to 4 Cu wire		LK70AN	**6.70**	DE3B
	Field-installed for #6 to 2/0 Al/Cu wire		LK100AN	**7.20**	DE3B
	Field-installed for #14 to 2/0 Al/Cu wire		LK125AN	**14.70**	DE3B
	Field-installed for #4 to 300 kcmil Al/Cu wire. Use in SeriesS, 150–225 A QO or HOM load center		LK225AN	**22.10**	DE3A
Miscellaneous					
Retaining Kit:	Secures circuit breaker to interior when used as a back-fed main. For HOM612L100F/S, RB and HOM48L125GC, GRB load centers.		HOM1RK	**4.30**	DE3C
	Secures ONE circuit breaker right side of interior when used as a back-fed main. For 100–125 ampere convertible main load centers, Series S01 and S02		HOM4RK2LA	**9.80**	DE3C
	Secures ONE circuit breaker right side of interior when used as a back-fed main. For 150–225 ampere convertible main load centers, Series S01 and S02		HOM4RK2HA	**9.80**	DE3C
	Secures circuit breaker to interior when used as a back-fed main for 2-pole 150–200 ampere circuit breakers		HOM5RK	**9.80**	DE3C
Lock Kit:	Use with convertible indoor load center covers(Series S-1)		PK6FL	**62.00**	DE3A
Generator Circuit Breaker Interlock Kit	For use on "S" Series NEMA 1 and "S1" Series NEMA 3R load centers. Interlocks a QOM2 2-pole main circuit breaker of a load center (150–225 A) with a HOMELINE 2-pole 15–125 A) branch circuit breaker.		HOMCGK2	**70.00**	DE3D
	For use on "S2" Series NEMA 3R load centers. Interlocks a QOM2 2-pole main circuit breaker of a load center (150–225 A) with a HOMELINE 2-pole (15–125 A) branch circuit breaker.		HOMRBGK2	**70.00**	DE3D

Wiggy® Voltage Tester

Voltage Testers

Solenoid Type with polarity indication and slotted receptacles for holding prods. UL and CSA Listed.

Description	Type	Price	Schedule
The *Wiggy*® **Voltage Tester** 120-240-480-600 Vac 50/60 Hz; 120-240-600 Vdc	6610 VT1	**$67.00**	DE3B
Same as VT-1 except with fused leads	6610 VT1S	**74.00**	DE3B
Deluxe Simulated Leather Carrying Case	6610 L2	**39.30**	DE3B
Replacement Polarity Indication Cap ■	6610 PC1	**8.00**	DE3B
Replacement Leads ■	6610 P1	**25.70**	DE3B
Fused Replacement Leads ■	6610 P1S	**35.50**	DE3B

■ IMPORTANT: Will fit only Class 6610 Series A testers and Catalog Number 5008, Series B testers. Will not fit 5008 Pre-Series B testers. Leads must be replaced as a unit. Replacement of individual lead components must not be attempted.

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Plug-On Circuit Breakers—UL Listed 10,000 Amperes RMS Symmetrical Interrupting Rating (AIR)

The Square D HOMELINE circuit breakers are in a 1-inch wide industry-standard format for 1-pole circuit breakers. They are designed to plug into HOMELINE load centers that are available from 4 to 42 circuits.

The Square D exclusive QWIK-OPEN® mechanism is standard on all 15 A and 20 A circuit breakers with a trip reaction within 1/60th of a second.

HOM

Ampere Rating	1-pole—120/240 Vac		2-pole—120/240 Vac Common Trip	
	Catalog Number	Price	Catalog Number	Price
10,000 Amperes RMS—UL Listed Interrupting Rating				
15	HOM115▲■	**$17.50**	HOM215■	**$ 40.30**
20	HOM120▲■	**17.50**	HOM220■	**40.30**
25	HOM125■	**17.50**	HOM225■	**40.30**
30	HOM130■	**17.50**	HOM230■	**40.30**
35	. . .	. . .	HOM235■	**40.30**
40	HOM140■	**17.50**	HOM240■	**40.30**
45	. . .	. . .	HOM245■	**40.30**
50	HOM150■	**17.50**	HOM250■	**40.30**
60	. . .	. . .	HOM260■	**40.30**
70	. . .	. . .	HOM270■	**82.00**
80	. . .	. . .	HOM280■	**112.00**
90	. . .	. . .	HOM290■	**112.00**
100	. . .	. . .	HOM2100■	**112.00**
110	. . .	. . .	HOM2110■	**246.00**
125	. . .	. . .	HOM2125■	**246.00**
150	. . .	. . .	HOM2150BB■♦	**285.00**
175	. . .	. . .	HOM2175BB■♦	**285.00**
200	. . .	. . .	HOM2200BB■♦	**285.00**

HOM-HM

High magnetic trip circuit breakers are recommended for applications where high initial inrush current may occur.

Amperes	1-pole—120/240 Vac		2-poles
	Catalog Number	Price	. . .
15	HOM115HM■	**$18.40**	. . .
20	HOM120HM■	**18.40**	. . .

HOM-AFI

HOMELINE Arc Fault Circuit Interrupters—Provide overload and short circuit protection, plus arc fault protection in accordance with UL 1699.

Ampere Rating	Poles 120 Vac	Catalog Number	Price
15	1	HOM115AFI■	**$150.00**
20	1	HOM120AFI■	**150.00**

HOM-GFI

HOM-GFI circuit breakers provide overload and short circuit protection, combined with Class A ground fault protection. Class A denotes a ground fault circuit interrupter that will trip when a fault current to ground is 6 milliamperes or more.

Ampere Rating	1-pole—120 Vac		2-pole—120/240 Vac Common Trip	
	1 Space Required		2 Spaces Required	
	Catalog Number	Price	Catalog Number	Price
10,000 AIR				
15	HOM115GFI	**$141.00**	HOM215GFI	**$275.00**
20	HOM120GFI	**141.00**	HOM220GFI	**275.00**
30	. . .	. . .	HOM230GFI	**275.00**
40	. . .	. . .	HOM240GFI	**275.00**
50	. . .	. . .	HOM250GFI	**275.00**

HOM-EPD

HOMELINE Equipment Protection Device—Circuit Breakers with 30 mA Equipment Ground Fault Protection (UL Listed)

Amperes	1-pole—120 Vac		2-pole—120/240 Vac Common Trip	
	Catalog Number	Price	Catalog Number	Price
10,000 AIR				
15	HOM115EPD	**$249.00**	HOM215EPD	**$440.00**
20	HOM120EPD	**249.00**	HOM220EPD	**440.00**
25	. . .	. . .	HOM225EPD	**440.00**
30	. . .	. . .	HOM230EPD	**440.00**
40	. . .	. . .	HOM240EPD	**440.00**
50	. . .	. . .	HOM250EPD	**440.00**

HOMT Tandem Circuit Breakers

Ampere Rating★	1-pole Tandem—120/240 Vac (One Space Required)	
	Catalog No.	Price
10,000 AIR		
15 and 15	HOMT1515■	**$34.90**
15 and 20	HOMT1520■	**34.90**
20 and 20	HOMT2020■	**34.90**
30 and 15	HOMT3015■	**34.90**
30 and 20	HOMT3020■	**34.90**

▲ UL Listed as SWD (switching duty) rated. Suitable for switching 120 Vac fluorescent lighting loads.
■ UL Listed as HACR type for use with air conditioning, heating and refrigeration equipment having motor group combinations and marked for use with HACR type circuit breakers.
♦ Requires four spaces (#1–300 kcmil Al/Cu). Use only in single phase panel rated 150 A or greater.

HOMT Quad Tandem Circuit Breakers

Ampere Rating★		2-pole Tandem—120/240 Vac (Two Spaces Required)	
1P	2P	Catalog No.	Price
10,000 AIR			
(2) 15	15	HOMT1515215■	**$80.00**
(2) 15	20	HOMT1515220■	**80.00**
(2) 15	25	HOMT1515225■	**80.00**
(2) 15	30	HOMT1515230■	**80.00**
(2) 15	40	HOMT1515240■	**80.00**
(2) 15	50	HOMT1515250■	**80.00**
(2) 20	20	HOMT2020220■	**80.00**
(2) 20	25	HOMT2020225■	**80.00**
(2) 20	30	HOMT2020230■	**80.00**
(2) 20	40	HOMT2020240■	**80.00**
(2) 20	50	HOMT2020250■	**80.00**

Typical catalog number (e.g. HOMT 1515230) represents two single-pole, outer poles (two 15 A 1P CBs) and one 2-pole inner circuit breaker with common trip (one 30 A 2P CB).

HOM 1-pole

1 Space Required

HOM 2-pole

2 Spaces Required

HOMT 1-pole

1 Space Required

HOMT Quad Breaker

2 Spaces Required

HOM 1-pole AFI (Arc Fault Circuit Interrupter)

1 Space Required

HOM 1-pole GFI (With Ground Fault Circuit Interrupter)

1 Space Required

HOM 2-pole GFI (With Ground Fault Circuit Interrupter)

2 Spaces Required

HOM2200BB Branch Breaker

4 Spaces Required

Circuit Breaker Wire Sizes▼

Breaker Type	Ampere Rating	Wire Size (AWG/kcmil)	
		Aluminum	Copper
HOM 1-pole	15–30 40–50	#14–8 #8–2	#14–8 or (2) #14–10 #8–2
HOM 2-pole	15–30 35–70 80–125 150–200	#14–8 #8–2 #4–2/0 #4–300	#14–8 or (2) #14–10 #8–2 #4–2/0 #4–300
HOMT and Quad Quad Only HOM-GFI - 1-pole HOM-GFI - 2-pole	15–30 40–50 15–20 15–50	#14–8 #6–#12 #14–10 #12–4	#14–8 #6–#14 #14–10 #14–6

Accessories

Description		Catalog No.	Price
HANDLE ATTACHMENTS Handle Tie: Converts any two adjacent 120/240 Vac single HOM breakers to independent trip 2-pole		HOM1HT	**$ 2.30†**
Handle Tie: Converts any two adjacent 120/240 Vac single-pole side-by-side HOMT breakers to independent trip 2-pole		HOMTHT	**2.50†**
Handle Clamp: Clamp for holding HOM single-pole handle in "ON" or "OFF" position		QO1LO	**2.50††**
Handle Blocking Device: Attaches to standard HOM 2-pole circuit breakers for holding the handle in the "OFF" position		HOM2HBD	**7.10†**
Handle Padlock Attachment: For padlocking 1-pole Standard HOM breakers in "ON" or "OFF" position.		HOM1PA	**6.60†**
Handle Padlock Attachment: For padlocking 2-pole Standard HOM breakers in "ON" or "OFF" position	15–70 A 80–125 A 150–200 A	HOM2PALA HOM2PAHA HOM2PAVHA	**6.60†** **6.60†** **33.60†**
Handle Padlock Attachment: For padlocking center poles of Homeline Quad breakers in "OFF" position.		HOMQPA	**6.60**
Handle Padlock Attachment: For padlocking main circuit breakers in convertible load center, "OFF"	50–125 A 100–225 A	QOM1PA△ QOM2PA△	**7.20††** **7.20††**
SUB-FEED LUGS 125 A 2-pole plug-on—2 spaces required 225 A 2-pole plug-on—4 spaces required		HOML2125 HOML2225♦	**31.70** **197.00**

★ 15–20 A tandem or quad tandem circuit breakers are suitable for use with 60°C or 75°C conductors. 25–50 A tandem or quad tandem circuit breakers are suitable for use with 75°C conductors only.
▼ 15–30 A circuit breakers are suitable for use with 60°C or 75°C conductors. 40–125 A circuit breakers are suitable for use with 75°C conductors.
△ 50–125 A QOM1 frame size; 100–225 A QOM2 frame size.

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HOMELINE® Load Centers
Series Rating
Class 1170

The rating of the load center is equal to the lowest interrupting rating of any circuit breaker installed or combination series connected circuit breaker. Additional or replacement circuit breakers MUST have an interrupting and voltage rating equal to or greater than that of the circuit breaker with the lowest interrupting and voltage rating presently installed. See load center interior for circuit breaker types.

Short Circuit Current Rating

Maxium Short Circuit Current Rating (RMS Symmetrical)	Load Center Voltage Rating 240 Vac Max.	Remote Square D Circuit Breaker		Integral Square D Circuit Breaker		Square D Branch Circuit Breaker		
		Catalog Designation ■	Current Rating Amperes Max.	Catalog Designation ■	Current Rating Amperes Max.	Catalog Designation ■ ♦	Current Rating Amperes	
	Systems Voltage						1-pole	2-pole
10,000	120/240 Vac, 1 Phase 3 Wire	…	…	…	…	HOM	15–50	15–200 ▲
						HOMT	15–30	15–50
Series Combination Short Circuit Current Rating								
22,000	120/240 Vac, 1 Phase 3 Wire	…	…	QOM-VH …	225 …	HOM	15–50	15–200 ▲
						HOMT	15–30	15–50
		QO-VH	200	…	…	HOM	15–50	15–200 ▲
						HOMT	15–30	15–50
42,000	120/240 Vac, 1 Phase 3 Wire	QOH	125	…	…	HOM	15–50	15–200 ▲
						HOMT	15–30	15–50
25,000	120/240 Vac, 1 Phase 3 Wire	QD	225	…	…	HOM	15–50	15–200 ▲
						HOMT	15–30	15–50
65,000	120/240 Vac, 1 Phase 3 Wire	QG	225	…	…	HOM	15–50	15–200 ▲
						HOMT	15–30	15–50
100,000	120/240 Vac, 1 Phase 3 Wire	QJ	225	…	…	HOM	15–50	15–200 ▲
						HOMT	15–30	15–50

▲ 100 Amperes maximum branch circuit breaker in load centers with 125 A maximum mains rating.
■ See circuit breaker for voltage and interrupting rating.
♦ HOM includes suffixes: GFI and AFI.

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HOMELINE® Load Centers
Indoor—Single Phase, Main Lug, Main Circuit Breaker
Class 1170

Single Phase Three Wire—120/240 Vac—UL Listed—10,000 RMS Sym. Amperes Short Circuit Current Rating

Mains Rating (A)	Spaces	Max. Number Single Pole Circuits▲	Max. Number of Tandem Circuit Breakers	Load Center Box, Interior and Cover ■ Catalog Number	Price (DE3C)	Main Wire Size AWG/kcmil Al	Cu	Equipment Ground Bar Kit (Order Separately) Catalog Number	Price (DE3A)	Box No. See page 19
INDOOR										
Main Lugs—Order HOM, HOMT, HOMGFI and HOMAFI Circuit Breakers from page 15										
Factory-installed Fixed Main Lugs										
70	2	4	2	HOM24L70F/S ♦ ★	**$ 39.20**	#12–3	#14–4	PK3GTA1	**$ 7.60**	2
100	6	12	6	HOM612L100F/S ♦ ▼	**52.00**	#8–1		PK7GTA	**7.80**	4
125	4	8	4	HOM48L125GC	**57.00**	#12–2/0	#14–2/0	PK7GTA Factory-included		21
Convertible Mains—Factory-installed Main Lugs										
QOM1 Main Frame Size—Convertible to 22,000 AIR Main Circuit Breaker (See page 18)										
125	8	16	8	HOM816L125C	**88.00**	#6–2/0		PK15GTA	**11.40**	6
	8	16	8	HOM816L125TC	**100.00**			Factory-installed	...	6
	12	12	0	HOM12L125C	**116.00**			PK15GTA	**11.40**	6
	12	24	12	HOM1224L125TC	**136.00**			Factory-installed	...	6
	16	24	8	HOM1624L125C	**173.00**			PK15GTA	**11.40**	8
	20	20	0	HOM20L125C	**158.00**			PK15GTA	**11.40**	8
	20	24	4	HOM2024L125TC	**192.00**			Factory-installed	...	8
	24	24	0	HOM24L125TC	**229.00**			Factory-installed	...	8
Convertible Mains—Factory-installed Main Lugs										
QOM2 Main Frame Size—Convertible to 22,000 AIR Main Circuit Breaker (See page 18)										
150	30	30	0	HOM30L150C	**250.00**	#6–250		PK23GTA	**14.20**	10
200	16	32	16	HOM1632L200TC	**238.00**	#6–250		Factory-installed	...	9
	16	32	16	HOM1632L200TCFT△	**383.00**					10
	20	40	20	HOM2040L200TC	**278.00**					9
200	30	30	0	HOM30L200C	**280.00**	#6–250		PK23GTA	**14.20**	10
	30	30	0	HOM30L200TC	**309.00**			Factory-installed	...	10
	30	40	10	HOM3040L200TC	**319.00**			Factory-installed	...	10
	40	40	0	HOM40L200C	**412.00**			PK23GTA	**14.20**	12
225	42	42	0	HOM42L225C	**488.00**	#6–250		PK23GTA	**14.20**	12
Main Circuit Breaker—22,000 RMS Sym. Amperes Short Circuit Current Rating										
Convertible Mains—Factory-installed Main Circuit Breaker										
QOM1 Main Frame Size—Convertible to Main Lugs or Lower Amperage Main Circuit Breaker (See page 18)										
100	8	16	8	HOM816M100C	**$210.00**	#6–1		PK15GTA	**11.40**	5
	8	16	8	HOM816M100TC	**222.00**	#6–1		Factory-installed	...	5
	12	12	0	HOM12M100C	**196.00**	#4–2/0		PK15GTA	**11.40**	6
	12	24	12	HOM1224M100TC	**256.00**	#4–2/0		Factory-installed	...	6
	20	20	0	HOM20M100C	**264.00**	#4–2/0		PK15GTA	**11.40**	8
	24	24	0	HOM24M100C	**342.00**	#4–2/0		PK15GTA	**11.40**	8
	30	30	0	HOM30M100C	**448.00**	#4–2/0		PK23GTA	**14.20**	10
125	12	24	12	HOM1224M125C	**404.00**	#4–2/0		PK15GTA	**11.40**	6
	12	24	12	HOM1224M125TC	**413.00**			Factory-installed	...	6
	24	24	0	HOM24M125C	**473.00**			PK15GTA	**11.40**	8
	30	30	0	HOM30M125C	**541.00**			PK23GTA	**14.20**	10
Convertible Mains—Factory-installed Main Circuit Breaker										
QOM2 Main Frame Size—Convertible to Main Lugs or Lower Amperage Main Circuit Breaker (See page 18)										
150	16	32	16	HOM1632M150TC	**424.00**	#4–250		Factory-installed	...	9
	20	30	10	HOM2030M150TC	**500.00**			Factory-installed	...	9
	30	30	0	HOM30M150C	**517.00**			PK23GTA	**14.20**	10
200	12	24	12	HOM1224M200TC	**381.00**	#4–250		Factory-installed	...	9
	16	32	16	HOM1632M200TC	**450.00**			Factory-installed	...	9
	20	40	20	HOM2040M200C	**474.00**			PK23GTA	**14.20**	9
	20	40	20	HOM2040M200TC	**509.00**			Factory-installed	...	9
	30	30	0	HOM30M200C	**532.00**			PK23GTA	**14.20**	10
	30	40	10	HOM3040M200TC	**594.00**			Factory-installed	...	10
	40	40	0	HOM40M200C	**679.00**			PK23GTA	**14.20**	12
	42	42	0	HOM42M200C	**729.00**			PK23GTA	**14.20**	12
225	42	42	0	HOM42M225C	**744.00**	#4–250		PK23GTA	**14.20**	12
Universal Mains—No Factory-installed Main Circuit Breaker or Main Lugs										
QOM2 Main Frame Size—Field-install 22,000 AIR Main Circuit Breaker or Main Lugs (See page 18)										
200	16	32	16	HOM1632U200TC	**195.00**	#4–250		Factory-installed	...	9
	20	40	20	HOM2040U200TC	**238.00**			Factory-installed	...	9
	30	40	10	HOM3040U200TC	**353.00**			Factory-installed	...	10

Above listings thru 200 A mains rating meet Federal Specification W-P-115c as Type 1, Class 2.
▲ Maximum number of single pole branch circuits utilizing HOM and/or HOMT circuit breakers.
■ C at end of catalog number indicates combination flush/surface cover included with device.
♦ F/S at end of catalog number indicates to order F for flush device or S for surface device. The cover does not have a door.
★ HOM-GFI branch circuit breaker is limited to number 10 maximum wire.
▼ 70 A maximum back feed main circuit breaker.
△ Supplied with feed-thru lugs.

For additional information, reference Catalog #1100CT9901.

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HOMELINE® Load Centers

Rainproof—Single Phase, Main Lug, Main Circuit Breaker
Class 1170

SQUARE D
www.SquareD.com
For the most up-to-date information

Single Phase Three Wire—120/240 Vac—UL Listed—10,000 RMS Sym. Amperes Short Circuit Current Rating

Main Lugs—Order HOM, HOMT, HOMGFI and HOMAFI Circuit Breakers from page 15

	Mains Rating (A)	Spaces	▲ Max. Number Single Pole Circuits	Max. Number of Tandem Circuit Breakers	Load Center Box, Interior and Cover Catalog Number	Load Center Box, Interior and Cover Price (DE3C)	Main Wire Size AWG/kcmil Al	Main Wire Size AWG/kcmil Cu	Equipment Ground Bar Kit (Order Separately) Catalog Number	Equipment Ground Bar Kit (Order Separately) Price (DE3A)	Box No. See page 20
RAINPROOF	**Factory-installed Fixed Main Lugs**										
	70	2	4	2	HOM24L70RB ■	**$ 74.00**	#12–3	#14–4	PK4GTA	**$ 7.20**	1R
	100	6	12	6	HOM612L100RB	**86.00**	#8–1		PK7GTA	**7.80**	2R
	125	4	8	4	HOM48L125GRB	**91.00**	#12–2/0	#14–2/0	PK7GTA Factory-included		15R
	Convertible Mains—Factory-installed Main Lugs ♦ QOM1 Main Frame Size—Convertible to 22,000 AIR Main Circuit Breaker (See Below)										
	125	8	16	8	HOM816L125RB	**165.00**	#6–2/0		PK15GTA	**11.40**	3R
		12	12	0	HOM12L125RB	**156.00**			PK15GTA	**11.40**	3R
		12	24	12	HOM1224L125RB	**185.00**			PK15GTA	**11.40**	3R
		20	20	0	HOM20L125RB	**255.00**			PK15GTA	**11.40**	4R
	Convertible Mains—Factory-installed Main Lugs ♦ QOM2 Main Frame Size—Convertible to 22,000 AIR Main Circuit Breaker (See Below)										
	200	12	12	0	HOM12L200RB	**282.00**	#6–250		PK23GTA	**14.20**	5R
		20	40	20	HOM2040L200RB	**373.00**			PK23GTA	**14.20**	6R
		30	30	0	HOM30L200RB	**391.00**			PK23GTA	**14.20**	7R
		40	40	0	HOM40L200RB	**607.00**			PK23GTA	**14.20**	14R
	Main Circuit Breaker— 22,000 RMS Sym. Amperes Short Circuit Current Rating ★ Convertible Mains—Factory-installed Main Circuit Breaker ♦ QOM1 Main Frame Size—Convertible to Main Lugs or Lower Amperage Main Circuit Breaker (See Below)										
RAINPROOF	100	8	16	8	HOM816M100RB	**286.00**	#4–2/0		PK15GTA	**11.40**	3R
		12	12	0	HOM12M100RB	**277.00**			PK15GTA	**11.40**	3R
		20	20	0	HOM20M100RB	**354.00**			PK15GTA	**11.40**	4R
	125	24	24	0	HOM24M125RB	**572.00**	#4–2/0		PK15GTA	**11.40**	6R
	Convertible Mains—Factory-installed Main Circuit Breaker ♦ QOM2 Main Frame Size—Convertible to Main Lugs or Lower Amperage Main Circuit Breaker (See Below)										
	150	30	30	0	HOM30M150RB	**685.00**	#4–250		PK23GTA	**14.20**	7R
	200	20	40	20	HOM2040M200RB	**581.00**	#4–250		PK23GTA	**14.20**	6R
		30	30	0	HOM30M200RB	**669.00**			PK23GTA	**14.20**	7R
		30	40	10	HOM3040M200RB	**768.00**			PK23GTA	**14.20**	7R
		40	40	0	HOM40M200RB	**851.00**			PK23GTA	**14.20**	14R
	225	16	24	8	HOM1624M225RB	**788.00**	#4–250		PK15GTA	**11.40**	7R
		42	42	0	HOM42M225RB	**882.00**			PK23GTA	**14.20**	14R
	Factory-installed Main Circuit Breaker with Feed-thru Lugs ♦										
	150	8	16	8	HOM816M150FTRB	**523.00**	#4–250		PK15GTAL	**23.30**	6R
	200 ▼	8	16	8	HOM816M200FTRB	**523.00**	#4–250		PK15GTAL	**23.30**	6R
	Universal Main with Feed-thru Lugs—No Factory-installed Main Circuit Breaker ♦ QOM2 Main Frame Size—Field-install 22,000 AIR Main Circuit Breaker (See Kits Below)										
	200	8	16	8	HOM816U200FTRB	**297.00**	#4–250		PK15GTAL	**23.30**	6R

Above listings thru 200 A mains rating meet Federal Specification W-P-115c as Type 1, Class 2.
▲ Maximum number of single pole branch circuits utilizing HOM and/or HOMT circuit breakers.
■ HOM-GFI branch circuit breaker is limited to number 10 maximum wire.
♦ Side hinge door device allow 1¼" on left side for door to open.
★ 22,000 AIR main circuit breaker UL Listed for use ahead of HOM and HOMT 10,000 AIR branch circuit breakers to permit their application on systems with up to 22,000 A available fault current.
▼ Rated 200 A when using copper wire. Reference NEC® Table 310.15(B)(6) when using Al wire.

Main Lug Kits

QOL125

QOL225

Field-installable Main Lugs (Convertible Load Centers Only)

Main Lug △ Ampere Rating	Use On Convertible Load Center With Mains Rating	Catalog Number	Price (DE3A)	Lug Wire Size □ AWG/kcmil Al or Cu
125	100–125	QOL125◊	**$29.40**	#6–2/0
225	150–225	QOL225◊	**69.00**	#6–300

△ Do not exceed the load center mains rating.
□ Wire Range listed for QOL lug kits is the wire range of that lug. To find out maximum wire size permitted in a particular load center per UL, see pages 17, 18 under main wire size.
◊ If main circuit breaker knockout has been removed from the load center's trim, order appropriate filler plate from page 14.

For additional information, reference Catalog #1100CT9901.

Main Circuit Breaker Kits

Field-installable Main Circuit Breaker (Convertible Load Centers Only)

Main Circuit Breaker Rating (A) ☆	Use With Convertible Load Center Mains Rating	22,000 AIR ▽ Main Circuit Breaker	22,000 AIR ▽ Price (DE3A)	Lug Wire Size ◒ AWG/kcmil Al or Cu
QOM1 Frame Size				
50	100–125	QOM50VH	**$ 93.00**	#12–2/0
60	100–125	QOM60VH	**93.00**	
70	100–125	QOM70VH	**93.00**	
80	100–125	QOM80VH	**134.00**	
90	100–125	QOM90VH	**134.00**	
100	100–125	QOM100VH	**134.00**	
110	125	QOM110VH	**312.00**	
125	125	QOM125VH	**312.00**	
QOM2 Frame Size ∗				
100	150–225	QOM2100VH	**312.00**	#4–300
125	150–225	QOM2125VH	**312.00**	
150	150–225	QOM2150VH	**312.00**	
175	200–225	QOM2175VH	**312.00**	
200	200–225	QOM2200VH	**312.00**	
225	225	QOM2225VH	**312.00**	

☆ Do not exceed the load center mains rating.
▽ 22,000 AIR main circuit breaker UL Listed for use ahead of HOM and HOMT 10,000 AIR branch circuit breakers to permit their application on systems with up to 22,000 amperes available fault current.
◒ Wire range listed for QOM circuit breaker kits is the wire range of that circuit breaker. To find out maximum wire size permitted in a particular load center per UL, see pages 17,18 under Main Wire Size.
∗ Add suffix 1021 for 120, 208, 240 Vac shunt trip. Add **$126.00**.

DE3A		DE3C		Discount Schedule

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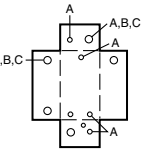
Knockout Information and Enclosure Dimensions

Indoor

Box No.	Dimensions W IN	W mm	H IN	H mm	D IN	D mm
1	3.81	97	6.72	171	3.00	76
2	4.81	122	9.30	236	3.19	81
3	4.81	122	9.30	236	3.19	81
4	8.88	226	12.57	319	3.80	97
5	14.25	362	14.92	379	3.75	95
6	14.25	362	17.92	455	3.75	95
7	14.25	362	20.92	531	3.75	95
8	14.25	362	26.04	661	3.75	95
9	14.25	362	29.86	758	3.75	95
10	14.25	362	33.78	858	3.75	95
11	14.25	362	37.98	965	3.75	95
12	14.25	362	39.37	1000	3.75	95

Box No.	Dimensions W IN	W mm	H IN	H mm	D IN	D mm
13	5.88	149	13.12	333	3.38	86
14	14.25	362	20.92	531	3.75	95
15	20.00	508	50.00	1270	5.75	146
16	20.00	508	68.00	1727	5.75	146
17	20.00	508	53.00	1346	5.75	146
18	5.88	149	16.12	409	3.38	86
19	7.56	192	23.12	587	4.25	108
20	9.62	244	26.12	663	4.75	121
21	8.88	226	14.80	376	3.80	97
22	8.55	217	23.92	608	3.95	100
23	14.25	362	29.86	758	3.75	95

Knockouts									
Symbol	A	B	C	D	E	F	G	H	I
Conduit Size	½	¾	1	1¼	1½	2	2½	3	3½



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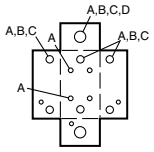

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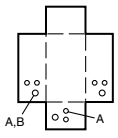

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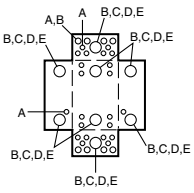

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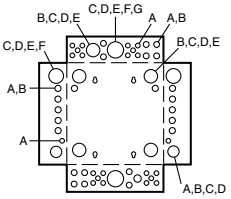

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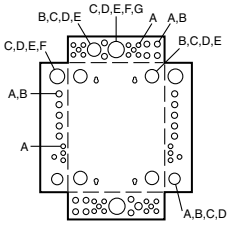

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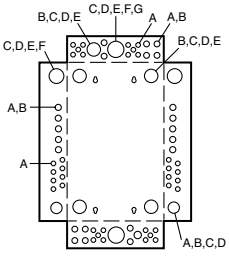

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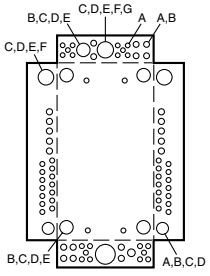

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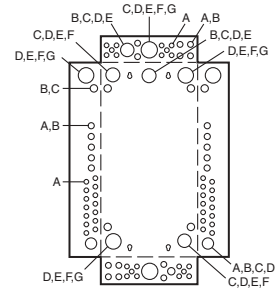

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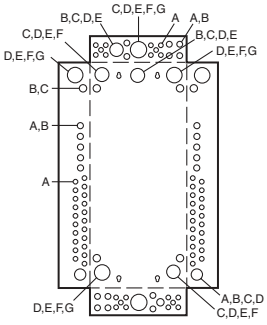

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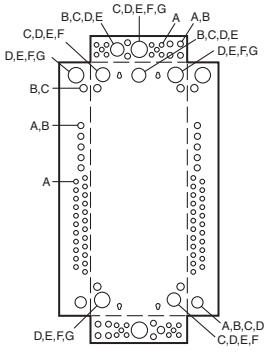

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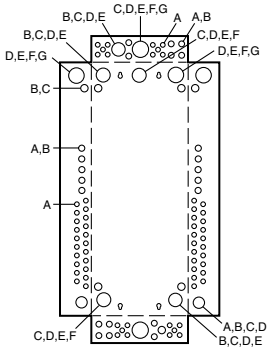

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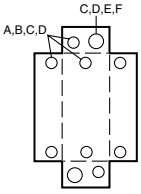

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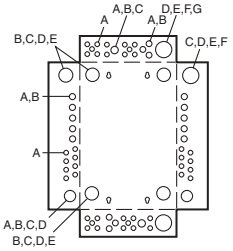

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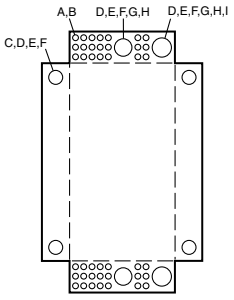

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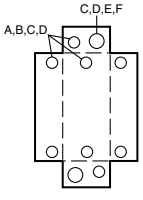

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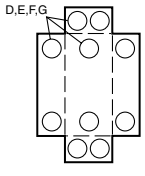

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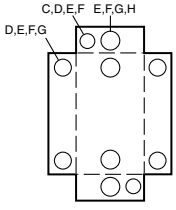

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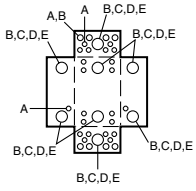

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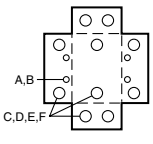

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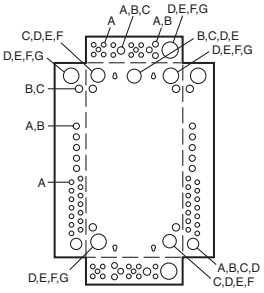

Box 23

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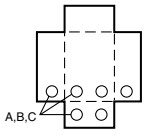

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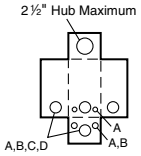

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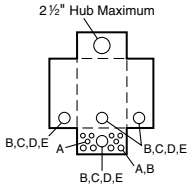

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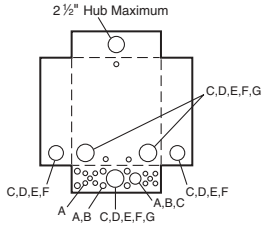

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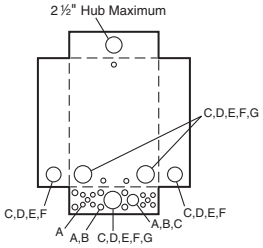

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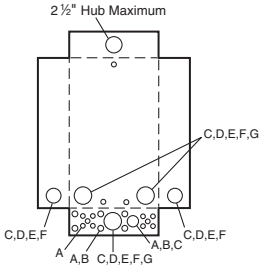
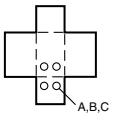


Box 6R, 7R, 8R



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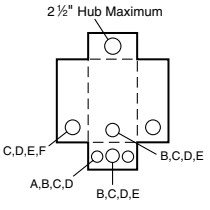

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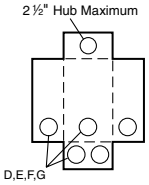
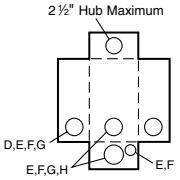


Box 11R



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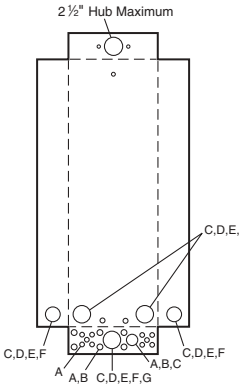
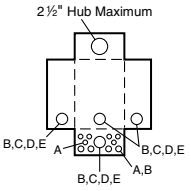


Box 14R



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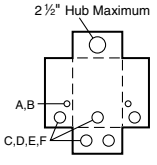

Box 16R

Enclosure Dimensions

Box No.	Dimensions					
	W		H		D	
	IN	mm	IN	mm	IN	mm
1NM	6.52	166	8.79	223	3.90	99
1R▲	4.88	124	9.38	238	4.00	102
2R	8.88	226	12.65	321	4.27	108
3R	14.75	375	18.92	481	4.52	115
4R	14.75	375	22.06	560	4.52	115
5R	14.75	375	26.04	661	4.52	115
6R	14.75	375	29.86	758	4.52	115
7R	14.75	375	33.78	858	4.52	115
8R	14.75	375	37.98	965	4.52	115
9R	4.56	116	6.50	165	3.88	99
10R	6.92	176	13.18	335	4.12	105
11R	7.56	192	23.24	590	4.75	121
12R	9.62	244	26.24	666	5.50	140
13R	6.92	176	16.18	411	4.12	105
14R	14.75	375	39.37	1000	4.52	115
15R	8.88	226	14.80	376	4.27	108
16R	8.55	217	24.75	629	4.16	106

▲ HOME250SPA top endwall has no hub opening.

Knockout Information

Knockouts								
Symbol	A	B	C	D	E	F	G	H
Conduit Size	½	¾	1	1¼	1½	2	2½	3

Bolt-On Hubs

Square D equipment with "R" or "RB" suffix, designated rainproof NEMA 3R rainproof construction, utilizes bolt-on hubs listed below. "RB" devices will accept ¾" through 2" bolt-on hubs without the use of reducers. Off-center conduit thread openings and elongated mounting holes provide quick and easy adjustment to eliminate costly conduit offsets and bends. Catalog suffix "R" devices require 3" through 4" field cut opening. Hubs are suitable for use with conduit having ANSI standard taper pipe thread.

