

MEGATECH ENGINEERING LTD

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KM LNG Export Terminal
Belt Conveyor
Kitimat, BC

OPERATION AND MAINTENANCE MANUAL



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1. SAFETY

The following instructions are issued as recommendations only and are not intended to supersede any ruling authority or plant procedure that may affect this work. In all cases, operating and maintenance personnel should use their best judgment and common sense.

- Lockout equipment before beginning any work on conveyor.
- Prior to working on conveyor, personnel should read manual.
- Work should only be performed by those suitably trained in the installation & operation of belt conveyors.
- When loading, unloading, or otherwise handling equipment, check for surrounding obstructions, fittings and powerlines.
- The moving parts of a conveyor may catch loose clothing, jewelry, long hair, etc. Dress appropriately.
- Never ride on conveyor.
- Check that all personnel are clear before starting conveyor.
- The conveyor must not be operated without all of the guards and control accessories in place.



2. INSTALLATION

The following installation procedures are designed and prepared to assist with the understanding of the installation of the belt conveyor. This document should be read in conjunction with the drawings.

Equipment installation should only be undertaken by persons familiar with heavy equipment installations, such as certified Millwrights. All rigging and support structures should be so arranged as to ensure the Safety of all persons involved in the installation of the equipment.

Under no circumstances should equipment start-up be made until all equipment is correctly installed, with all required supports in place and all anchor bolts secure. Failure to do so may cause injury.



2.1 Storage

- i. Check all materials and equipment upon delivery. Inspect for damages or missing components. Unless Megatech is notified within seven days of receipt of the equipment, Megatech will not be held responsible for any damaged or missing components.
- ii. All electrical equipment, motors, and control devices shall be covered and stored in a clean, dry, heated area.
- iii. Tarpaulin heavy-duty polyethylene sheets shall cover all equipment stored outdoors, or equipment should be stored in a warehouse. If equipment is to be stored outdoors with protective coverings, it shall be mounted on a suitable support, clear of any vegetation or foliage.
- iv. All machined surfaces shall be greased and individually wrapped prior to being covered.

2.2 Civil Requirements

- i. Review the contract and shop drawings for the belt conveyor and provide the necessary bases, foundations, miscellaneous steel work and civil works required for the equipment. Allow sufficient access to the civil works to permit installation of the equipment.
- ii. Verify that all supports and auxiliary steelwork that are not provided by Megatech are available as required to install the belt conveyor and associated equipment.



2.3 Lifting Guidelines

- i. Lifting should always take place with approved lift slings, tackles, and/or other lifting materials.
- ii. Use designated lifting lugs if available. For small items without lugs, sling appropriately.
- iii. Weights of components can be found on the drawings.

2.4 Belt Conveyor Assembly

The belt conveyor will be shipped factory assembled to the greatest extent possible. Items not factory assembled shall be installed per drawings and standard conveyor installation procedures. Only trained personnel with extensive knowledge of belt conveyors shall be used.



3. START-UP & OPERATING PROCEDURES

Under no circumstances should equipment start-up be made until all equipment is correctly installed, with all required supports in place and all anchor bolts secure. Failure to do so may cause injury.

3.1 Prior to Initial Start-up

- i. Ensure gearbox and bearings contain proper quantity of lubricant.
- ii. Check proper rotation of motor.
- iii. Check proper installation of idlers.
- iv. Check proper installation of belt scrapers.
- v. Check proper adjustment of rubber skirting at loading point.
- vi. Check that all fasteners are secure.
- vii. Remove all construction materials.
- viii. Secure all guards.
- ix. Check function of safety devices.



3.2 Initial Start-up

- i. Run conveyor at slow speed. Check all equipment to determine proper adjustment and function. Increase speed until normal operating parameters are reached.
- ii. Check that motion detector is operating correctly. To test motion detector system, run the conveyor and create a simulated motion detector failure. This is done by either removing the motion detector from the shaft or by disconnecting the lead wires at the nearest junction box. This should cause a shutdown of the conveyor and all upstream equipment (i.e. all equipment feeding the conveyor). If this test procedure fails, make adjustment and repeat the test until system operates correctly.
- iii. Once proper belt tracking has been achieved, slowly introduce material until full capacity is reached

3.3 General Operation

- i. When system is started, warning horn will sound. Conveyor is first equipment to start.
- ii. Emergency stoppage of the conveyor will stop all upstream equipment as well.
- iii. Under normal shutdown conditions, equipment will stop in sequence with conveyor being the last. Time delay of shutdown is adjustable.
- iv. Motion detectors on conveyor detect a loss of motion. If loss of motion is detected, an alarm is issued, the conveyor will stop, and upstream equipment will shut down.