"RB" Hub

Bolt-On Hubs UL Listed For "RB" Devices

Conduit Size	¾"	1"	1¼"	1½"	2"	2½"
Hub Cat. No.	B075	B100	B125	B150	B200	B250
Price	**$22.20**	**$22.20**	**$22.20**	**$22.20**	**$40.90**	**$68.00**

Note: Closing cap (catalog number BCAP) is provided factory-installed on each device having "RB" suffix. Price if ordered separately; **$2.50**

Bolt-On Hubs UL Listed For Mounting In Field Cut Opening

Conduit Size	3"	3½"	4"	
Hub Cat. No.	B300	B350	B400	Designed for mounting in field cut opening. Includes gasket and four mounting bolts and nuts.
Price	**$124.00**	**$200.00**	**$245.00**	

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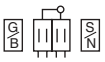
1 Phase 3 Wire Main Lugs

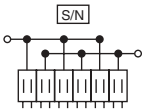
QO2L30S
QO2L40RB

QO2L30TTS▲

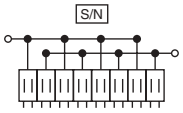
QO24L60NRNM▲
QO24L70F/S
QO24L70RB
QO24L70TS▲



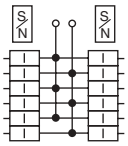
QO24L50TTS▲



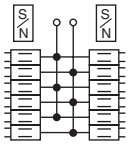
QO612L100DFCU/SCU
QO612L100DF/S
QO612L100DTF/S▲
QO612L100F/S
QO612L100RB
QO612L100RBCU
QO612L100TF/S▲
QO612L100TRB▲



QO816L100DF/S
QO816L100DFCU/SCU
QO816L100DTF/S▲
QO816L100F/S
QO816L100RB
QO816L100RBCU
QO816L100TF/S▲



QO112L125G
QO112L125GC
QO112L125GRB
QO112L200G
QO112L200GRB



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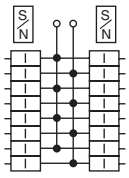
QO11224L125GC
QO11224L125GRB
QO11224L125GWGC



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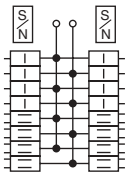

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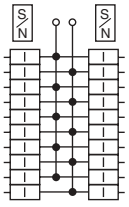
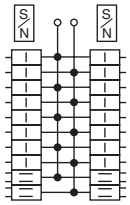
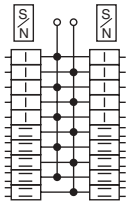
QO11624L125GRB



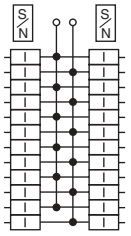
QO120L125G
QO120L125GC



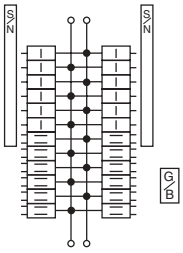
QO12024L125G
QO12024L125GWGC



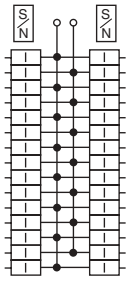
QO12030L150G



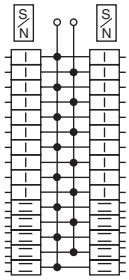
QO124L125G
QO124L125GRB
QO124L150G



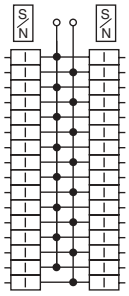
QO12436L200TFT



QO130L150G
QO130L150GRB
QO130L200G
QO130L200GRB



QO13040L200G
QO13040L200GC
QO13040L200GRB
QO13040L200WG



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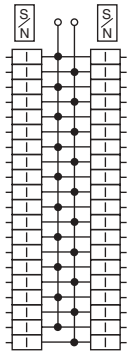

QO140L200G
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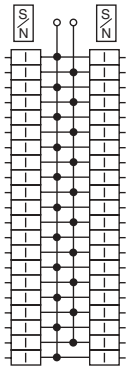

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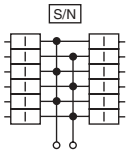
QO142L225GRB



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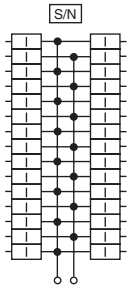
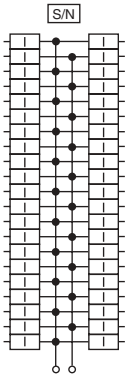
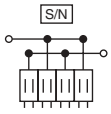


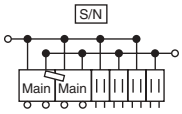
QON30LS400



QON42LS400

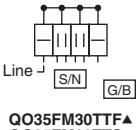


QO148L125GF/S
QO148L125GRB

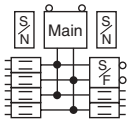


QO48M30DSGP
QO48M60DSGP
Generator Panel

1 Phase 3 Wire Main Breaker



QO35FM30TTF▲
QO35FM30TTS▲



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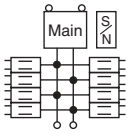
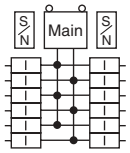
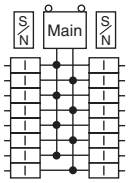


QO1816M150FTRB
QO1816M200FTRB



QO112M100
QO112M100C
QO112M100RB



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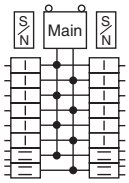
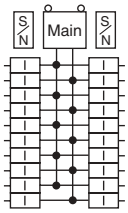
QO116M100C
QO116M100RB



QO11220M100C



QO120M100
QO120M100C
QO120M100RB

▲ Includes Factory Installed Ground Bar

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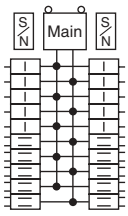
1 Phase 3 Wire Main Breaker (Continued)



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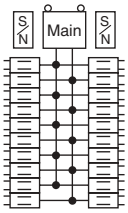
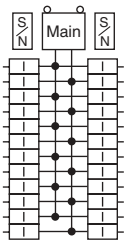
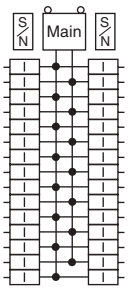
QO12030M150C
QO12030M150RB



QO12040M200
QO12040M200C
QO12040M200RB
QO12040M200TC▲



QO124M100
QO124M125
QO124M125RB
QO124M150
QO124M200



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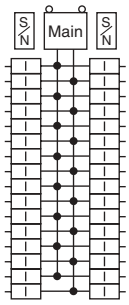
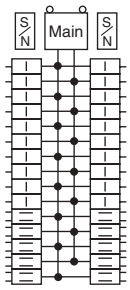
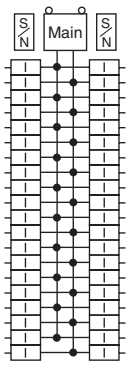
QO130M150RB
QO130M200
QO130M200C
QO130M200RB



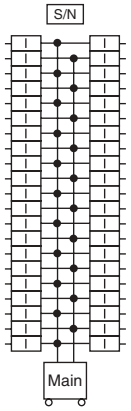
QO132M100
QO132M125
QO132M150



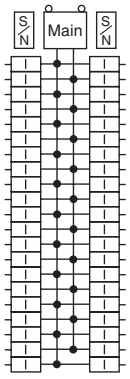
QO13040M200
QO13040M200C



QO140M200
QO140M200C
QO140M200RB
QO140M225

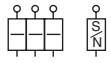


QON42MS300
QON42MS400

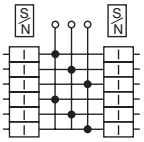


QO142M200
QO142M225

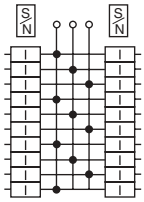
3 Phase 4 Wire Main Lugs



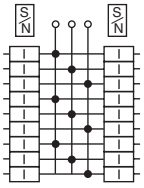
QO403L60NF/S
QO403L60NRB



QO312L125G
QO312L125GRB



QO320L125G
QO320L125GRB



QO318L200G
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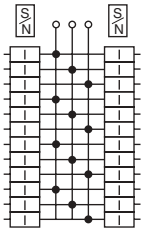
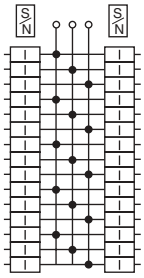


QO324L125G



QO330L200G
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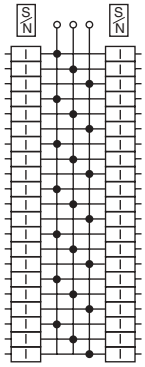
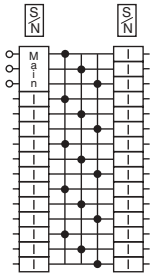
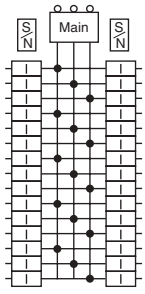


QO342L225G
QO342L225GRB

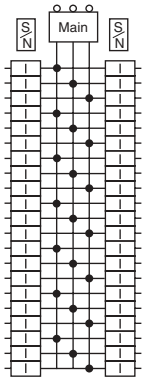
3 Phase 4 Wire Main Circuit Breaker



QO327M100
QO327M100RB



QO330MQ125
QO330MQ125RB
QO330MQ150
QO330MQ150RB
QO330MQ200
QO330MQ200RB



QO342MQ150
QO342MQ200
QO342MQ200RB
QO342MQ225
QO342MQ225RB

▲ Includes Factory Installed Ground Bar

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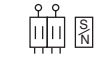
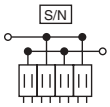
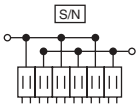
1 Phase 3 Wire Main Lugs



HOM24L70F/S
HOM24L70RB



HOM48L125GC
HOM48L125RB



HOM612L100F/S
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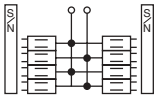
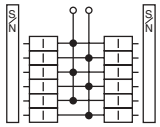
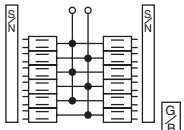


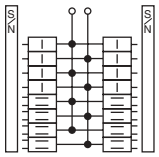
HOM816L125C
HOM816L125RB
HOM816L125TC▲



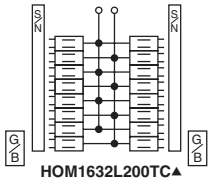
HOM12L125C
HOM12L125RB
HOM12L200RB



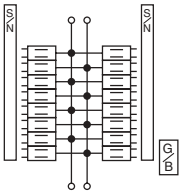
HOM1224L125TC▲
HOM1224L125RB



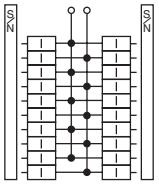
HOM1624L125C



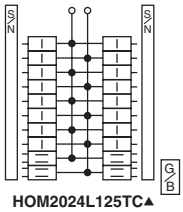
HOM1632L200TC▲



HOM1632L200TCFT▲



HOM20L125C
HOM20L125RB



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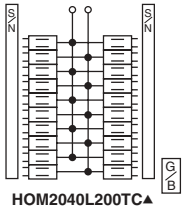

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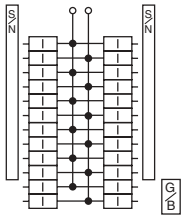

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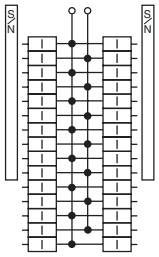
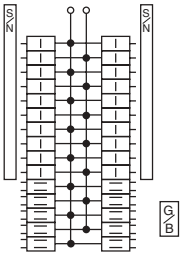
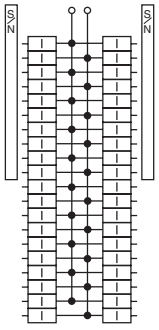


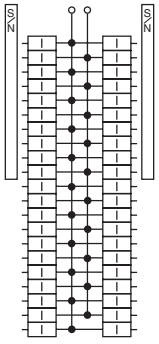
HOM30L150C
HOM30L200C
HOM30L200RB
HOM30L200TC▲



HOM3040L200TC▲

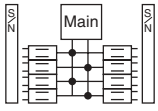


HOM40L200C
HOM40L200RB

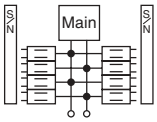


HOM42L225C

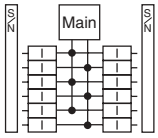
1 Phase 3 Wire Main Breaker



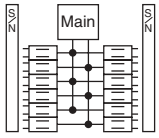
HOM816M100C
HOM816M100RB
HOM816M100TC▲



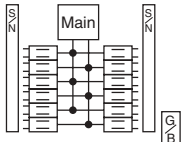
HOM816M150FTRB
HOM816M200FTRB



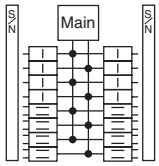
HOM12M100C
HOM12M100RB



HOM1224M125C



HOM1224M100TC▲
HOM1224M125TC▲
HOM1224M200TC▲



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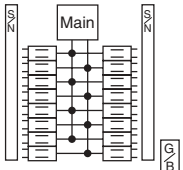
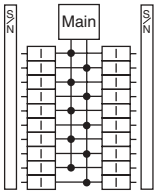
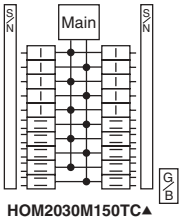


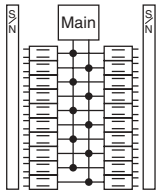
HOM1632M150TC▲
HOM1632M200TC▲



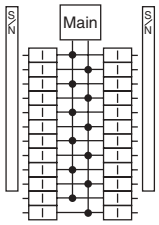
HOM20M100C
HOM20M100RB



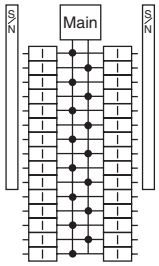
HOM2030M150TC▲



HOM2040M200C
HOM2040M200RB
HOM2040M200TC▲



HOM24M100C
HOM24M125C
HOM24M125RB



HOM30M100C
HOM30M125C
HOM30M150C
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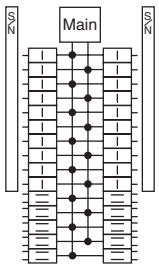
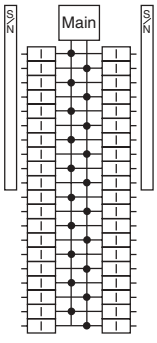
HOM30M200C
HOM30M200RB



HOM3040M200RB
HOM3040M200TC▲



HOM40M200C
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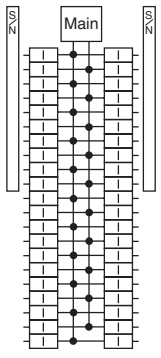
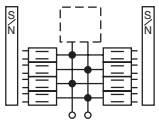
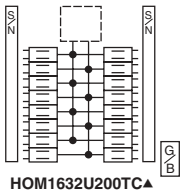


HOM42M200C
HOM42M225C

Universal Mains



HOM816U200FTRB



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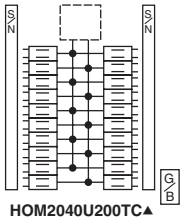
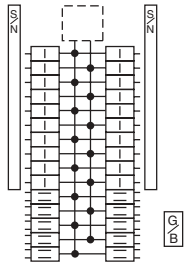


HOM2040U200TC▲



HOM3040U200TC▲

▲ Includes Factory Installed Ground Bar

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Combination

SERVICE ENTRANCE DEVICE (CSED)

Flexibility...

Meter-Main CSEDs
Meter main devices are used in residential applications where local codes require service disconnects to be located outside the dwelling. They include the utility meter socket and factory installed and/or provisions for field installation of service disconnect(s) to feed downstream devices. Meter mains are surface mount and typically used with interior mounted sub-feed load centers.

All-In-One CSEDs
These devices come with a 30/40 circuit 200 A main circuit breaker load center and an additional 200 A maximum service disconnect for subfeed applications. 300 A and 400 A versions are available.

Meter Mains

Square D meter mains include a basic meter socket and single main service disconnect. Dual main devices are available to feed a second load, such as a water pump, with a separate service disconnect. Four or six main disconnect units provide flexibility for feeding additional loads, such as air conditioning, spa, swimming pool, or garage.

- Ring or ringless styles meet local utility requirements
- Fifth jaw and horn bypasses available

Combination Service Entrance Devices
Rainproof—Single Phase, Meter-Mains
Class 4119/4120

Meter-Mains
Meets Federal Spec. W-P-115c as Type 1, Class 2, UL Listed, suitable only for use as service equipment, 120/240 Vac, 1-Phase, 3-Wire, NEMA 3R enclosure

		Ampere Rating	By-pass Type	Service (Type of Feed) UL	Service (Type of Feed) UL & EUSERC	Short Circuit Current Rating	Catalog Number	List Price (DE3A)	Service Disconnect(s) 2-pole Circuits (Max.)	Service Disconnect(s) Type (Order Separately from page 27 except as noted)	Service Disconnect(s) Ampere Rating (Max.)	Load Center and Branch Circuit Breakers (Order separately page 27) Max. Quantity Spaces	1-pole Circuits	1-pole Tandems	Ampere Rating (Max.)	Hub Type (Order separately from page 27)	Line Side Main Lugs AWG/ kcmil (Al/Cu)	Service Ground Lug AWG/ kcmil (Al/Cu)	Weight Each (Lbs) and Pallet Qty.
RING TYPE	QO®	**Surface Mount only**																	
		125	None	OH/UG	. . .	10k	C125RB	**245.**	1	QOM1-VH	125	.....	.....	.....	.....	B	#4–1/0	#8–1/0	15, 54
		200	None	OH/UG	. . .	22k	CM200S	**681.**	1	QOM2-VH	200	.....	.....	.....	.....	A	#4–250	(2) #8–2/0	26, 24
				OH/UG	. . .	22k	C2M200S	**722.**	1 1	QOM2-VH QO-VH	200 50	.....	.....	.....	....	A	#4–250	(2) #8–2/0	27, 20
				OH/UG	. . .	10k	C4L200S	**762.**	2	QO	100	.....	.....	.....	.....	A	#4–250	(2) #8–2/0	27, 28
		Surface Mount, convertible to Semiflush with FK400 flange kit (order separately)																	
		400	None	UG	UG	25k	CU12L400CN ■	**2540.**	1 1 4	QDL22200▲ QDL, QGL, QJL◑ QOH▼	200 200 200◆	....	....	....	....	A-L	(2) Studs	#4–250	98, 4
		400	Class 320 Manual Bypass	UG	UG	25k	CU12L400CB ■	**2657.**	1 1 4	QDL22200▲ QDL, QGL, QJL◑ QOH▼	200 200 200◆	....	....	....	....	A-L	(2) Studs	#4–250	98, 4
		400	None	UG	UG	25k	CU816D400CN□ ■	**2650.**	1 1	QDL22200▲ QDL, QGL, QJL◑	200 200	8	16	8	200	A-L	(2) Studs	#4–250	98, 4
		400	Class 320 Manual Bypass	UG	UG	25k	CU816D400CB□ ■	**2767.**	1 1	QDL22200▲ QDL, QGL, QJL◑	200 200	8	16	8	200	A-L	(2) Studs	#4–250	98, 4
	HOMELINE	**Surface Mount only**																	
		125	None	OH/UG	OH/UG	10k	SC8L125S	**564.**	4	HOM	125★	.....	.....	.....	.....	A	#6–2/0	#12–4	31, 24
		200	None	OH/UG	OH/UG	10k	SC12L200S	**946.**	6	HOM	200	.....	.....	.....	.....	A–L	#4–250	#12–2/0	40, 10
		Semiflush Mount only																	
		125	None	OH/UG	OH/UG	10k	SC8L125F	**564.**	4	HOM	110	.....	.....	.....	.....	A or B300	#6–2/0	#12–2/0	37, 20
		200	None	OH△/UG	OH△/UG	10k	SC12L200F	**946.**	6	HOM	200	.....	.....	.....	.....	A–L	#4–250	#12–2/0	47, 10
			None	OH△/UG	OH△/UG	22k	SC816F200F □	**791.**	1	QOM2200VH▲	200	8	16	8	200	A–L	#4–250	#12–2/0	51, 10
		Surface Mount—Supplied with Feed Thru Lugs and provisions for Branch Circuit Breakers																	
		150	None	OH/UG	OH/UG	22k	SC816F150S □	**791.**	1	QOM2150VH▲	150	8	16	8	150	A–L	#4–250	#12–2/0	40, 10
						10k	SC816D150C□ ◊	**833.**	1 1	HOM2150▲ HOM	150 50	8	16	8	100	A or A–L	#6–300	#12–1/0	48, 18
		200	None	OH/UG	OH/UG	22k	SC816F200S □	**791.**	1	QOM2200VH▲	200	8	16	8	200	A–L	#4–250	#12–2/0	40, 10
						10k	SC816D200C□ ◊	**833.**	1 1	HOM2200▲ HOM	200 50	8	16	8	100	A or A–L	#6–300	#12–1/0	48, 18
RINGLESS	QO	**Surface Mount Only**																	
			None				RC200S	**681.**	1	QOM2-VH	200					A	#6–350	(2)#8–2/0	26, 24
			None				RC2M200S	**722.**	1	QOM2-VH	200					A	#6–350	(2)#8–2/0	27, 20
		200	Horn	OH/UG	.....	22k	RC2M200SH	**757.**	1	QO-VH	50	.....	.....	.....	.....	A	#6–350	(2)#8–2/0	27, 20
			None				QC12L200C☆	**1041.**	6	QO-VH	200					A	#6–350	#12–2/0	40, 21
			Horn				QC12L200CH☆▽◒	**1255.**	6	QO-VH	200					A	#6–350	#12–2/0	40, 21
		400	Class 320 Lever	UG	.....	25k	QU12L400SL ✱	**2540.**	1 1 4	QDL22200▲ QDL, QGL, QJL◑ QOH▼	200 200 200◆	....	....	....	....	A-L	(2) Studs	#4–250	98, 4
		Surface Mount Only, Supplied with Feed Thru Lugs and provisions for Branch Circuit Breakers																	
		100	Horn	OH/UG	.....	22k	QC816F100CH□☆▽◒	**904.**	1	QOM2100VH▲	100	8	16	8	100				
		125	None	OH/UG	.....	22k	QC816F125C□☆	**869.**	1	QOM2125VH▲	125	8	16	8	100				
			Horn	OH/UG	.....	22k	QC816F125CH□☆▽	**904.**	1	QOM2125VH▲	125	8	16	8	100				
		150	None	OH/UG	.....	22k	QC816F150C□☆	**869.**	1	QOM2150VH▲	150	8	16	8	150	A	#6–350	#12–2/0	40, 21
			Horn	OH/UG	.....	22k	QC816F150CH□☆▽	**904.**	1	QOM2150VH▲	150	8	16	8	150				
		200	None	OH/UG	.....	22k	QC816F200C□☆	**904.**	1	QOM2200VH▲	200	8	16	8	200				
			Horn	OH/UG	.....	22k	QC816F200CH□☆▽	**904.**	1	QOM2200VH▲	200	8	16	8	200				
		400	Class 320 Lever	UG	.....	25k	QU816D400SL□	**2710.**	1 1	QDL22200▲ QDL, QGL, QJL◑	200 200	8 8	16 16	8 8	200 200	A-L	(2) Studs	#4–250	98, 4
		Surface Mount, convertible to Semiflush with FK400 flange kit (order separately)																	
		400	Class 320 Lever	UG	UG	25k	QU12L400CL ✱ ◆	**2540.**	1 1 4	QDL22200▲ QDL, QGL, QJL◑ QOH▼	200 200 200◆	....	....	....	....	A-L	(2) Studs	#4–250	98, 4
		400		UG	UG	25k	QU816D400CL ✱ ◆ □	**2710.**	1 1	QDL22200▲ QDL, QGL, QJL◑	200 200	8	16	8	200	A-L	(2) Studs	#4–250	98, 4
	HOMELINE	**Surface Mount Only**																	
		125	None	OH/UG	.....	10k	RC8L125S	**564.**	4	HOM	125★	.....	.....	.....	.....	A	#6–2/0	#12–4	27, 32
		200	None	OH/UG	.....	10k	RC12L200C☆	**946.**	6	HOM	200	.....	.....	.....	.....	A	#6–350	#12–2/0	40, 21
		200	Horn	OH/UG	.....	10k	RC12L200CH☆▽◒	**946.**	6	HOM	200	.....	.....	.....	.....	A	#6–350	#12–2/0	40, 21
		Surface Mount Only, Supplied with Feed Thru Lugs and provisions for Branch Circuit Breakers																	
		100	Horn	OH/UG	.....	22k	RC816F100CH□☆▽	**818.**	1	QOM2100VH▲	100	8	16	8	100				
		125	Horn	OH/UG	.....	22k	RC816F125CH□☆▽	**818.**	1	QOM2125VH▲	125	8	16	8	100				
		150	None	OH/UG	.....	22k	RC816F150C□☆	**791.**	1	QOM2150VH▲	150	8	16	8	150	A	#6–350	#12–2/0	40, 21
			Horn	OH/UG	.....	22k	RC816F150CH□☆▽	**818.**	1	QOM2150VH▲	150	8	16	8	150				
		200	None	OH/UG	.....	22k	RC816F200C□☆	**818.**	1	QOM2200VH▲	200	8	16	8	200				
			Horn	OH/UG	.....	22k	RC816F200CH□☆▽	**818.**	1	QOM2200VH▲	200	8	16	8	200				
		200	Horn	OH/UG	.....	10k	RC816D200CH◆ □ ◊ ▽	**861.**	1 1	HOM2200▲ HOM	200 50	8 ...	16 ...	8 ...	100 ...	A or B300	#6–300	#6–1/0	48, 18

▲ Service disconnect supplied factory-installed.
■ For use only on 120/240 Vac, 1-Phase, 3-Wire system. (4-jaw meter socket.)
◆ Knockout provided in cover for use with barrel lock kit, order catalog number SCBRLLOCK (see Accessories page 27).
★ 125 A HOMELINE® 2-pole circuit breaker can be installed in top position only. All other positions are limited to 100 A max.
▼ UL short circuit current rating is equal to the lowest interrupting rating of any circuit breaker installed.
△ Suitable for OH service with addition of tunnel kit (SCTK20). Order separately.
□ Supplied with load side feed thru lugs, for #6 AWG–250 kcmil (Al/Cu) conductors.
◊ Convertible to semiflush with SC200F flange kit (order separately).
☆ Device supplied with barrel lock provisions factory-installed.
▽ Supplied with horn bypass and 5th jaw factory-installed.
◒ Not stocked in PDS, contact Lexington for delivery.
✱ 5th jaw factory-installed.
◆ QO panel is rated 200 A maximum.
◑ Circuit breaker prefix QBL at 10 kAIR may be used. For complete circuit breaker catalog number, see page 29.

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Combination Service Entrance Devices

Rainproof—Single Phase, All-In-Ones
Class 4120

All-In-Ones

- Ring or ringless type meter socket designs available
- UL Listed, suitable only for use as service equipment
- Meets EUSERC standards
- Service disconnect(s) are supplied factory-installed, except where noted
- Semiflush-REVERSE design available, supplied with load center (indoor access)
- Supplied with 100% branch neutrals, all unused terminals may be used for equipment grounding wires.
- Meets Federal Specification W-P-115c as Type 1, Class 2

		Ampere Rating	By-pass Type	Service (Type of Feed) UL & EUSERC	Short Circuit Current Rating	Catalog Number	List Price (DE3A)	Service Disconnect(s)			Load Center & Branch Circuit Breakers (Order separately page 27)				Hub Type (Order Separately page 27)	Line Side Main Lugs AWG/ kcmil (Al/Cu)	Service Ground Lug AWG/ kcmil (Al/Cu)	Weight Each (Lbs) and Pallet Qty.
											Max. Quantity							
												1-pole						
								2-pole Circuits (Max.)	Type (Factory Installed)	Ampere Rating (Max.)	Spaces	Circuits	Tandems	Ampere Rating (Max.)				
RING TYPE	HOMELINE	**Surface Mount only**																
		100	None	OH/UG	10k	SC1624M100S	**$ 496.**	1	HOM2100	100	16	24	8	100	A	#6–2/0	#12–4	32, 24
		125	None	OH/UG	10k	SC1624M125S	**1012.**	1	HOM2125	125	16	24	8	125▲				
		200	None	OH/UG	22k	SC2040M200S	**1114.**	1	QOM2200VH	200	20	40	20	200	A-L	#4–250	#12–2/0	45, 10
		200	None	OH/UG	10k	SC2040M200C ■	**1199.**	1	HOM2200	200	20	40	20	100	A or A-L	#6–300	#12–1/0	47, 18
		Semiflush Mount only																
		100	None	OH/UG	10k	SC1624M100F	**$ 496.**	1	HOM2100	100	16	24	8	100	A or B300	#6–2/0	#12–2/0	44, 20
		125	None	OH/UG	10k	SC1624M125F	**1012.**	1	HOM2125	125	16	24	8	110				
				OH♦/UG	22k	SC2040M125F	**1114.**	1	QOM2125VH	125	20	40	20	110	A-L	#4–250	#12–2/0	51, 10
		200	None	OH♦/UG	22k	SC2040M200F	**1114.**	1	QOM2200VH	200	20	40	20	200				
				OH★/UG		SC3040M200F	**1376.**	1	QOM2200VH	200	30	40	10	200				56, 10
		225	None		22k	SC3040M225F	**1520.**	1	QOM2225VH	225	30	40	10	200				
		Surface Mount only																
		100	None	OH◊	10k	SO1020M100S	**$ 295.**	1	HOM2100	100	10	20	10	80	A	#6–1	#14–4	20, 42
		200	None	OH◊	22k	SO2040M200S	**774.**	1	QOM2200VH	200	20	40	20	200	A	#6–350	#8–2/0	43, 21
		200	None	OH/UG	22k	SC3040M200S	**1340.**	1	QOM2200VH	200	30	40	10	200	A-L	#4–250	#12–2/0	50, 10
						SC40M200S	**1621.**	1	QOM2200VH	200	40	40	0	200		#4–250	#12–2/0	52, 10
		REVERSE All-In-One - Semiflush Mount with Service Disconnect (outdoor access) and Load Center (indoor access)																
		200	None	UG	10k	SU3040M200R	**$1482.**	1	QOM2200VH	200	30	40	10	200	A or B300	#6–300	#12–1/0	60, 15
		225	None	UG	10k	SU3040M225R	**1764.**	1	QOM2225VH	225								
		Surface Mount, convertible to Semiflush with FK400 flange kit (order separately)																
		300	Class 320 Manual Bypass	UG	25k	SU3040D300CB△ □	**4400.**	1	QDL22200	200	30	40	10	200	A-L	(2) Studs	#4–250	100, 4
								1	QDL, QGL, QJL✱▼	100	.....	.....	.....	.....				
		400	None	UG	25k	SU3040D400CN△ □	**4700.**	1	QDL22200	200	30	40	10	200	A-L	(2) Studs	#4–250	100, 4
								1	QDL, QGL, QJL✱▼	200	.....	.....	.....	.....				
		400	Class 320 Manual Bypass	UG	25k	SU3040D400CB△ □	**4778.**	1	QDL22200	200	30	40	10	200	A-L	(2) Studs	#4–250	100, 4
								1	QDL, QGL, QJL✱▼	200	.....	.....	.....	.....				
RINGLESS	HOMELINE	**Surface Mount Only**																
		100	None	OH/UG◊	10k	RC1624M100S	**496.**	1	HOM2100	100	16	24	8	100	A	#6–2/0	#12–4	32, 24
		125				RC1624M125S	**1012.**		HOM2125	125				125▲				
		125	Horn	OH/UG◊	22k	RC2040M125CH☆▽	**1067.**	1	QOM2125VH	125	20	40	20	100	A	#6–350	#12–2/0	40, 21
		150	Horn	OH/UG◊	22k	RC2040M150CH☆▽	**1142.**	1	QOM2150VH	150	20	40	20	150				
		200	None	OH/UG◊	22k	RC2040M200C☆	**1142.**	1	QOM2200VH	200	20	40	20	200				
			Horn	OH/UG◊	22k	RC2040M200CH☆▽	**1142.**	1	QOM2200VH	200	20	40	20	200				
		All-In-One Surface Mount, convertible to Semiflush with FK400 flange kit (order separately)																
		400	Class 320 Lever	UG	25k	RU3040D400CL△◒	**4662.**	1	QDL22200	200	30	40	10	200	A-L	(2) Studs	#4–250	100, 6
								1	QDL, QGL, QJL✱▼	200	.....	.....	.....	.....				
		400	K-4 Bolt-On None	UG	25k	RU3040D400CK△	**4662.**	1	QDL22200	200	30	40	10	200				
								1	QDL, QGL, QJL✱▼	200	.....	.....	.....					
	QO	**Surface Mount Only**																
		150	Horn	OH/UG◊	22k	QC2442M150CH☆▽	**1270.**	1	QOM2150VH	150	24	42	18	150	A	#6–350	#12–1/0	40, 21
		200	None	OH/UG◊	22k	QC2442M200C☆	**1270.**	1	QOM2200VH	200	24	42	18	200				
			Horn	OH/UG◊	22k	QC2442M200CH☆▽	**1270.**	1	QOM2200VH	200	24	42	18	200				

▲ 125 A HOMELINE® 2-pole circuit breaker can be installed in top position only. All other positions are limited to 100 A max.
■ Convertible to semiflush with SC200F flange kit (order separately).
♦ Suitable for OH service with addition of tunnel kit (SCTK20). Order separately.
★ Suitable for OH service with addition of tunnel kit (SCTK30). Order separately.
▼ UL short circuit current rating is equal to the lowest interrupting rating of any circuit breaker installed.
△ Knockout provided in cover for use with barrel lock kit, order catalog number SCBRLLOCK (see Accessories page 27).
□ For use only on 120/240 Vac, 1-Phase, 3-Wire system (4-jaw meter socket).
◊ Device not EUSERC approved.
☆ Device supplied with barrel lock provisions factory-installed.
▽ Supplied with horn bypass and 5th jaw factory-installed.
◒ 5th jaw factory-installed.
✱ Additional service disconnect for field-installation, order prefix QBL at 10 kA, QDL at 25 kA, QGL at 65 kA or QJL at 100 kA. Order separately. For complete circuit breaker catalog number, see page 29.

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Combination Service Entrance Devices
Circuit Breakers, Accessories, Hubs
Class 4119/4120

Circuit Breakers
For use with Meter Mains and All-In-One devices

Ampere Rating ▲	Type: HOM, 1-pole		Type: HOM, 2-pole		Type: QO, 1-pole		Type: QO, 2-pole		Type: QO-VH, 1-pole		Type: QO-VH, 2-pole	
	Catalog Number	Price (DE3D)	Catalog Number	Price (DE3D)	Catalog Number	Price (DE2A)	Catalog Number	Price (DE2A)	Catalog Number	Price (DE2A)	Catalog Number	Price (DE2A)
10	...	...	...	...	QO110	$20.40	...	...	...	...	...	...
15	HOM115	$17.50	...	...	QO115	19.40	...	...	QO115VH	$42.30	...	...
20	HOM120	17.50	...	...	QO120	19.40	...	...	QO120VH	42.30	...	...
25	HOM125	17.50	...	...	QO125	19.40	...	...	QO125VH	48.50	...	...
30	HOM130	17.50	HOM230	$ 40.30	QO130	19.40	QO230	$ 44.70	QO130VH	48.50	QO230VH	$ 97.00
35	...	...	HOM235	40.30	QO135	20.40	QO235	46.90	...	...	...	...
40	HOM140	17.50	HOM240	40.30	QO140	19.40	QO240	44.70	...	...	QO240VH	97.00
45	...	...	HOM245	40.30	QO145	20.40	QO245	46.90	...	...	...	...
50	HOM150	17.50	HOM250	40.30	QO150	19.40	QO250	44.70	...	...	QO250VH	97.00
60	...	...	HOM260	40.30	QO160	20.40	QO260	44.70	...	...	QO260VH	97.00
70	...	...	HOM270	82.00	QO170	46.90	QO270	89.00	...	...	QO270VH	149.00
80	...	...	HOM280	112.00	...	...	QO280	126.00	...	...	QO280VH	210.00
90	...	...	HOM290	112.00	...	...	QO290	126.00	...	...	QO290VH	210.00
100	...	...	HOM2100	112.00	...	...	QO2100	126.00	...	...	QO2100VH	210.00
110	...	...	HOM2110	258.00	...	...	QO2110	285.00	...	...	QO2110VH	689.00
125	...	...	HOM2125	246.00	...	...	QO2125	285.00	...	...	QO2125VH	689.00
150	...	...	HOM2150BB	285.00	...	...	QO2150	327.00	...	...	QO2150VH	707.00
175	...	...	HOM2175BB	285.00	...	...	QO2175	327.00	...	...	QO2175VH	707.00
200	...	...	HOM2200BB	285.00	...	...	QO2200	327.00	...	...	QO2200VH	707.00

Ampere Rating ▲	Type: QOM1-VH, 2-pole		Type: QOM2-VH, 2-pole		Type: QDL, 2-pole♦	
	Catalog Number	Price (DE3A)	Catalog Number	Price (DE3A)	Catalog Number	Price (DE2A)
50	QOM50VH■	$ 93.00	...	...	...	...
60	QOM60VH	93.00	...	...	...	...
70	QOM70VH	93.00	...	...	QDL22070	$762.00
80	QOM80VH	134.00	...	...	QDL22080	762.00
90	QOM90VH	134.00	...	...	QDL22090	762.00
100	QOM100VH	134.00	QOM2100VH	$312.00	QDL22100	762.00
110	QOM110VH	312.00	...	...	QDL22110	762.00
125	QOM125VH	312.00	QOM2125VH	312.00	QDL22125	762.00
150	...	...	QOM2150VH	312.00	QDL22150	762.00
175	...	...	QOM2175VH	312.00	QDL22175	762.00
200	...	...	QOM2200VH	312.00	QDL22200	762.00
225	...	...	QOM2225VH	312.00	...	...

▲ Do not exceed mains rating of device
■ Reference National Electrical Code Article 230-79.
♦ For additional interrupting rating circuit breakers, order circuit breaker prefix QBL at 10 kA, QGL at 65 kA or QJL at 100 kA, see page 29.

Accessories

Description	Catalog Number	Price	Disc. Sch.
Generator Kit: Interlocks main service disconnect and generator circuit breaker (order separately). For use on: HOMELINE® CSED Devices RC816F-, RC2040M-, SO2040M-	RCGK2	$163.00	(DE3A)
QO CSED Devices QC816F-, QC2442M-	QCGK3	163.00	
Fifth Jaw Kit for: Meter Main Types: C, RC, SC, QC All-In-One Types: SC, SU (100–225 A), QC, RC, SO	5J	12.20	(DE3A)
Bypass (Horn Type) for: Ringless Type Meter Mains and All-In-Ones (100–200 A)	RCHB2	61.00	(DE3A)
Lexan Meter Socket Cover Plate for: Ring and Ringless Type Meter Mains Ring and Ringless Type All-In-Ones	29007	6.70	(DE4)
Meter Socket Sealing Rings for Ring Type Meter Mains and All-In Ones: Screw Type Aluminum	29008W	13.40	(DE4)
Snap Type Stainless Steel	ARP00026★	11.70	
Trim Kit for 2" X 6" stud wall, used with: REVERSE All-In-Ones, SU3040M200R, and SU3040M225R	SU2X6TRIM	177.00	(DE3A)
Barrel Lock Kit (Barrel Lock not included), supplied with bracket and mounting screw, refer to listings for where used.	SCBRLLOCK	35.30	(DE3A)
Semiflush Flange Kit for: Meter Mains: SC816D150/200C and RC816D200CH All-In-Ones: SC2040M200C	SC200F	21.20	(DE3A)
Semiflush Flange Kit for: Ring and Ringless Type Meter Mains and All-In-Ones 400 A)	FK400	131.00	(DE3A)
Ringless Type Utility Cover for use on: RU3040D400CL, QU12L400CL, and QU816D400CL. Includes one piece meter socket and pull box cover with handles and closing plate.	R400L	177.00	(DE3A)
Lug Kit includes (4) lugs, for use with #2 AWG–600 kcmil Al/Cu conductors. Lugs are for standard 2-Hole mounting. Meter Main and All-In-One units supplied with (2) Studs per phase and neutral will accept one lug per phase and neutral	CMELK4★	91.00	(DE4)
Overhead Feed Trough: For use on 400 A ring and ringless type meter mains and All-in-Ones.	OCK400	378.00	(DE3A)
3" Conduit Adapter Kit: For use on 400 A ring and ringless type meter mains and All-in-Ones.	SU400PVCHA3	8.80	(DE3A)

★ Order only. Not stocked in PDS. Order Point: Lexington.

Accessories

Description	Catalog Number	Price	Disc. Sch.
Touch-Up Paint (ASA49 Gray)	PK49SP	$26.00	(DE1)
Ground Bar Kit Meter Mains and All-In-Ones QC, RC, and SC (100–225 A)	PK15GTA	11.40	(DE3A)
Filler Plate for: Meter Main Types: QC, CU All-In-One Types: QC	QOFP	2.40	(DE3A)
Filler Plate for: Meter Main Types: RC, SC All-In-One Types: SC, RC, SU	HOMFP	2.10	(DE3A)
Neutral Lug (#6-2/0) for: Meter Main Types: RC, SC, QC All-In-One Types: SC, SU, QC, RC	LK100AN	7.20	(DE3A)

Hubs and Closing Plates

Hub Series	Conduit Size (inches)	Catalog Number	List Price	Disc. Sch.
Closing Plate for "A" Hub opening		ACP	$ 8.90	(DE4)
A	1.00	A100	22.60	(DE4)
	1.25	A125	22.60	(DE4)
	1.50	A150	22.60	(DE4)
	2.00	A200	31.90	(DE4)
	2.50	A250	40.40	(DE4)
Adapter plate to allow use of "A" Hubs on "A-L" size hub openings		AAP	22.50	(DE4)
Closing Plate for "A-L" Hub opening		ACPL	12.20	(DE4)
A-L	2.00	A200L▼	55.00	(DE4)
	2.50	A250L	58.00	(DE4)
	3.00	A300L	74.00	(DE4)
	3.50	A350L	76.00	(DE4)
	4.00	A400L	79.00	(DE4)
Closing Plate for "B" Hub opening		BCAP	2.50	(DE1A)
B	0.75	B075	22.20	(DE1A)
	1.00	B100	22.20	(DE1A)
	1.25	B125	22.20	(DE1A)
	1.50	B150	22.20	(DE1A)
	2.00	B200	40.90	(DE1A)
	2.50	B250	68.00	(DE1A)
B300	3.00	B300	124.00	(DE1A)

▼ Supplied with AAP adapter plate and "A" hub.

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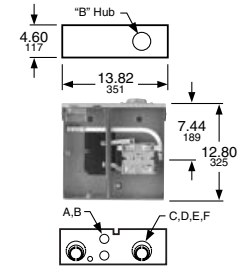
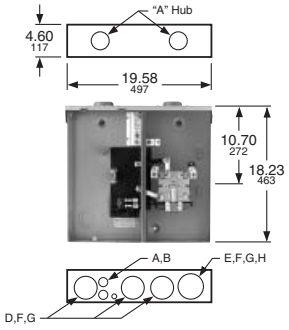
Combination Service Entrance Devices

Dimensions

Class 4119, 4120

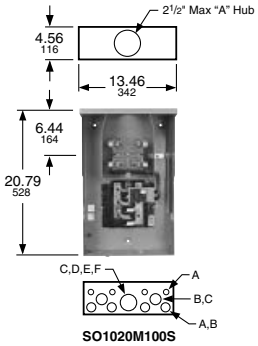


C125RB (Shown)
CQRB100

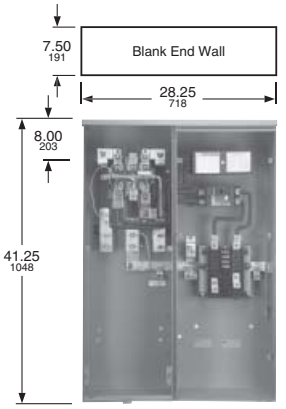


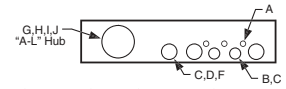
Ring Type:
CM200S
C2M200S (Shown)
C4L200S

Ringless Type:
RC200S
RC2M200S
RC2M200SH



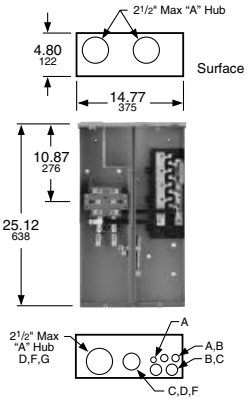
SO1020M100S



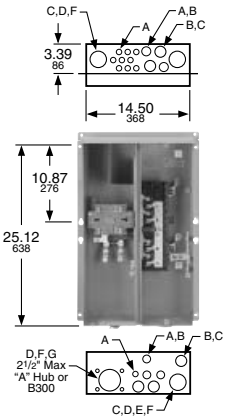


CU12L400CN■
CU12L400CB■
QU12L400CL■
QU12L400SL

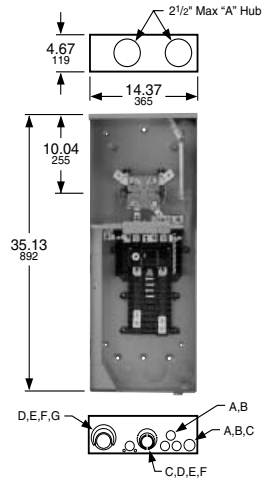
CU816D400CB■
CU816D400CN■
QU816D400CL■
QU816D400SL (Shown)



SC8L125S (Shown)
RC8L125S
SC1624M100S
SC1624M125S
RC1624M100S
RC1624M125S

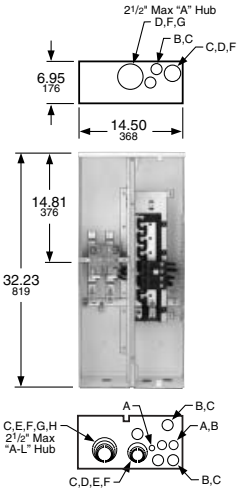


SC8L125F (Shown)
SC1624M100F
SC1624M125F

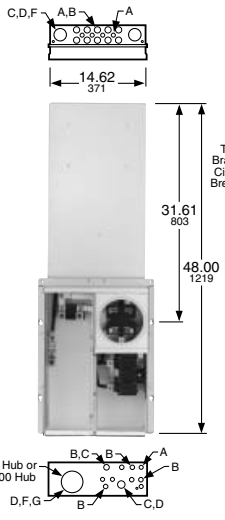


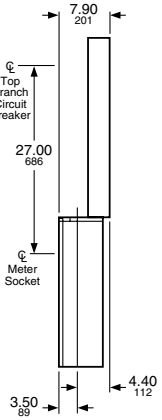
RC816F100CH
RC816F125CH
RC816F150C/CH
RC816F200C/CH
RC12L200C/CH
RC2040M125CH
RC2040M150CH
RC2040M200C/CH

QC816F100CH
QC816F125C/CH
QC816F150C/CH (Shown)
QC816F200C/CH
QC12L200C/CH
QC2442M150CH
QC2442M200C/CH
SO2040M200S

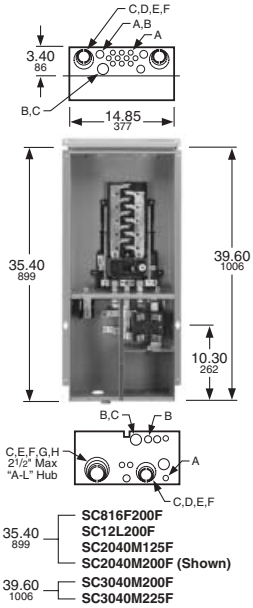


SC816D150C▲ (Shown)
SC816D200C▲
SC2040M200C▲
RC816D200CH▲



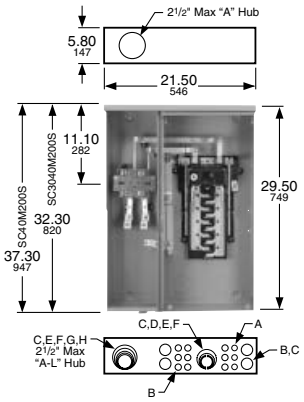


SU3040M200R (Shown)
SU3040M225R

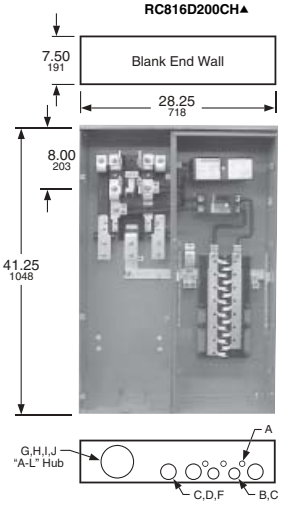


SC816F200F
SC12L200F
SC2040M125F
SC2040M200F (Shown)
35.40
899

SC3040M200F
SC3040M225F
39.60
1006

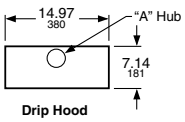


SC12L200S
SC816F150S
SC816F200S
SC40M200S
SC2040M200S (Shown)
SC3040M200S



SU3040D400CB■ (Shown)
RU3040D400CL■
RU3040D400CK■

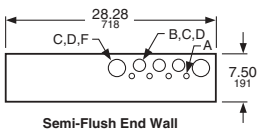
SU3040D300CB■
SU3040D400CN■



Drip Hood

▲ **Note 1:**
Driphood supplied factory-installed and is required for surface mount installation.
For semi-flush installation, remove driphood and install flange kit, catalog number: SC200F (order separately).

■ **Note 2:**
Unit supplied with blank top endwall (factory-installed) for surface mount installation. For semi-flush installation, install flange kit, catalog number FK400 (order separately). Kit includes replacement top endwall (with knockouts) and flanges.



Semi-Flush End Wall

Knockouts										
Symbol	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
Conduit Size (inches)	½	¾	1	1¼	1½	2	2½	3	3½	4

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Enclosed Molded Case Switches, Enclosed GFCI Circuit Breakers, Circuit Breaker Enclosures

Class 1131

Enclosed Molded Case Switches—UL Listed

Molded Case Switch Included. Does not provide overcurrent protection.

Service	Ampere Rating	General Purpose Catalog No.	General Purpose Price	Rainproof Catalog No.	Rainproof Price	Box No. See Page 19, 20
240 Vac	60 ▲■	QO260NATS	**$107.00**	QO200TR	**$112.00**	2, 9R ♦
120/240 Vac	100 ★	QO2000NS	**184.00**	QO2000NRB	**225.00**	13,10R

Housing Bracket

Description	Catalog No.	Price
Bracket used with QO200TR for stucco, aluminum and vinyl siding. Order quantity multiples of 10.	PKHB	**$2.10**

Enclosed GFCI Circuit Breakers—UL Listed

2-pole, 120/240 Vac, GFCI circuit breaker included, 10,000 AIR

Service	Ampere Rating	Type 3R—Rainproof Catalog No.	Type 3R—Rainproof Price	Circuit Breaker Included	Box. No. See Page 20
120/240 Vac	50	QOE250GFINM HOME250SPA	**$352.** **315.**	QO250GFI HOM250GFI	1NM (Non-metallic) 1R (Metallic)

Circuit Breaker Enclosures—UL Listed

22,000 RMS Symmetrical Ampere Short Circuit Current Rating. Not for use with one pole QO circuit breakers. Circuit breakers not included. Order QO®, QO-GFI, QO AFI, QO-EPD and QO-PL circuit breakers separately from pages 3 and 4. Accepts QO circuit breakers with factory-installed accessories. Order equipment ground bar PK0GTA2, if required.

Service	Ampere Rating	General Purpose ▼ Catalog No.	General Purpose ▼ Price	Rainproof Catalog No.	Rainproof Price	Box. No. See Page 19, 20
120/240 Vac	100 125	QO2100BNF/S QO2125BNF/S	**$55.00** **72.00**	QO2100BNRB QO2125BNRB	**$ 90.00** **105.00**	13, 10R 18, 13R
240 Vac	100	QO3100BNF/S	**99.00**	QO3100BNRB	**138.00**	13, 10R

10,000 RMS Symmetrical Ampere Short Circuit Current Rating.
Circuit breaker not included. Order separately from page 3. Will not accept QO-GFI circuit breaker nor QO circuit breakers with factory-installed accessories.

240 Vac	60 ▲	....	....	QO2TR	**$ 63.00**	9R ♦

QO2000NS

QO3100BNF
With Cover Removed

Q Frame Enclosures and Q Frame Circuit Breakers—UL Listed

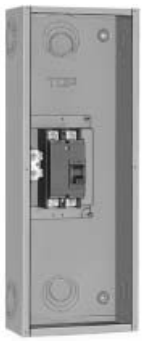
Service	Enclosure Only □ Type 1—General Purpose ▼ Catalog No.	Type 1 Price	Type 3R—Rainproof Catalog No.	Type 3R Price	Box No. See Page 19, 20	Circuit Breaker (Order Separately) Ampere Rating	10,000 AIR Cat. No.	10,000 AIR Price	25,000 AIR Cat. No.	25,000 AIR Price	65,000 AIR Cat. No.	65,000 AIR Price	100,000 AIR Cat. No.	100,000 AIR Price
2-pole 240 Vac Maximum	Q22200NS ◊ or Q23225NF/S	**$117.00** **145.00**	Q22200NRB◊ or Q23225NRB	**$253.00** **278.00**	19, 11R 20, 12R	70	QBL22070	**$316.**	QDL22070	**$ 762.**	QGL22070	**$1014.**	QJL22070	**$1260.**
						80	QBL22080	**316.**	QDL22080	**762.**	QGL22080	**1014.**	QJL22080	**1260.**
						90	QBL22090	**316.**	QDL22090	**762.**	QGL22090	**1014.**	QJL22090	**1260.**
						100	QBL22100	**316.**	QDL22100	**762.**	QGL22100	**1014.**	QJL22100	**1260.**
						110	QBL22110	**316.**	QDL22110	**762.**	QGL22110	**1014.**	QJL22110	**1260.**
						125	QBL22125	**316.**	QDL22125	**762.**	QGL22125	**1014.**	QJL22125	**1260.**
						150	QBL22150	**316.**	QDL22150	**762.**	QGL22150	**1014.**	QJL22150	**1260.**
						175	QBL22175	**316.**	QDL22175	**762.**	QGL22175	**1014.**	QJL22175	**1260.**
						200	QBL22200	**316.**	QDL22200	**762.**	QGL22200	**1014.**	QJL22200	**1260.**
						225	QBL22225	**316.**	QDL22225	**762.**	QGL22225	**1014.**	QJL22225	**1260.**
3-pole 240 Vac	Q23225NF/S	**145.00**	Q23225NRB	**278.00**	20, 12R	70	QBL32070	**832.**	QDL32070	**1189.**	QGL32070	**1628.**	QJL32070▽	**1864.**
						80	QBL32080	**832.**	QDL32080	**1189.**	QGL32080	**1628.**	QJL32080▽	**1864.**
						90	QBL32090	**832.**	QDL32090	**1189.**	QGL32090	**1628.**	QJL32090▽	**1864.**
						100	QBL32100	**832.**	QDL32100	**1189.**	QGL32100	**1628.**	QJL32100▽	**1864.**
						110	QBL32110	**832.**	QDL32110	**1189.**	QGL32110	**1628.**	QJL32110▽	**1864.**
						125	QBL32125	**832.**	QDL32125	**1189.**	QGL32125	**1628.**	QJL32125▽	**1864.**
						150	QBL32150	**832.**	QDL32150	**1189.**	QGL32150	**1628.**	QJL32150▽	**1864.**
						175	QBL32175	**832.**	QDL32175	**1189.**	QGL32175	**1628.**	QJL32175▽	**1864.**
						200	QBL32200	**832.**	QDL32200	**1189.**	QGL32200	**1628.**	QJL32200▽	**1864.**
						225	QBL32225	**832.**	QDL32225	**1189.**	QGL32225	**1628.**	QJL32225▽	**1864.**

QOM2 Enclosures and QOM2 Circuit Breakers—UL Listed

Service	Enclosure Only△ Type 1 General Purpose▼ Catalog No.	Type 1 Price	Type 3R Rainproof Catalog No.	Type 3R Price	Box No. See Pages 19, 20	QOM2 Circuit Breaker (Order Separately) ☆ Ampere Rating	22,000 AIR Catalog No.	22,000 AIR Price ‡
2-pole 240 Vac Maximum	QOM22225NF/S	**$156.**	QOM22225NRB	**$293.**	22, 16R	100	QOM2100VH	**$312.**
						125	QOM2125VH	**312.**
						150	QOM2150VH	**312.**
						175	QOM2175VH	**312.**
						200	QOM2200VH	**312.**
						225	QOM2225VH	**312.**

▲ Not suitable for service equipment.
■ Maximum 10 hp 240 Vac.
♦ Top endwall has no hub opening.
★ Maximum 20 hp 240 Vac.
▼ Order F for flush, S for surface.
△ Equipment ground bar kit PKOGTA2 factory-included.
□ Factory-installed groundable neutral assembly includes (2) ground lugs and (2) neutral lugs. Equipment ground kit PKOGTA2 also included.
◊ Accepts 200 A max. 2-pole Q Frame circuit breakers.
☆ Add suffix 1021 for 120, 208 or 240 Vac shunt trip. Add **$126.**
▽ When these 3-pole circuit breakers are mounted in an enclosure, the maximum AIR rating is 65,000 at 240 Vac and 100,000 at 208 Vac.

QOM22225NS
With Cover Removed



Q22200NS
With Cover Removed

Q23225NF

(Order Q Frame circuit breaker separately)

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DE2A		‡DE3A	

Discount Schedule

Surge

PROTECTION

Surgebreaker® secondary surge arresters

The Surgebreaker secondary surge arrester is available for both QO® and Homeline® load centers. These surge arresters plug onto the load center bus bars like a circuit breaker and provide protection from high voltage surges. The Homeline Surgebreaker surge arrester can be used in Square D All-In-Ones and Meter Mains.

Surgebreaker Plus Whole House Surge Protector

The Surgebreaker Plus Whole House Surge Protector from Square D is ideal for protecting electrical circuits, multiple telephone lines and multiple TV lines in today's electronic home.

- UL listed 1449, 2nd edition.
- $50,000 Warranty.
- Suitable for use in service entrance locations: meets requirements of NEC Article 280.
- Suitable for indoor applications only.
- LED Status Indicator.
- Flush or surface mounting.
- Electrical System - Connects through the main load center.
- Two coax lines - Master antenna, satellite dish or cable.
- Four line telephone (Digital/Analog POTS) protection.

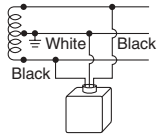
QO2175SB

SDSB1175C

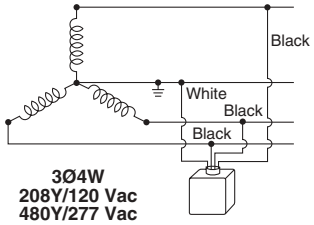
HOM2175SB

SDSA1175

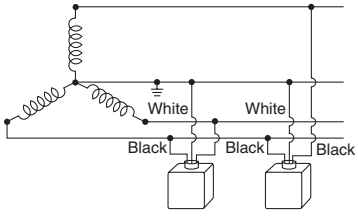
SDSA3650



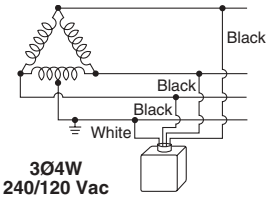
One SDSA1175 on
120/240 Vac Circuit



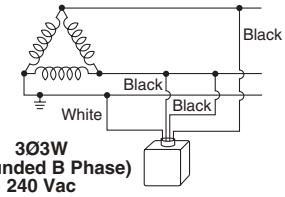
3Ø4W
208Y/120 Vac
480Y/277 Vac
600Y/347 Vac



Two SDSA1175 on
208Y/120 Vac Circuit



3Ø4W
240/120 Vac



3Ø3W
Grounded B Phase)
240 Vac
480 Vac

SURGEBREAKER® PLUS
Transient Voltage Surge Suppressor

Suitable for use in service entrance locations; meets requirements of NEC® Article 280, UL Listed 1449, 2nd Edition, and meets ANSI/IEEE C62.41-1991.

- AC line protection
- Four line telephone (Digital/Analog POTS) protection
- Two line coaxial protection
- Suitable for indoor applications only
- Flush or surface mounting
- LED status indicator
- Modular design

Single Phase Three Wire—120/240 Vac

Description	Catalog Number	Price
SURGEBREAKER PLUS	SDSB1175C	**$420.**

SURGEBREAKER
Secondary Surge Arrester

Suitable for use in service entrance locations; meets requirements of NEC Article 280.

- cULus Listed secondary surge arresters; QO2175SB also CSA Certified
- Meet ANSI/IEEE C62.11-1993
- QO2175SB for QO® load centers and combination devices, NQOD panelboards
- HOM2175SB for HOMELINE® load centers and combination devices
- Plug-on design requires two pole spaces
- LED indicates operational status

Description	Catalog Number	Price
QO SURGEBREAKER cULus Listed Secondary Surge Arrester 150 Vac line-to-ground maximum.	QO2175SB	**$106.**
HOMELINE SURGEBREAKER cULus Listed Secondary Surge Arrester 150 Vac line-to-ground maximum.	HOM2175SB	**106.**

Hard-Wired Secondary Surge Arrester

Suitable for use in service entrance locations; meets requirements of NEC Article 280.

- cULus Listed and CSA Certified secondary surge arresters
- Meet ANSI/IEEE C62.11-1993
- Suitable for indoor and outdoor applications
- LED indicates operational status

Description	Catalog Number	Price
SECONDARY SURGE ARRESTER For 1Ø3W systems. 150 Vac phase-to-ground maximum.	SDSA1175▲	**$ 61.**
SECONDARY SURGE ARRESTER For 3Ø systems. 600 Vac phase-to-ground maximum.■	SDSA3650	**165.**

▲ See page 13 for QOSAMK mounting kit for installation in QO load centers.
■ Do not use on ungrounded systems. Systems must be solidly grounded.

For additional information, reference Catalog #6671CT9701R2/02.

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Air Conditioning

DISCONNECT

Air Conditioning Disconnects

No air conditioning electrical protection system is complete without a Square D air conditioning disconnect. Our disconnects are available in a variety of configurations that let you choose the best product for your particular application. These include molded case switch, fused, and non-fused switches.

Enclosed Molded Case Switch

- Cover housing can be removed to provide open access to lugs for easy wiring.
- 60 A switch rated for 10 hp motors at 240 Vac.
- Factory installed ground bar is located in front for easy access.
- Open area for mounting allows plenty of room for power actuated tool. Dimples accommodate nailer.

Fusible and Not Fusible Pullout Switches

- Interior trim cannot be removed unless the pull-out head is completely disengaged or placed in the OFF position.
- Pull-out head can be replaced in the OFF position.
- 30 A and 60 A fusible, and 60 A not fusible ratings, up to 10 hp at 240 Vac.

QO200TR

QO200TRNM

PKHB
Housing
Bracket

FP221R

Not Fusible Air Conditioning Disconnect—Molded Case Switch
Rainproof—UL Listed

Service	Ampere Rating ▲	Metallic		Non-metallic		Max. Hp
		Catalog Number	Price	Catalog Number	Price	
2 Wire (Molded Case Switch Included)—240 Vac Maximum						
G/B	60	QO200TR	**$107.00**	QO200TRNM	**$127.00**	10

Housing Bracket

Description	Catalog No.	Price
Bracket used with QO200TR for stucco, aluminum and vinyl siding. Order quantity multiples of 10.	PKHB	**$2.10**

Not Fusible Air Conditioning Disconnect—Pullout
Rainproof—UL Listed

Service	Ampere Rating ▲	Metallic		Non-metallic		Max. Hp
		Catalog Number	Price	Catalog Number	Price	
2 Wire—240 Vac Maximum						
G/B	60	UFP222R	**$113.00**	UFP222RNM	**$127.00**	10
2 Wire—240 Vac Maximum—with 20 A GFI receptacle						
G/B GFI Rec.	60	UFP222RGFI	**$303.00**	. . .	. . .	10
2 Wire—240 Vac Maximum—with 20 A duplex receptacle						
G/B Duplex Rec.	60	UFP222RD	**$173.00**	. . .	. . .	10

Fusible Air Conditioning Disconnect—Pullout
Rainproof—UL Listed

Service	Ampere Rating ■	Metallic		Non-metallic		Max. Hp
		Catalog Number	Price	Catalog Number	Price	
2 Wire (Pullout and Fuseholder)—240 Vac Maximum						
G/B	30	FP221R	**$107.00**	FP221RNM	**$127.00**	3
	60	FP222R	**107.00**	FP222RNM	**127.00**	10

Note: Suitable for use as service equipment on 120/240 Vac 1Ø3 wire services if used only on a 1Ø2 wire load; and only when the equipment grounding terminal is replaced with ground terminal kit catalog number PK3GTA1. Price **$7.60**.

Box Dimensions

Catalog Number	H		W		D	
	IN	mm	IN	mm	IN	mm
QO200TR	4.63	117	6.50	165	3.88	98
QO200TRNM	8.75	222	6.50	165	3.88	98
UFP222R	5.25	133	7.50	191	3.25	83
UFP222RNM	8.75	222	6.50	165	3.88	98
FP221R	5.25	133	7.50	191	3.25	83
FP221RNM	8.75	222	6.50	165	3.88	98
FP222R	5.25	133	8.88	225	3.25	83
FP222RNM	8.75	222	6.50	165	3.88	98

▲ Does not contain overcurrent protection. Suitable for use on systems with up to 10,000 RMS symmetrical amperes available fault current at 240 Vac max when protected by a fuse or circuit breaker rated 60 A or less.
■ Suitable for use on systems with up to 10,000 RMS symmetrical amperes available fault current at 240 Vac.

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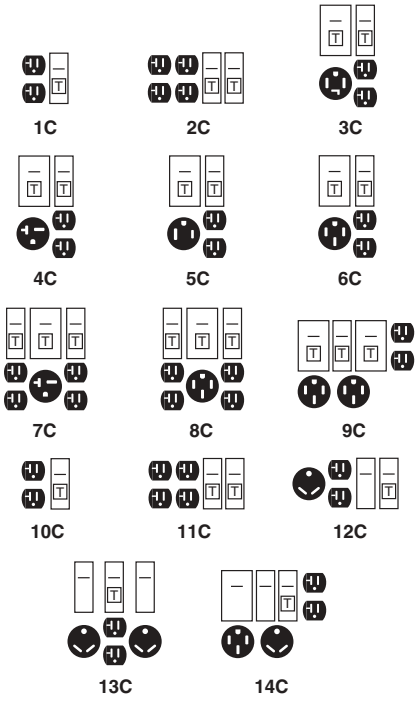
SERVICEPAK® Power Outlet Panels
Class 1140

For Construction Sites

- Provide temporary power at construction sites.
- Each receptacle protected by QO-GFI circuit breaker in compliance with NEC® requirements.
- Each enclosure is rainproof.
- 10,000 RMS symmetrical ampere short circuit current rating.
- UL Listed as suitable for use as temporary site service equipment.
- Provided with neutral bonding provisions.
- Boxes have provisions for type "B" hubs to be field-installed.

Power Outlet Configuration	Service ▲	Mains Ampere Rating	Circuit Breaker (Included)	Receptacles (Included) ■					Catalog Number ♦	Price	Main Wire Size AWG ★	
				A	C	D	E	F			Cu	Al
1C	1Ø2W	40	(1) QO120GFI	1					PAK10C1	**$294.**	#14–6	#12–6
2C	1Ø2W	40	(2) QO120GFI	2					PAK11C ▼	**545.**	#14–6	#12–6
2C	1Ø2W	40	(2) QO120GFI	2					PAK11C1	**545.**	#14–6	#12–6
3C	1Ø3W	70	(1) QO120GFI (1) QO230GFI	1			1		PAK31CGFI	**649.**	#8–1	#8–1
4C	1Ø3W	70	(1) QO120GFI (1) QO220GFI	1		1			PAK36C1GFI	**649.**	#8–1	#8–1
5C	1Ø3W	70	(1) QO120GFI (1) QO250GFI	1				1	PAK51CGFI	**649.**	#8–1	#8–1
6C	1Ø3W	70	(1) QO120GFI (1) QO250GFI	1	1				PAK55CGFI	**649.**	#8–1	#8–1
7C	1Ø3W	70	(2) QO120GFI (1) QO220GFI	2		1			PAK72CGFI	**882.**	#8–1	#8–1
8C	1Ø3W	70	(2) QO120GFI (1) QO250GFI	2	1				PAK76CGFI	**882.**	#8–1	#8–1
9C	1Ø3W	100	(1) QO120GFI (2) QO250GFI	1	2				PAK1004CGFI	**1054.**	#14–1	#12–1



For Recreational Vehicle Parks

- Provide electrical power to individual recreational vehicle park sites.
- Each receptacle protected by appropriate GFI or Standard QO® circuit breaker.
- All receptacles and circuit breakers included.
- 10,000 RMS Symmetrical Ampere short circuit current rating. • UL Listed.
- All enclosures are rainproof. • No neutral bonding provisions. • Loop-feed provisions.

Power Outlet Configuration	Service ▲	Mains Ampere Rating	Circuit Breaker (Included)	Receptacles (Included) ■			Catalog Number	Price	Main Wire Size AWG/kcmil △ Phase and Neutral	
				A	B	C			Cu	Al
Underground or Overhead Loop-Feed Terminals—Non-Pedestal ♦ □										
10C	1Ø2W	40	(1) QO120GFI	1			PAK10CTG	**$313.**	#14–6	#12–6
11C	1Ø2W	40	(2) QO120GFI	2			PAK11CTG	**530.**		
12C	1Ø2W	50	(1) QO120GFI (1) QO130	1	1		PAK41CTG ◊	**376.**		
13C	1Ø2W	75	(1) QO120GFI (2) QO130	1	2		PAK61CTG ◊	**435.**	#14–1	#12–1
14C	1Ø3W	100	(1) QO120GFI (1) QO250 (1) QO130	1	1	1	PAK75CTG (Not Loop Feed) ◊	**446.**		
Pedestal Mounted—Underground Loop-Feed Terminals ☆ ▽										
11C	1Ø2W	40	(2) QO120GFI	2			PAK11PG	**$690.**	(2)#6–250	(2)#6–250
12C	1Ø2W	50	(1) QO120GFI (1) QO130	1	1		PAK41PG ◊	**568.**		
13C	1Ø2W	75	(1) QO120GFI (2) QO130	1	2		PAK61PG ◊	**609.**		
14C	1Ø3W	100	(1) QO120GFI (1) QO250 (1) QO130	1	1	1	PAK75PG ◊	**671.**		

▲ (1Ø2W 120 Vac) (1Ø3W 120/240 Vac)
■ 20 ampere receptacles protected by 20 ampere GFI circuit breaker.
♦ Devices have a bolt-on factory-installed closing cap. Order type "B" bolt-on hub separately from page 20.
★ Equipment Ground Terminal suitable for (2) #14 or 12 AWG Cu or (2) #12 or 10 AWG Al.
▼ Receptacles in this device are in bottom endwall and are accessible with outer door padlocked. "Order Only" from Lexington—Minimum order quantity is 50 devices.
△ Two wires each per phase, neutral, and equipment ground—for loop feed (except PAK75CTG).
□ Equipment ground terminal suitable for (2) #14–12 AWG Cu or (2) #12–10 Al.
◊ GFI circuit breaker can be substituted for standard 30 A circuit breaker. For 30 ampere receptacles add **$140.00** per circuit breaker.
Add suffix "FI" to catalog number. Example: PAK41CTGFI.
☆ Stabilizer foot available for use in unstable ground, order catalog number HNPSF **$27.50** list.
▽ Equipment ground terminals suitable for (2) #10–2/0 AWG Cu or (2) #6–2/0 AWG Al.

A		20 Amp 125 Volt 2W and Grd. NEMA 5-20R
B		30 Amp 125 Volt 2W and Grd. ANSI #73.13
C		50 Amp 125/250 Volt 3W and Grd. NEMA 14-50R
D		20 Amp 250 Volt 2W and Grd. NEMA 6-20R
E		30 Amp 125/250 Volt 3W and Grd. NEMA 14-30R
F		50 Amp 250 Volt 2W and Grd. NEMA 6-50R

All non-pedestal devices have provisions to field-install a Type "B" hub on the bottom endwall for bottom feed from a conduit riser. Order Type "B" bolt-on hub (B250 Max.) and two mounting screws (Part No. 8002505501) and two hex nuts (Part No. 2340102000).

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Structured Wiring

A NEW OPPORTUNITY

TO INCREASE YOUR SALES PER HOME

The Square D Multi-Link Structured Wiring System devices organize the way a house is wired to coordinate telephone, video, and data services for unmatched flexibility and convenience. Installed during construction, these devices increase capabilities without adding significant cost to the home.

Pre-wiring with standard Cat-5 and RG-6 cables will ensure that the home is wired to meet the demands of today and the future innovations of tomorrow. Square D Multi-Link Structured Wiring System provide the enclosures and brackets to install the video, voice, audio and data hubs along with the accessories and upgrade options to bring the home into the telecommunication and entertainment future.

Application:
- Residential and light commercial
- New multi-family and single-family construction

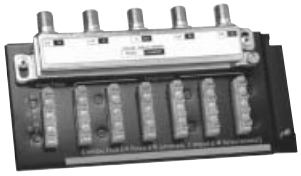
Standards:
- UL 1492, Audio/Video Products and Accessories
- UL 514A, Metallic Outlet Boxes
- UL 1863, Communications Circuit Accessories
- Federal Regulation 47CFR15.115
- TIA/EIA 570-A, Residential Telecommunications Cabling Standard

Enclosures:
- NEMA Type 1
- Surface or flush mount

Construction:
- Modules mount on enclosure grid via “hook and swing” method
- All modules incorporate a metal backplate for strength and rigidity
- Data and telephone modules available with either 110 punch down terminations or RJ-45 modular plugs

Accessories: AC power accessories, universal adapter brackets, patch cords, cover lock kit, video attenuators, low pass filters.

SDM18CW and SDM18BW



SDM46P14V

SDM46P

SDM38VBIR/SDM38VHIR

SDM11VMH/SDM11VMB

The Square D Multi-Link Structured Wiring System devices organize the way a house is wired to coordinate telephone, video, and data services for unmatched flexibility and convenience. Installed during construction, these devices increase capabilities without adding significant cost to the home.

System Components

Description	Catalog Number	Price	Grid Mounting Space (IN)	Standard Package
Mounting Brackets and Enclosures				
Surface mounting bracket, 6 1/2"w x 10"h, white	SDM10BW	**$ 15.20**	10	10
Cover for SDM10BW, white	SDM10CW	**28.60**	. . .	1
Enclosure w/mounting grid, 14"w x 18"h, white	SDM18BW	**44.60**	34▲	1
Cover for SDM18BW, white	SDM18CW	**16.30**	. . .	1
Enclosure w/mounting grid, 14"w x 36"h, white	SDM36BW	**86.00**	70■	1
Cover for SDM36BW, white	SDM36CW	**28.00**	. . .	1
Combination Video/Telephone Hubs				
Combo hub, video splitter (1 input x 4 TVs) / phone (2 lines x 6 phones), grid mount	SDM26P14V	**58.00**	3	1
Combo hub, video splitter (1 input x 4 TVs) / phone (4 lines x 6 phones), grid mount	SDM46P14V	**77.00**	3	1
Telephone Hubs				
Telephone master hub, 4 lines x 6 phones, grid mount	SDM46P	**58.00**	3	1
Telephone expansion hub, 4 lines x 8 phones, grid mount	SDM48PX	**58.00**	3	1
Telephone interface hub, 4 lines x 11 phones, grid mount, RJ45 jacks	SDM412PJ	**74.00**	3	1
Video Hubs				
Video splitter, (1 input x 3 TVs), grid mount	SDM13VS	**19.10**	2	1
Video splitter, (1 input x 4 TVs), grid mount	SDM14VS	**22.90**	2	1
Video splitter, (1 input x 8 TVs), grid mount	SDM18VS	**42.00**	2	1
Video amplifier hub (1 input x 6 TVs), bi-directional CATV or antenna, grid mount, 120 Vac power supply included	SDM16VAB	**96.00**	3	1
Video amplifier hub (3 inputs x 8 TVs), bi-directional CATV, IR repeating system, grid mount, 120 Vac power supply included	SDM38VBIR	**286.00**	2.5	1
Video amplifier hub (3 inputs x 8 TVs), CATV or antenna, IR repeating system, grid mount, 120 Vac power supply included	SDM38VHIR	**286.00**	2.5	1
Modulators				
Single channel modulator, RCA inputs, grid mount, 120 Vac power supply included	SDM11VM	**248.00**	2.5	1
Single channel combination modulator, amplifier. Cat-5 input for modulation, combined with amplified coax input for bi-directional CATV, grid mount, 120 Vac power supply included	SDM11VMB	**286.00**	2.5	1
Single channel combination modulator, amplifier. Cat-5 input for modulation, combined with amplified coax input for CATV or antenna, grid mount, 120 Vac power supply included	SDM11VMH	**286.00**	2.5	1
Set top mount dual channel modulator, RCA inputs, IR repeating system, 120 Vac power supply included	SDM21VT	**372.00**	. . .	1
Set top mount quad channel modulator, RCA inputs, IR repeating system, 120 Vac power supply included	SDM41VT	**563.00**	. . .	1
Set top mount dual channel MTS stereo modulator, RCA inputs, IR repeating system, 120 Vac power supply included	SDM21VTST	**667.00**	. . .	1
Set top mount quad channel MTS stereo modulator, RCA inputs, IR repeating system, 120 Vac power supply included	SDM41VTST	**1122.00**	. . .	1
Modulator combiner hub (8 input x 1 output), grid mount, use with Video Hub SDM38VHIR/SDM38VBIR, 120 Vac power supply included	SDM81VC	**172.00**	2.5	1
Cat-5 Video Wall Plate, use with SDM11VMB/ SDM11VMH if modulating from a source with RCA outputs	SDM1VWP	**67.00**	. . .	1
Satellite Hub				
Satellite TV multi-switch, connects 4 satellite receivers to a dual LNB dish, grid mount	SDM24VD	**133.00**	2.5	1
Audio Hub				
Speaker distributon hub (stereo), distributes 1 audio source to six rooms, grid mount	SDM16A	**63.00**	3	1

▲ Two columns of grid mounting space, 17" of space per column.
■ Two columns of grid mounting space, 35" of space per column.

For additional information, reference Catalog #1400CT0101R3/03.

DE7 | Discount Schedule

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SDM8D

SDM2VC/SDM2VCC

SDM1VC/SDM1VCC

SDM18BW with optional modules

System Components, continued

Description	Catalog Number	Price	Grid Mounting Space (IN)	Standard Package
Data Hubs				
Data termination hub provides termination point for Cat-5 wiring, 100 Base-T certified, 8 bridgeable circuits (8 - 110 punch down blocks connected to 8 - RJ-45 jacks)	SDM8D	**$ 67.00**	3	1
Data termination hub provides termination point for Cat-5 wiring, 100 Base-T certified, 16 bridgeable circuits (16 - 110 punch down blocks connected to 8 - RJ-45 jacks)	SDM8DB	**87.00**	4.5	1
Ethernet hub, 10 Base-T certified, 5 - RJ-45 ports, uplink port, grid mount, 120 Vac power supply included	SDM5DE	**114.00**	4	1
Router hub, 10/100 Base-T certified, 7 - RJ-45 ports, grid mount, integral 120 Vac power supply	SDM7DR	**374.00**	14▲	1
Video Cameras				
B&W, single gang in-wall, 0.3 lux, fixed aim, used with and powered by SDM11VMB/SDM11VMH modulator via Cat-5 wiring	SDM1VC	**229.00**	. . .	1
Color, single gang in-wall, 6 lux, fixed aim, used with and powered by SDM11VMB/SDM11VMH modulator via Cat-5 wiring	SDM1VCC	**457.00**	. . .	1
B&W, double gang in-wall, 2 lux, adjustable aim, used with and powered by SDM11VMB/SDM11VMH modulator via Cat-5 wiring	SDM2VC	**343.00**	. . .	1
Color, double gang in-wall, 8 lux, adjustable aim, used with and powered by SDM11VMB/SDM11VMH modulator via Cat-5 wiring	SDM2VCC	**533.00**	. . .	1
IR Controls				
IR remote control target, coaxial in/out, locate at television	SDM1VIR	**82.00**	. . .	1
IR remote control emitter, locate at video source	SDM2VIR	**20.40**	. . .	1
Wall Plates				
White wall plate 4 phone and 2 video	SDM10PVWPW	**19.70**	. . .	10
White wall plate 1 data, 2 phone and 2 video	SDM10DPVWPW	**17.40**	. . .	10
Almond wall plate 4 phone and 2 video	SDM10PVWPA	**19.70**	. . .	10
Almond wall plate 1 data, 2 phone and 2 video	SDM10DPVWPA	**17.40**	. . .	10
Ivory wall plate 4 phone and 2 video	SDM10PVWPI	**19.70**	. . .	10
Ivory wall plate 1 data, 2 phone and 2 video	SDM10DPVWPI	**17.40**	. . .	10
Accessories				
AC outlet accessory, mounts in enclosures, 2 duplex receptacles (not included) accepts 2 power supplies, UL Listed, 120 Vac	SDM4AC	**30.50**	5.5	1
AC outlet accessory, mounts in enclosures, 4 duplex receptacles (not included) accepts 4 power supplies, UL Listed, 120 Vac	SDM8AC	**36.50**	11■	1
Adapter bracket to mount ChannelPlus 3400 or 8200 on Square D Multi-Link grid	SDM1A	**19.10**	2	1
Adapter bracket to mount RJ and type F connectors on Square D Multi-Link grid	SDM6A	**19.10**	2	1
Wire Spacer Mezzanine, Universal Grid, lifts modules 1" above grid, providing wire management capabilities, 11.2"h x 6.5"w	SDM12WS	**29.20**	12	1
Universal heavy duty isolation mounting bracket for non-Square D Multi-Link products. Load rated 60 pounds.	SDM1IMB	**58.00**	♦	1
Universal light duty isolation mounting bracket for non-Square D Multi-Link products. Load rated 10 pounds.	SDM2IMB	**28.60**	♦	1
Patch Cord 1 foot length, Cat-5, RJ-45 plugs on both ends	SDM1DC	**7.70**	. . .	1
Patch Cord 2 foot length, Cat-5, RJ-45 plugs on both ends	SDM2DC	**9.60**	. . .	1
Enclosure Coupling Tube for stacking enclosures, 2 inch conduit	SDM2C	**15.20**	. . .	1
Plastic grommet for 2" enclosure knockout, (5) pack	SDM2G	**2.90**	. . .	1
Cover Lock Kit	SDMLK	**29.20**	. . .	1
Replacement snap locks, lock Square D Multi-Link modules to grid, black (10) pack	SDM10SL	**11.40**	. . .	1
Attenuator, 3 dB	SDM2503	**2.70**	. . .	10
Attenuator, 6 dB	SDM2506	**2.70**	. . .	10
Low Pass Filter, Channel 91	SDM600LPF	**38.90**	. . .	1

▲ Requires 7" of grid mounting space per column, 14" total.
■ Requires 5.5" of grid mounting space per column, 11" total.
♦ Space required is dependent upon size of the device utilizing the mounting bracket.