4. SHUTDOWN PROCEDURES

4.1 Recommended Short-Term Shutdown Procedures

- i. Short-term shut-down includes running the conveyor long enough to allow the conveyed materials to discharge from the conveyor.
- ii. Once material is clear of the conveyor, initiate system shutdown, per the Facilities Standard Operating Procedure.

4.2 Recommended Long-Term Shutdown Procedures

- i. Run conveyor until empty.
- ii. Inspect the conveyor for any signs of unusual wear.
- iii. Check lubrication level of the gear reducer. Lubricate all bearings.
- iv. Once a month, operate the conveyor for a short period of time.



5. MAINTENANCE INSTRUCTIONS

Safety Notice

Under no circumstances should personnel perform any work on conveyor while power is available to the electric motor drive. Before performing any work on the conveyor, the starter shall be in the 'OFF' position with approved safety tags and padlocks in place. In addition, the local disconnects should be opened. After this has been accomplished, it should be verified that the starter that has been disabled is the correct one for the equipment.



5.1 Lubrication

Operations management shall setup a regular lubrication schedule. Refer to manufacturer's literature for recommendations and procedures.

5.2 Motion Detector Check

The objective of this test is to determine whether the motion detector sensor and relay unit are operating properly.

The principle of operation of the equipment is as follows:

- As the sensor rotates an electric current (or pulse) is generated.
- A regular series of pulses (from a properly operating conveyor) causes the relay to give a permissive signal to the drive motor controller.
- An irregular series of pulses (or none at all) causes the relay (after a preset time delay) to give a failure signal to the drive motor controller. This results in a conveyor shut down.

The motion detector system is tested as follows:

- i. Run the conveyor.
- ii. Locate motion sensor.
- iii. Remove sensor from shaft. The signal will be lost which simulates a stopped conveyor. Alternatively, disconnect lead wires.
- iv. The conveyor should stop operating (along with upstream equipment).
- v. If conveyor does not stop, shut down conveyor. Check motion sensor connections and repair as required.
- vi. Test again. If conveyor still fails to stop, replace sensor.
- vii. Record date of test.



5.3 TROUBLESHOOTING GUIDE

5.3.1 General

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>
Conveyor will not start.	No power to motor. No permission from the downstream equipment or control system.
Conveyor has not started.	Check for possible jamming. No permission from the downstream equipment or control system. Check if the disconnect switch is off. Check fuses or circuit breakers.
Vibrations.	Check belting. Check that idlers and structure are secure. Check that gear reducer is secure.
Full capacity is not achieved.	Check feed to conveyor. Check discharge chutes for plugging.

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5.3.2 Belting

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>	<u>CORRECTION</u>
Conveyor belt runs to one side at a particular point on the conveyor.	One or more idlers not at right angles to longitudinal centerline of belt.	Advance the end of idler to which the belt has shifted in the direction of belt travel.
	Conveyor frame not lined up properly.	Stretch line along edge to determine how much out of line and correct.
	Sticking idlers.	Replace or free idler.
	Structure not level and belt tends to shift to low side.	Level structure.
	Build up of material on idlers.	Adjust belt scrapers.
One section of belting runs off to one side all along the conveyor.	Splices not square.	Re-splice.
	Crooked belt.	If new, may correct itself when broken in. Otherwise, replace with new section.
Conveyor belt runs to one side for some distance along conveyor.	Improper loading of belt.	Make changes in loading area so that material is centered properly.
Belt has erratic action, following no particular pattern.	Belt too stiff.	May be due to newness. If so, allow proper break-in time. Add training idlers.
Belt running off at head pulley.	Head pulley or troughing idlers approaching head pulley out of alignment.	Check alignment of pulley and adjacent troughing idlers.