For additional information, reference Catalog #1400CT0101R3/03.

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Metering

THE WIDEST SELECTION IN THE INDUSTRY

Metering Equipment

Schneider Electric provides the most reliable and most versatile line of metering equipment in the industry for residential and commercial applications.
As fewer utilities provide meter sockets it's important to have one reliable source that meets all your needs. From individual meter sockets to multi-metering centers there's no better choice than Square D.

- Individual and Horizontal ganged meter sockets
- Meter-Pak and EZ Meter-Pak multi-metering equipment

Individual Meter Sockets

Square D individual meter sockets have provisions to feed a downstream main lug load center (with a maximum of 6 service disconnects), main breaker load center, or an individually enclosed service disconnect. 400 ampere, studs only units have provisions for mounting dual load side lugs to feed two downstream main breaker load centers or two individually enclosed disconnects.

EZ Meter-Pak® Multi-Metering Equipment

These exclusive Square D Meter Centers not only make it easier to install multi-unit metering equipment, but also provide a more economical option than separately purchasing individual meter sockets.

EZ Meter-Pak meter center enclosures meet NEC wire bending requirements, and are designed for wall mounting only (not suitable for floor mounting). All unmetered conductor compartments are sealable by the utility company.

UTRS101B

UTRS202B
(cover not shown)

UTH5203T
(cover not shown)

URTRS213B

Individual Meter Sockets—Ring and Ringless Type

- Available single or three phase, 600 Vac max., with and without horn or lever bypass, overhead and underground service feed.
- 10,000 RMS symmetrical amperes short circuit current rating (or higher with utility approval).
- UL Listed, NEMA 3R enclosure.
- Units supplied with bonded neutral.
- Units supplied with hub opening in top endwall require the use of a bolt-on hub, or closing plate.
- Units supplied with solid top are for underground feed only.
- Accessories, refer to page 40.

This metering is generally utility specific. Always check with local utility company before installing.
Contact your nearest Square D/Schneider Electric sales office for additional catalog numbers, if required by utility.

Ampere Rating (Cont.)	Jaw Qty.	Service Type	Catalog Number ▲	Price	Lug Wire Range (Al/Cu)			Enclosure Information			Box No. see page 41
					Line, Load, and Neutral (AWG/kcmil)	Wire Binding	Gnd. (AWG)	Material	Top Endwall Conf. Hub Opening ■	Top Endwall Conf. Closing Plate ■	
Ringless Type, 1-Phase, 3-Wire 600 Vac Max., Without Bypass or Jaw Release											
125	4	UG	UTZRS101A★	**$ 82.00**	#8–2/0	1/2" HEX	#14–2	Steel	Solid Top★	. . .	1R
125	4	OH	UTRS101B	**82.00**	#8–2/0	SLOTTED	#14–2	Steel	Series A	ACP	1R
125	4	OH	UATRS101B	**91.00**	#8–2/0	SLOTTED	#14–2	Aluminum	Series A	ACPA	1R
125	4	OH	URS101BCPL	**90.00**	#8–2/0	SLOTTED	#14–2	Steel	Series A	ACP	1R
125	5	OH/UG	1003880A▼	**107.00**	#8–2/0	SLOTTED	#14–2	Steel	Series A	ACP	1R
200	4	OH	UTRS202B	**118.00**	#8–250	1/2" HEX	#14–2	Steel	Series A	ACP	3R
200	4	OH	UATRS202B	**130.00**	#8–250	1/2" HEX	#14–2	Aluminum	Series A	ACPA	3R
200	4	UG	UTRS213A★	**141.00**	#1/0–350	1/2" HEX	#14–2	Steel	Solid Top★	. . .	5R
200	4	OH/UG	UTRS213B▼	**141.00**	#1/0–350	1/2" HEX	#14–2	Steel	Series A	ACP	5R
200	4	OH/UG	UATRS213B▼	**150.00**	#1/0–350	1/2" HEX	#14–2	Aluminum	Series A	ACPA	5R
200	4	OH/UG	U92197CCCPL □	**160.00**	#1/0–350	1/2" HEX	#14–2	Steel	(2)Series A	(2)ACP□	7R
Ringless Type, 1-Phase, 3-Wire 600 Vac Max., With Horn Bypass, Without Jaw Release											
125	4	OH/UG	UHTRS101B	**107.00**	#8–2/0	SLOTTED	#14–2	Steel	Series A	ACP	1R
125	5	OH	UGHTRS101L♦	**107.00**	#8–2/0	SLOTTED	#14–2	Steel	A125♦	. . .	1R
125	4	OH	URS101BDQ◊	**92.00**	#8–2/0	1/2" HEX	None	Steel	Series A	ACP	1R
125	5	OH/UG	UGHTRS111C△	**138.00**	#8–2/0	SLOTTED	#14–2	Steel	Series A	ACP△	4R
200	4	OH/UG	UBHMRS212B▼	**140.00**	#8–250	1/2" HEX	None	Steel	Series A	ACP	4R
200	4	OH	UHTRS202B	**137.00**	#8–250	1/2" HEX	#14–2	Steel	Series A	ACP	3R
200	4	OH/UG	UHTRS212B▼	**137.00**	#8–250	1/2" HEX	#14–2	Steel	Series A	ACP	4R
200	4	OH/UG	UHTRS213B▼	**142.00**	#1/0–350	1/2" HEX	#14–2	Steel	Series A	ACP	5R
200	4	UG	UHTRS223A★	**181.00**	#1/0–350	1/2" HEX	#14–2	Steel	Solid Top★	. . .	2R
200	4	UG	URS212ADQ★◊	**135.00**	#8–250	1/2" HEX	None	Steel	Solid Top	. . .	4R
Ringless Type, 1-Phase, 3-Wire 600 Vac Max., With Lever Bypass and Jaw Release											
200	4	OH	UTH4203T	**310.00**	#6–350	1/2" HEX	#14–2	Steel	Series A-L	ACPL	8R
200	4	OH/UG	UTH4213T▼	**319.00**	#6–350	1/2" HEX	#14–2	Steel	Series A-L	ACPL	9R
200	5	OH	UTH5203T	**329.00**	#6–350	1/2" HEX	#14–2	Steel	Series A-L	ACPL	8R
200	5	OH/UG	UTH5213T▼	**376.00**	#6–350	1/2" HEX	#14–2	Steel	Series A-L	ACPL	9R
320	4	OH/UG	UTH4330T▼☆	**499.00**	Studs Only	3/8" dia. studs	#14–1/0	Steel	Series A-L	ACPL	11R
Ringless Type, 3-Phase, 4-Wire 600 Vac Max., With Lever Bypass and Jaw Release											
200	7	OH/UG	UTH7213T▼	**444.00**	#6–350	1/2" HEX	#14–2	Steel	Series A-L	ACPL	9R
320	7	OH	UTH7300T☆	**553.00**	Studs Only	3/8" dia. studs	#14–1/0	Steel	Series A-L	ACPL	10R
Ringless Type, 3-Phase, 4-Wire 600 Vac Max., Bolt-On Socket Without Bypass											
400	7	OH/UG	UK7T▼☆	**1615.00**	Studs Only	1/2–20" dia. studs	1/2–20" dia. studs	Steel	Series A-L	ACPL	12R
400	7	OH/UG	UAK7T▼☆	**1785.00**	Studs Only	1/2–20" dia. studs	1/2–20" dia. studs	Aluminum	Series A-L	ACPLA	12R
Ring Type, 1-Phase, 3-Wire 600 Vac Max., Without Bypass or Jaw Release											
125	4	OH/UG	URTRS101B▼▽	**$ 82.00**	#8–2/0	SLOTTED	#14–2	Steel	Series A	ACP	1R
200	4	OH/UG	URTRS213B▼▽	**141.00**	#1/0–350	1/2" HEX	#14–2	Steel	Series A	ACP	5R

▲ Device requires approval from the serving utility, consult your nearest Square D/Schneider Electric sales office.
■ Order appropriate bolt-on hub or closing plate separately and install on TOP endwall.
♦ Device supplied with 1-1/4" bolt-on hub (Cat.No. A125) mounted on TOP endwall.
★ Device supplied with solid top endwall (without hub opening).
▼ When unit is installed for underground feed, the appropriate closing plate must be ordered separately and installed over hub opening in TOP endwall of device.
△ Device supplied with closing plate (Cat. No. ACP) mounted on TOP endwall.
□ Device supplied with two closing plates (Cat. No. ACP) mounted in TOP endwall.
◊ Contains "Duquesne Light Co." approved label.
☆ Order lugs separately, refer to accessories, page 40.
▽ Device supplied with stainless steel, snap-on sealing ring.

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UT2R1121B

Horizontal Ganged Meter Sockets

- Single phase, 600 Vac max., main lugs only, 2 through 6 meter positions, with and without horn or lever bypass, end or center feed, overhead and underground service feeds
- 10,000 RMS symmetrical amperes short circuit current rating (or higher with utility approval)
- UL Listed, NEMA 3R enclosure
- Supplied with ground lugs
- Supplied with hub opening in top endwall, requires the use of a bolt-on hub, or closing plate

This metering is generally utility specific. Always check with local utility company before installing.
Contact your nearest Square D/Schneider Electric sales office for additional catalog numbers, if required by utility.

Ringless Type, 1-Phase, 3-Wire, 600 Vac Max., Without Bypass or Jaw Release

Branch Ratings				Mains Rating	Catalog Number	Price	Main Lugs Phase & Neutral Al/Cu (AWG/kcmil)	Branch Lugs Phase & Neutral Al/Cu (AWG)	Top Endwall▲		Box No. See page 41
Amperes (cont.)	Number of Positions	Socket Jaw Qty.■	Service Type						Hub Type (Order Separately)	Closing Plate (Order Separately)	
100	2	4	OH/UG	200	UT2R1121B	**$ 302.**	#6–250	#8–2/0	Series A	ACP	13R
	3			205	UT3R1121B	**373.**	#6–250				13R1
	4			205	UT4R1131B	**440.**	#6–350				14R
	5			250	UT5R1131B	**605.**	#6–350				15R
	6			300	UT6R1131B♦	**771.**	#6–350				16R
200	2	4	OH/UG	205	UT2R2122B	**431.**	#6–250	#8–250	Series A	ACP	17R
	4			360	UT4R2352T♦	**737.**	#1/0–500		Series A-L	ACPL	18R
	5			500	UT5R2392TU	**922.**	#1/0–500 or (2)#1/0–350		Series A-L	ACPL	19R
	6			620	UT6R2392TU	**1032.**	#1/0–500 or (2)#1/0–350		Series A-L	ACPL	20R

▲ For Hubs and Closing Plates, see Accessories table below.
■ Fifth Jaw Kit available to convert 4-Jaw Socket to a 5-Jaw Socket. See Accessories table below.
♦ For 120/240 Volt, Three-Wire, Single Phase Dwelling services see NEC Table 310-16 Note 3.

EMT3225CB

EMT3225CB
Without Covers

Surface Mount, Ring Type, Meter Main with Test Block Bypass (Meets EUSERC Requirements)

Supplied with bondable neutral, suitable for use as service equipment. Suitable for overhead or underground service. UL Listed File E6294.

System (Incoming) and Service (Outgoing)	Meter Socket Type	Ampere Rating (Max.)	Short Circuit Current Rating	Catalog Number△	Price	Main Circuit Breaker Type (Order Separately)★
120/240 Vac 1Ø3W	5-Jaw	200 A	42k Max.	EMT1225CB	**$2730.**	2-pole, Type QB, QD, QG, QJ, QO▼, QO-VH▼ or QOH▼
208Y/120 Vac 3Ø4W or 240/120 Vac 3Ø4W Delta	7-Jaw	200 A	22k Max.	EMT3225CB	**3570.**	3-pole, Type QB, QD, QG or QJ

★ Refer to page 50 to select main circuit breaker.
▼ Requires use of EZM125QOA adapter (order separately). Refer to page 50 for pricing.
△ Refer to page 41 for box dimensions.

EMT Terminal Data□

Line Phase Lug Wire Size (AWG-kcmil)	Line Neutral Lug Wire Size (AWG-kcmil)	Service Ground Lug Wire Size (AWG-kcmil)	Equipment Ground Lug Wire Size (AWG-kcmil)	Load Neutral Lug Wire Size (AWG-kcmil)
#6–300 Al/Cu	#6–350 Al/Cu	#4–300 Al/Cu	#6–300 Al/Cu	#4–300 Al/Cu

□ Refer to circuit breaker listings for usable load lug wire sizes.

Meter Sockets Accessories

Description	Catalog Number	Price
FIFTH JAW KIT Converts a 4-jaw meter socket to a 5-jaw meter socket. For use on meter sockets supplied without lever bypass or jaw release only.	A5J	**$ 9.90**
CLOSING PLATES (to seal hub openings)		
For Series A (steel)	ACP	**8.90**
For Series A (aluminum)	ACPA	**7.90**
For Series A-L (steel)	ACPL	**12.20**
For Series A-L (aluminum)	ACPLA	**11.00**
HUBS (listed by conduit size)		
Series A:		
1.00 inch	A100	**22.60**
1.25 inch	A125	**22.60**
1.50 inch	A150	**22.60**
2.00 inch	A200	**31.90**
2.50 inch	A250	**40.40**
Series A-L:		
2.00 inch	A200L	**55.00**
2.50 inch	A250L	**58.00**
3.00 inch	A300L	**74.00**
3.50 inch	A350L	**76.00**
4.00 inch	A400L	**79.00**
Series B:		
3.00 inch	B300	**124.00‡**
ADAPTER PLATE To allow the use of a Series A Hub on a device that is setup for a series A-L Hub.	AAP	**22.50**
LUG KITS For use on meter sockets supplied with Line, Load, and Neutral Studs only. Be sure to order enough lugs for each device (a typical 1-Phase device requires 6 lugs).		
Includes one, two-barrel lug (#6-250 kcmil)	ARP00118◊	**25.40**
Includes one, single barrel lug (#4-600 kcmil)	ARP00129◊	**36.80**
Includes three, two-barrel lugs (#6-350 kcmil)	ARP00427◊	**90.00**
SEALING RING (Non-Standard)		
Snap-on Stainless Steel	ARP00026◊	**11.10**
Latch-Type Stainless Steel	29008G	**13.40**
Screw Type Aluminum	29008W	**13.40**

◊ Order only. Not stocked in PDS. Order point: Lexington.

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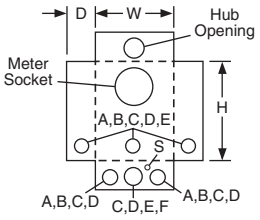
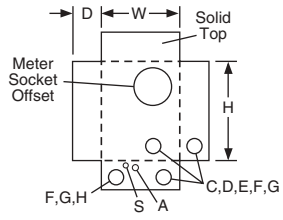
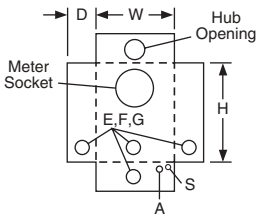


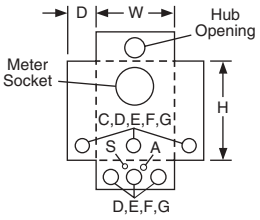
1R



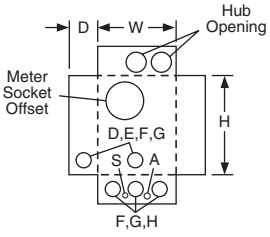
2R



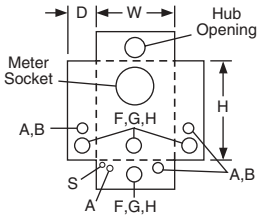
3R, 6R



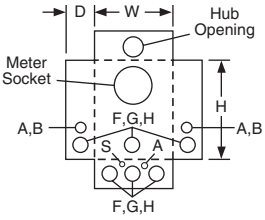
4R, 5R



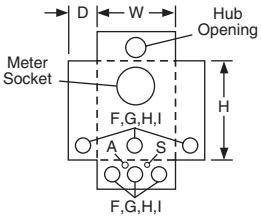
7R



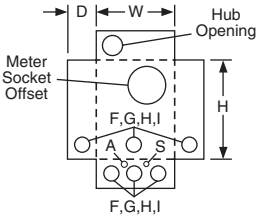
8R



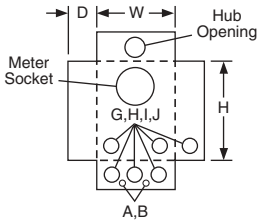
9R



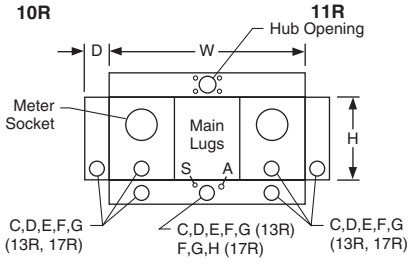
10R



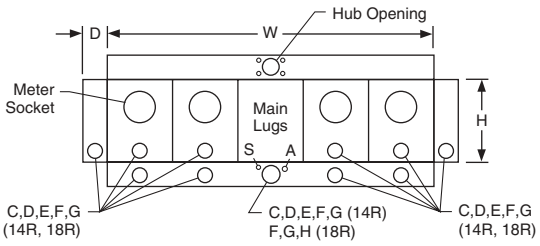
11R



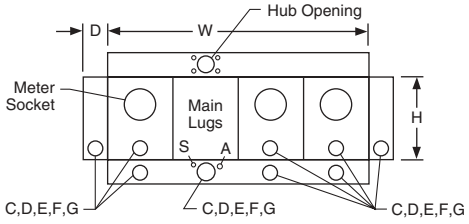
12R



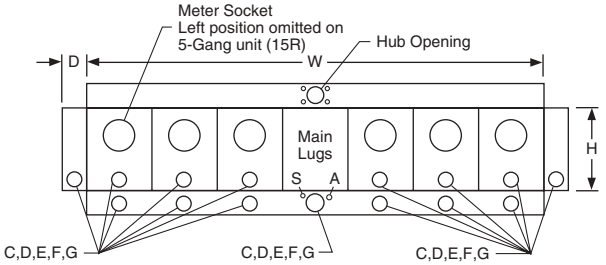
13R and 17R



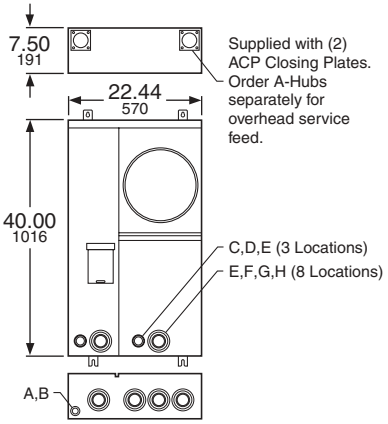
14R and 18R

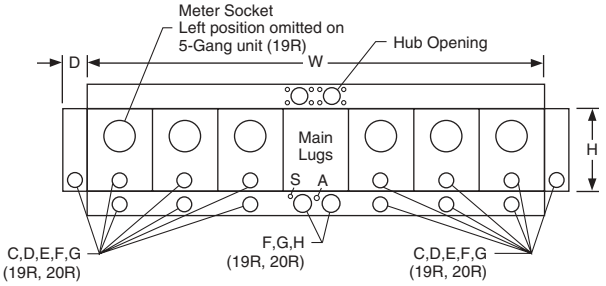


13R1



15R and 16R





19R and 20R

Knockout Information and Enclosure Dimensions

Dimensions (Inches)				
Box No.	**H**	**W**	**D**	**Hub Opening (Max. Conduit Size)▲**
1R	10.88	8.00	3.50	Series A
2R	13.00	13.00	4.94	Solid Top
3R	14.00	8.00	4.38	Series A
4R	14.00	11.00	4.38	Series A
5R	15.00	11.00	4.38	Series A
6R	15.50	8.00	4.36	Series A
7R	17.13	13.00	4.94	(2) Series A
8R	19.00	10.50	4.94	Series A-L
9R	19.00	13.00	4.94	Series A-L
10R	34.50	15.00	5.68	Series A-L
11R	36.62	15.00	5.68	Series A-L
12R	43.00	20.25	6.00	Series A-L
13R	14.12	24.31	4.50	Series A
13R1	14.12	32.50	4.50	Series A
14R	14.12	40.62	4.50	Series A
15R	14.12	48.75	4.50	Series A
16R	14.12	57.00	4.50	Series A
17R	14.12	24.31	5.38	Series A
18R	14.12	40.62	5.38	Series A-L
19R	14.12	54.75	5.38	(2) Series A-L
20R	14.12	63.00	5.38	(2) Series A-L

▲ Refer to page 40 for closing plates and hubs.

Knockouts											
Symbol	**S**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
Conduit Size (inches)	5/16 ■	½	¾	1	1¼	1½	2	2½	3	3½	4

■ Knockout for ground conductor.

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Ring and Ringless Type Devices

- Consult local utility for approval before installation.
- 120/240 Vac 1 Phase 3 Wire.
- Main lugs only—two to six meter sockets.
- Enclosures are indoor/rainproof NEMA 3R construction.
- Suitable only for use as service equipment.
- Swingable mounting feet supplied at bottom of device.
- Factory installed mechanical lugs, alternate lugs and NEMA/EUSERC lug landing kits available.
- Surface mount, convertible to semi-flush with field installed flange kit.
- Ring type devices supplied with 4-jaw meter sockets (5th jaw kits available, order separately).
- Ringless type devices supplied with 5-jaw meter sockets, available with and without horn or lever bypass.
- Provisions for mounting 2-pole circuit breaker for each meter socket position (order circuit breakers separately).
- Mounting channel supplied, except for box 1R (125 A, 2-position).
- Combination overhead/underground feed.

Step 1: Select Ring or Ringless Type MP METER-PAK Metering Equipment

Ring Type MP METER-PAK Metering Equipment with 125 A (42k RMS Symmetrical Amperes Maximum SCCR) or 200 A (22k RMS Symmetrical Amperes Maximum SCCR) Meter Socket Positions

Amps per Pos.	No. of Pos.	Factory Installed Main Lug Ampacity (See page 43 for alternate lugs)	Main Bus Ampacity	Catalog Number■	Price	Line Lug Wire Size Al/Cu AWG/kcmil	Circuit Breaker Type (2-Pole)	Hub Prov.	Semi-Flush Flange Kit	Wt Lbs	Box No. (See pg. 44)
125	2	200	200	MP22125▲	**$ 651.**	(1) 4–250	QO, QO-VH, QOH	A/B300	MPSF12	46	1R
	3	300	300	MP33125■	**791.**	(1) 1/0–600 or (2) 1/0–250		A-L	MPSF14	95	2R
	4	400	400	MP44125■	**1153.**	(1) 1/0–600 or (2) 1/0–250		A-L	MPSF14	97	2R
	5	400 Al 500 Cu	500	MP55125■	**1386.**	(1) 1/0–600 or (2) 1/0–250		A-L	MPSF16	130	3R
	6	400 Al 500 Cu	600	MP66125■	**1610.**	(1) 1/0–600 or (2) 1/0–250		A-L	MPSF16	132	3R
200	2	400	400	MP42200■	**849.**	(1) 1/0–600 or (2) 1/0–250	QOM2-MM, QOM2-MVH	A-L	MPSF23	99	4R
	3	400	400	MP43200■	**1434.**	(1) 1/0–600 or (2) 1/0–250			MPSF23	99	4R
	4	400	600	MP64200■	**1876.**	(1) 1/0–600 or (2) 1/0–250			MPSF24	135	5R
	5	600 Al, 750 Cu	800	MP85200■	**2251.**	(2) 3/0–500			MPSF26	173	6R
	6	600 Al, 750 Cu	800	MP86200■	**2693.**	(2) 3/0–500			MPSF26	173	6R

▲ Meets EUSERC standards.
■ Meets EUSERC standards with addition of lug landing kit, MMSK2.

Ringless Type MP METER-PAK Metering Equipment with 125 A (42k RMS Symmetrical Amperes Maximum SCCR) or 200 A Type MPR, MPH (22k RMS Symmetrical Amperes Maximum SCCR) or 225 A Type MPL (100k RMS Symmetrical Amperes Maximum SCCR) Meter Socket Positions

Amps Per Pos.	No. of Pos.	Factory Installed Main Lugs Ampacity (See page 43 for alternate lugs)	Main Bus Ampacity	No. Bypass Catalog Number	Price	Horn Bypass Catalog Number	Price	Lever Bypass Catalog Number	Price	Line Lug Wire Size Al/Cu AWG/kcmil	Circuit Breaker Type (2-Pole)	Hub Prov.	Semi-Flush Flange Kit	Wt Lbs	Box No. (See pg. 44)
125	2	200	200	MPR22125	**$ 663.**	MPH22125	**$ 668.**	....	**...**	(1) 4–250	QO, QO-VH, QOH	A/B300	MPSF12	46	1R
	3	300	300	MPR33125	**813.**	MPH33125	**835.**	....	**...**	(1) 1/0–600 or (2) 1/0–250		A-L	MPSF14	95	2R
	4	400	400	MPR44125	**1187.**	MPH44125	**1220.**	....	**...**	(1) 1/0–600 or (2) 1/0–250			MPSF14	97	2R
	5	400 Al 500 Cu	500	MPR55125	**1497.**	MPH55125	**1553.**	....	**...**	(1) 1/0–600 or (2) 1/0–250			MPSF16	130	3R
	6	400 Al 500 Cu	600	MPR66125	**1743.**	MPH66125	**1810.**	....	**...**	(1) 1/0–600 or (2) 1/0–250			MPSF16	132	3R
200	2	400	400	MPR42200	**860.**	MPH42200	**866.**	....	**...**	(1) 1/0–600 or (2) 1/0–250	QOM2-MM, QOM2-MVH		MPSF23	99	4R
	3	400	400	MPR43200	**1457.**	MPH43200	**1479.**						MPSF23	99	4R
	4	400	600	MPR64200	**1910.**	MPH64200	**1944.**						MPSF24	135	5R
225	2	300	300	...	**...**	...	**...**	MPL32225	**$1159.**	(1) 1/0–600 or (2) 1/0–250	QB, QD, QG, QJ, QO♦, QO-VH♦ or QOH♦		N/A	105	7R
	3	400	400	...	**...**	...	**...**	MPL53225	**1827.**				N/A	147	8R
	4	400	600	...	**...**	...	**...**	MPL64225	**2437.**				N/A	200	9R
200	5	600 Al, 750 Cu	800	MPR85200	**2363.**	MPH85200	**2418.**	....	**...**	(2) 3/0–500	QOM2-MM, QOM2-MVH		MPSF26	173	6R
	6	600 Al, 750 Cu	800	MPR86200	**2827.**	MPH86200	**2894.**	....	**...**	(2) 3/0–500			MPSF26	173	6R

♦ Requires use of EZM125QOA adapter (order separately). Refer to page 50 for pricing.

UL Listed short circuit current rating depends on lowest interrupting rating of circuit breaker installed. (See page 43)

For additional information, reference Catalog #4100CT9801.

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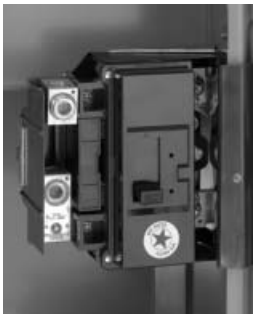
QO2100VH
2-Pole, Plug-on Type
Circuit Breaker

QDP22200TM
2-Pole, Bolt-on Type
Circuit Breaker



QOM2200MVH

MMLK500

Step 2: Select Tenant Circuit Breakers

Amps	10,000 AIR 120/240 Vac	Price ‡	22,000 AIR 120/240 Vac	Price ‡	42,000 AIR 120/240 Vac	Price ‡	100,000 AIR 120/240 Vac	Price ‡
For Use in 125 A Max. Type MP, MPR and MPH METER-PAK Metering Equipment								
60	QO260	**$ 44.70**	QO260VH	**$ 97.00**	QOH260▲	**$ 211.00**	. . .	. . .
70	QO270	**89.00**	QO270VH	**149.00**	QOH270▲	**352.00**	. . .	. . .
80	QO280	**126.00**	QO280VH	**210.00**	QOH280▲	**434.00**	. . .	. . .
90	QO290	**126.00**	QO290VH	**210.00**	QOH290	**434.00**	. . .	. . .
100	QO2100	**126.00**	QO2100VH	**210.00**	QOH2100	**434.00**	. . .	. . .
125	QO2125	**285.00**	QO2125VH	**689.00**	QOH2125	**926.00**	. . .	. . .
For Use in 200 A Max. Type MP, MPR and MPH METER-PAK Metering Equipment								
100	QOM2100MM	**316.00**	QOM2100MVH	**762.00**	. . .	. . .	. . .	. . .
125	QOM2125MM	**316.00**	QOM2125MVH	**762.00**	. . .	. . .	. . .	. . .
150	QOM2150MM	**316.00**	QOM2150MVH	**762.00**	. . .	. . .	. . .	. . .
175	QOM2175MM	**316.00**	QOM2175MVH	**762.00**	. . .	. . .	. . .	. . .
200	QOM2200MM	**316.00**	QOM2200MVH	**762.00**	. . .	. . .	. . .	. . .
For Use in 225 A MPL Lever Bypass METER-PAK Metering Equipment								
	10,000 AIR 120/240 Vac	**Price ‡**	**25,000 AIR 120/240 Vac**	**Price ‡**	**65,000 AIR 120/240 Vac**	**Price ‡**	**100,000 AIR 120/240 Vac**	**Price ‡**
40	QO240■	**44.70**	QO240VH■♦	**97.00**	QOH240■★	**211.00**	. . .	. . .
50	QO250■	**44.70**	QO250VH■♦	**97.00**	QOH250■★	**211.00**	. . .	. . .
60	QO260■	**44.70**	QO260VH■♦	**97.00**	QOH260■★	**211.00**	. . .	. . .
70	QBP22070TM	**316.00**	QDP22070TM	**762.00**	QGP22070TM	**1014.00**	QJP22070TM	**$1260.00**
80	QBP22080TM	**316.00**	QDP22080TM	**762.00**	QGP22080TM	**1014.00**	QJP22080TM	**1260.00**
90	QBP22090TM	**316.00**	QDP22090TM	**762.00**	QGP22090TM	**1014.00**	QJP22090TM	**1260.00**
100	QBP22100TM	**316.00**	QDP22100TM	**762.00**	QGP22100TM	**1014.00**	QJP22100TM	**1260.00**
110	QBP22110TM	**316.00**	QDP22110TM	**762.00**	QGP22110TM	**1014.00**	QJP22110TM	**1260.00**
125	QBP22125TM	**316.00**	QDP22125TM	**762.00**	QGP22125TM	**1014.00**	QJP22125TM	**1260.00**
150	QBP22150TM	**316.00**	QDP22150TM	**762.00**	QGP22150TM	**1014.00**	QJP22150TM	**1260.00**
175	QBP22175TM	**316.00**	QDP22175TM	**762.00**	QGP22175TM	**1014.00**	QJP22175TM	**1260.00**
200	QBP22200TM	**316.00**	QDP22200TM	**762.00**	QGP22200TM	**1014.00**	QJP22200TM	**1260.00**
225	QBP22225TM	**316.00**	QDP22225TM	**762.00**	QGP22225TM	**1014.00**	QJP22225TM	**1260.00**

▲ Order only. Not stocked in PDS. Order Point: Lincoln.
■ Requires use of EZM125QOA adapter (order separately). Refer to page 50 for pricing.
♦ QOVH tenant circuit breakers are rated 22,000 AIR at 120/240 Vac.
★ QOH tenant circuit breakers are rated 42,000 AIR at 120/240 Vac.

UL Listed Short Circuit Current Rating depends on lowest interrupting rating of circuit breaker installed. (Refer to the table on the bottom of page 52 for Square D certified ratings for downstream panelboards and load centers.)

Accessories

Description	Catalog Number	Price
Fifth Jaw Kit	5J	**$ 12.20**
Horn Bypass Kit	MMHB	**11.10**
QO Adapter for Bolt-on Q2M tenant circuit breakers (40–125 A, 2-pole)	EZM125QOA	**182.00**
Slider Type Manual Circuit Closing:		
125 A Ring Style 2 Position Top Meter (Only)	MM125MB▼	**114.00**
125 A/200 A Ring Style	MM200MB▼	**114.00**
Sealing Rings:		
Snap-on Aluminum Screw Type Aluminum Snap-on Type Stainless Steel	2920910001 29008W ARP00026	**5.00** **13.40** **11.10**
Meter Cover-Lexan®	29007	**6.70**
Optional Lug Kits:		
(1) 1/0–600 AWG/kcmil or (2) 1/0–250 per phase	MMLK250△□	**100.00**
(2) 3/0–500 AWG/kcmil per phase	MMLK500□	**133.00**
(2) 2–600 AWG/kcmil per phase	MMLK600□	**155.00**
Semiflush Kits:		
125 A 2 Position 125 A 3–4 Position 125 A 5–6 Position 200 A 2–3 Position 200 A 4 Position 200 A 5–6 Position	MPSF12 MPSF14 MPSF16 MPSF23 MPSF24 MPSF26	**67.00** **89.00** **145.00** **96.00** **114.00** **170.00**

Accessories (Continued)

Description	Catalog Number	Price
NEMA/EUSERC Lug Landing Kit: For 3 through 6 position 125 A and 200 A devices. Each pad rated 600 A maximum and includes (2) 1/2-13 studs and mounting hardware.	MMSK2□	**$123.00**
NEMA Lug Landing Kit: For use ONLY on MPL43225 and MPL64200 with optional lugs. See wiring diagram of each device for optional lugs.	MMSK4	**184.00**
MP Meter-Pak Wireway:		
125 A 2 Position ONLY	MP43X8PED	**294.00**
125 A 3–6 Position	MP43X11PED	**336.00**
200 A 2–6 Position	MP43X11PED	**336.00**
MPL32-200	MP35X11PED◊	**336.00**
MPL53-200	MP43X11PED	**336.00**
MPL64-200	MP35X11PED◊	**336.00**
MP Meter-Pak Wireway Extensions:		
Used ONLY with MP43X8PED	MP12X8PEDEXT◊	**68.00**
Used with MP43X11PED & MP35X11PED	MP12X11PEDEXT◊	**84.00**

▼ The meter center short circuit current rating is 10,000 amperes RMS symmetrical when manual circuit closing is used. Not rated for continuous duty.
△ Standard lug for 3 through 6 position 125 A and 2 through 4 position 200 A devices.
□ Cannot be installed on 2 position 125 A device.
◊ Order only. Not stocked in PDS. Order point: Lexington.

See page 40 for hubs and closing plates

For additional information, reference Catalog #4100CT9801.

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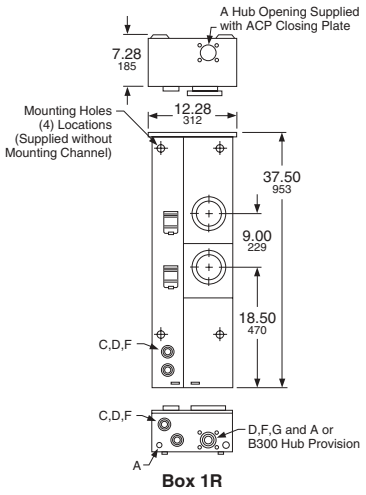
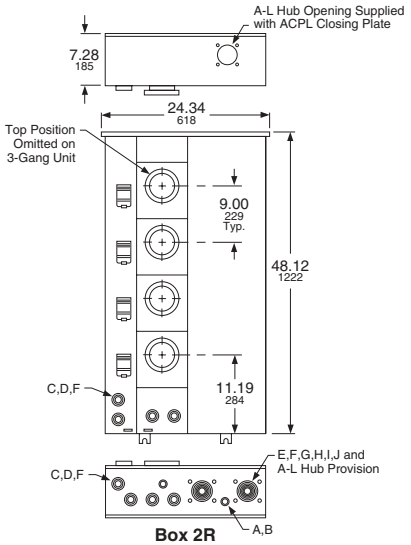
‡DE2A		DE4		Discount Schedule



Box 1R



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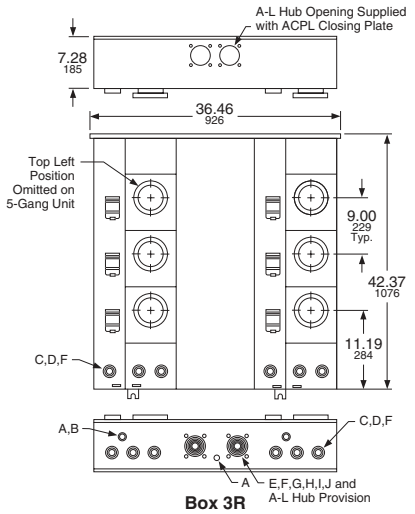

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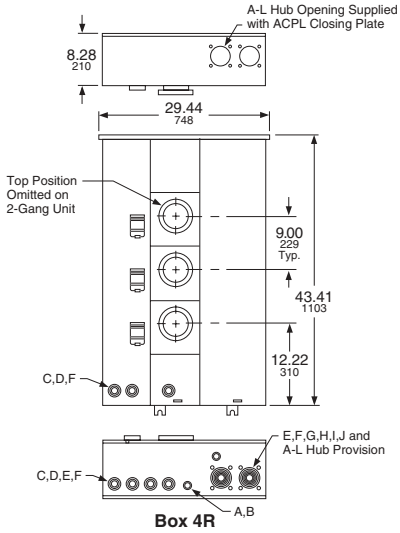

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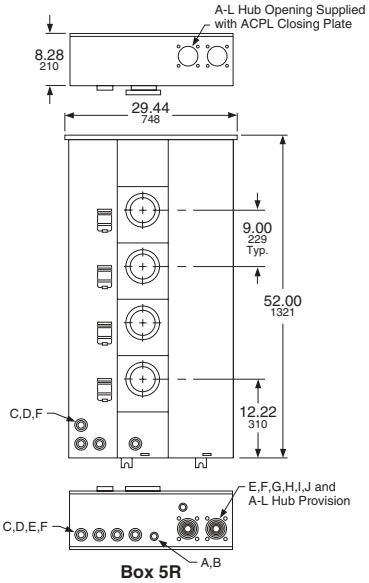

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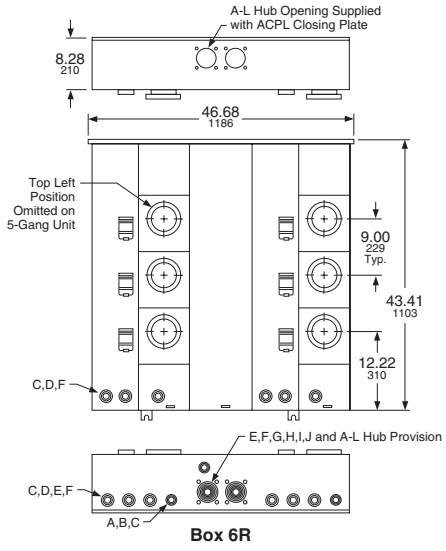
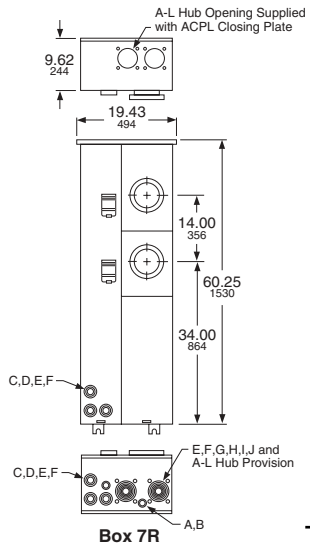


Box 6R



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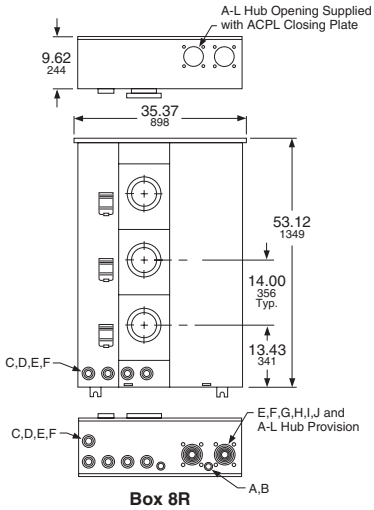
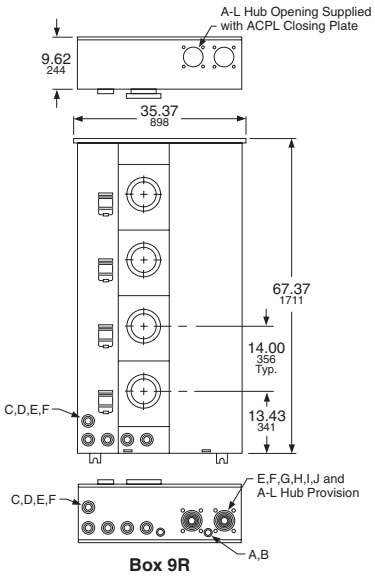


Box 8R



Box 9R

Knockouts										
Symbol	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
Conduit Size (inches)	½	¾	1	1¼	1½	2	2½	3	3½	4

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1Ø3W EZ METER-PAK Meter Centers—UL Listed

Select EZM meter center short circuit current rating RMS symmetrical amperes from table on page 53. Using this table as a reference, make the following selections:

① Select EZM single phase main device below with an equal or higher short circuit rating than the application.

② Select EZM single phase branch units; page 46.

③ Select proper 2-pole type QO, QO-VH, QOH, QBP-TM, QDP-TM, QGP-TM or QJP-TM branch circuit breakers for use as tenant mains in branch unit; page 50.

④ Select accessories as required; page 50.

⑤ Dimensions; page 51.

EZM1800CB

EZM1800CBU

① Main Devices—NEMA 3R Construction

Overhead/Underground Feed

System Type	Ampere Rating	Horizontal Cross Bus Rating and Bus Bar Material	Catalog Number	Width (Dim. see pg. 51)	Price	Line Side Lug and Wire Size (AWG–kcmil) Conductor Qty. per Phase and Neutral (Factory Installed)
65,000 RMS Symmetrical Ampere Short Circuit Current Rating **Main Circuit Breakers (1Ø Incoming and 1Ø Outgoing)**						
1Ø3W 120/240 Vac	400	800 A Al	EZM1400CB▼	18.66	**$ 4120.**	(1) #1–600 or (2) #1–250
	600	800 A Al	EZM1600CB▼	18.66	**5715.**	(3) 3/0–500
	800	800 A Al	EZM1800CB▼	18.66	**7576.**	(3) 3/0–500
	1000	1000 A Al	EZM11000CB▼◊	18.66	**10511.**	(3) 3/0–500
	1200	1200 A Al/Cu	EZM11200CB△□	30.19	**13577.**	(4) 1/0–750
	1600	1200 A Al/Cu	EZM11600CB△□	30.19	**19936.**	(6) 1/0–750
100,000 RMS Symmetrical Ampere Short Circuit Current Rating **Main Fusible Switches (1Ø Incoming and 1Ø Outgoing)—** **Requires 300 Vac Class T Fuses (Order Separately)**						
1Ø3W 120/240 Vac	400	800 A Al	EZM1400FS	18.66	**2659.**	(1) #1–600 or (2) #1–250
	600	800 A Al	EZM1600FS	18.66	**4652.**	(3) 3/0–500
	800	800 A Al	EZM1800FS	18.66	**5981.**	(3) 3/0–500
	1200	1200 A Al/Cu	EZM11200FS□	30.19	**7709.**	(4) 1/0–750
Main Lugs Terminal Boxes (1Ø Incoming and 1Ø Outgoing)♦						
1Ø3W 120/240 Vac	225	800 A Al	EZM1225TB	11.50	**532.**	(1) 4–300
	225	800A Cu	EZM1225TBCU	11.50	**581.**	(1) 4–300
	400	800 A Al	EZM1400TB	18.66	**610.**	(2) 3/0–500
	400	800A Cu	EZM1400TBCU	18.66	**677.**	(2) 3/0–500
	600	800 A Al	EZM1600TB	17.00	**665.**	(1) 350–750 or (2) 1/0–300
	600	800A Cu	EZM1600TBCU	17.00	**810.**	(1) 350–750 or (2) 1/0–300
	800	800 A Al	EZM1800TB	23.93	**824.**	(4) 3/0–500
	800	800A Cu	EZM1800TBCU	23.93	**1105.**	(4) 3/0–500
	1600	1200 A Al	EZM11600TB□	22.33	**2392.**	(6) 3/0–600
	1600	1200 A Cu	EZM11600TBCU	22.33	**2986.**	(6) 3/0–600

Underground Feed Only

System Type	Ampere Rating	Horizontal Cross Bus Rating and Bus Bar Material	Catalog Number Meets EUSERC Requirements	Width (Dim. see pg. 51)	Price	Factory Installed Lug Landings For Use with Crimp-Type Lugs (2-Hole Mounting) Qty. per Phase and Neutral▲
65,000 RMS Symmetrical Ampere Short Circuit Current Rating **Main Circuit Breakers (1Ø Incoming and 1Ø Outgoing)**						
1Ø3W 120/240 Vac	400	800 A Al	EZM1400CBU▼	20.46	**$ 4253.**	1 (Order Lugs Separately)
	600	800 A Al	EZM1600CBU▼	20.46	**6114.**	2 (Order Lugs Separately)
	800	800 A Al	EZM1800CBU▼	20.46	**7841.**	2 (Order Lugs Separately)
	1000	1000 A Al	EZM11000CBU▼■◊	34.19	**11031.**	3 (Order Lugs Separately)
	1200	1200 A Al/Cu	EZM11200CBU▼□■	34.19	**14221.**	3 (Order Lugs Separately)
	1600	1200 A Al/Cu	EZM11600CBU△□★	30.19	**21105.**	6 (Order Lugs Separately)
100,000 RMS Symmetrical Ampere Short Circuit Current Rating **Main Circuit Breakers (1Ø Incoming and 1Ø Outgoing)**						
1Ø3W 120/240 Vac	1000	1000 A Al	EZM11000CBU▼◊	34.19	**11031.**	3 (Order Lugs Separately)
	1200	1200 A Al/Cu	EZM11200CBU▼□	34.19	**14221.**	3 (Order Lugs Separately)
100,000 RMS Symmetrical Ampere Short Circuit Current Rating **Main Fusible Switches (1Ø Incoming and 1Ø Outgoing)—** **Requires 300 Vac Class T Fuses (Order Separately)**						
1Ø3W 120/240 Vac	400	800 A Al	EZM1400FSU	20.46	**4120.**	1 (Order Lugs Separately)
	600	800 A Al	EZM1600FSU	20.46	**6246.**	2 (Order Lugs Separately)
	800	800 A Al	EZM1800FSU	20.46	**7709.**	2 (Order Lugs Separately)
	1200	1200 A Al/Cu	EZM11200FSU□	34.19	**9436.**	3 (Order Lugs Separately)
Main Lugs Terminal Boxes (1Ø Incoming and 1Ø Outgoing). Supplied with isolated neutral (can not be bonded). ♦						
1Ø3W 120/240 Vac	400	800 A Al	EZM1400TBU	16.16	**1029.**	1 (Order Lugs Separately)
	400	800A Cu	EZM1400TBUCU	16.16	**1379.**	1 (Order Lugs Separately)
	800	800 A Al	EZM1800TBU	24.16	**1218.**	2 (Order Lugs Separately)
	800	800A Cu	EZM1800TBUCU	24.16	**1633.**	2 (Order Lugs Separately)
	1200	1200 A Al/Cu	EZM11200TBU□	32.16	**2483.**	3 (Order Lugs Separately)
	1200	1200 A Cu	EZM11200TBUCU	32.16	**3327.**	3 (Order Lugs Separately)

▲ For mechanical lugs (3/0 to 600 kcmil) order kit catalog number CMELK4, Price **$91.00**. Kit includes 4 lugs only. Multiple kits may be required, consult factory. For crimp-type lugs refer to Anderson Electrical Connector Products Catalog AEC-40R.
■ Has a 100,000 RMS symmetrical ampere short circuit current rating.
♦ Has a maximum 100,000 RMS symmetrical short circuit current rating when protected by Class R (600 A Max.) or Class T (800 A Max.) fuses. For other short circuit current ratings refer to table on page 53. Suitable for use on LINE or LOAD side of service equipment. Use to feed type EZMT branch units for 6-Sub Division Rule applications.
★ Does not meet EUSERC Standards. Not stocked in PDS, Order only (allow 6 weeks for delivery). Not UL Listed.
▼ Available by special order with main circuit breaker supplied with other standard ampere ratings, consult local Field Office (allow 6 weeks for delivery).
△ Ampere rating of the PA circuit breaker supplied with this main can be changed it field by ordering a different set of rating columns, refer to Digest 173 page 6-25 for listing.
□ Supplied with copper horizontal bus bars and aluminum vertical bus bars.
◊ May be end mounted to feed branch units with 800 A or 1200 A horizontal cross bus.

For additional information, reference Catalog #4100CT9801.

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EZMH114125

1Ø3W EZ Meter-Pak Meter Centers — UL Listed

② Branch Devices—NEMA 3R Construction

Branch Units—1Ø Incoming and 1Ø Outgoing

System Type	Width (Dim. see pg. 51)	Number of Meter Sockets	Horizontal Cross Bus Rating and Bus Bar Material	Ring Type 4-Jaw Meter Socket▲		Ringless Type 5-Jaw Meter Socket		Ringless Type 5-Jaw Meter Socket with Horn Bypass	
				Catalog Number	Price	Catalog Number	Price	Catalog Number	Price
125 A Maximum (Order Type QO, QO-VH or QOH Circuit Breakers Separately)△									
1Ø3W 120/240 Vac 2-Pole Branch Circuit Breakers	12.25	3	800 A Al 800 A Cu	EZM113125 EZM113125CU	**$ 957.** **1288.**	EZMR113125 EZMR113125CU	**$ 957.** **1288.**	EZMH113125 EZMH113125CU	**$1170.** **1608.**
		4	800 A Al 800 A Cu	EZM114125 EZM114125CU	**1276.** **1767.**	EZMR114125 EZMR114125CU	**1276.** **1767.**	EZMH114125 EZMH114125CU	**1435.** **2007.**
		5	800 A Al 800 A Cu	EZM115125 EZM115125CU	**1569.** **2206.**	EZMR115125 EZMR115125CU	**1569.** **2206.**	EZMH115125 EZMH115125CU	**1940.** **2764.**
		6	800 A Al 800 A Cu	EZM116125 EZM116125CU	**1861.** **2644.**	EZMR116125 EZMR116125CU	**1861.** **2644.**	EZMH116125 EZMH116125CU	**2366.** **3402.**
225 A Maximum Branch Units (Order Type QB, QD, QG or QJ Circuit Breakers Separately)△☆									
1Ø3W 120/240 Vac 2-Pole Branch Circuit Breakers	17.38	2	800 A Al 800 A Cu	EZM112225 EZM112225CU	**1515.** **2126.**	EZMR112225 EZMR112225CU	**1515.** **2126.**	EZMH112225 EZMH112225CU	**1649.** **2326.**
		3	800 A Al 800 A Cu	EZM113225 EZM113225CU	**1861.** **2644.**	EZMR113225 EZMR113225CU	**1861.** **2644.**	EZMH113225 EZMH113225CU	**2046.** **2923.**
		4	800 A Al 800 A Cu	EZM114225 EZM114225CU	**2392.** **3441.**	EZMR114225 EZMR114225CU	**2392.** **3441.**	EZMH114225 EZMH114225CU	**2685.** **3881.**
		5	1200 A Al/CU 1200 A Cu	EZM115225 EZM115225CU	**3143.** **4459.**	EZMR115225 EZMR115225CU	**3143.** **4459.**	EZMH115225 EZMH115225CU	**3143.** **5198.**

EZML113225

225 A Maximum Commercial Branch Units (Order Type QB, QD, QG or QJ Circuit Breakers Separately)☆

System Type	Number of Meter Sockets	Horizontal Cross Bus Rating and Bus Bar Material	Ringless Type 5-Jaw Meter Socket with Lever Bypass and Jaw Release▼			Ring Type 5-Jaw Meter Socket with Test Block Bypass. Meets EUSERC Requirements		
			Catalog Number	Width (Dim. see pg. 51)	Price	Catalog Number	Width (Dim. see pg. 51)	Price
1Ø3W 120/240 Vac 2-Pole Branch Circuit Breakers	1	1200 A Al/Cu 1200 A Cu 1200 A Al/Cu	EZML111225 EZML111225CU EZML111225D■	19.44	**$1635.** **2453.** **1717.**	EZMT111225♦	22.42	**$2258.** **. . .** **. . .**
	2	1200 A Al/Cu 1200 A Cu 1200 A Al/Cu	EZML112225 EZML112225CU EZML112225D■	19.44	**2977.** **4466.** **3126.**	EZMT112225♦	22.42	**4095.** **. . .** **. . .**
	3	1200 A Al/Cu 1200 A Cu 1200 A Al/Cu	EZML113225 EZML113225CU EZML113225D■	19.44	**4386.** **6579.** **4605.**	EZMT113225♦□	22.42	**6143.** **. . .** **. . .**
	4	1200 A Al/Cu 1200 A Cu 1200 A Al/Cu	EZML114225 EZML114225CU EZML114225D■	19.44	**5875.** **8813.** **6169.**	. . . .	. . . .	**. . .** **. . .** **. . .**

EZMT111225

400 A Maximum Commercial Branch Units

System Type	Number of Meter Sockets	Main Cross Bus Rating and Bus Bar Material	Ringless Type 5-Jaw Meter Socket with Lever Bypass and Jaw Release—400 A Type LAL Branch Circuit Breaker Included Factory Installed.★▼◊			Ringless Type K Bolt-On 4-Jaw Meter Socket with Manual Bypass—400A Type DJM Branch Circuit Breaker Included Factory Installed. Ampere rating field adjustable from 160 A–400 A.		
			Catalog Number	Width (Dim. see pg. 51)	Price	Catalog Number	Width (Dim. see pg. 51)	Price
1Ø3W 120/240 Vac 2-Pole Branch Circuit Breakers	1	1200 A Al/Cu 1200 A Cu	EZML111400 EZML111400CU	23.21	**$ 3987.** **5981.**	. . . EZMK111400	. . . 27.56	**. . .** **$4949.**
	2	1200 A Al/Cu 1200 A Cu	EZML112400 EZML112400CU	23.21	**7975.** **11963.**	. . . EZMK112400	. . . 27.56	**. . .** **9687.**

▲ Snap-on aluminum sealing rings supplied as standard.
■ Supplied with removable drip hood and equipped with an indoor top endwall with knockouts provided.
♦ Supplied with bondable neutral, suitable for use as service equipment. Use main lugs tapbox type EZM-TBU for 6-Sub Division Rule applications to feed this device. Supplied with copper horizontal bus bars and aluminum vertical bus bars.
★ Device has limited short circuit current rating, refer to page 53.
▼ Supplied with Class 320 meter socket.
△ For 1200A main cross bus add suffix "X" to catalog number (Example: EZM314125X). Add **$147.** per device. Allow 6 weeks for delivery.
□ Does not meet EUSERC 48" minImum / 75" maximum meter height requirements for outdoor installations. This device measures 37" minimum / 75" maximum. EUSERC indoor requirements are 36" minimum / 75" maximum.
◊ Not UL Listed.
☆ Type QO, QO-VH and QOH branch circuit breakers (40 A–60 A) may be installed with use of EZM125QOA adapter kits, refer to page 50.

For additional information, reference Catalog #4100CT9801.

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3Ø4W EZ METER-PAK Meter Centers—UL Listed

Select EZM meter center short circuit current rating RMS symmetrical amperes from table on page 53. Using this table as a reference, make the following selections:

① Select three phase EZM main device below with an equal or higher short circuit rating than the application.

② Select EZM three phase branch units from page 48 and 49.

③ Select proper 2-pole type QO, QO-VH, QOH, QBP-TM, QDP-TM, QGP-TM or QJP-TM or 3-pole QBP-TM, QDP-TM, QGP-TM or QJP-TM branch circuit breakers for use as tenant mains in branch unit; page 50.

④ Select accessories as required, page 50.

⑤ Dimensions, page 51.

EZM3600FS

EZM31600CB

① Main Devices—NEMA 3R Construction

Overhead/Underground Feed

System Type	Ampere Rating	Horizontal Cross Bus Rating and Bus Bar Material	Catalog Number	Width (Dim. see pg. 51)	Price	Line Side Lug and Wire Size (AWG–kcmil) Conductor Qty. per Phase and Neutral (Factory Installed)
65,000 RMS Symmetrical Ampere Short Circuit Current Rating **Main Circuit Breakers (3Ø Incoming and 3Ø Outgoing)**						
3Ø4W 208Y/120 Vac OR 240/120 Vac DELTA	400	800 A Al	EZM3400CB▼	18.66	**$ 4413.**	(1) #1–600 or (2) #1–250
	600	800 A Al	EZM3600CB▼	18.66	**6831.**	(3) 3/0–500
	800	800 A Al	EZM3800CB▼	18.66	**9100.**	(3) 3/0–500
	1000	1000 A Al	EZM31000CB▼☆	18.66	**11351.**	(3) 3/0–500
	1200	1200 A Al/Cu	EZM31200CB△□	30.19	**15418.**	(4) 1/0–750
	1600	1200 A Al/Cu	EZM31600CB△□	30.19	**23525.**	(6) 1/0–750
100,000 RMS Symmetrical Ampere Short Circuit Current Rating **Main Fusible Switches (3Ø Incoming and 3Ø Outgoing)—Requires 300 Vac Class T Fuses (Order Separately)**						
3Ø4W 208Y/120 Vac OR 240/120 Vac DELTA	400	800 A Al	EZM3400FS	18.66	**2977.**	(1) #1–600 or (2)#1–250
	600	800 A Al	EZM3600FS	18.66	**5582.**	(3) 3/0–500
	800	800 A Al	EZM3800FS	18.66	**7710.**	(3) 3/0–500
Main Lugs Terminal Boxes (3Ø Incoming and 3Ø Outgoing)♦						
3Ø4W 208Y/120 Vac OR 240/120 Vac DELTA	225	800 A Al	EZM3225TB	11.50	**675.**	(1) 4–300
	225	800A Cu	EZM3225TBCU	11.50	**749.**	(1) 4–300
	400	800 A Al	EZM3400TB	18.66	**742.**	(2) 3/0–500
	400	800A Cu	EZM3400TBCU	18.66	**1286.**	(2) 3/0–500
	600	800 A Al	EZM3600TB	17.00	**797.**	(1) 350–750 or (2) 1/0–300
	600	800A Cu	EZM3600TBCU	17.00	**1415.**	(1) 350–750 or (2) 1/0–300
	800	800 A Al	EZM3800TB	23.93	**961.**	(4) 3/0–500
	800	800A Cu	EZM3800TBCU	23.93	**2363.**	(4) 3/0–500
	1600	1200 A Al	EZM31600TB□	22.33	**2685.**	(6) 3/0–600
	1600	1200 A Cu	EZM31600TBCU	22.33	**3576.**	(6) 3/0–600

Underground Feed Only

System Type	Ampere Rating	Horizontal Cross Bus Rating and Bus Bar Material	Catalog Number Meets EUSERC Requirements	Width (Dim. see pg. 51)	Price	Factory Installed Lug Landings For Use with Crimp-Type Lugs (2-Hole Mounting) Qty. per Phase and Neutral▲
65,000 RMS Symmetrical Ampere Short Circuit Current Rating **Main Circuit Breakers (3Ø Incoming and 3Ø Outgoing)**						
3Ø4W 208Y/120 Vac OR 240/120 Vac DELTA	400	800 A Al	EZM3400CBU▼	20.46	**$ 4785.**	1 (Order Lugs Separately)
	600	800 A Al	EZM3600CBU▼	20.46	**7204.**	2 (Order Lugs Separately)
	800	800 A Al	EZM3800CBU▼	20.46	**9410.**	2 (Order Lugs Separately)
	1000	1000 A Al	EZM31000CBU▼■☆	34.19	**11962.**	3 (Order Lugs Separately)
	1200	1200 A Al/Cu	EZM31200CBU▼□■	34.19	**16215.**	3 (Order Lugs Separately)
	1600	1200 A Al/Cu	EZM31600CBU△□★	30.19	**24780.**	6 (Order Lugs Separately)
100,000 RMS Symmetrical Ampere Short Circuit Current Rating **Main Circuit Breakers (3Ø Incoming and 3Ø Outgoing)**						
3Ø4W, 208Y/120 Vac OR 240/120 Vac DELTA	1000	1000 A Al	EZM31000CBU▼☆	34.19	**11962.**	3 (Order Lugs Separately)
	1200	1200 A Al/Cu	EZM31200CBU▼□	34.19	**16215.**	3 (Order Lugs Separately)
Main Fusible Switches (3Ø Incoming and 3Ø Outgoing)—Requires 300 Vac Class T Fuses (Order Separately)						
3Ø4W 208Y/120 Vac OR 240/120 Vac DELTA	400	800 A Al	EZM3400FSU	20.46	**4652.**	1 (Order Lugs Separately)
	600	800 A Al	EZM3600FSU	20.46	**7576.**	2 (Order Lugs Separately)
	800	800 A Al	EZM3800FSU	20.46	**10101.**	2 (Order Lugs Separately)
Main Lugs Terminal Boxes (3Ø Incoming and 3Ø Outgoing). Supplied with isolated neutral (can not be bonded). ♦						
3Ø4W 208Y/120 Vac OR 240/120 Vac DELTA	400	800 A Al	EZM3400TBU	16.16	**1225.**	1 (Order Lugs Separately)
	400	800 A Cu	EZM3400TBUCU	16.16	**1642.**	1 (Order Lugs Separately)
	800	800 A Al	EZM3800TBU	24.16	**1400.**	2 (Order Lugs Separately)
	800	800 A Cu	EZM3800TBUCU	24.16	**1875.**	2 (Order Lugs Separately)
	1200	1200 A Al/Cu	EZM31200TBU□	32.16	**2975.**	3 (Order Lugs Separately)
	1200	1200 A Cu	EZM31200TBUCU	32.16	**3986.**	3 (Order Lugs Separately)

▲ For mechanical lugs (3/0 to 600 kcmil) order kit catalog number CMELK4, Price **$91.00**. Kit includes 4 lugs only. Multiple kits may be required, consult factory. For crimp-type lugs refer to Anderson Electrical Connector Products Catalog AEC-40R.
■ Has a 100,000 RMS symmetrical ampere short circuit current rating.
♦ Has a maximum 100,000 RMS symmetrical short circuit current rating when protected by Class R (600 A Max.) or Class T (800 A Max.) fuses. For other short circuit current ratings refer to table on page 53. Suitable for use on LINE or LOAD side of service equipment. Use to feed type EZMT branch units for 6-Sub Division Rule applications.
★ Does not meet EUSERC requirements. Not stocked in PDS, order only (allow 6 weeks for delivery). Not UL Listed.
▼ Available by special order with main circuit breaker supplied with other standard ampere ratings, consult your nearest Square D/Schneider Electric sales office (allow 6 weeks for delivery).
△ Ampere rating of the PA circuit breaker supplied with this main can be changed it field by ordering a different set of rating columns, refer to Digest 173 page 6-25 for listing.
□ Supplied with copper horizontal bus bars and aluminum vertical bus bars.
◊ May be end mounted to feed branch units with 800 A or 1200 A horizontal cross bus.

For additional information, reference Catalog #4100CT9801.

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EZML313225

3Ø4W EZ Meter-Pak Meter Centers — UL Listed

② Branch Devices—NEMA 3R Construction

Branch Units—3Ø Incoming and 1Ø Outgoing

System Type	Width (Dim. see pg. 51)	Number of Meter Sockets	Horizontal Cross Bus Rating□ and Bus Bar Material	Ring Type 5-Jaw Meter Socket▲ Catalog Number	Price	Ringless Type 5-Jaw Meter Socket Catalog Number	Price	Ringless Type 5-Jaw Meter Socket with Horn Bypass Catalog Number	Price
125 A Maximum (Order Type QO, QO-VH or QOH Circuit Breakers Separately)▲□★									
3Ø4W 208Y/120 Vac 5-Jaw-Meter Socket 2-Pole Branch Circuit Breakers	12.25	3	800 A Al	EZM313125	**$1036.**	EZMR313125	**$1036.**	EZMH313125	**$1250.**
			800 A Cu	EZM313125M10■	**2835.**	. . .	**. . .**	. . .	**. . .**
			800 A Cu	EZM313125CU	**1408.**	EZMR313125CU	**1408.**	EZMH313125CU	**1727.**
		4	800 A Al	EZM314125	**1356.**	EZMR314125	**1359.**	EZMH314125	**1649.**
			800 A Cu	EZM314125M10■	**3780.**	. . .	**. . .**	. . .	**. . .**
			800 A Cu	EZM314125CU	**1887.**	EZMR314125CU	**1891.**	EZMH314125CU	**2326.**
		5	800 A Al	EZM315125	**1728.**	EZMR315125	**1728.**	EZMH315125	**2074.**
			800 A Cu	EZM315125M10■	**4725.**	. . .	**. . .**	. . .	**. . .**
			800 A Cu	EZM315125CU	**2445.**	EZMR315125CU	**2445.**	EZMH315125CU	**2964.**
		6	800 A Al	EZM316125	**1994.**	EZMR316125	**1994.**	EZMH316125	**2525.**
			800 A Cu	EZM316125CU	**2844.**	EZMR316125CU	**2844.**	EZMH316125CU	**3641.**
225 A Maximum (Order Type QB, QD, QG or QJ Circuit Breakers Separately)▲☆□									
3Ø4W 208Y/120 Vac 5-Jaw-Meter Socket 2-Pole Branch Circuit Breakers	17.38	2	800 A Al	EZM312225	**$1515.**	EZMR312225	**$1515.**	EZMH312225	**$1649.**
			800 A Cu	EZM312225CU	**2126.**	EZMR312225CU	**2126.**	EZMH312225CU	**2326.**
		3	800 A Al	EZM313225	**1861.**	EZMR313225	**1861.**	EZMH313225	**2074.**
			800 A Cu	EZM313225CU	**2644.**	EZMR313225CU	**2644.**	EZMH313225CU	**2964.**
		4	800 A Al	EZM314225	**2499.**	EZMR314225	**2499.**	EZMH314225	**2765.**
			800 A Cu	EZM314225CU	**3602.**	EZMR314225CU	**3602.**	EZMH314225CU	**4001.**
		5	1200 A Al/Cu	EZM315225	**3280.**	EZMR315225	**3638.**	EZMH315225	**3812.**
			1200 A Cu	EZM315225CU	**4660.**	EZMR315225CU	**4832.**	EZMH315225CU	**5128.**

EZMT311225

EZMT311225
Without Cover

225 A Maximum Commercial Branch Units

System Type	Number of MeterSockets	Horizontal Cross Bus Rating and Bus Bar Material	Ringless Type Meter Socket without Bypass Catalog Number	Width (Dim. see pg. 51)	Price	Ringless Type Meter Socket with Lever Bypass and Jaw Release★ Catalog Number	Width (Dim. see pg. 51)	Price	Ring Type Meter Socket with Test Block Bypass. Meets EUSERC Requirements Catalog Number	Width (Dim. see pg. 51)	Price
3Ø Incoming and 1Ø Outgoing▲ (Order Type QB, QD, QG or QJ circuit breakers separately)☆											
3Ø4W 208Y/120 Vac 5-Jaw Meter Sockets 2-Pole Branch Circuit Breakers	1	1200 A Al/Cu	. . .	. . .	**. . .**	. . .	. . .	**. . .**	EZMT311225■	22.42	**$2363.**
	2	1200 A Al/Cu	. . .	. . .	**. . .**	EZML312225	19.44	**$2844.**	EZMT312225■	22.42	**4463.**
		1200 A Cu	. . .	. . .	**. . .**	EZML312225CU		**4267.**	. . .	. . .	**. . .**
		1200 A Al/Cu	. . .	. . .	**. . .**	EZML312225D★		**2986.**	. . .	. . .	**. . .**
	3	1200 A Al/Cu	. . .	. . .	**. . .**	EZML313225	19.44	**4280.**	EZMT313225■◊	22.42	**6694.**
		1200 A Cu	. . .	. . .	**. . .**	EZML313225CU		**6420.**	. . .	. . .	**. . .**
		1200 A Al/Cu	. . .	. . .	**. . .**	EZML313225D★		**4494.**	. . .	. . .	**. . .**
	4	1200 A Al/Cu	. . .	. . .	**. . .**	EZML314225	19.44	**5821.**	. . .	. . .	**. . .**
		1200 A Cu	. . .	. . .	**. . .**	EZML314225CU		**8732.**	. . .		**. . .**
		1200 A Al/Cu	. . .	. . .	**. . .**	EZML314225D★		**6112.**	. . .		**. . .**
3Ø Incoming and 3Ø Outgoing (Order QB, QD, QG or QJ circuit breakers separately)											
3Ø4W 240/120 Vac DELTA or 208Y/120 Vac 7-Jaw Meter Socket 3-Pole Branch Circuit Breakers	1	1200 A Al/Cu	. . .	. . .	**. . .**	EZML331225	19.44	**1861.**	EZMT331225■	22.42	**2625.**
		1200 A Cu	. . .	. . .	**. . .**	EZML331225CU		**2791.**	. . .	. . .	**. . .**
		1200 A Al/Cu	. . .	. . .	**. . .**	EZML331225D★		**1954.**	. . .	. . .	**. . .**
	2	1200 A Al/Cu	EZMR332225	19.44	**$3124.**	EZML332225	19.44	**3403.**	EZMT332225■	22.42	**4638.**
		1200 A Cu	EZMR332225CU		**4686.**	EZML332225CU		**5105.**	. . .	. . .	**. . .**
		1200 A Al/Cu	. . .		**. . .**	EZML332225D★		**3573.**	. . .	. . .	**. . .**
	3	1200 A Al/Cu	EZMR333225	19.44	**4891.**	EZML333225	19.44	**5196.**	EZMT333225■◊	22.42	**6869.**
		1200 A Cu	EZMR333225CU		**7336.**	EZML333225CU		**7795.**	. . .	. . .	**. . .**
		1200 A Al/Cu	. . .		**. . .**	EZML333225D★		**5456.**	. . .	. . .	**. . .**
	4	1200 A Al/Cu	EZMR334225	19.44	**6779.**	EZML334225	19.44	**7111.**	. . .		**. . .**
		1200 A Cu	EZMR334225CU		**10168.**	EZML334225CU		**10666.**	. . .	. . .	**. . .**
		1200 A Al/Cu	. . .		**. . .**	EZML334225D★		**7476.**	. . .		**. . .**

▲ Snap-On aluminum sealing rings supplied as standard.
■ Distance between meter sockets as measured from centerline to centerline is 10 inches.
♦ For 240/120 Vac DELTA Systems add Suffix "CA" to catalog number (Example: EZM314125**CA**). All meter sockets are phased A and C only. Price remains the same as the base catalog number. Order only branch units, not stocked in PDS (6-week delivery).
★ Supplied with removable drip hood and equipped with an indoor top endwall with knockouts provided.
▼ Supplied with bondable neutral, suitable for use as service equipment. Use main lugs tap box type EZM-TBU for 6-Sub Division Rule applications to feed this device. Supplied with copper horizontal bus bars and aluminum vertical bus bars.
△ Supplied with Class 320 meter socket.
□ For 1200 A main cross bus, add suffix "X" to catalog number. Example: EZMR313125X. Add **$147.** per device. Allow 6 weeks for delivery.
◊ Does not meet EUSERC 48" minimum/75" maximum meter height requirements as measured from grade level to centerline on meter. This device measures 37" minimum/75" maximum
☆ Type QO, QO-VH and QOH branch circuit breakers (40 A–60 A) may be installed with use of EZM125QOA adapter kits, refer to page 50.

For 400 A maximum Commercial Branch Units, see page 49.

For additional information, reference Catalog #4100CT9801.

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EZMK311400

3Ø4W EZ Meter-Pak Meter Centers — UL Listed

② Branch Devices—NEMA 3R Construction (Continued)

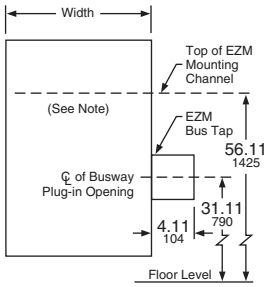
400 A Maximum Commercial Branch Units

System Type	Number of Meter Sockets	Horizontal Cross Bus Rating	Ringless Type Meter Socket with Lever Bypass and Jaw Release— 400 A Type LAL Branch Circuit Breaker Included Factory Installed.♦★			Ringless Type K Bolt-On Meter Socket with Manual Bypass— 400 A Type DJM Branch Circuit Breaker Included Factory Installed. Ampere rating field adjustable from 160 A–400 A.		
			Catalog Number	Width (Dim. see pg. 51)	Price	Catalog Number	Width (Dim. see pg. 51)	Price
3Ø Incoming and 1Ø Outgoing▲								
3Ø4W 208Y/120 Vac 5-Jaw Meter Socket 2-Pole Branch Circuit Breakers	1	1200 A Al/Cu 1200 A Cu	EZML311400■ EZML311400CU	23.21	**$ 3987.** **5981.**	. . . EZMK311400	. . . 27.56	. . . **$ 5949.**
	2	1200 A Cu	EZML312400■ EZML312400CU	23.21	**7975.** **11963.**	. . . EZMK312400	. . . 27.56	. . . **11689.**
3Ø Incoming and 3Ø Outgoing								
3Ø4W 240/120 Vac DELTA or 208Y/120 Vac 7-Jaw Meter Socket 3-Pole Branch Circuit Breakers	1	1200 A Al/Cu 1200 A Cu	EZML331400■ EZML331400CU	23.21	**4652.** **6977.**	. . . EZMK331400	. . . 27.56	. . . **$ 7010.**
	2	1200 A Al/Cu 1200 A Cu	EZML332400■ EZML332400CU	23.21	**9304.** **13957.**	. . . EZMK332400	. . . 27.56	. . . **13810.**

▲ For 240/120 Vac DELTA Systems add Suffix "CA" to catalog number (Example: EZML312400**CA**). All meter sockets are phased A and C only. Price remains the same as the base catalog number. "Order only" branch units, not stocked in PDS (4–6 week delivery). Order point Lexington.
■ Supplied with copper horizontal bus bars and aluminum vertical bus bars.
♦ Device has limited short circuit current rating, refer to page 53.
★ Supplied with Class 320 meter socket.

EZM Main with Busway Tap

EZ METER-PAK metering equipment is available for use in high rise applications for connection to 800 A–5000 A I-LINE® or I-LINE II plug-in busway installed as a vertical riser. Three phase only EZM main devices in the form of a main circuit breaker or main fusible switch are available with an integral busway tap extending from the right or left side of the main device and phased to align with the busway for either neutral front or neutral back installations.



EZM3800CBNFBTR

BUSWAY Mains, three phase only (Indoor only) ordering instructions:

Step #1: Determine height to center line of busway plug-in opening, check local utility requirements for minimum and maximum meter socket heights.

Step #2: Determine side of EZM main section for busway tap to extend from (busway tap is an integral part of the main and extends to the left or right on the EZM device as viewed from the front).

Step #3: Check phasing of busway riser to insure that it matches phasing of busway tap on main section (indicated as neutral front or neutral back as viewed from the front).

Step #4: Select catalog number from tables below.

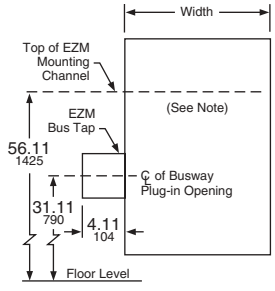
Step #5: Busway main devices are build to order specials and require 4 to 6 weeks for delivery (order point Lexington).

EZM Mains with Busway Tap (Three Phase Only—note positioning left or right below)

Ampere Rating	Width (IN)	Horizontal Cross Bus Rating	Main Circuit Breaker with Busway Tap▼			Main Fusible Switch with Busway Tap△		
			Neutral Front	Neutral Back	Price	Neutral Front	Neutral Back	Price
Busway to RIGHT of metering equipment lineup								
400	18.66	800 A Al	EZM3400CBNFBTR	EZM3400CBNBBTR	**$ 5924.**	EZM3400FSNFBTR	EZM3400FSNBBTR	**$4488.**
600	18.66	800 A Al	EZM3600CBNFBTR	EZM3600CBNBBTR	**8342.**	EZM3600FSNFBTR	EZM3600FSNBBTR	**7093.**
800	18.66	800 A Al	EZM3800CBNFBTR	EZM3800CBNBBTR	**10496.**	EZM3800FSNFBTR	EZM3800FSNBBTR	**9220.**
1000	18.66	1000 A Al	EZM31000CBNFBTR☆	EZM31000CBNBBTR☆	**12861.**	. . .	. . .	. . .
1200	30.19	1200 A Al/Cu	EZM31200CBNFBTR□◊	EZM31200CBNBBTR□◊	**16929.**	. . .	. . .	. . .
Busway to LEFT of metering equipment lineup								
400	18.66	800 A Al	EZM3400CBNFBTL	EZM3400CBNBBTL	**$ 5924.**	EZM3400FSNFBTL	EZM3400FSNBBTL	**$4488.**
600	18.66	800 A Al	EZM3600CBNFBTL	EZM3600CBNBBTL	**8342.**	EZM3600FSNFBTL	EZM3600FSNBBTL	**7093.**
800	18.66	800 A Al	EZM3800CBNFBTL	EZM3800CBNBBTL	**10496.**	EZM3800FSNFBTL	EZM3800FSNBBTL	**9220.**
1000	18.66	1000 A Al	EZM31000CBNFBTL☆	EZM31000CBNBBTL☆	**12861.**	. . .	. . .	. . .
1200	30.19	1200 A Al/Cu	EZM31200CBNFBTL□◊	EZM31200CBNBBTL□◊	**16929.**	. . .	. . .	. . .

▼ Has a maximum 65,000 RMS symmetrical short circuit current rating.
△ Has a 100,000 RMS symmetrical ampere short circuit current rating.
□ Supplied with copper horizontal bus bars and aluminum vertical bus bars.
◊ Requires use of branch units supplied with 1200 A horizontal cross bus.
☆ May be end mounted to feed branch units with 800 A or 1200 A horizontal cross bus.

Note: Dimensions shown will position the centerline of top meter socket of a 125 A, 5-Gang or 6-Gang branch unit at 72" above floor level. Check with utility to meet local requirements.