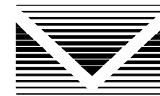
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Belt Conveyor
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<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>	<u>CORRECTION</u>
Belt running off at tail pulley.	Build up of material on return idlers.	Remove material. Provide better maintenance.
	Return rollers out of line.	Adjust at right angle to frame.
	Unequal loading.	Adjust loading chute to properly center the load.
Excessive wear on underside of belt.	Slippage between belt and drive pulley.	Increase tension. Renew worn-out lagging.
	Sticking troughing idlers.	Replace or free.
	Material ground between pulley and belt.	Adjust scrapers.
Excessive wear on carrying side of belt.	Dirty, frozen, or misaligned return idlers.	Adjust scrapers. Clean, repair, align return idlers.
	Excessive sag between troughing idlers causing load to move and shift on belt as it passes over idlers.	Increase belt tension if too low. Reduce idler spacing.
	Abrasive skirtboards.	Check material.
	Poor loading.	Check loading.



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<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>	<u>CORRECTION</u>
Belt requires too much tension resulting in excessive stretch in belt.	Improper maintenance of troughing and return idlers.	Reduce friction by replacing frozen or worn-out idlers. Provide better maintenance. Clean pulley lagging. Increase speed, if possible. Reduce tonnage at slower speed. Tighten screw take-up just enough to keep belt from slipping.



5.3.3 Bearings

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>
Leaking.	Check seals.
Noisy.	Check lubricant.
Hot.	Check lubricant.
Housing loose.	Check housing bolts and housing fastening bolts.
Shaft is difficult to turn.	Check grease condition and level. Check bearing clearances.



5.3.4 Gear Reducer

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>
Leaking.	Check seals.
Hot.	Check oil level and condition of oil.
Noisy.	Check gearing for excessive wear and oil levels.
Excessive vibrations.	Check connections.
Oil foaming.	Check oil level and condition of the oil (replace oil).



5.3.5 Drive Motor

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>
Hot.	Check ventilation ports. Check thermistors on motor winding for faulty winding or power input. Compare actual motor current draw with normal.
Noisy.	Check bearings.
Will not start.	Check power characteristics. Check downstream equipment permissive signals. Check safety stop switches. Check permissive contacts (ie. motion detector).



5.3.6 Motion Detector

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
Conveyor not moving material.	Control equipment fault.	Resolve faults in control equipment.
	Conveyor jammed.	Check feed and discharge chutes.
	Belt broken.	Check for cause of failure. Repair belt.
	Motion detector fault.	Adjust or replace motion detector components.
Conveyor not starting.	Faulty starting relay	Check/replace starting relay.
Excessive time interval to stop.	Improper control setting.	Check switch setup.



5.4 Schedule for Preventative Maintenance

Item	Action and Frequency			Comment
	Daily	Weekly	Monthly	
General Operation	Visual			
Belting	Tracking		Wear	
Electric Motors			Clean vents	Grease per motor manual
Gear Reducers			Check seals. Check oil level.	Replace oil every two years min.
Bearings		Grease	Check seals.	
Motion Detector			Check operation	
Safety Switches			Check operation	

- Lubrication intervals depend on use/conditions and should be altered accordingly