EZM3800FSNBBTL

For additional information, reference Catalog #4100CT9801.

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QO2100VH
2-Pole, Plug-on Type
Circuit Breaker

QDP22200TM
2-Pole, Bolt-on Type
Circuit Breaker

For additional information, reference Catalog #4100CT9801.

③ Tenant Circuit Breakers

Poles	Ampere Rating	10 kA AIR		22 kA AIR		42 kA AIR		100 kA AIR	
		Cat. No.	Price	Cat. No.	Price	Cat. No.	Price	Cat. No.	Price
125 A Max. EZM Branch Unit Tenant Circuit Breakers									
2	40	QO240	$ 44.70	QO240VH	$ 97.00	QOH240	$ 211.00	. . .	. . .
	50	QO250	44.70	QO250VH	97.00	QOH250	211.00	. . .	. . .
	60	QO260	44.70	QO260VH	97.00	QOH260	211.00	. . .	. . .
	70	QO270	89.00	QO270VH	149.00	QOH270	352.00	. . .	. . .
	80	QO280	126.00	QO280VH	210.00	QOH280	434.00	. . .	. . .
	90	QO290	126.00	QO290VH	210.00	QOH290	434.00	. . .	. . .
	100	QO2100	126.00	QO2100VH	210.00	QOH2100	434.00	. . .	. . .
	110	QO2110	285.00	QO2110VH	689.00	QOH2110	926.00	. . .	. . .
	125	QO2125	285.00	QO2125VH	689.00	QOH2125	926.00	. . .	. . .

		10 kA AIR		25 kA AIR		65 kA AIR		100 kA AIR	
225 A Max. EZM Branch Unit Tenant Circuit Breakers									
2	40	QO240	$ 44.70	QO240VH▲	$ 97.00	QOH240■	$ 211.00	. . .	. . .
	50	QO250	44.70	QO250VH▲	97.00	QOH250■	211.00	. . .	. . .
	60	QO260	44.70	QO260VH▲	97.00	QOH260■	211.00	. . .	. . .
	70	QBP22070TM	316.00	QDP22070TM	762.00	QGP22070TM	1014.00	QJP22070TM	$1260.00
	80	QBP22080TM	316.00	QDP22080TM	762.00	QGP22080TM	1014.00	QJP22080TM	1260.00
	90	QBP22090TM	316.00	QDP22090TM	762.00	QGP22090TM	1014.00	QJP22090TM	1260.00
	100	QBP22100TM	316.00	QDP22100TM	762.00	QGP22100TM	1014.00	QJP22100TM	1260.00
	125	QBP22125TM	316.00	QDP22125TM	762.00	QGP22125TM	1014.00	QJP22125TM	1260.00
	150	QBP22150TM	316.00	QDP22150TM	762.00	QGP22150TM	1014.00	QJP22150TM	1260.00
	175	QBP22175TM	316.00	QDP22175TM	762.00	QGP22175TM	1014.00	QJP22175TM	1260.00
	200	QBP22200TM	316.00	QDP22200TM	762.00	QGP22200TM	1014.00	QJP22200TM	1260.00
	225	QBP22225TM	316.00	QDP22225TM	762.00	QGP22225TM	1014.00	QJP22225TM	1260.00
3	70	QBP32070TM	$ 832.00	QDP32070TM	$1189.00	QGP32070TM	$1628.00	QJP32070TM♦	$1864.00
	80	QBP32080TM	832.00	QDP32080TM	1189.00	QGP32080TM	1628.00	QJP32080TM♦	1864.00
	90	QBP32090TM	832.00	QDP32090TM	1189.00	QGP32090TM	1628.00	QJP32090TM♦	1864.00
	100	QBP32100TM	832.00	QDP32100TM	1189.00	QGP32100TM	1628.00	QJP32100TM♦	1864.00
	125	QBP32125TM	832.00	QDP32125TM	1189.00	QGP32125TM	1628.00	QJP32125TM♦	1864.00
	150	QBP32150TM	832.00	QDP32150TM	1189.00	QGP32150TM	1628.00	QJP32150TM♦	1864.00
	175	QBP32175TM	832.00	QDP32175TM	1189.00	QGP32175TM	1628.00	QJP32175TM♦	1864.00
	200	QBP32200TM	832.00	QDP32200TM	1189.00	QGP32200TM	1628.00	QJP32200TM♦	1864.00
	225	QBP32225TM	832.00	QDP32225TM	1189.00	QGP32225TM	1628.00	QJP32225TM♦	1864.00

▲ QO-VH tenant circuit breaker is rated 22 kA AIR max.
■ QOH tenant circuit breaker is rated 42 kA AIR max.
♦ 3-pole QJP tenant circuit breaker is rated 65 kA AIR max. at 240/120 Vac, 3-Phase, 4-Wire High Leg DELTA, or 100kA AIR max. at 208Y/120 Vac, 3-Phase, 4-Wire.

④ Accessories

Description	Catalog Number	Price
FIFTH JAW KIT (1 per kit)	5J★	$ 12.20
Secondary Surge Arrester Mounting Kit For use with 1 or 2-SDSA1175 or 1-SDSA3650 (order surge arrester separately)	MMSAMK▼	53.00
Transition Section, 1200 A (10.7" wide)		
Add right of old style 1Ø EZM lineup	EZM1TRANR	158.00
Add right of old style 3Ø EZM lineup	EZM3TRANR	168.00
Add left of old style 1Ø EZM lineup	EZM1TRANL	210.00
Add left of old style 3Ø EZM lineup	EZM3TRANL	221.00
1200 A 1Ø3W BUSSED EXTENSION (Indoor/Outdoor)	EZM1EXT	511.00
1200 A 1Ø3W BUSSED CORNER for INSIDE CORNER (NEMA 1 indoor only)	EZM1CORNER	1192.00
1200 A 3Ø4W BUSSED EXTENSION (Indoor/Outdoor)	EZM3EXT	644.00
1200 A 3Ø4W BUSSED CORNER for INSIDE CORNER (NEMA 1 indoor only)	EZM3CORNER	1478.00
1200 A, 1-Phase, 3-Wire BUSSED ELBOW for OUTSIDE CORNER (NEMA 1 indoor only)	EZM1ELBOW	1192.00
1200 A, 3-Phase, 4-Wire BUSSED ELBOW for OUTSIDE CORNER (NEMA 1 indoor only)	EZM3ELBOW	1478.00
Stud Kit for 400 A TAP BOX includes (2) 1/2"-13 studs per pad and mounting hardware. Four pads per kit.	EZMSK2	164.00
Stud Kit for 800 A TAP BOX includes (4) 1/2"-13 studs per pad and mounting hardware. Four pads per kit.	EZMSK4	328.00
LEXAN METER SOCKET CLOSING PLATE Not for use on commercial sockets.	29007	6.70
Q2 CIRCUIT BREAKER CLOSING PLATE	EZMPCP	7.40
MOUNTING CHANNEL (72" long)	EZM72MC	42.00
METAL CLOSING PLATE For use only on Type EZML and EZMR (3Ø IN-3Ø OUT) branch units.	RSG4	81.00
SEALING RINGS:		
SNAP-ON (Stainless Steel)	ARP00026	11.10
SCREW-Type (Aluminum)	29008W	13.40
LATCH-Type (Aluminum)-standard	2920910001	5.00
HORN BYPASS KIT (use with type EZMR 1Ø meter socket only)	MMHB	11.10
BARREL LOCK KIT For use on ringless EZM or MP branch unit covers, includes 6 each of head protectors, lock nuts and sealing caps. (Barrel lock not included.)	MMBLC	44.10
QO ADAPTER for BOLT-ON Q-frame Tenant Circuit Breakers (40–60 A, 2-Pole)	EZM125QOA	182.00
EQUIPMENT GROUND TERMINAL	. . . .	Included

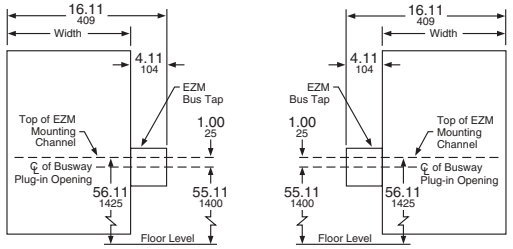
④ Accessories (Continued)

Description	Catalog Number	Price
SLIDER TYPE MANUAL CIRCUIT CLOSER (for one Ring Type socket only): 125–200 A (Indoor/Outdoor)	MM200MB△ □	114.00
ANTI-INVERSION CLIP Rejects use of 100 A and 200 A meters in Class 320 meter sockets in Type EZML branch units.	59676	5.30
Al/Cu Lug Kits (Each kit includes three, 2-barrel lugs.)		
(1) #1/0–600 kcmil or (2) #1/0–250 kcmil per lug	MMLK250	100.00
(2) #3/0–500 kcmil per lug	MMLK500	133.00
(2) #2–600 kcmil per lug	MMLK600	155.00

★ All sockets include 5th Jaw Factory installed except EZM11__ devices.
▼ Consult your nearest Square D/Schneider Electric sales office for details.
△ Meter center short circuit current rating is 10,000 RMS symmetrical amperes with manual circuit closers installed (bypass is not designed for use as continuous duty).
□ For use on ring type meter sockets only.

Busway Transition Section

EZM busway transition section provides no overcurrent protection for the downstream EZM branch units. Tenant main circuit breakers in these branch units must be selected as "fully rated" equipment. (Examples: QO for 10 kA, QO-VH for 22 kA or QOH for 42 kA.)



EZM3BUSRF and EZM3BUSRB **EZM3BUSLF and EZM3BUSLB**

EZM Busway Transition Sections (three phase only)

Ampere Rating	Neutral Front	Neutral Back	Width (IN)	Price
I-LINE® Busway located on RIGHT side of EZM Transition Section				
1200	EZM3BUSRF	EZM3BUSRB	12.00	$2625.
I-LINE Busway located on LEFT side of EZM Transition Section				
1200	EZM3BUSLF	EZM3BUSLB	12.00	2625.

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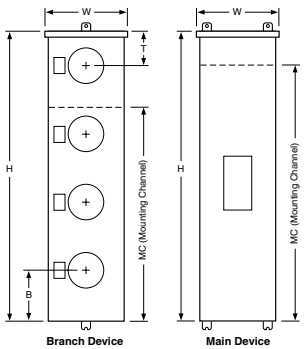
Main Devices

Catalog Number	Height (H)	Width (W)	Depth (D)	Mtg. Channel (MC)
EZM11000CB	53.97	18.66	11.50	34.30
EZM11000CBU	70.05	34.19	18.33	46.99
EZM11200CB	61.19	30.19	18.33	38.13
EZM11200CBU	70.05	34.19	18.33	46.99
EZM11200FS	61.19	30.19	18.33	38.13
EZM11200FSU	70.05	34.19	18.33	46.99
EZM11200TB [CU]	51.58	22.33	13.00	27.92
EZM11200TBU [CU]	44.71	33.16	11.12	31.17
EZM11600CB	61.19	30.19	18.33	38.13
EZM11600CBU	71.19	30.19	18.33	48.12
EZM11600TB [CU]	51.58	22.33	13.00	27.92
EZM1225TB [CU]	21.81	11.50	5.81	13.00♦
EZM1400CB	53.97	18.66	11.50	34.30
EZM1400CBU	69.03	20.46	11.50	49.37
EZM1400FS	53.97	18.66	11.50	34.30
EZM1400FSU	69.03	20.46	11.50	49.37
EZM1400TB [CU]	28.43	17.00	6.53	16.29
EZM1400TBU [CU]	35.71	17.16	8.00	27.17
EZM1600CB	53.97	18.66	11.50	34.30
EZM1600CBU	69.03	20.46	11.50	49.37
EZM1600FS	53.97	18.66	11.50	34.30
EZM1600FSU	69.03	20.46	11.50	49.37
EZM1600TB [CU]	28.43	17.00	6.53	16.29
EZM1800CB	53.97	18.66	11.50	34.30
EZM1800CBU	69.03	20.46	11.50	49.37
EZM1800FS	53.97	18.66	11.50	34.30
EZM1800FSU	69.03	20.46	11.50	49.37
EZM1800TB [CU]	51.76	23.93	6.41	28.01
EZM1800TBU [CU]	39.96	25.06	11.12	31.17
EZM1EXT	19.34	11.66	6.37	11.85♦
EZM1CORNER (indoor only)▲	19.50	14.40	8.02	11.85♦
EZM1ELBOW (indoor only)■	19.50	14.52	8.01	11.85♦
EZM31000CB	53.97	18.66	11.50	34.30
EZM31000CBU	70.05	34.19	18.33	46.99
EZM31200CB	61.19	30.19	18.33	38.13
EZM31200CBU	70.05	34.19	18.33	46.99
EZM31200TB [CU]	51.58	22.33	13.00	27.92
EZM31200TBU [CU]	44.71	33.16	11.12	31.17
EZM31600CB	61.19	30.19	18.33	38.13
EZM31600CBU	71.19	30.19	18.33	48.12
EZM31600TB [CU]	51.58	22.33	13.00	27.92
EZM3225TB [CU]	21.81	11.50	5.81	13.00♦
EZM3400CB	53.97	18.66	11.50	34.30
EZM3400CBU	69.03	20.46	11.50	49.37
EZM3400FS	53.97	18.66	11.50	34.30
EZM3400FSU	69.03	20.46	11.50	49.37
EZM3400TB [CU]	28.43	17.00	6.53	16.29
EZM3400TBU [CU]	35.71	17.16	8.00	27.17
EZM3600CB	53.97	18.66	11.50	34.30
EZM3600CBU	69.03	26.19	11.65	49.37
EZM3600FS	53.97	18.66	11.50	34.30
EZM3600FSU	69.03	26.19	11.65	49.37
EZM3600TB [CU]	28.43	17.00	6.53	16.29
EZM3800CB	53.97	18.66	11.50	34.30
EZM3800CBU	69.03	26.19	11.65	49.37
EZM3800FS	53.97	18.66	11.50	34.30
EZM3800FSU	69.03	26.19	11.65	49.37
EZM3800TB [CU]	51.76	23.93	6.41	28.01
EZM3800TBU [CU]	39.96	25.06	11.12	31.17
EZM3EXT	19.34	11.66	6.37	11.85♦
EZM3CORNER (indoor only)▲	19.50	14.40	8.02	11.85♦
EZM3ELBOW (indoor only)■	19.500	14.52	8.01	11.85♦

▲ Each leg of this corner section measures 14.72" from wall to start of next enclosure.
■ Each leg of elbow section measures 6.17" corner of wall to start of next enclosure.
♦ Device supplied without mounting channel, secure to wall by use of swingable mounting feet.
★ Standard branch units are available without suffix added.



For additional information,
reference Catalog #4100CT9801.

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Branch Devices

Catalog Number [available suffix]	Height (H)	Width (W)	Depth (D)	Mtg. Channel (MC)	Top Meter (T)	Bottom Meter (B)
Single Phase★						
EZM112225 [X, CU, CUX]	43.41	17.38	8.09	32.34	22.18	12.23
EZM113125 [X, CU, CUX]	42.37	12.25	7.09	31.30	13.18	11.19
EZM113225 [X, CU, CUX]	43.41	17.38	8.09	32.34	13.18	12.23
EZM114125 [X, CU, CUX]	48.12	12.25	7.09	31.30	9.93	11.19
EZM114225 [X, CU, CUX]	52.00	17.38	8.09	32.34	12.77	12.23
EZM115125 [X, CU, CUX]	57.12	12.25	7.09	31.30	9.93	11.19
EZM115225 [X, CU, CUX]	61.00	17.38	8.09	40.03	12.77	12.23
EZM116125 [X, CU, CUX]	66.12	12.25	7.09	40.30	9.93	11.19
EZMH112225 [X, CU, CUX]	43.41	17.38	8.09	32.34	22.18	12.23
EZMH113125 [X, CU, CUX]	42.37	12.25	7.09	31.30	13.18	11.19
EZMH113225 [X, CU, CUX]	43.41	17.38	8.09	32.34	13.18	12.23
EZMH114125 [X, CU, CUX]	48.12	12.25	7.09	31.30	9.93	11.19
EZMH114225 [X, CU, CUX]	52.00	17.38	8.09	32.34	12.77	12.23
EZMH115125 [X, CU, CUX]	57.12	12.25	7.09	31.30	9.93	11.19
EZMH115225 [X, CU, CUX]	61.00	17.38	8.09	40.03	12.77	12.23
EZMH116125 [X, CU, CUX]	66.12	12.25	7.09	40.30	9.93	11.19
EZMK111400	45.55	27.56	9.74	37.81	24.51	21.04
EZMK112400	72.99	27.56	9.74	37.81	22.26	21.04
EZML111225 [CU]	39.06	19.44	9.44	25.51	25.67	13.39
EZML111225D	39.06	19.44	9.44	25.51	25.67	13.39
EZML111400 [CU]	44.55	23.21	9.44	37.81	24.02	21.53
EZML112225 [CU]	39.06	19.44	9.44	25.51	11.67	13.39
EZML112225D	39.06	19.44	9.44	25.51	11.67	13.39
EZML112400 [CU]	69.61	23.21	9.44	37.81	20.64	21.53
EZML113225 [CU]	53.06	19.44	9.44	39.51	11.67	13.39
EZML113225D	53.06	19.44	9.44	39.51	11.67	13.39
EZML114225 [CU]	67.06	19.44	9.44	39.51	11.67	13.39
EZML114225D	67.06	19.44	9.44	39.51	11.67	13.39
EZMR112225 [X, CU, CUX]	43.41	17.38	8.09	32.34	22.18	12.23
EZMR113125 [X, CU, CUX]	42.37	12.25	7.09	31.30	13.18	11.19
EZMR113225 [X, CU, CUX]	43.41	17.38	8.09	32.34	13.18	12.23
EZMR114125 [X, CU, CUX]	48.12	12.25	7.09	31.30	9.93	11.19
EZMR114225 [X, CU, CUX]	52.00	17.38	8.09	32.34	12.77	12.23
EZMR115125 [X, CU, CUX]	57.12	12.25	7.09	31.30	9.93	11.19
EZMR115225 [X, CU, CUX]	61.00	17.38	8.09	40.03	12.77	12.23
EZMR116125 [X, CU, CUX]	66.12	12.25	7.09	40.30	9.93	11.19
EZMT111225	25.45	22.42	9.38	16.19	4.67	20.45
EZMT112225	60.56	22.42	9.38	43.63	12.67	28.89
EZMT113225	79.56	22.42	9.38	48.25	12.67	28.89
Three Phase★						
EZM312225 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	43.41	17.38	8.09	32.34	22.18	12.23
EZM313125 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	42.37	12.25	7.09	31.30	13.18	11.19
EZM313125M10	42.37	12.25	7.09	24.29	10.18	12.19
EZM313225 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	43.41	17.38	8.09	32.34	13.18	12.23
EZM314125 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	48.12	12.25	7.09	31.30	9.93	11.19
EZM314125M10	52.12	12.25	7.09	34.29	9.93	12.19
EZM314225 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	52.00	17.38	8.09	32.34	12.77	12.23
EZM315125 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	57.12	12.25	7.09	31.30	9.93	11.19
EZM315125M10	62.12	12.25	7.09	34.29	9.93	12.19
EZM315225 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	61.00	17.38	8.09	40.03	12.77	12.23
EZM316125 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	66.12	12.25	7.09	40.30	9.93	11.19
EZMH312225 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	43.41	17.38	8.09	32.34	22.18	12.23
EZMH313125 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	42.37	12.25	7.09	31.30	13.18	11.19
EZMH313225 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	43.41	17.38	8.09	32.34	13.18	12.23
EZMH314125 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	48.12	12.25	7.09	31.30	9.93	11.19
EZMH314225 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	52.00	17.38	8.09	32.34	12.77	12.23
EZMH315125 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	57.12	12.25	7.09	31.30	9.93	11.19
EZMH315225 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	61.00	17.38	8.09	40.03	12.77	12.23
EZMH316125 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	66.12	12.25	7.09	40.30	9.93	11.19
EZMK311400 [CA]	45.55	27.56	9.74	30.60	24.51	21.04
EZMK312400 [CA]	72.99	27.56	9.74	37.81	22.26	21.04
EZMK331400 [CA]	45.55	27.56	9.74	30.60	24.51	21.04
EZMK332400 [CA]	72.99	27.56	9.74	37.81	22.26	21.04
EZML311400 [CU, CA, CUCA]	45.55	23.21	9.44	37.81	24.02	21.53
EZML311225 [CU, CA, CUCA]	39.06	19.44	9.44	25.51	25.67	13.39
EZML312225 [CU, CA, CUCA]	39.06	19.44	9.44	25.51	11.67	13.39
EZML312225D [CA]	39.06	19.44	9.44	25.51	11.67	13.39
EZML312400 [CU, CA, CUCA]	69.61	23.21	9.44	37.82	20.64	21.53
EZML313225 [CU, CA, CUCA]	53.06	19.44	9.44	39.51	11.67	13.39
EZML313225D [CA]	53.06	19.44	9.44	39.51	11.67	13.39
EZML314225 [CU, CA, CUCA]	67.06	19.44	9.44	39.51	11.67	13.39
EZML314225D [CA]	67.06	19.44	9.44	39.51	11.67	13.39
EZML331225 [CU]	39.06	19.44	9.44	25.51	25.67	13.39
EZML331225D	39.06	19.44	9.44	25.51	25.67	13.39
EZML331400 [CU]	45.55	23.21	9.44	37.81	24.02	21.53
EZML332225 [CU]	39.06	19.44	9.44	35.51	11.67	13.39
EZML332225D	39.06	19.44	9.44	35.51	11.67	13.39
EZML332400 [CU]	69.61	23.21	9.44	37.82	20.64	21.53
EZML333225 [CU]	53.06	19.44	9.44	39.51	11.67	13.39
EZML333225D	53.06	19.44	9.44	39.51	11.67	13.39
EZML334225 [CU]	67.06	19.44	9.44	39.51	11.67	13.39
EZML334225D	67.06	19.44	9.44	39.51	11.67	13.39
EZMR312225 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	43.41	17.38	8.09	32.34	22.18	12.23
EZMR313125 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	42.37	12.25	8.09	31.30	13.18	11.19
EZMR313225 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	43.41	17.38	8.09	32.34	13.18	12.23
EZMR314125 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	48.12	12.25	7.09	31.30	9.93	11.19
EZMR314225 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	52.00	17.38	8.09	32.34	12.77	12.23
EZMR315125 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	57.12	12.25	7.09	31.30	9.93	11.19
EZMR315225 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	61.00	17.38	8.09	40.03	12.77	12.23
EZMR316125 [X, CU, CUX, CA, XCA, CUCA, CUXCA]	66.12	12.25	7.09	40.30	9.93	11.19
EZMR332225 [CU]	39.06	19.44	9.44	25.51	11.67	13.39
EZMR333225 [CU]	53.06	19.44	9.44	39.51	11.67	13.39
EZMR334225 [CU]	67.06	19.44	9.44	39.51	11.67	13.39
EZMT311225 [CA]	25.45	22.42	9.38	16.19	4.67	20.45
EZMT312225 [CA]	60.56	22.42	9.38	43.63	12.67	28.89
EZMT313225 [CA]	79.56	22.42	9.38	48.25	12.67	28.89
EZMT331225	25.12	22.42	9.38	16.19	4.67	20.45
EZMT332225	60.56	22.42	9.38	43.63	12.67	28.89
EZMT333225	79.56	22.42	9.38	48.25	12.67	28.89

240 Vac Maximum, NEMA 3R Construction Meter Centers for use on AC-Systems. Suitable for use as Service Equipment.

Utility Company Requirements: Review local utility requirements to ensure that metering equipment meets their standards.

EZ METER-PAK meter center enclosures meet NEC wire bending requirements, and are designed for wall mounting only (not suitable for floor mounting). All unmetered conductor compartments are sealable by the utility company.

EZ METER-PAK meter centers have UL Listed short circuit current ratings up to 100,000 RMS symmetrical amperes at 240 Vac when properly applied. Refer to table below for details and appropriate downstream load centers and panelboards.

Suitable incoming services for an EZM main device and available outgoing feeder(s) to downstream panelboards from EZM branch section(s):

Incoming Service to Main Device 120/240 Vac, 1Ø3W:
Available outgoing feeder(s) to downstream panelboards:
- 120/240 Vac, 1Ø3W
  (4-jaw ring type meter sockets, 2-pole circuit breakers)
  (5-jaw ringless meter sockets, 2-pole circuit breakers)

Incoming Service to Main Device 240/120 Vac, 3Ø4W Delta:
Available outgoing feeder(s) to downstream panelboards:
- 120/240 Vac, 1Ø3W
  (Fed from transformer's "A-Phase" and "C-Phase" only.) NOTE: Connection to High-Leg "B-Phase" not permitted for this service
  (4-jaw ring type meter sockets, 2-pole circuit breakers)
  (5-jaw ringless meter sockets, 2-pole circuit breakers)
  Standard 3-Phase IN/1-Phase OUT branch units ***are not suitable for use on this DELTA System***. Special branch units are available for this System by adding suffix: **"CA"** to catalog number (Typical Examples: EZM313125CA, EZMH314200CA, etc.).
- 240/120 Vac, 3Ø4W Delta
  (7-jaw meter sockets, 3-pole circuit breakers)

Incoming Service to Main Device 208Y/120 Vac, 3Ø4W:
Available outgoing feeder(s) to downstream panelboards:
- 120/208 Vac, 1Ø3W
  (5-jaw meter sockets, 2-pole circuit breakers)
- 208Y/120 Vac, 3Ø4W
  (7-jaw meter sockets, 3-pole circuit breakers)

Main Devices:

- 1200 A main disconnect or terminal box **must be center mounted** when used with branch devices with main bus rated 800 A.
- 1600 A main disconnect or terminal box **must be center mounted.**
- 400, 800 and 1200 A type EZM-TBU tap boxes supplied with lug landings to meet EUSERC requirements.

Main Circuit Breaker, ratings: 400, 600, 800, 1000, 1200, and 1600 A
Main Fusible Switch, ratings: 400, 600, 800, and 1200 A (1 phase, 3 wire only)
Main Lugs Terminal Box, ratings: 225 A, 400, 600, 800, 1200, and 1600 A

Branch Unit:

- **125 A and 225 A residential branch units**, available in ring or ringless type construction and supplied with 800 A horizontal cross bus. For all-copper bussing, add suffix **"CU"** to catalog number (Example: EZM314125CU). Plug-in style meter sockets are available as ring type **EZM** without bypass, ringless type **EZMR** without bypass, and ringless type **EZMH** with horn bypass. For 1200 A main cross bus, add suffix **"X"** to catalog number (Example: EZM314125X).
- **225 A commercial branch units**, available in ring or ringless type construction and supplied with 1200 A horizontal cross bus. For all-copper bussing, add suffix **"CU"** to catalog number (Example: EZML334200CU). Plug-in style meter sockets are available as ringless type **EZMR** without bypass, ringless type **EZML** with lever bypass and ring type **EZMT** with test block bypass (meets EUSERC requirements).
- **400 A branch units**, Type **EZML** branch units are available in ringless type construction, supplied with 1200 A AL/CU (standard), or 1200 A copper (add suffix **"CU"**) horizontal cross bus. This plug-in meter socket is supplied with lever bypass and jaw release. Type **EZMK** branch units are supplied with 1200 A copper (standard) horizontal cross bus. This bolt-on meter socket is supplied with a manual bypass.
- Units having **800 A horizontal cross bus** WILL CONNECT with units having **1200 A horizontal cross bus**.
- **Single Phase units** (three bus bars in horizontal cross bus) WILL NOT CONNECT with **three phase units** (four bus bars in horizontal cross bus).

Square D Certified Ratings for Downstream Panelboards:▲

For load centers or panelboards installed downstream from any UL Listed MP METER-PAK (single phase only) or EZ METER-PAK meter center applied on a system capable of delivering greater than 10,000 RMS symmetrical amperes. Requires a minimum of 20 feet of cable between meter center and downstream load center or panelboard. all ratings verified by actual Square D tests.	Meter Center 125 A and 225 A Branch Units	QO Load Centers or NQOD Panelboards with Branch Circuit Breakers rated 10,000 AIR	HOM Load Centers with Branch Circuit Breakers rated 10,000 AIR
	Downstream Single Phase Load Center or Panelboard	QO, QOB – 1-Pole (15 A–70 A) QOT–1-Pole (15 A–70 A) QO-GFI, QOB-GFI–1-Pole (15 A–30 A) QO-AFI, QOB-AFI–1-Pole (15 A–20A) QO, QOB–2-Pole (15 A–125 A)	HOM–1-Pole (15 A–50 A) HOMT–1-Pole (15 A–20 A) HOM-AFI–1-Pole (15A–20A) HOM-GFI–1-Pole (15 A–20 A) HOM–2-Pole (15 A–70 A) HOMT–2-Pole (15 A–30 A)
	Downstream Three Phase Load Center or Panelboard	QO, QOB– 1-Pole (15 A–70 A) 2-Pole (15 A–125 A) 3-Pole (15 A–100 A) QO-AFI, QOB-AFI–1-Pole (15 A–20 A) QO-GFI, QOB-GFI–1-Pole (15 A–30 A)	. . .

▲ For additional information, refer to Data Bulleting #4100DB0301.

For additional information, reference Catalog #4100CT9801.

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Selection Information

- Review local utility requirements to ensure that metering equipment meets their standards.
- Check local utility to determine available fault current at the meter center.
- Using the SCCR table:
  - — Select meter center configuration, main lugs only (6-Subdivision Rule), or remote main, main circuit breaker, or main fusible switch.
  - — Read down to select SCCR equal to, or greater than desired rating.
  - — Read across to select branch unit tenant circuit breaker type.
  - — Continue reading across to select EZM main device type.
- With information obtained from table below, turn to appropriate selection/ pricing pages to determine catalog numbers for main device, branch units, and tenant circuit breakers to complete meter center.
- Refer to "Square D Certified Ratings" table on page 52 to determine suitable downstream load centers or panelboards.

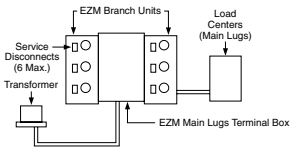

Figure 1

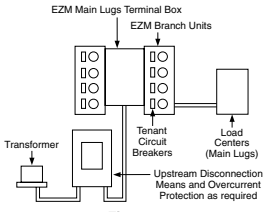

Figure 2

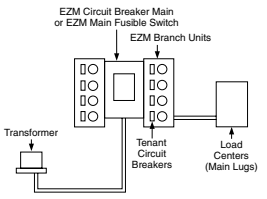

Figure 3

UL Listed Meter Center Short Circuit Current Ratings (SCCR)

Short Circuit Current Rating (RMS Symmetrical Amperes at 240 Vac Maximum)▲■	EZM Meter Center Overcurrent Protection Devices	
	EZM Branch Unit Tenant Circuit Breaker Types Available (Branch Unit Amperes max., **Number of Poles, Tenant Circuit Breaker Amperes Rating Range)**	**EZM Main Device with Integral Mounted Main, Remote Mounted Main or without an Upstream Mounted Main (6-Sub-Division Rule)**
EZ METER-PAK (6-Subdivision Rule Applications)—See Figure 1		
10,000	QO (**125 A**, 2-Pole, 40–125 A) QO (**225 A**, 2-Pole, 40–125 A)▼ QB (**225 A**, 2 or 3-Pole, 70–225 A)	225–1600 A Main Lugs Terminal Box (Tenant Circuit Breakers used as Service Disconnects—6 maximum)
18,000	LAL (**400 A**, 2 or 3-Pole, 125–400 A)▼	
22,000	QO-VH (**125 A**, 2-Pole, 40–125 A) QO-VH (**225 A**, 2-Pole, 40–60 A)▼	
25,000	QD (**225 A**, 2 or 3-Pole, 70–225 A)	
42,000	QOH (**125 A**, 2-Pole, 40–125 A) QOH (**225 A**, 2-Pole, 40–60 A)▼	
65,000	QG (**225 A**, 2 or 3-Pole, 70–225 A)	
100,000	QJ (**225 A**, 2-Pole only, 70–225 A) QJ (**225 A**, 3-Pole only, 70–225 A) ♦ DJM (**400 A**, 2 or 3-Pole, 160–400 A)△	
EZ METER-PAK—Main Lugs Terminal Box Applications Protected By Remote Main—See Figure 2		
10,000	QO (**125 A**, 2-Pole, 40–125 A) QO (**225 A**, 2-Pole, 40–125 A)▼ QB (**225 A** 2 or 3-Pole, 70–225 A)	225–1600 A Main Lugs Terminal Box Must be protected by an Upstream Disconnecting Means Rated 10,000 AIR minimum
18,000	LAL (**400 A**, 2 or 3-Pole, 125–400 A)▼	225–1600 A Main Lugs Terminal Box Must be protected by an Upstream Disconnecting Means Rated 18,000 AIR minimum
22,000	QO-VH (**125 A**, 2-Pole, 40–125 A) QO-VH (**225 A**, 2-Pole, 40–60 A)▼	225–1600 A Main Lugs Terminal Box Must be protected by an Upstream Disconnecting Means Rated 22,000 AIR minimum
25,000	QD (**225 A** 2 or 3-Pole, 70–225 A)	225–1600 A Main Lugs Terminal Box Must be protected by an Upstream Disconnecting Means Rated 25,000 AIR minimum
42,000	QOH (**125 A**, 2-Pole, 40–125 A) QOH (**225 A**, 2-Pole, 40–60 A)▼	225–1600 A Main Lugs Terminal Box Must be protected by an Upstream Disconnecting Means Rated 42,000 AIR minimum
	QO-VH (**125 A**, 2-Pole, 40–125 A) QO-VH (**225 A**, 2-Pole, 40–60 A)▼ QD (**225 A** 2 or 3-Pole, 70–225 A) DJM (**400 A**, 2 or 3-Pole,160–400 A)△	225–1600 A Main Lugs Terminal Box Must be protected by a Square D Circuit Breaker Type LA (400 A max.) or MA (800 A max.) Rated 42,000 AIR minimum
65,000	QG (**225 A** 2 or 3-Pole, 70–225 A)	225–1600 A Main Lugs Terminal Box Must be protected by an Upstream Disconnecting Means Rated 65,000 AIR minimum
	QO-VH (**125 A**, 2-Pole, 40–125 A) QO-VH (**225 A**, 2-Pole, 40–60 A)▼ QD (**225 A** 2 or 3-Pole, 70–225 A) DJM (**400 A**, 2 or 3-Pole, 160–400 A)△	225–1600 A Main Lugs Terminal Box Must be protected by a Square D Circuit Breaker Type LH (400 A max.), MH (1000 A max.) or PA (1600 A max.) Rated 65,000 AIR minimum
	QD (**225 A** 2 or 3-Pole, 70–225 A)	225–1600 A Main Lugs Terminal Box Must be protected by a Square D Circuit Breaker Type MG (800 A max.), PG (1200 A max.) or RG (1600 A max.) Rated 65,000 AIR minimum
100,000	QJ (**225 A** 2-Pole only, 70–225 A) QJ (**225 A** 3-Pole only, 70–225 A)	225–1600 A Main Lugs Terminal Box Must be protected by an Upstream Disconnecting Means Rated 100,000 AIR minimum
	QO-VH (**125 A**, 2-Pole, 40–125 A) QO-VH (**225 A**, 2-Pole, 40–60 A)▼ DJM (**400 A**, 2 or 3-Pole, 160–225 A)△	Must be protected by an Upstream Disconnection Means with Class R (600 A max.), or Class T (300 Vac, 800 A maximum) fuses.
	QD (**225 A** 2-Pole only, 70–225 A)	Must be protected by an Upstream Disconnection Means with Class J (600 A max.), Class L (1200 A max.), Class R (600 A max.), Class T (300 Vac, 1200 A max.) or Class T (600 Vac, 800 A maximum) fuses. Or be protected by a Square D circuit breaker Type MJ (800 A max.), PJ (1200 A max.), PH (1600 A max.) or RJ (1600 A max.) Rated 100,000 AIR minimum.
	QD (**225 A** 3-Pole only, 70–225 A)♦	
EZ METER-PAK—Main Circuit Breaker Applications—See Figure 3		
10,000	QO (**125 A**, 2-Pole, 40–125 A) QO (**225 A**, 2-Pole, 40–125 A)▼ QB (**225 A** 2 or 3-Pole, 70–225 A)	400–1600 A EZM Main Device with Type LH (400 A max.), MH (1000 A max.) or PA (1600 A max.) Circuit Breaker.
18,000	LAL (**400 A**, 2 or 3-Pole, 120–400 A)▼	
65,000	QO-VH (**125 A**, 2-Pole, 40–125 A) QO-VH (**225 A**, 2-Pole, 40–60 A)▼ QD (**225 A** 2 or 3-Pole, 70–225 A) DJM (**400 A**, 2 or 3-Pole, 160–400 A)	
100,000	QO-VH (**125 A**, 2-Pole, 40–125 A) QO-VH (**225 A**, 2-Pole, 40–60 A)▼ QD (**225 A** 2-Pole only, 70–225 A) QD (**225 A** 3-Pole only, 70–225 A)♦ DJM (**400 A**, 2 or 3-Pole, 160–400 A)△	1000–1200 A Main Device with Catalog Number Suffix "CBU" supplied with Type MHF Circuit Breaker.
EZ METER-PAK—Main Fusible Switch Applications—See Figure 3		
10,000	QO (**125 A**, 2-Pole, 40–125 A) QO (**225 A**, 2-Pole, 40–125 A)▼ QB (**225 A** 2 or 3-Pole, 70–225 A)	400–800 A EZM Main Device (1-Phase or 3-Phase) with Class T (300 Vac) Fuses installed.
18,000	LAL **400 A**, 2 or 3-Pole, 125–400 A)▼	
42,000	QO-VH (**125 A**, 2-Pole, 40–125 A) QO-VH (**225 A**, 2-Pole, 40–60 A)▼	1200 A EZM Main Device (1-Phase only) with Class T (300 Vac) Fuses installed.
65,000	DJM (**400 A**, 2-Pole, 160–400 A)△	
100,000	QD (**225 A** 2-Pole, 70–225 A)	
100,000	QO-VH (**125 A**, 2-Pole, 40–125 A) QO-VH (**225 A**, 2-Pole, 40–60 A)▼ QD (**225 A** 2-Pole only, 70–225 A) QD (**225 A** 3-Pole only, 70–225 A)♦ DJM (**400 A**, 2 or 3-Pole, 160–400 A)△	400–800 A EZM Main Device (1-Phase or 3-Phase) with Class T (300 Vac) Fuses installed.

▲ Meter center short circuit current rating is equal to the lowest short circuit current rating given in the table for any circuit breaker installed in any meter panelboard in the meter center.
■ Short circuit current rating is measured at the LINE SIDE terminals of the integral mounted or remote mounted main providing overcurrent protection for the EZM metering equipment lineup.
♦ Limited to 208Y/120 Vac maximum (3-pole circuit breaker only).
★ Requires use of EZM125QOA adapter (order separately). Refer to page 50 for pricing.
▼ Supplied with 400 A circuit breaker(s) factory installed, consult local field office for ordering other ampere ratings.
△ Supplied with factory installed circuit breaker(s), with an adjustable trip rating range of 160–400 A.

For additional information, reference Catalog #4100CT9801.

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Switches &

DISCONNECTS

Safety Switches

In 1909 Thomas Edison chose a Square D safety switch for his laboratories in Philadelphia. Today, Square D safety switches are still the best choice for performance and reliability. That's why professionals choose Square D safety switches 2:1 over any other brand.

General Duty Switches

Square D general duty safety switches meet the needs of residential and commercial applications with many features designed for economy, safety, and superior performance. They are ideal for lighting, air conditioning, and appliance loads up to 240 Vac. In addition, they may be used as service entrance equipment.

- Simplifies installation, operation, and maintenance while saving money.
- Rugged enclosures built to last.
- Padlock provisions.
- Operating mechanism exceeds the number of operations required by NEMA and UL standards.

General Duty—
Up To 100,000 A Short Circuit Current Rating With Proper Current Limiting Fusing

General duty safety switches are designed for residential and commercial applications where economy is a prime consideration. Typical loads are lighting, air conditioning and appliances. They are suitable for use as service equipment when equipped with a factory-installed neutral assembly or a field-installed service grounding kit.

General duty safety switches are UL Listed, File E2875, and meet or exceed the NEMA Standard KS1.

400 and 600 A general duty switches (NEMA 1 only) will accept Class J fuses and are UL Listed for use on systems with up to 100,000 RMS symmetrical amperes available fault current. 600 A requires Class J fuse kit—GDJK600 (page 56).

Class T 400–800 A general duty safety switches, use 300 Vac Class T fuses and are UL Listed for use on systems with up to 100,000 RMS symmetrical amperes available fault current.

D223N

Fusible

System	Amps	Fuse	NEMA 1 Indoor Catalog Number	NEMA 1 Indoor Price	NEMA 3R▲ Rainproof Catalog Number	NEMA 3R▲ Rainproof Price	Class R Fuse Kits Field Installable■ Catalog Number	Class R Fuse Kits Field Installable■ Price	Horsepower Ratings Std. (Using Fast Acting-One Time Fuses) 1Ø	Std. 3Ø	Max. (Using Dual Element-Time Delay Fuses) 1Ø	Max. 3Ø
2 Wire (1 Blade and Fuseholder, 1 Neutral)—120 Vac												
	30	Plug	Use Light Duty Device for This Application (see below)						–	–	–	–
	30	Cart.	Use 3 Wire Devices for this application.						–	–	–	–
3 Wire (2 Blades and Fuseholders, 1 Neutral)—120/240 Vac (Plug), 240 Vac (Cart.) Maximum												
	30	Plug	D211N	**$ 60.00**	D211NRB	**$ 118.00**	–	**–**	1½	–	3	–
	30	Cart.	D221N	**81.00**	D221NRB	**125.00**	DRK 30	**$17.10**	1½	3 ♦	3	7½♦
	60	Cart.	D222N	**137.00**	D222NRB	**217.00**	RFK 03H	**17.00**	3	7½♦	10	15 ♦
	100	Cart.	D223N	**284.00**	D223NRB	**320.00**	RFK 10	**31.80**	7½	15 ♦	15	30 ♦
	200	Cart.	D224N✱	**589.00**	D224NRB✱	**800.00**	HRK 1020	**31.80**	15	25 ♦	–	60 ♦
	400	Cart.	D225N	**1703.00**	D225NR	**2306.00**	DRK 40	**74.00**	–	–	–	–
	600	Cart.	D226N	**3406.00**	D226NR	**4379.00**	DRK 600	**74.00**	–	–	–	–
4 Wire (3 Blades and Fuseholders, 1 Neutral)—240 Vac Maximum												
	30	Cart.	D321N	**$ 125.00**	D321NRB	**$ 195.00**	DRK 30	**$17.10**	1½	3	3	7½
	60	Cart.	D322N	**217.00**	D322NRB	**294.00**	RFK 03H	**17.00**	3	7½◑	10	15◑
	100	Cart.	D323N	**376.00**	D323NRB	**544.00**	RFK 10	**31.80**	7½	15◑	15	30◑
	200	Cart.	D324N✱	**801.00**	D324NRB✱	**974.00**	HRK 1020	**31.80**	15	25◑	–	60◑
	400	Cart.	D325N	**2075.00**	D325NR	**2595.00**	DRK 40	**74.00**	–	50	–	125
	400	Class T	D325NT	**1996.00**	D325NTR	**2494.00**	–	**–**	–	50	–	–
	600	Cart.	D326N	**3882.00**	D326NR	**5251.00**	DRK 600	**74.00**	–	75	–	150
	600	Class T	D326NT	**3732.00**	D326NTR	**5046.00**	–	**–**	–	75	–	–
	800	Class T	T327N	**6481.00**	T327NR	**8292.00**	–	**–**	–	100	–	–

Not Fusible

System	Amps	NEMA 1 Indoor Catalog Number	NEMA 1 Indoor Price	NEMA 3R Rainproof▲ Catalog Number	NEMA 3R Rainproof▲ Price	Horsepower Ratings (Max.) 1Ø	3Ø
2 Wire (2 Blades)—240 Vac Maximum							
	30		–	DU221RB★	**$118.00**	3	–
	60		–	DU222RB★	**235.00**	10	–
	60	QO260NATS▼△	**$ 107.00**	QO200TR▼△□	**112.00**	10	–
	100	QO2000NS▼◊	**184.00**	QO2000NRB▼◊	**225.00**	20	–
	200	Use 3-pole Switch	–	Use 3-pole Switch	–	–	–
	400	Use 3-pole Switch	–	Use 3-pole Switch	–	–	–
	600	Use 3-pole Switch	–	Use 3-pole Switch	–	–	–
3 Wire (3 Blades)—240 Vac Maximum							
	30	DU321★	**$ 103.00**	DU321RB★	**$195.00**	3	7½
	60	DU322★	**137.00**	DU322RB★	**295.00**	10	15
	100	DU323☆	**318.00**	DU323RB☆	**544.00**	15	30
	200	DU324▽	**589.00**	DU324RB▽	**974.00**	15	60◆
	400	DU325★	**1465.00**	–	–	–	125
	600	DU326◒	**2794.00**	–	–	–	150

▲ Bolt-on hubs—Refer to page 62.
■ When installed, this kit rejects all but Class R fuses. When installed with this kit and Class R fuses, the switch is UL Listed for use on systems with up to 100,000 RMS symmetrical amperes available fault current.
♦ For corner grounded delta systems only. Use switching poles for ungrounded conductors.
★ Suitable for use as service equipment requires field installation of a service grounding kit (page 56).
▼ Enclosed molded case switch—Refer to page 29.
△ Includes factory installed grounding kit.
□ Not service entrance rated—Refer to page 33 for more information.
◊ Includes factory installed neutral.
☆ For service equipment use or when neutral is required, order part number SN0610 at **$71.00**.
▽ Suitable for use as service equipment, requires field installation of neutral assembly SN20A at **$133.00**.
◒ Suitable for use as service equipment requires field installation of neutral assembly D600SN at **$153.00**.
✱ For 200% neutral, order (1) additional neutral kit SN20A at **$133.** and (1) neutral jumper kit SN20NI at **$18.40**.
◆ If corner grounded delta, install neutral and use outer switching poles for ungrounded conductors.
◑ If corner grounded delta, use outer switching poles for ungrounded conductors.

UL LISTED SHORT CIRCUIT WITHSTAND RATING (RMS SYMMETRICAL AMPERES)		
Switch Type	**Fuse Class**	**Short Circuit Rating**
Fusible	Plug	10,000
	H	10,000
	K	10,000
	J	100,000
	R	100,000
	T	100,000
Not Fusible ✪	H	10,000
	K	10,000
	J	100,000
	R	100,000◪
	T	100,000

✪ The UL Listed short-circuit current rating for Square D general duty, not fusible switches is based on the switch being used in conjunction with fuses. Evaluation of not fused switches in conjunction with molded case circuit breakers has not been performed. If a UL Listed short-circuit current rating is required, this not fused switch must be replaced with a Square D general duty fusible safety switch equipped with the appropriate class and size fusing. The UL Listed short-circuit current rating of the fusible switch is typically as follows; when used with Class H & K fuses—10,000 A, Class R and J fuses—100,000 A. Consult the wiring diagram of the switch to verify the UL Listed short-circuit current rating.
◪ 50,000 amperes for 60 A not fusible switch.

L211N

Light Duty—Visible Blades 10,000 A Short Circuit Current Rating

The Square D light duty enclosed switch is ideal for home applications in disconnecting power to workshops, hobby rooms, furnaces and garages.

Fusible

System	Amps	Fuse	NEMA 1 Indoor Catalog Number	NEMA 1 Indoor Price●	Horsepower Ratings Std.	Max.
2 Wire (1 Blade and Fuseholder, 1 Neutral)—120 Vac						
	30	Plug	L111N	**$35.90**	½	2

Fusible

System	Amps	Fuse	NEMA 1 Indoor Catalog Number	NEMA 1 Indoor Price●	Horsepower Ratings Std.	Max.
3 Wire (2 Blades and Fuseholders, 1 Neutral)—120/240 Vac						
	30	Plug	L211N	**$47.80**	1½♦	3♦
	30	Cart.	L221N	**65.00**	1½♦	3♦

♦ For single phase hp rating, use two switching poles.

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Field Installable Electrical Interlock Kits

Electrical interlocks for Series F 100–200 A general duty safety switches and Series F 60 A fusible general duty safety switches are available in kit form for field installation. Each kit contains instructions for proper field mounting. A pivot arm operates from switch mechanism, breaking the control circuit before the main switch blades break. Switches with electrical interlocks installed are UL Listed.

Electrical Interlock Kit

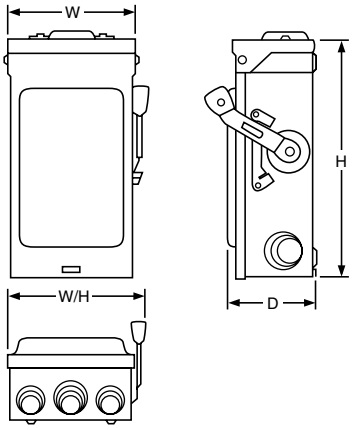
Switch Ampere Rating	Electrical Interlock Kit Catalog Number▲	Price
Fusible Series F 60	EIK031 or EIK032	**$145.**
Series F 100–200	EIK1 or EIK2	**207.**

▲ Electrical interlock kit catalog numbers with -1 suffix indicates one normally open and one normally closed contact; -2 indicates two normally open and two normally closed contacts. Kits are UL Listed.

Field Installable Class J Fuse Kit

Kit consists of three Class J fuse adapters as required for 3-Pole, fusible 600 A General Duty switch. Kit can be installed in 600 A series E3 switches only (NEMA 1).

Switch Ampere Rating	Class J Kit Catalog Number	Price
600 A Series E3	GDJK600	**$195.**



Field Installable Fuse Puller Kits

Kit consists of three fuse pullers as required for a 3-pole, fusible, 60 and 100 ampere general duty switch. Kits can be installed in 60 and 100 ampere Series F switches.

Description	Catalog Number	Price
Series F 60 Ampere Fuse Puller Kit	FPK03	**$20.00**
Series F 100 Ampere Fuse Puller Kit	FPK0610	**28.40**

Field Installable Service Grounding Kits

Switch Ampere Rating	Catalog Number	Price	Wire Size AWG
30	PK3GTA1	**$ 7.60‡**	(2) #12 Cu or (2) #10 Al or (1) #4 Al/Cu Max.
Series E 60	PK3GTA1	**7.60‡**	(2) #12 Cu or (2) #10 Al or (1) #4 Al/Cu Max.
Series F 60	GTK03	**7.60**	(2) #12 Cu or (2) #10 Al or (1) #4 Al/Cu Max.
100	GTK0610	**12.60**	(2) #1/0 Al/Cu Max.
200	PKOGTA2	**36.80**	(2) #2/0 Al/Cu Max.
400 600	PKOGTA2 (Two Required)	**36.80**	(2) #2/0 Al/Cu Max. Per Lug
800	PKOGTA3	**82.00**	(6) #3/0 Al/Cu Max.

Terminal Lug Data ■

Ampere Rating	Conductors Per Phase	Wire Range Wire Bending Space Per NEC Table 373-6 AWG/kcmil	Lug Wire Range AWG/kcmil
30	1	#12–6 (Al) or #14–6 (Cu)	#12–6 (Al) or #14–6 (Cu)
60	1	#10–3 (Al) or #14–3 (Cu)	#10–2 (Al) or #14–2 (Cu)
100	1	#12–1 (Al) or #14–1 (Cu)	#12–1/0 (Al) or #14–1/0 (Cu)
200	1	#6 –250 (Al/Cu)	#6 –300 (Al/Cu)
400 NEMA 1	1 or 2	#1/0 –600 (Al/Cu) or #1/0 –300 (Al/Cu)	(1) #1/0 –750 (Al/Cu) or (2) #1/0 –300 (Al/Cu)
400 NEMA 3R	2	#1/0–250 (Al/Cu)	(1) #1 –600 (Al/Cu) or (2) #1/0 –250 (Al/Cu)
600	2	#4 –500 (Al/Cu)	#4 –600 (Al/Cu)
800	3	#3/0 –500 (Al/Cu)	#3/0 –500 (Al/Cu)

■ 30–100 A switches suitable for 60°C or 75°C conductors. 200–800 A switches suitable for 75°C conductors.

Field Installable Lug Kit

Kit consists of three line, three load and two neutral lugs as required for a 3-pole 400 A or 600 A general duty switch. Kit can be installed on 400 or 600 A Series E3 switches. **This kit applicable to NEMA 1 enclosures only.**

Switch Ampere Rating	Lug Kit Catalog Number	Wire Range/NEC AWG/kcmil	Lug Wire Range AWG/kcmil	Price
400 or 600 A Series E3	GD4060LK	(1) 1/0–600 (2) 1/0–500 (4) 1/0–250	(2) 1/0–600 (4) 1/0–250	**$269.**

Approximate Dimensions

Catalog Number	Series	H		W		W/H		D		Std. Pack
		IN	mm	IN	mm	IN	mm	IN	mm	
L111N	E2	7.63	194	5.00	127	6.13	156	4.00	102	1
L211N	E2	7.63	194	5.00	127	6.13	156	4.00	102	1
L221N	E2	7.63	194	5.00	127	6.13	156	4.00	102	1
D211N♦	E3	9.25	235	6.75	171	7.25	184	3.63	92	5
D211NRB♦	E2	9.63	245	7.25	184	7.75	197	3.75	95	5
D221N♦	E3	9.25	235	6.75	171	7.25	184	3.63	92	5
D221NRB♦	E3	9.63	245	7.25	184	7.75	197	3.75	95	5
D222N	F1	14.63	372	6.50	165	7.45	189	4.88	124	1
D222NRB	F1	14.88	378	6.63	168	7.45	189	4.88	124	1
D223N	F3	17.50	445	8.50	216	10.50	267	6.50	165	1
D223NRB	F3	17.50	445	8.50	216	10.50	267	6.50	165	1
D224N	F1	29.00	737	17.25	438	19.00	483	8.25	210	1
D224NRB	F1	29.25	743	17.25	438	19.00	483	8.25	210	1
D225N	E3	45.12	1146	24.00	610	24.88	632	8.88	226	1
D225NR	E1	30.63	778	21.38	543	22.25	565	10.13	257	1
D226N♦	E3	49.13	1248	24.00	610	24.88	632	8.88	226	1
D226NR♦	E1	49.13	1248	24.75	629	25.13	638	8.88	226	1
D321N♦	E3	9.25	235	6.75	171	7.25	184	3.63	92	5
D321NRB♦	E3	9.63	245	7.25	184	7.75	197	3.75	95	5
D322N	F1	14.63	372	6.50	165	7.45	189	4.88	124	1
D322NRB	F1	14.88	378	6.63	168	7.45	189	4.88	124	1
D323N	F3	17.50	445	8.50	216	10.50	267	6.50	165	1
D323NRB	F3	17.50	445	8.50	216	10.50	267	6.50	165	1
D324N	F1	29.00	737	17.25	438	19.00	483	8.25	210	1
D324NRB	F1	29.25	743	17.25	438	19.00	483	8.25	210	1
D325N♦	E3	45.12	1146	24.00	610	24.88	632	8.88	226	1
D325NT♦	E3	45.12	1146	24.00	610	24.88	632	8.88	226	1
D325NR♦	E1	30.63	778	21.38	543	22.25	565	10.13	257	1
D325NTR♦	E1	30.63	778	21.38	543	22.25	565	10.13	257	1
D326N♦	E3	49.13	1248	24.00	610	24.88	632	8.88	226	1
D326NT♦	E3	49.13	1248	24.00	610	24.88	632	8.88	226	1
D326NR♦	E1	49.13	1248	24.75	629	25.13	638	8.88	226	1
D326NTR♦	E1	49.13	1246	24.75	629	25.13	638	8.88	226	1
DU221RB♦	E2	9.63	245	7.25	184	7.75	197	3.75	95	5
DU222RB♦	E1	9.63	245	7.25	184	7.75	197	3.75	95	5
DU321♦	E2	9.25	235	6.75	171	7.25	184	3.63	92	5
DU321RB♦	E2	9.63	245	7.25	184	7.75	197	3.75	95	5
DU322♦	E1	9.25	235	6.75	171	7.25	184	3.63	92	5
DU322RB♦	E1	9.63	245	7.25	184	7.75	197	3.75	95	5
DU323	F3	17.50	445	8.50	216	10.50	267	6.50	165	1
DU323RB	F3	17.50	445	8.50	216	10.50	267	6.50	165	1
DU324	F1	29.00	737	17.25	438	19.00	483	8.25	210	1
DU324RB	F1	29.25	743	17.25	438	19.00	483	8.25	210	1
DU325♦	E3	45.12	1146	24.00	610	24.88	632	8.88	226	1
DU326♦	E3	49.13	1248	24.00	610	24.88	632	8.88	226	1
QO200TR♦	G3	6.50	165	4.63	118	. . .	. . .	3.88	99	5
QO260NATS♦	E2	9.25	235	4.88	124	. . .	. . .	3.25	83	1
QO2000NRB♦	E1	14.00	356	7.75	197	. . .	. . .	4.50	114	1
QO2000NS♦	E1	13.38	340	6.13	156	. . .	. . .	3.50	89	1
T327N♦	E1	49.13	1248	24.00	610	24.88	632	8.88	226	1
T327NR♦	E1	49.13	1248	24.75	629	25.13	638	8.88	226	1

♦ Does not have a cover draw as indicated in above drawing.

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30–100 A DT, DTU (Series F5)
NEMA 1

New—Series F

30–100 A Types DT, DTU (Series F)

- Fusible (DT) and not fusible (DTU) switches available.
- Manually operated switch suitable for use in accordance with article 702 of the NEC, ANSI/NFPA 70.
- Standards: UL 98, NEMA KS1, CSA, and NOM
- Modular design—switch handle, lock-plate, switch mechanism, line and load bases are field replaceable.
- UL listed short circuit current ratings up to 200,000 A (using Class R, J, or T fuses—see table for rating).
- Load make/break rated.
- Meets NEMA hp ratings.
- Dual cover interlock.
- May be padlocked ON or OFF.
- Lock-off accepts up to three padlocks.
- Side-opening door.
- Quick make/quick break mechanism.
- Meets NEMA requirements as heavy duty switch. (**Note:** handle is all black)
- Electrical interlock kits field installable.
- Neutral assembly kits field installable (2 and 3-pole switches).
- UL Listed as suitable for use as service equipment.
- Supplied as standard for switching one load between two power sources, and may be field converted to switch one power source between two loads.

DTU (Series E) 200 A
NEMA 3R

82,000 and 92,000 Line
NEMA 1

92251

30 (Series T4), 200–600 A Types 82,000, 92,000 and 200 A DTU (Series E)

- Not fusible
- Designed for manual transfer of loads from one supply to another.
- UL Listed switches are suitable for use in accordance with Article 702 of the National Electrical Code, ANSI/NFPA 70.
- All 82,000–92,000 and DTU double throw switches are continuous duty rated for their nameplate ampere rating.
- The 82,000 and DTU (Series E) switches are load make/break rated.
- The 92,000 switches are not load make/break rated and should be used for isolating purposes only.
- UL Listed as suitable for use as service equipment except as footnoted.
- Horsepower rated only as footnoted.
- All accessories, except service ground kits, require factory installation.
- For application above 600 amperes, see Supplemental Digest.

For additional information, reference Catalog #3100CT9801.

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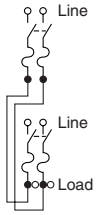
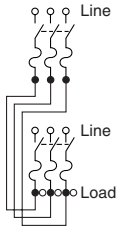
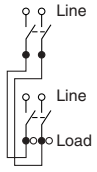
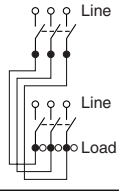
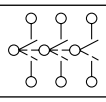
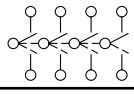
Double Throw Safety Switches
240 Volt
Class 3140

System	Ampere Rating	Current Series	NEMA 1		NEMA 3R		NEMA 4,4X,5 Stainless		NEMA 12 Gasketed		Horsepower Ratings ▲☆ 240 Vac Std. 1Ø	240 Vac Std. 3Ø	240 Vac Max. 1Ø	240 Vac Max. 3Ø	250 Vdc ◆
			Catalog No.	Price	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price					
Fusible															
2-Pole, 240 Vac—250 Vdc															
	100	F	DT223	**$1586.**	DT223RB	**$2037.**	...	...	...	...	7.5	15 ■	15	30 ■	20
3-Pole, 240 Vac—250 Vdc															
	30	F	DT321	**1097.**	DT321RB	**1477.**	...	...	...	...	1.5★	3 ■	3★	7.5 ■	5
	60	F	DT322	**1313.**	DT322RB	**1741.**	...	...	...	...	3★	7.5 ■	10★	15 ■	10
	100	F	DT323	**2069.**	DT323RB	**2483.**	...	...	...	...	7.5★	15 ■	15★	30 ■	20
Not Fusible															
2-Pole, 240 Vac—250 Vdc															
	60	F	DTU222	**$ 641.**	...	...	...	...	...	...	...	...	10	...	10▼
	100	F	DTU223	**914.**	DTU223RB	**$ 898.**	...	...	...	...	...	...	15	...	20▼
	30	T4	92251△	**390.**	...	...	...	...	...	...	...	...	...	...	...
	200	E	82254	**1210.**	DTU224NRB△▽	**1451.**	...	...	H82254	**$3114.**	15	...	...	...	...
	200	E	82254NW	**1914.**	...	...	...	...	...	...	15	...	...	...	...
	400	E	92255△	**3548.**	92255R△	**5251.**	...	...	H92255△	**6259.**	...	...	...	...	...
3-Pole, 240 Vac—250 Vdc															
	30	F	DTU321	**536.**	...	...	...	...	...	...	...	3■	5★	10■	5▼
	60	F	DTU322	**746.**	...	...	...	...	...	...	...	...	10★	15■	10▼
	100	F	DTU323	**1176.**	DTU323RB	**1302.**	...	...	...	...	...	...	15★	30■	20▼
	30	T4	92351△	**458.**	...	...	...	...	...	...	...	...	...	...	...
	200	E	82354△	**1709.**	DTU324NRB△▽	**2003.**	...	...	H82354△	**3605.**	...	15	...	...	...
	200	E	DTU324N△▽	**1865.**	...	...	...	...	...	...	...	15	...	...	...
	400	E	92355△	**4874.**	92355R△	**8692.**	...	...	H92355△	**7100.**	...	...	...	...	...
	600	E	92356 ♦	**6605.**	92356R△	**9081.**	...	...	H92356	**9508.**	...	...	...	...	...
4-Pole, 240 Vac															
	30	T4	92451△	**635.**	...	...	...	...	...	...	...	...	...	...	...
	200	E	92454 □	**2811.**	92454RB □	**5011.**	...	...	H82454 □	**4519.**	...	15 □	...	...	...
	400	E	92455	**6389.**	92455R	**9012.**	...	...	H92455	**8860.**	...	...	...	...	...
	600	E	92456	**7683.**	92456R	**9904.**	...	...	H92456 ◊	**10641.**	...	...	...	...	...

▲ Refer to page 6-35 for additional motor application data. The starting current of motors or more than standard horsepower may require the use of fuses with appropriate time delay characteristics.
■ If used on corner grounded delta systems, install neutral and use outer switching pole for ungrounded conductors.
♦ For switching dc, use two switching poles..
★ Use outer switching poles.
▼ Maximum rating.
△ 240 Vac only
□ Hp rating applies only to H82454. (92454, 92454RB are not Hp rated)
◊ Not UL listed or suitable for use as service equipment.
☆ Std.—Using fast acting one time fuses. Max.—Using dual element time delay fuses.
▽ Neutral included with device.

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For additional information, reference Catalog #3100CT9801.

DE1 | Discount Schedule

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Double Throw Safety Switches
Application Data
Class 3140

Situations Requiring Fuses:

30–100 A Type DT (Series F):

Select DT switches from page 58 which have provisions for accepting fuses.

30, 200–600 A Type 82,000, 92,000 (Series E, T4), all DTU devices:

Use the not fused double throw switches from page 58 in conjunction with standard fused devices, and install them according to the below diagram 1 or 2.

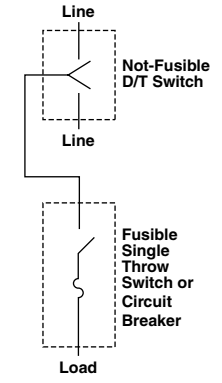

Diagram 1

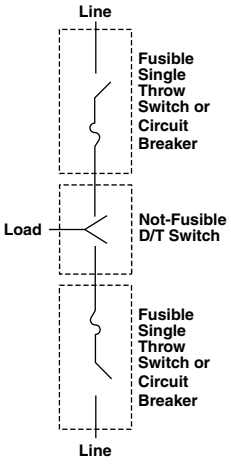

Diagram 2

UL Listed Short Circuit Current Ratings

Switch Type	Ampere Rating	Voltage Rating	UL Listed Fuse Class	Short Circuit Current Rating▲ (RMS Symmetrical Amperes)
Type DT (Series F)	30–100 A	240 V	H, K	10,000
			R, J	200,000
Type DTU■ (Series F)	30–100 A	240 V	H or K	10,000♦
			R or J	200,000
DTU224NRB and DTU324NRB (Series E)	200 A	240 V	H, K	10,000♦
DTU324N (Series E)	200 A	240 V	H, K	10,000♦
			R, J	100,000
Type 82,000	all	240 V	H, K	10,000♦
			R, J	100,000
		600 V	H, K	10,000♦
Type 92,000	all	240 V	H, K	10,000♦

▲ Rating applies to AC only. The UL Listed short circuit current rating for Not Fusible switches is based on the switch being used in conjunction with the corresponding fuse type. Evaluation of Not Fusible switches in conjunction with molded case circuit breakers has not been performed.
■ The DTU361 and DTU361RB are also suitable for use on a circuit capable of delivering not more than
(A) 18,000 rms summetrical A, 600 Vac maximum when protected by Type FH circuit breaker rated 30 A maximum or
(B) 14,000 rms symmetrical A, 600 Vac maximum when protected by Type FA circuit breaker rated 30 A maximum.
♦ Any brand of circuit breaker or fuse not exceeding the ampere rating of the switch may be used ahead of an unfused safety switch when there is up to 10,000 A short circuit current available.

Terminal Lug Data for Type DT, DTU (Series F) Double Throw Safety Switches

Switch Ampere Rating	Wires per Phase	NEMA 1, 3R, 4, 4X, 12			Optional Copper Only Lug
		Wire Range Wire Bending Space Per NEC Table 373-6 AWG/kcmil Al/Cu	Standard Lug Wire Range AWG/kcmil Al/Cu	Optional Compression Lug Field Installable	
30–60 A Type DT, DTU (Series F)	1	#12–2 (Al) or #14–2 (Cu)	#12–2 (Al) or #14–2 (Cu)	C10-14, D8-14, or E6-14★	See Digest 173 pages 3-11 and 3-13 for appropriate kit. Order 2 kits per switch.
100 A Type DT, DTU (Series F)	1	#12–1/0 (Al) or #14–1/0 (Cu)	#12–1/0 (Al) or #14–1/0 (Cu)	VCEL02114S1▼	

Terminal Lug Data for Types 82,000, 92,000 and for E-Series DTU devices△

Ampere Rating	Wires per Phase	Wire Range Wire Bending Space Per NEC Table 373-6 AWG/kcmil Al/Cu	Lug Wire Range AWG/kcmil Al/Cu	Optional Compression Lugs Field Installable
30 A (Series T4)□	1	#14–8	#12–2 (Al) or #14–2 (Cu)	. . .
200	1	#6–300	#6–300	VCEL030516H1▼
400	2	#4–250	#4–350	. . .
600	2	#4–500	#4–600	. . .

★ Thomas and Betts catalog numbers.
▼ VERSA-CRIMP® catalog numbers.
△ 200–600 A switches suitable for 75° C conductors.
□ 30 A switches suitable for 60° C or 75° C conductors.

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For additional information, reference Catalog #3100CT9801.

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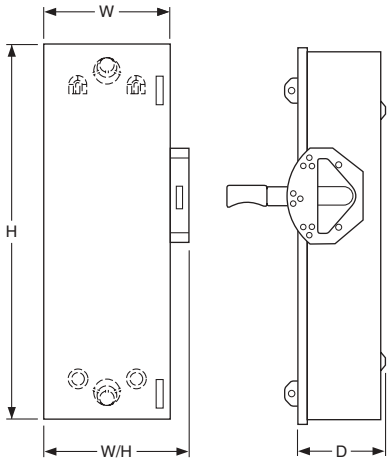
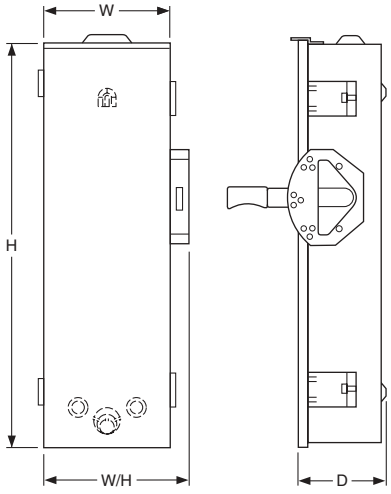


NEMA 1



NEMA 3R

30–100 A Type DT, DTU (Series F)—Approximate Dimensions

Catalog Number	Series	H		W		W/H		D	
		IN	mm	IN	mm	IN	mm	IN	mm
DT223	F5	38.00	965	9.88	251	11.13	283	6.75	171
DT223RB	F5	38.00	965	6.87	174	8.12	206	6.60	168
DT321	F5	38.00	965	10.25	260	11.50	292	6.75	171
DT321RB	F5	38.00	965	10.25	260	11.80	300	6.60	168
DT322	F5	38.00	965	10.25	260	11.50	292	6.75	171
DT322RB	F5	38.00	965	10.25	260	11.80	300	6.60	168
DT323	F5	38.00	965	9.88	251	11.13	283	6.75	171
DT323RB	F5	38.00	965	6.87	174	8.12	206	6.60	168
DTU222	F5	29.94	760	10.25	260	11.96	304	6.93	176
DTU223	F5	29.94	760	10.25	260	11.96	304	6.93	176
DTU223RB	F5	30.50	775	10.25	260	11.96	304	6.93	176
DTU321	F5	29.94	760	10.25	260	11.96	304	6.93	176
DTU322	F5	29.94	760	10.25	260	11.96	304	6.93	176
DTU323	F5	29.94	760	10.25	260	11.96	304	6.93	176
DTU323RB	F5	30.50	775	10.25	260	11.96	304	6.93	176

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For additional information, reference Catalog #3100CT9801.

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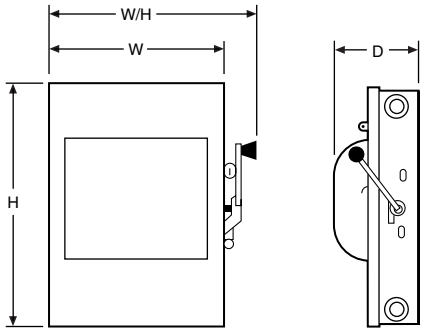
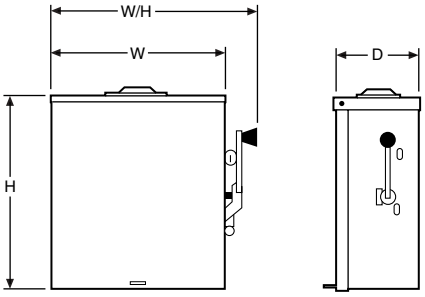
Double Throw Safety Switches
Dimensions—Series E, T4 Devices
Class 3140



NEMA 1



DTU—200 A
NEMA 3R

30, 200–600 A Types 82,000, 92,000 and E-Series DTU devices, NEMA 1 and 3R—Approximate Dimensions

Catalog Number	Series	H		W		W/H		D	
		IN	mm	IN	mm	IN	mm	IN	mm
DTU224NRB	E1	32.50	826	20.63	524	24.00	610	10.63	270
DTU324N	E1	32.50	826	23.50	597	26.85	682	10.63	270
DTU324NRB	E1	32.50	826	24.13	613	26.25	667	10.63	270
82254	E1	30.88	784	15.75	400	19.63	499	9.75	248
82254NW	E1	30.88	784	20.00	508	23.88	607	11.75	298
82354	E1	30.88	784	20.00	508	23.88	607	11.75	298
92251	T4	10.00	254	8.00	203	9.75	248	4.75	121
92255	E1	31.50	800	21.00	533	24.25	616	14.13	359
92255R	E1	31.25	794	30.13	765	33.00	838	11.38	289
92351	T4	10.00	254	8.00	203	9.75	248	4.75	121
92355	E1	31.50	800	29.38	746	32.63	829	14.13	359
92355R	E1	31.25	794	30.13	765	33.00	838	11.38	289
92356	E1	53.00	1346	34.25	870	37.50	953	16.38	416
92356R	E1	52.63	1337	34.38	873	37.63	956	13.88	353
92451	T4	10.00	254	10.00	254	11.75	298	4.75	121
92454	E1	31.13	791	24.75	629	28.25	718	11.75	298
92454RB	E1	30.78	782	20.50	521	28.00	711	10.62	270
92455	E1	31.50	800	37.75	959	41.13	1045	14.13	359
92455R	E1	31.20	792	35.65	906	38.52	978	10.90	277
92456	E1	53.00	1346	44.25	1124	47.50	1207	16.38	416
92456R	E1	52.50	1334	43.70	1110	48.00	1219	13.50	343

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Neutral Assembly For 2 and 3-Pole Switches Only

Switch Ampere Rating	Field Installed Standard Neutral Kit Catalog No.	Terminal Data AWG/kcmil	Price	Field Installed Copper only Neutral Kit Catalog No.	Terminal Data AWG/kcmil	Price
30–100 A Type DT, DTU (Series F)	SN0310	#14–1/0 Al/Cu	**$ 76.**	SN0310C	#14–1/0 Cu	**$ 80.**
30 A (Series T4)	▲	▲	**605.**	. . .	. . .	**. . .**
200 A Type 82000, 92,000 and DTU (Series E)	▲	▲	**740.**	▲	▲	**740.**
400–600 A Type 82000, 92,000	▲	▲	**948.**	▲	▲	**948.**

▲ For Type 82,000 and 92,000 switches, neutral is available factory installed on 2 and 3-pole double throw switches. Not UL Listed. To order, add suffix N to the standard catalog number and add the above price to the list price of the switch. For DTU (Series E) switches, neutral is factory installed in standard device and is UL Listed.

Electrical Interlocks

Switch Ampere Rating	Field Installed Electrical Interlock Kit Catalog Number■	Price	Factory Installed Price Adder Per Switch
30–100 A Type DT, DTU (series F)	EIK1, EIK2♦	**$207.**	**$603.★**
200 A Type 82000, 92,000 and DTU (series E)	. . .	**. . .**	**742.▼**
400–600 A Type 82000, 92,000	. . .	**. . .**	**932. ▼**

■ Electrical interlock kit catalog numbers with "1" suffix indicate one normally open and normally closed contact; "2" indicates two normally open and two normally closed contacts. See Digest 173 page 3-9 for electrical interlock ratings.
♦ 30–100 A Type DT, DTU (Series F) switches contain (2) separate switching mechanisms. Each mechanism will accept an electrical interlock. Some applications may therefore require (2) electrical interlocks.
★ 30–100A Type DT, DTU (Series F) switches with factory installed electrical interlocks installed are UL Listed and interlocks are furnished with 2 N.O. /2 N.C. contacts installed in both "ON" positions. To order, add suffix EI to standard catalog number.
▼ Type 82,000 and 92,000, and DTU (Series E) switches are available with electrical interlock factory installed only. Not UL Listed. Electrical interlocks are furnished with 2 N.O. /2 N.C. contacts and are installed in both "ON" positions. To order, add suffix EI to standard catalog number.

Service Grounding Kit (Required for service equipment use.)

Switch Ampere Rating	Field Installed Service Ground Lug Kit Catalog Number	Terminal Data AWG/kcmil	Price
30–100 A Type DT, DTU (Series F)	Included	Included	**std.**
30 A Type 92,000	DT30SG	(4) #14–4 Cu/Al	**$19.60**
200 A Type 82000, 92,000 and DTU (Series E)	DT100SG	(3) #14–1/0 Cu/Al	**20.00**
400–600 A Type 82000, 92,000	PKOGTA2 (2 required)	(4) #10–2/0 Cu or (4) #6–2/0 Al	**35.00**

Class R Fuse Kits

When installed, this kit rejects all but Class R fuses. Kits are available for field installation. For factory installation, add "CLR" suffix to catalog number.

Switch Ampere Rating	Series Number	Class R Fuse Kit Catalog Number	Price	Factory Installed Price
Class R Fuse Kits—240 V (two kits per 3-pole switch)				
30	F5	RFK03	**$16.30**	**$260.00**
60	F5	RFK06	**17.00**	**260.00**
100	F5	RFK10	**31.80**	**260.00**
Class R Fuse Kits—600 V (two kits per 3-pole switch)				
30	F5	RFK06	**17.00**	**260.00**
60	F5	RFK06H	**17.00**	**260.00**
100	F5	RFK10	**31.80**	**260.00**

Lock-On Provisions—UL Listed

30–100 A type DT, DTU (Series F) and type 92,000 included on standard device.

Type 82,000 and 200 A DTU (Series E): available factory installed. Add SPLO to catalog number and add **$273.** to list price.

"RB Hub"

Rainproof Bolt-On Hubs—For Use On NEMA 3R Enclosures

Conduit Size	¾	1	1¼	1½	2	2½	3	3½	4	Closing Cap
Hub Cat. No.	B075	B100	B125	B150	B200	B250	B300	B350	B400	BCAP
Price Each ‡	**$23.30**	**$23.30**	**$23.30**	**$23.30**	**$42.90**	**$71.00**	**$130.00**	**$200.00**	**$245.00**	**$2.50**

NEMA 3R rainproof enclosures with catalog number ending in RB have a bolt-on closing cap factory installed. Order bolt-on hubs separately from table above. For more details see page 20. Hubs thru size 2½ can be directly installed on RB devices. Devices requiring 3" or larger hubs must have holes cut in the field. Gaskets are provided on 3" and larger hubs.
All hubs are UL Listed for indoor and rainproof applications and suitable for use with conduit having ANSI standard taper pipe thread.

Watertight Hubs—For Use On NEMA 4, 4X and 5 Stainless Steel and NEMA 12 Enclosures

Conduit Trade Size	½	¾	1	1¼	1½	2	2½	3	3½	4
Standard-Zinc Hub Catalog Number	H050	H075	H100	H125	H150	H200	H250	H300	H350	H400
Zinc Price Each	**$20.70**	**$30.00**	**$31.40**	**$36.00**	**$55.00**	**$80.00**	**$ 92.00**	**$118.00**	**$188.00**	**$254.00**
Chrome Plated Hub Catalog Number	H050CP	H075CP	H100CP	H125CP	H150CP	H200CP	H250CP	H300CP	H350CP	H400CP
Chrome Plated Price Each	**27.10**	**37.60**	**42.90**	**44.60**	**64.00**	**91.00**	**123.00**	**162.00**	**237.00**	**272.00**

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SAFETY SWITCHES

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A. Limited Warranties —

1. Square D Single Phase Load Centers and Combination Service Entrance Devices. Square D warrants its single phase load centers and combination service entrance devices to be free from defects in material and workmanship, under normal care and proper usage in a residential installation, for a period of ten (10) years from the date of installation. If the product fails within the warranty period because of a defect in material or workmanship, Square D will, at its option, repair or replace the defective part or parts upon following the notice procedures below and return of product to place of purchase.