6. DATA SHEETS

6.1 SEW Gear Reducer

1

2

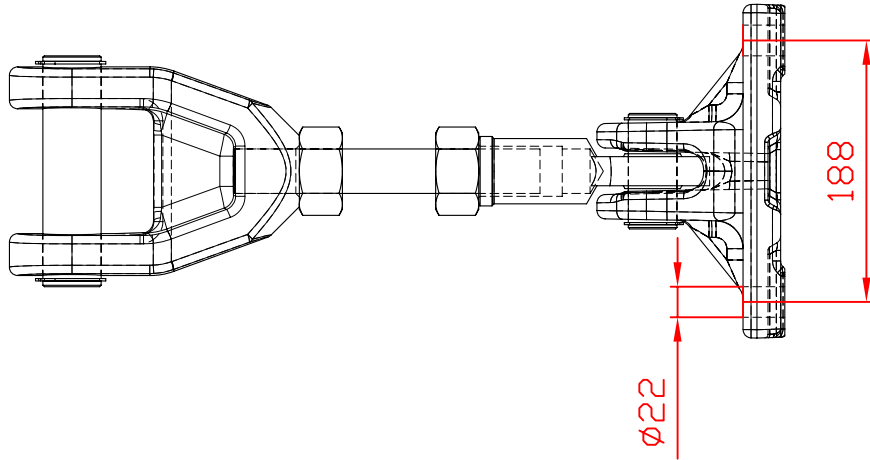
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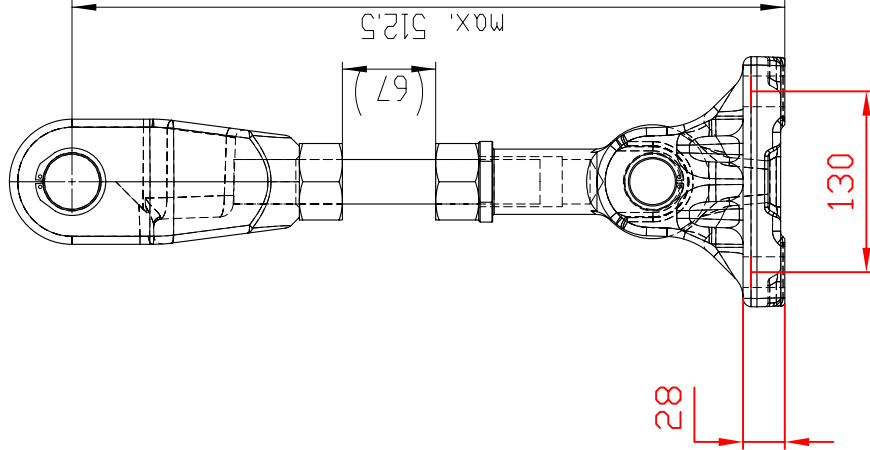
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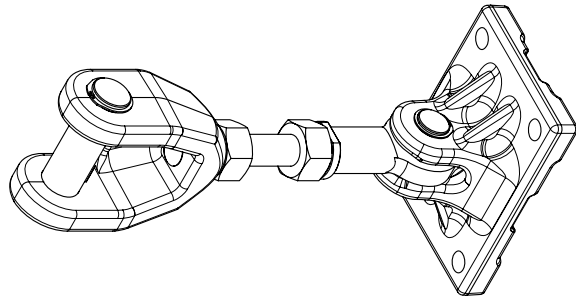
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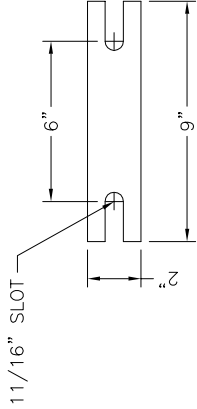
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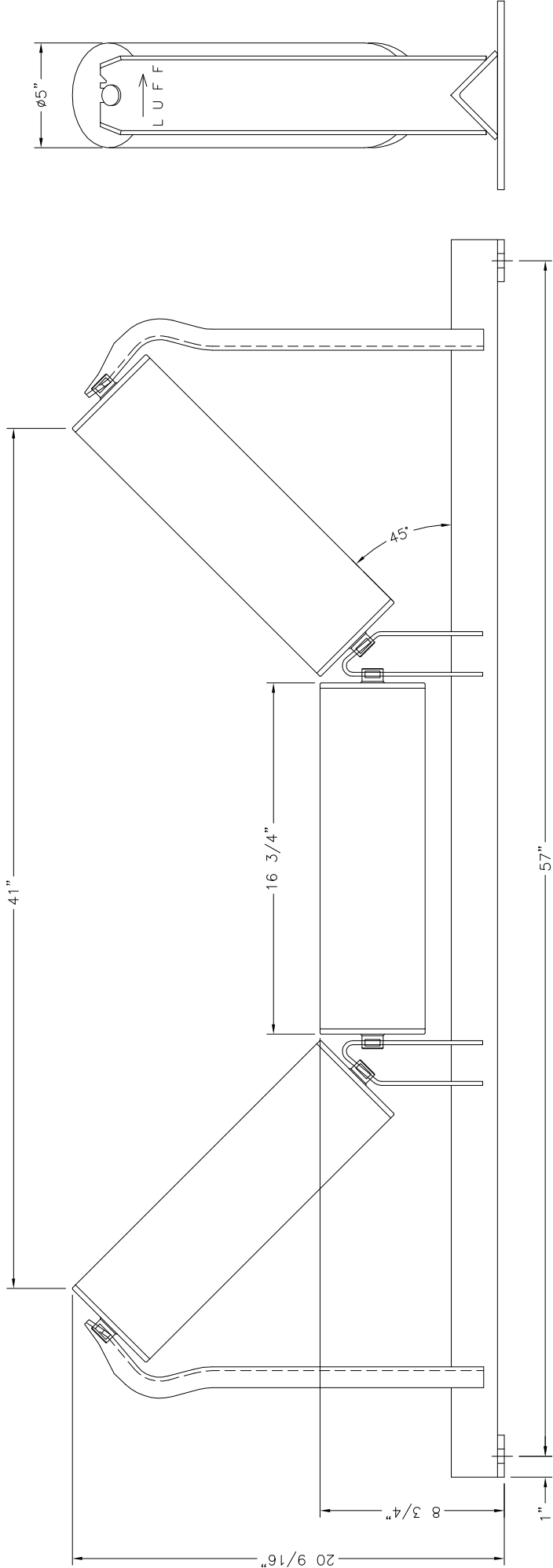
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Check:			made from:		
Stand:		Scale 1:5			
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Mod.-No.	Type: X160-170 X180-190		Part number	Status: Rev.	Format Validity
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Name:					
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Torque arm cpl.
STD