2. Square D Load Center Branch Circuit Breakers. Square D warrants its branch circuit breakers to be free from defects in material and workmanship under normal care and proper usage in a residential installation, for the lifetime of the load center in which it is installed. If the circuit breaker fails within the warranty period because of a defect in material or workmanship, Square D will replace the defective breaker free of charge upon following the notice procedures below and return of the product to place of purchase.

B. Exclusive Remedy — The repair and/or replacement of defective products is your sole and exclusive remedy.

C. Warranty Redemption and Exclusions —

1. Square D must be given prompt written notice of any defect or failure of any product covered by these limited warranties at the following address: Square D Company, 1415 S. Roselle Road, Palatine, Illinois, 60067, (888) 778-2733, weekdays between the hours of 8:00 a.m. and 5:00 p.m. Eastern Time.

   For warranty redemption, you must return the product to Square D at the above address.

2. Any product returned under these limited warranties, if shipped, must be sent freight costs prepaid. Square D will deliver repaired or replaced products to buyer, freight costs prepaid. Repaired or replaced products shall be warranted hereunder only for the unexpired portion of the original warranty period. This warranty does not include costs or reimbursement for labor.

   Any limited warranties granted or liabilities assumed hereunder will not apply to products that have been damaged, altered, repaired or operated otherwise than in conformity with the requirements for safe operation and maintenance.

   For your safety and to provide optimum short circuit protection, Square D recommends that you use only the Square D circuit breakers identified on the load center or combination service entrance device label or wiring diagram. Square D disclaims all liability for damage, injury or non-performance caused by the use or failure of incompatible or UL Classified circuit breakers.

D. Disclaimer of All Other Warranties — EXCEPT FOR THE EXPRESS WARRANTY SET FORTH ABOVE OR ANY WARRANTIES IMPLIED BY LAW, Square D MAKES NO OTHER EXPRESS OR IMPLIED WARRANTIES. TO THE FULLEST EXTENT PERMITTED BY LAW, Square D DISCLAIMS ALL IMPLIED WARRANTIES, INCLUDING ALL WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE. THE FOREGOING DISCLAIMER MAY NOT APPLY TO YOU DEPENDING UPON THE PRODUCT YOU PURCHASE, THE APPLICATION AND USE OF YOUR PRODUCT, OR YOUR STATUS AS A CONSUMER. TO THE EXTENT YOU ARE ENTITLED TO RECOVER UNDER AN IMPLIED WARRANTY, THE DURATION OF THAT IMPLIED WARRANTY SHALL BE THE PERIOD OF THE EXPRESS LIMITED WARRANTY SET FORTH ABOVE.

E. Limitation of Liability — Square D expressly disclaims any and all liability to you for any consequential or incidental damages, damages for loss of use, loss of profits, income or revenue, loss of time or inconvenience, loss or damage to associated equipment, damages to tangible or intangible property, other than the equipment covered by this limited warranty, cost of substituted or replacement equipment other than as expressly warranted, damages associated with excessive overvoltages, obsolescence, abuse, misuse, non-authorized modification, alteration or catastrophic events, or any other incidental, consequential or special damage arising out of the use of the products. Square D shall not be liable for indirect, special, incidental or consequential damages with respect to the sale of the products, including any lost revenue or profits, consequential and/or incidental damages, business interruption or damage to business reputation, regardless of the theory upon which any claim may be based, including any statutory, tort contract or insurance subrogation causes of action or claims. In no event will Square D's entire liability to you, including any liability in the event the exclusive remedy set forth in this agreement fails of its essential purpose, exceed the purchase price for the affected products. Some States do not allow the exclusion or limitation of incidental or consequential damages, so the preceding limitations or exclusions may not apply to you. This limited warranty gives you specific legal rights, and you may also have other rights which vary from State to State.

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Warranties
Square D Structured Wiring

A. Limited Warranty — Square D warrants to customers purchasing through authorized Square D distributors that the Square D® labeled passive (enclosure, cover and any non-powered module) structured wiring products ("passive components") at the time of sale by Square D are free from defects in materials and workmanship. Square D also warrants that the Square D labeled active (any powered module) structured wiring products ("active components") at the time of sale by Square D are free from defects in materials and workmanship.

B. Exclusions and Exclusive Remedy —
If within the applicable warranty period, purchaser discovers that a product subject to this Limited Warranty was not as warranted and promptly notifies Square D in writing, Square D shall repair or replace the product or refund the purchase price, at Square D's option. This warranty shall not apply (a) to equipment not supplied by Square D, (b) to equipment or product which shall have been improperly repaired or altered or modified in a non-authorized manner, (c) to equipment or products which shall have been subjected to negligence, misuse, accident, or damage by circumstances beyond Square D's control, or to improper operation, maintenance or storage, or to other than normal use or service. The foregoing limited warranties do not cover reimbursement for labor, transportation, removal, installation, or other expenses that may be incurred in connection with repair or replacement. This Limited Warranty is your sole and exclusive remedy.

C. Warranty Period — For active components, this Limited Warranty shall be in effect until five (5) years following the date of purchase, or until four (4) years following the house closing by the original owner. For passive components, this Limited Warranty shall be in effect until fifteen (15) years following the date of purchase, or until fourteen (14) years following the house closing by the original owner.

D. Warranty Transferable — The unexpired portion of this warranty can be transferred to the subsequent homeowner.

E. Claims Procedure — Send either (1) the original dated sales receipts of the product or
(2) the dated documentation of the original owner's house closing or (3) original Certificate
of Occupancy along with the damaged product
to Square D Company, 8001 Highway 64 East, Knightdale, NC 27545, Attn: Multi-Link Device Warranty.

Note: If these documents are unavailable, the product may be returned to the address above, and the earliest identifiable date code stamped on the product will be used to determine if the product is subject to the conditions and terms of this express warranty.

F. Disclaimer of All Other Warranties — EXCEPT FOR THE EXPRESS WARRANTY SET FORTH ABOVE OR ANY WARRANTIES IMPLIED BY LAW, Square D MAKES NO OTHER EXPRESS OR IMPLIED WARRANTIES. TO THE FULLEST EXTENT PERMITTED BY LAW, Square D DISCLAIMS ALL IMPLIED WARRANTIES, INCLUDING ALL WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE. THE FOREGOING DISCLAIMER MAY NOT APPLY TO YOU DEPENDING UPON THE PRODUCT YOU PURCHASE, THE APPLICATION AND USE OF YOUR PRODUCT, OR YOUR STATUS AS A CONSUMER. TO THE EXTENT YOU ARE ENTITLED TO RECOVER UNDER AN IMPLIED WARRANTY, THE DURATION OF THAT IMPLIED WARRANTY SHALL BE THE PERIOD OF THE EXPRESS LIMITED WARRANTY SET FORTH ABOVE.

G. Limitation of Liability — Square D expressly disclaims any and all liability to you for any consequential or incidental damages, damages for loss of use, loss of profits, income or revenue, loss of time or inconvenience, loss or damage to associated equipment, damages to tangible or intangible property, other than the equipment covered by this limited warranty, cost of substituted or replacement equipment other than as expressly warranted, damages associated with excessive overvoltages, obsolescence, abuse, misuse, non-authorized modification, alteration or catastrophic events, or any other incidental, consequential or special damage arising out of the use of the products. Square D shall not be liable for indirect, special, incidental or consequential damages with respect to the sale of the products, including any lost revenue or profits, consequential and/or incidental damages, business interruption or damage to business reputation, regardless of the theory upon which any claim may be based, including any statutory, tort contract or insurance subrogation causes of action or claims. In no event will Square D's entire liability to you, including any liability in the event the exclusive remedy set forth in this agreement fails of its essential purpose, exceed the purchase price for the affected products. Some States do not allow the exclusion or limitation of incidental or consequential damages, so the preceding limitations or exclusions may not apply to you. This limited warranty gives you specific legal rights, and you may also have other rights, which vary from State to State.

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Square D Conditions Of Sale

NOTE: The following Conditions of Sale are subject to change. All transactions for all products sold by Square D Company, including Square D brand products and all Schneider Electric brand products, such as Merlin Gerin, Modicon and Telemecanique brand products, are subject to the latest published Conditions of Sale of the Square D Company and to any Special Conditions of Sale which may be contained in applicable Square D quotations and acknowledgments.

1. **GOVERNING PROVISIONS AND ACCEPTANCE:** All quotations are subject to these conditions of sale. Acceptance of an order by Square D shall be expressly conditioned on Purchaser's assent to these conditions. Purchaser's direction to proceed with engineering, manufacture or shipment by Square D shall be deemed evidence of this assent. No modified or other conditions will be applicable unless those conditions are so stated in Square D's proposal or are specifically agreed to in writing and signed by an authorized official of Square D. Failure to object to provisions contained in any Purchase Order or other communication from the Purchaser (including, without limitation, penalty clauses of any kind) shall not be construed as a waiver of these Conditions nor an acceptance of any other provisions. These terms are a complete statement of the parties' agreement and may only be modified in writing signed by both parties. These terms may not be modified by course of dealing, course of performance or usage of trade. These terms supersede all previous written or oral quotations, statements or agreements. Any contract for sale by and between the parties shall be governed by and construed according to the laws of the State of Illinois without regard to its rules on the conflict of laws. The Convention on the International Sale of Goods is expressly excluded.

2. **QUOTATIONS:** Written quotations shall be valid for no more than thirty (30) days from their date, unless otherwise stated in the quotation. All quotations are subject to change by Square D Company at any time upon notice to Purchaser. It is Purchaser's obligation to review the quotation carefully and to immediately advise Square D in writing of any differing interpretation Purchaser has so any necessary change can be made.

3. **PRICE POLICY:** All prices are subject to change without notice. In the event of a net price change and unless otherwise agreed to in writing, prices for orders scheduled for immediate release shall be those in effect at time of order entry. Prices for orders placed for future shipment without an agreed price and ship date will be billed at the pricing in effect as of the shipment date. All clerical errors are subject to correction.

4. **SUBSTITUTION:** Square D may furnish suitable substitutes for material unobtainable because of priorities or regulations established by governmental authority or non-availability of materials from suppliers, provided such substitutions do not adversely affect the technical soundness of the equipment. Square D assumes no liability for deviation from published dimensions and descriptive information not essential to proper performance of the product.

5. **TAXES:** Any manufacturer's tax, retailer's tax, occupation tax, use tax, sales tax, excise tax, (except federal excise tax on vehicles), duty, customs, inspecting or testing fee, or other tax, fee or charge of any nature whatsoever, imposed by any governmental authority or measured by any transaction between Square D and Purchaser, shall be paid by the Purchaser in addition to the prices quoted or invoiced, and such charges will appear as a separate line item on the invoice. In the event Square D will be required to pay any such tax, fee, or charge, Purchaser shall reimburse Square D or, in lieu of such payment, Purchaser shall supply Square D at the time the order is submitted with an exemption certificate or other document acceptable to the tax authority. Purchase Orders must state the existence and amount of any such tax, fee or charge for which Purchaser claims an exemption.

6. **TERMS OF PAYMENT:** Acceptance of all Purchase Orders is subject to Purchaser meeting Square D credit standards. Terms are subject to change for failure to meet such standards. Terms are net thirty (30) days from date of invoice of each shipment, unless otherwise stated in Square D's quotation. For an authorized distributor or authorized reseller order, applicable terms of payment are stated in the quotation or applicable discount schedule. Square D reserves the right at any time to demand full or partial payment before proceeding with a contract of sale if, in its sole judgment, as a result of changes in the financial condition of the Purchaser the terms of payment originally specified are no longer justified.

7. **PAYMENTS:** If delivery is delayed or deferred by the Purchaser beyond the scheduled date, payment shall be due in full when Square D is prepared to ship. The equipment may be stored at the risk and expense of the Purchaser. If the Purchaser defaults when any payment is due, then the whole contract price shall become due and payable upon demand, or Square D at its option, without prejudice to other lawful remedies, may defer delivery or cancel the contract for sale. If Purchaser becomes insolvent, or bankrupt or in the event any proceeding is brought against the Purchaser, voluntarily or involuntarily under the bankruptcy or any insolvency law, Square D may cancel any order outstanding at any time and recover its applicable cancellation charges from the Purchaser or the Purchaser's estate.

8. **DELIVERY:**

   A) **F.O.B. POINT OF SHIPMENT:** When the Square D quotation is based on delivery F.O.B. point of shipment, freight prepaid and allowed for delivery within the continental United States, product is sold F.O.B. point of shipment, freight prepaid and allowed. A shipping and handling charge of twenty-five dollars ($25) will be added to all orders having a total net invoice price of less than one thousand dollars ($1,000). Delivery by Square D to the point of shipment constitutes delivery to the Purchaser; and title and all risk of loss or damage

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in transit shall pass to the Purchaser at time of delivery at the F.O.B. point. Square D is not responsible for breakage after having received "in good order" receipts from the carrier. Purchaser is responsible for pursuing any damage claims with the carrier. No allowance will be made in lieu of transportation if the Purchaser accepts shipment at factory, warehouse or freight station or otherwise supplies its own transportation. **Freight prepaid is defined as: a)** Shipments to destinations within the continental United States to the accessible common carrier point nearest the first destination. **b)** Shipments to U.S. destinations outside the continental United States shall be to the common carrier free delivery point in the United States nearest the original port of embarkation. All charges associated with F.A.S., C.I.F., or other charges such as pier transfer, lift, ocean freight, and marine or war insurance shall be paid by the Purchaser, unless otherwise specifically agreed in a specific Purchase Order. In no event will Square D be responsible for demurrage or detention charges.

B) **DELIVERY: F.O.B. DESTINATION:** When the Square D quotation is based on delivery F.O.B. Destination, for shipments for delivery within the continental United States, Square D will retain title and all risk of loss or damage in transit to the common carrier free delivery point in the United States nearest the first destination for a price addition of 2% of the net price. If the Purchaser elects this option, **Purchaser's obligations shall be as follows: a)** Purchaser shall have the responsibility of inspecting the equipment for apparent loss or damage immediately upon its arrival at the free delivery point. **b)** In the event of apparent shipping loss or damage, Purchaser shall make written notation of the loss on the carrier's delivery receipt and, within 72 hours of delivery shall notify the Square D Customer Information Center. Purchaser shall not remove product from the point of examination and shall retain the shipping container and packing material. Purchaser shall request the carrier to make an inspection and send Square D a copy of the carrier's inspection report. **c)** In the event of concealed damage which occurred during transit and is discovered by the Purchaser after delivery, Purchaser shall report such damage immediately, but in no event later than 15 days after delivery, to the delivering carrier, and within 72 hours of discovery, shall notify the local Square D field office. If such notification is not made, Square D shall not be liable for loss or damage in transit.

C) **SHIPMENT AND ROUTING:** Square D shall select the point of origin of shipment, the method of transportation and the routing of the shipment. Purchasers that request expedited or special modes of transportation or routing involving air, premium or any other non-standard Square D shipping shall be assessed additional charges for shipping, handling, freight and expediting. Any rebates, allowances, discounts or incentives received by Square D from its carriers shall be retained by Square D. All prices include domestic packaging only. When other than domestic packaging is required, contact your local Square D field office. Purchaser specified packaging and marking may be subject to additional charges.

9. **SHORTAGES:** Claims for shortages or errors must be made in writing to Square D within 60 days after invoice date, and failure to give such notice shall constitute unqualified acceptance and a waiver of all such claims by the Purchaser.

10. **INSTALLMENTS:** Square D reserves the right to make shipments in installments, unless otherwise expressly stipulated in a specific Purchase Order; and all such installments when separately invoiced shall be paid for when due per invoice without regard to subsequent shipments. Delay in shipment of any installment shall not relieve Purchaser of its obligation to accept remaining shipments.

11. **FORCE MAJEURE:** Square D shall not be liable for any damages as a result of any delays due to any causes beyond Square D's control, including, without limitation, an act of God; act of Purchaser or Square D supplier; embargo or other governmental act; regulation or request; fire; accident; strike; slowdown; flood; fuel or energy shortage; sabotage; war; riot; delay in transportation and inability to obtain necessary labor, materials or manufacturing facilities from usual sources. In the event of any such delay, the date of delivery shall be extended for a period of time reasonably necessary to overcome the effect of such delay.

12. **STANDARD WARRANTY:** Square D warrants equipment manufactured by it and sold through authorized sales channels to be free from defects in materials and workmanship for eighteen (18) months from date of invoice by Square D or its authorized sales channel. If within such period any such equipment shall be proved to Square D's satisfaction to be non-conforming, such equipment shall be repaired or replaced at Square D's option. This warranty shall not apply (a) to equipment not manufactured by Square D, (b) to equipment that has been repaired or altered by other than Square D so as, in its judgment, to affect the same adversely, or (c) to equipment that has been subjected to negligence, accident, or damage by circumstances beyond Square D's control, or improper operation, maintenance or storage, or to other than normal use or service. With respect to equipment not manufactured by Square D, the warranty obligations of Square D shall in all respects conform and be limited to the warranty actually extended to Square D by its supplier. Non-conforming products must be returned at Square D's expense for evaluation unless this is waived in writing. Replacement products may be new or reconditioned. The foregoing warranties do not cover reimbursement for labor, transportation, removal, installation, temporary power, or any other expenses that may be incurred in connection with repair or replacement.

13. **OPTIONAL WARRANTIES:** (Only available on equipment to be located in the U.S.) **Option 1—Extended—2 or 3 years from Shipment**. If requested by the Purchaser and specifically accepted in writing by Square D, the standard

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warranty will be extended to two (2) years from date of invoice for a price addition of 1% of the net face value of the Purchase Order or will be extended for three (3) years from date of invoice for a price addition of 3% of the net face value of the Purchase Order. **Option 2—Special Warranty:** If requested by the Purchaser and specifically accepted in writing by Square D, the standard warranty will be extended, for a price addition of 3% of the net face value of the Purchase Order, to cover reimbursement of the direct costs of: a) Removal of non-conforming equipment or part thereof; b) Transporting equipment or parts to and from the place of repair; c) Off-loading of truck and reinstallation at the original site. Such special warranty, which may be chosen to cover a period not exceeding that of the standard or extended warranty (see above) selected, will not include the cost of providing temporary power or removing or replacing other apparatus or structures, or costs of transportation beyond a common carrier free delivery point in the continental United States. Further, the obligation of Square D for expenses and costs arising under this special warranty coverage will not exceed 50% of the net invoice price on the equipment being repaired. This warranty does not change or affect the allocation of risk or loss during shipment. **Option 3—Extended Warranty—Preventative Maintenance Agreements:** If requested by the Purchaser, and specifically accepted by Square D, a Preventative Maintenance Agreement is available to provide preventative maintenance on equipment covered by the agreement. Terms of the Preventative Maintenance Agreement shall be as defined in a separate Services Agreement agreed to by the parties.

14. **RETURN OF EQUIPMENT:** NO EQUIPMENT MAY BE RETURNED WITHOUT FIRST OBTAINING SQUARE D'S WRITTEN PERMISSION AND A RETURNED MATERIAL IDENTIFICATION TAG. Returned equipment must be of current manufacture, in the original packaging, unused, undamaged and in saleable condition. Returned equipment must be securely packed to reach Square D without damage and labeled with the return authorization number. Any cost incurred by Square D to put equipment in first class condition will be charged to the Purchaser. Purchaser requested returns not involving a Square D error will be assessed Square D's standard restocking fee. Returns will be credited at the pricing specified in Square D's standard return policy. Special Order and Custom equipment is not returnable. Square D shall bear the cost of returns resulting from Square D error, and method and route of return will be at the discretion of Square D. Costs incurred by failure to follow Square D direction will be borne by the Purchaser.

15. **SOFTWARE:** Any software or computer information, in whatever form that is provided with equipment manufactured by Square D, is licensed to Purchaser solely pursuant to standard licenses of Square D or its supplier of such software or computer information which licenses are hereby incorporated by reference. Square D does not warrant that such software or computer information will operate error free or without interruption, and warrants only that during the warranty period applicable to the equipment that the software will perform the essential functions necessary for the normal and customary operation of the equipment. If such software or computer information fails to conform to such warranty, Square D will, at its option, provide an update to correct the non-conformance or replace the software or computer information with the latest available version containing a correction. Square D shall have no obligation to provide updates or revisions.

16. **LIMITATIONS:** These disclaimers and limitations of remedies apply to all warranties offered to Purchaser and to all Purchase Orders. THE WARRANTIES SET FORTH ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESSED OR IMPLIED WARRANTIES (EXCEPT WARRANTIES OF TITLE), INCLUDING, BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANT-ABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Except as may be expressly provided in an authorized writing by Square D, Square D shall not be subject to any other obligations or liabilities whatsoever, other than as stated above with respect to equipment sold or services rendered by Square D. Notwithstanding anything to the contrary herein contained SQUARE D COMPANY, ITS CONTRACTORS AND SUPPLIERS OF ANY TIER, SHALL NOT BE LIABLE IN CONTRACT, IN TORT (INCLUDING NEGLIGENCE OR STRICT LIABILITY) OR OTHERWISE FOR LOST TIME, LOST PROFITS, OR SPECIAL, INDIRECT, INCIDENTAL OR CON-SEQUENTIAL DAMAGES OF ANY KIND WHATSOEVER. The remedies of the Purchaser are exclusive and the total cumulative liability of Square D, its contractors and suppliers of any tier, with respect to this contract or anything done in connection therewith, such as the use of any product covered by or furnished under the contract, whether in contract, in tort (including negligence or strict liability) or otherwise, shall not exceed the price of the product, part, or service on which such liability is based.

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(Continued)

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19. **NUCLEAR APPLICATIONS TERMS AND CONDITIONS:** Unless otherwise agreed in writing by a duly authorized representative of Square D, products sold hereunder are not intended for use in or in connection with any nuclear facility or activity. If so used, Square D disclaims all liability for any damage, injury or contamination arising from a nuclear incident or nuclear hazard; and Purchaser shall indemnify Square D against any such liability, whether arising as a result of breach of contract, warranty or tort (including negligence) or otherwise.

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21. **PRODUCT NOTICES:** Purchaser shall promptly supply the user (including its employees) of the product with all Square D supplied product notices, warnings, instructions, recommendations and similar materials.

22. **ERRORS:** Square D reserves the right to correct errors or omissions in quotations, acknowledgments, invoices, or other documents.

23. **OSHA COMPLIANCE:** Compliance with OSHA or similar federal, state or local laws during the operation or use of the product(s) is the sole responsibility of the Purchaser.

24. **TERMINATION:** Any order may be terminated by the Purchaser only upon written notice to Square D and upon payment of reasonable and proper termination charges based on the price of the terminated order and reimbursement of all direct costs and expenses associated with the order caused by such termination and shall include a reasonable profit. Special or custom ordered equipment is not cancelable after final acceptance of approval drawings for the commencement of manufacturing.

25. **CANCELLATION:** Square D shall have the right to cancel any order or contract at any time by written notice for any material breach of the contract by the Purchaser, including material delays in releasing equipment for manufacture or approval drawings and excessive changes to specifications or drawings.

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FRACTION, DECIMAL, AND MILLIMETER EQUIVALENTS CONVERSION TABLES

FRACTIONS TO DECIMALS TO MILLIMETERS

Fractions	Decimals	Millimeters
1/64	0.015625	0.397
1/32	0.03125	0.794
3/64	0.046875	1.191
1/16	0.0625	1.588
5/64	0.078125	1.984
3/32	0.09375	2.381
7/64	0.109375	2.778
1/8	0.1250	3.175
9/64	0.140625	3.572
5/32	0.15625	3.969
11/64	0.171875	4.366
3/16	0.1875	4.763
13/64	0.203125	5.159
7/32	0.21875	5.556
15/64	0.234375	5.953
1/4	0.2500	6.350
17/64	0.265625	6.747
9/32	0.28125	7.144
19/64	0.296875	7.541
5/16	0.3125	7.938
21/64	0.328125	8.334
11/32	0.34375	8.731
23/64	0.359375	9.128
3/8	0.3750	9.525
25/64	0.390625	9.922
13/32	0.40625	10.319
27/64	0.421875	10.716
7/16	0.4375	11.113
29/64	0.453125	11.509
15/32	0.46875	11.906
31/64	0.484375	12.303
1/2	0.500	12.700
33/64	0.515625	13.097
17/32	0.53125	13.494
35/64	0.546875	13.891
9/16	0.5625	14.288
37/64	0.578125	14.684
19/32	0.59375	15.081
39/64	0.609375	15.478
5/8	0.6250	15.875
41/64	0.640625	16.272
21/32	0.65625	16.669
43/64	0.671875	17.066
11/16	0.6875	17.463
45/64	0.703125	17.859
23/32	0.71875	18.256
47/64	0.734375	18.653
3/4	0.7500	19.050
49/64	0.765625	19.447
25/32	0.78125	19.844
51/64	0.796875	20.241
13/16	0.8125	20.638
53/64	0.828125	21.034
27/32	0.84375	21.431
55/64	0.859375	21.828
7/8	0.8750	22.225
57/64	0.890625	22.622
29/32	0.90625	23.019
59/64	0.921875	23.416
15/16	0.9375	23.813
61/64	0.953125	24.209
31/32	0.96875	24.606
63/64	0.984375	25.003
1	1.000	25.400

MILLIMETERS TO INCHES

Millimeters	Inches	Millimeters	Inches
0.1	0.0039	46	1.8110
0.2	0.0079	47	1.8504
0.3	0.0118	48	1.8898
0.4	0.0157	49	1.9291
0.5	0.0197	50	1.9685
0.6	0.0236	51	2.0079
0.7	0.0276	52	2.0472
0.8	0.0315	53	2.0866
0.9	0.0354	54	2.1260
		55	2.1654
1	0.0394	56	2.2047
2	0.0787	57	2.2441
3	0.1181	58	2.2835
4	0.1575	59	2.3228
5	0.1969	60	2.3622
6	0.2362	61	2.4016
7	0.2756	62	2.4409
8	0.3150	63	2.4803
9	0.3543	64	2.5197
10	0.3937	65	2.5591
11	0.4331	66	2.5984
12	0.4724	67	2.6378
13	0.5118	68	2.6772
14	0.5512	69	2.7165
15	0.5906	70	2.7559
16	0.6299	71	2.7953
17	0.6693	72	2.8346
18	0.7087	73	2.8740
19	0.7480	74	2.9134
20	0.7874	75	2.9528
21	0.8268	76	2.9921
22	0.8661	77	3.0315
23	0.9055	78	3.0709
24	0.9449	79	3.1102
25	0.9843	80	3.1496
26	1.0236	81	3.1890
27	1.0630	82	3.2283
28	1.1024	83	3.2677
29	1.1417	84	3.3071
30	1.1811	85	3.3465
31	1.2205	86	3.3858
32	1.2598	87	3.4252
33	1.2992	88	3.4646
34	1.3386	89	3.5039
35	1.3780	90	3.5433
36	1.4173	91	3.5827
37	1.4567	92	3.6220
38	1.4961	93	3.6614
39	1.5354	94	3.7008
40	1.5748	95	3.7402
41	1.6142	96	3.7795
42	1.6535	97	3.8189
43	1.6929	98	3.8583
44	1.7323	99	3.8976
45	1.7717	100	3.9370

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QO Load Centers – Main Breaker

Amps	Spaces	Max. Circuits	Cover	Catalog #	Ground Bar	UPC Code	Box Size
Indoor – QOM1 Main Breaker Frame Size							(see pg.18)
100	12	12	Combination	QO112M100C	PK9GTA	7-85901-84127-2	4
	12	20	Combination	QO11220M100C	PK15GTA	7-85901-84118-0	5
	16	16	Combination	QO116M100C	PK15GTA	7-85901-84775-5	5
	20	20	Combination	QO120M100C	PK15GTA	7-85901-84788-5	5
	24	24	Order Separately*	QO124M100✚	PK15GTA	7-85901-84792-2	6
	32	32	Order Separately*	QO132M100	PK18GTA	7-85901-19337-1	6
125	24	24	Order Separately*	QO124M125✚	PK15GTA	7-85901-84793-9	6
	32	32	Order Separately*	QO132M125	PK18GTA	7-85901-19338-8	6
Indoor – QOM2 Main Breaker Frame Size							(see pg.18)
150	24	24	Order Separately*	QO124M150✚	PK15GTA	7-85901-84794-6	8
	30	30	Combination	QO130M150C	PK18GTA	7-85901-86743-2	8
	32	32	Order Separately*	QO132M150✚	PK23GTA	7-85901-39489-1	9
200	20	40	Combination	QO12040M200C	PK23GTA	7-85901-84783-0	8
	24	24	Order Separately*	QO124M200✚	PK15GTA	7-85901-84795-3	8
	30	30	Combination	QO130M200C	PK18GTA	7-85901-86754-8	8
	30	40	Combination	QO13040M200C	PK23GTA	7-85901-84800-4	8
	40	40	Combination	QO140M200C	PK23GTA	7-85901-86766-1	9
	42	42	Order Separately*	QO142M200✚	PK23GTA	7-85901-39490-7	10
225	40	40	Order Separately*	QO140M225✚	PK23GTA	7-85901-86767-8	10
Outdoor – QOM1 Main Breaker Frame Size							(see pg.19)
100	12	12	Rainproof	QO112M100RB✚	PK9GTA	7-85901-86787-6	3R
	16	16	Rainproof	QO116M100RB✚	PK12GTA	7-85901-86794-4	4R
	20	20	Rainproof	QO120M100RB	PK15GTA	7-85901-86798-2	4R
125	24	24	Rainproof	QO124M125RB✚	PK15GTA	7-85901-86804-0	4R
Outdoor – QOM2 Main Breaker Frame Size							(see pg.19)
150	20	30	Rainproof	QO12030M150RB	PK18GTA	7-85901-86796-8	5R
	30	30	Rainproof	QO130M150RB✚	PK18GTA	7-85901-86810-1	6R
200	20	40	Rainproof	QO12040M200RB	PK23GTA	7-85901-86797-5	5R
	30	30	Rainproof	QO130M200RB	PK18GTA	7-85901-86811-8	6R
	40	40	Rainproof	QO140M200RB	PK23GTA	7-85901-86813-2	7R
Outdoor – Feed Thru: 22,000 AIR (mobile home applications)							(see pg.19)
125	6	12	Rainproof	QO1612M125FTRB✚▲	PK12GTA	7-85901-86816-3	3R
150	8	16	Rainproof	QO1816M150FTRB	PK15GTA-L	7-85901-86817-0	6R
200	8	16	Rainproof	QO1816M200FTRB	PK15GTA-L	7-85901-86818-7	6R

Main Circuit Breakers

- UL Listed, NOM Certified
- Single-Phase, 3-Wire
- 120/240 Vac—UL Listed
- 22,000 AIR◆
- Convertible to Main Lugs or Lower Amperage Main Breaker
- Factory Installed Main Breaker
- Copper Bus
- Catalog Number Guide Page 17

Listings thru 200A mains meet Federal Specification W-P-115c as Type 1, Class 2.

◆ 22,000 AIR main circuit breaker UL listed for use ahead of QO and QOT 10,000 AIR branch breakers to permit their application systems with up to 22,000A available fault current.

* Contact Square D sales representative for ordering information.

✚ Item may require additional lead time.

▲ QO1612M125FTRB provided with QOM1 frame main circuit breaker.

QO120M100C

QO120M100RB

QO140M200C

QO140M200RB

QO Load Centers – Main Lugs

Amps	Spaces	Max. Circuits	Cover	Catalog #	Ground Bar	UPC Code	Box Size
Indoor – 10,000 AIR							(see pg.18)
30	2	2	Surface	QO2L30SCP●✱❐	PK3GTA-1	0-47569-80432-8	1
70	2	4	Flush	QO24L70FCP●■	PK4GTA	0-47569-80435-9	2
	2	4	Surface	QO24L70SCP●■	PK4GTA	0-47569-80436-6	2
100	6	12	Flush	QO612L100FCP●	PK7GTA	0-47569-80508-0	3
	6	12	Surface	QO612L100SCP●	PK7GTA	0-47569-80507-3	3
	6	12	Flush	QO612L100DF●	PK7GTA	7-85901-78564-4	3
	6	12	Surface	QO612L100DS●	PK7GTA	7-85901-78562-0	3
	8	16	Flush	QO816L100FCP●	PK7GTA	0-47569-80475-5	3
	8	16	Surface	QO816L100SCP●	PK7GTA	0-47569-80476-2	3
	8	16	Flush	QO816L100DF●	PK7GTA	7-85901-78569-9	3
	8	16	Surface	QO816L100DS●	PK7GTA	7-85901-78574-3	3
125	4	8	Flush	QO148L125GF✚	Included	7-85901-48438-7	22
	4	8	Surface	QO148L125GS✚	Included	7-85901-48440-0	22
Indoor – QOM1 Main Frame Size: Convertible to 22,000 AIR Main Breaker							(see pg.18)
125	12	12	Combination	QO112L125GC	Included	7-85901-86845-3	5A
	12	24	Combination	QO11224L125GC	Included	7-85901-84120-3	5A
	16	16	Order Separately*	QO116L125G	Included	7-85901-84773-1	6
	16	24	Order Separately*	QO11624L125G✚	Included	7-85901-84130-2	6
	20	20	Combination	QO120L125GC	Included	7-85901-84786-1	6
	20	24	Order Separately*	QO12024L125G✚	Included	7-85901-84777-9	6
	24	24	Order Separately*	QO124L125G✚	Included	7-85901-84790-8	6
Indoor – QOM2 Main Frame Size: Convertible to 22,000 AIR Main Breaker							(see pg.18)
150	20	30	Order Separately*	QO12030L150G✚	Included	7-85901-84779-3	8
	24	24	Order Separately*	QO124L150G✚	Included	7-85901-84791-5	8
	30	30	Order Separately*	QO130L150G✚	Included	7-85901-84801-1	8
200	12	12	Order Separately*	QO112L200G✚	Included	7-85901-84124-1	8
	30	30	Order Separately*	QO130L200G✚	Included	7-85901-84802-8	8
	30	40	Combination	QO13040L200GC	Included	7-85901-84798-4	8
225	42	42	Order Separately*	QO142L225G✚	Included	7-85901-86775-3	10
Outdoor – Non-metallic Enclosure							(see pg.19)
60	2	4	Rainproof	QO24L60NRNM	Included	7-85901-32802-5	1NM
Outdoor – 10,000 AIR							(see pg.19)
40	2	2	Rainproof	QO2L40RBCP●■	PK3GTA-1	0-47569-80437-3	1R
70	2	4	Rainproof	QO24L70RBCP●■	PK4GTA	0-47569-80438-0	1R
100	6	12	Rainproof	QO612L100RBCP●	PK7GTA	0-47569-80509-7	2R
	8	16	Rainproof	QO816L100RBCP●	PK7GTA	0-47569-80477-9	2R
125	4	8	Rainproof	QO148L125GRB✚	Included	7-85901-48439-4	9R
Outdoor – QOM1 Main Frame Size: Convertible to 22,000 AIR Main Breaker							(see pg.19)
125	12	12	Rainproof	QO112L125GRB✚	Included	7-85901-86785-2	3R
	12	24	Rainproof	QO11224L125GRB	Included	7-85901-86784-5	3R
	16	24	Rainproof	QO11624L125GRB	Included	7-85901-86788-3	4R
	24	24	Rainproof	QO124L125GRB	Included	7-85901-86799-9	4R
Outdoor – QOM2 Main Frame Size: Convertible to 22,000 AIR Main Breaker							(see pg.19)
150	30	30	Rainproof	QO130L150GRB	Included	7-85901-86808-8	6R
200	12	12	Rainproof	QO112L200GRB	Included	7-85901-86786-9	5R
	30	30	Rainproof	QO130L200GRB	Included	7-85901-86809-5	6R
	30	40	Rainproof	QO13040L200GRB	Included	7-85901-86806-4	6R
225	42	42	Rainproof	QO142L225GRB✚	Included	7-85901-86815-6	8R

Main Lugs

- UL Listed
- Single-Phase, 3-Wire
- 120/240 Vac
- 12 Spaces and Higher Panels Convertible to Main Breaker
- Factory Installed Main Lugs
- Copper Bus Bar Only on 12 Circuits and Higher
- Catalog Number Guide Page 17

QO13040L200GC

QO11624L125GRB

Listings thru 200A mains meet Federal Specification W-P-115c as Type 1, Class 2.

- ● Not supplied with copper bus bar.
- ✱ Will not accept Qwik-Gard QO GFI circuit breakers.
- ❐ Mains rated 25A when aluminum wire is used.
- ■ Use #10 maximum size wire for GFI circuit breaker.
- * Contact Square D sales representative for ordering information.
- ✚ Item may require additional lead time.

QO Load Centers

> Catalog Number Guide

QO 1 8 16 M 100 T FT C CP

Position 1 – Brand
"QO" = QO
"HOM" = Homeline

Position 2 – Phases
Only applies to QO
Blank or "1" = Single
"3" = Three

Position 3 – Spaces
Maximum number of full-size single-pole circuit breaker spaces.

Position 4 – Circuits
Maximum number of single-pole circuits when using tandem breakers
Note: Number of circuits minus number of spaces equals number of tandem breakers accepted.

Position 5 – Mains Type
"M" = Main Breaker
"L" = Main Lugs

Position 6 – Mains Ratings
(Amps)

Position 7 – Ground Bar
"G" = Included
"T" = Factory Installed
Blank = Order separately

Position 8 – Special Construction
"FT" = Feed Through

Position 9 - Cover
"C" = Combination Cover
"F" = Flush Cover
"S" = Surface Cover
"RB" = Rainproof
"EP" = Longer Cover Accessory
Blank = Order separately

Position 10 - Consumer Product
"CP" = Consumer Products
CP only applies to Homeline load centers with six spaces or less and QO load centers with eight spaces or less and does not change the product.

Amps▲	Use With Main Lug Load Center Mains Rating	Main Circuit Breaker Catalog #	Main Wire Size AWG/kcmil (Al or Cu)	UPC Code
Field Installable Main Breaker (convertible load centers only): QOM1 Frame Size				
50	100-125	QOM50VH✚		7-85901-87959-6
60	100-125	QOM60VH✚		7-85901-87960-2
70	100-125	QOM70VH✚		7-85901-05471-9
80	100-125	QOM80VH✚		7-85901-05472-6
90	100-125	QOM90VH✚	#12 - 2/0	7-85901-05473-3
100	100-125	QOM100VHCP		0-47569-82259-9
110	125	QOM110VH		Special Order
125	125	QOM125VHCP		0-47569-03461-9
Field Installable Main Breaker (convertible load centers only): QOM2 Frame Size				
100	150-225	QOM2100VH✚		7-85901-02195-7
125	150-225	QOM2125VH✚		7-85901-02197-1
150	150-225	QOM2150VH	#4 - 300	7-85901-00405-9
175	200-225	QOM2175VH✚		7-85901-84858-5
200	200-225	QOM2200VH		7-85901-00406-6
225	225	QOM2225VH		7-85901-00407-3
Field Installable Main Lugs (convertible load centers only)				
125	100-125	QOL125✚	#6 - 2/0	7-85901-74796-3
200	150-225	QOL225✚	#6 - 300	7-85901-74797-0

Product	Catalog #	UPC Code
High Amperage Breaker Enclosures		
Outdoor Enclosure with Factory Installed 200A Main Breaker (Replaces Q2E2200NRBCP)	QOM2E2200NRB	7-85901-37530-2
Outdoor Enclosure Only (100A to 225A QOM2 Main Breaker order separately)	QOM22225NRB	7-85901-32887-2
Indoor Surface Mount Enclosure Only (100A to 225A QOM2 Main Breaker order separately)	QOM22225NS✚	7-85901-32886-5

QOM2E2200NRB

✚ Item may require additional lead time.
▲ Do not exceed the load center mains rating.