6.2 LUFF Components

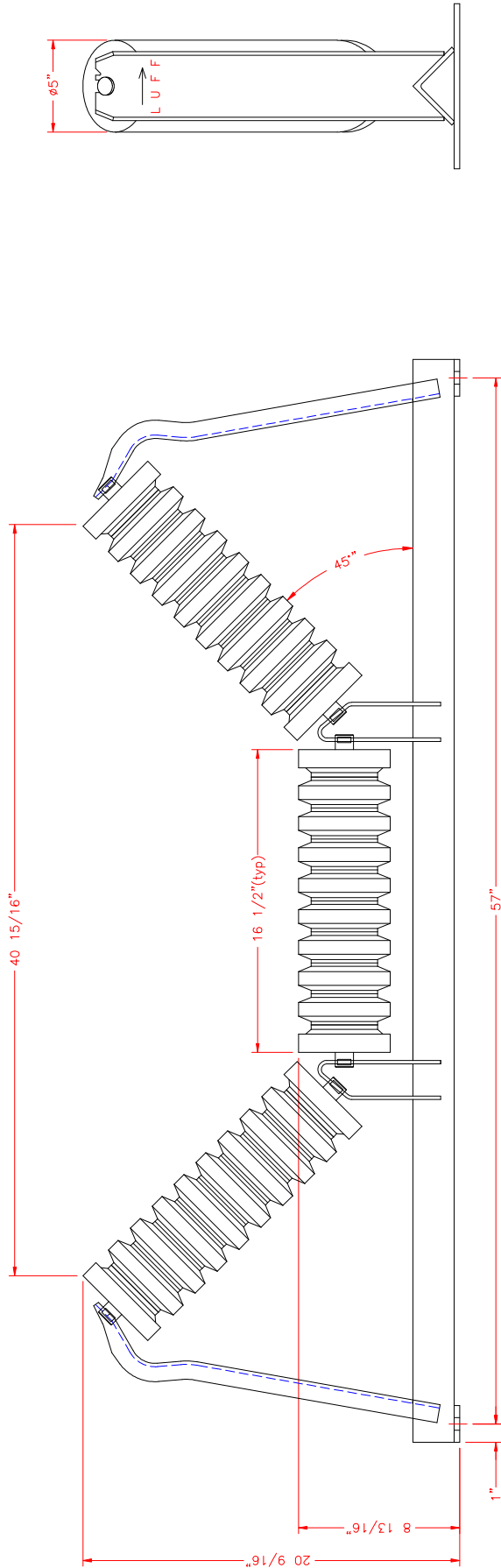
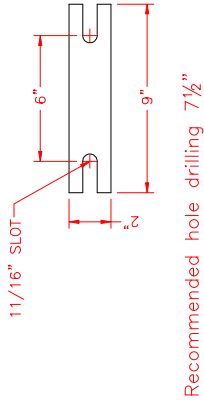


Recommended hole drilling 7 1/2"



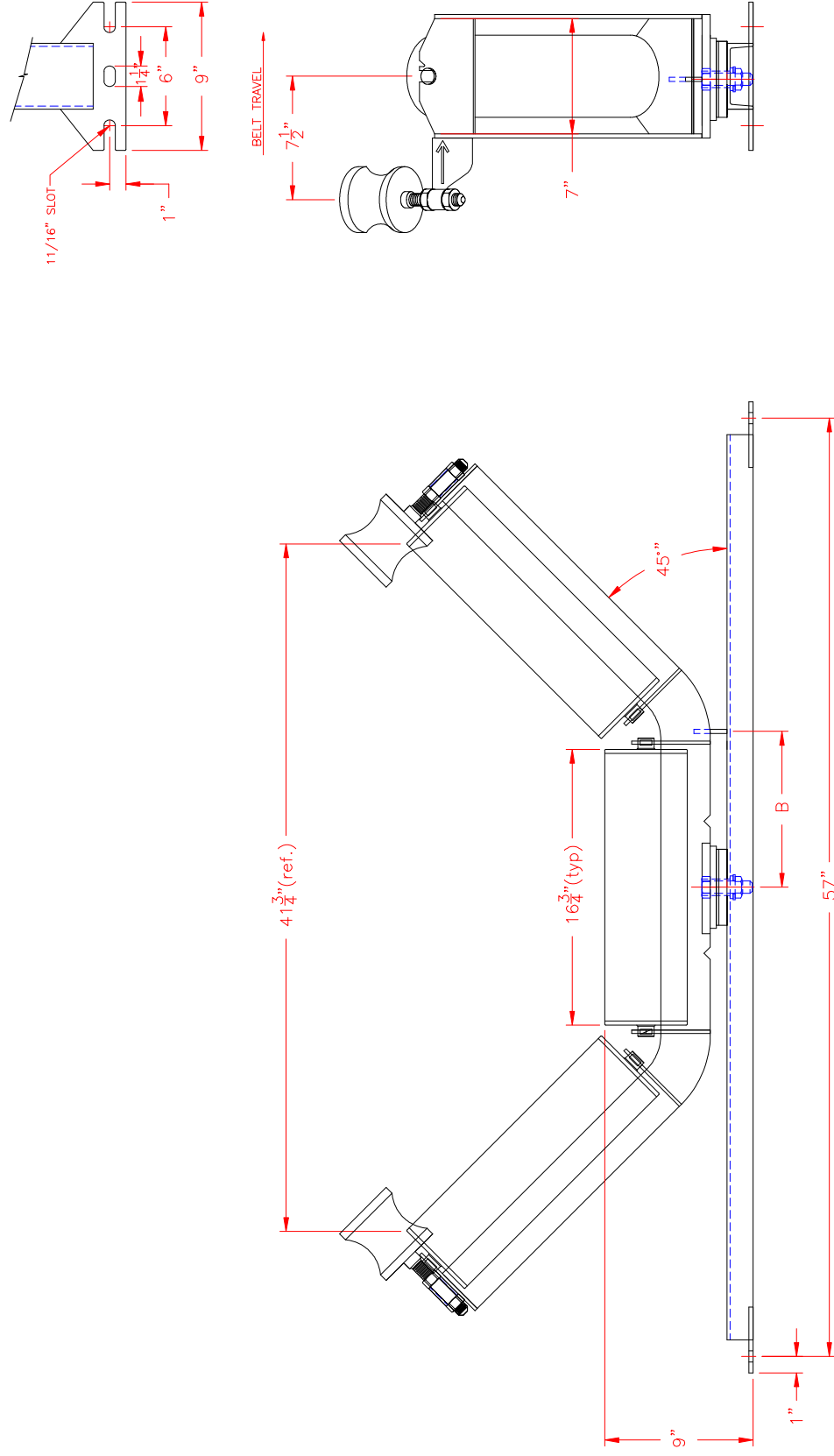
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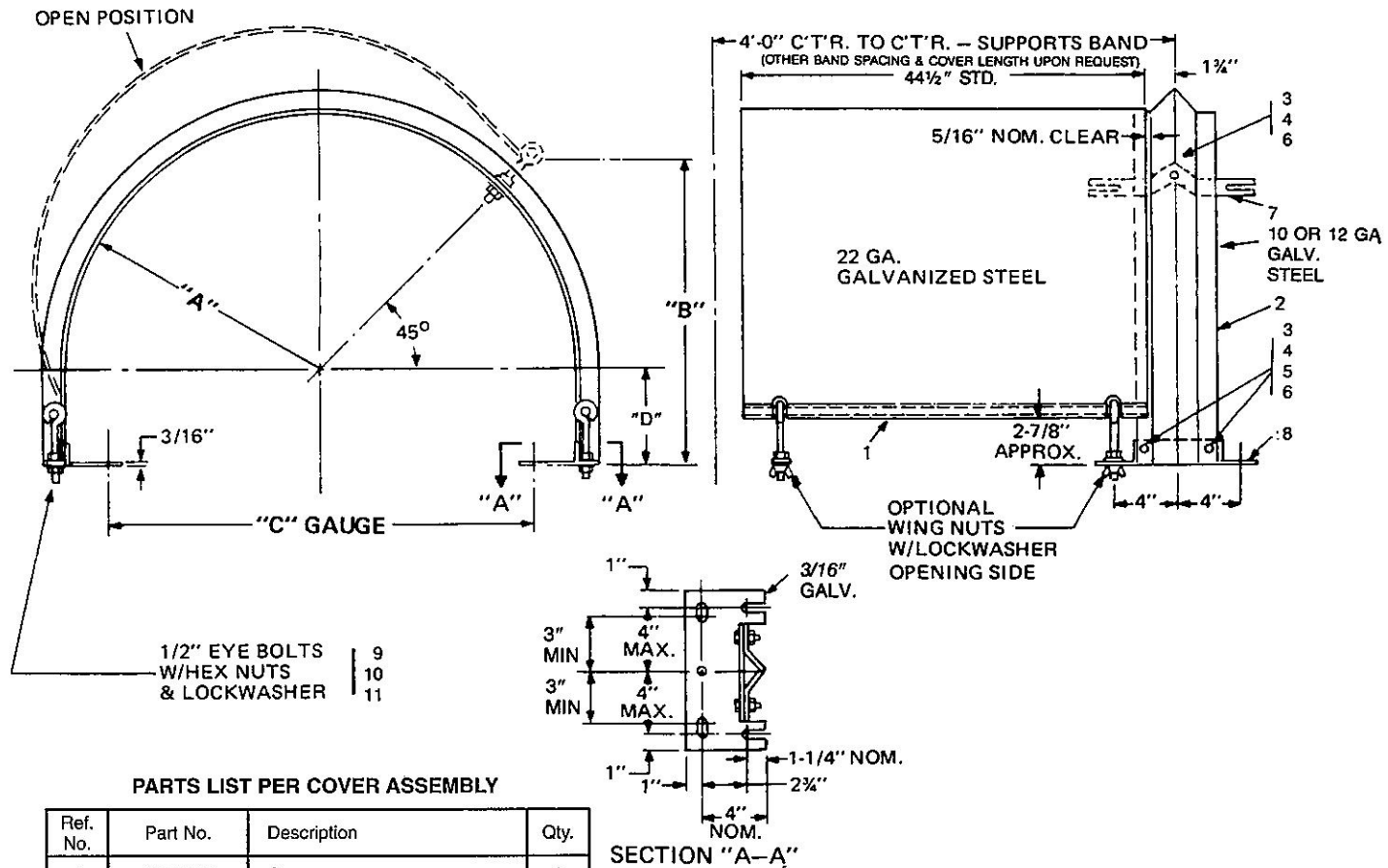
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CH-SERIES FULL SMOOTH COVERS



PARTS LIST PER COVER ASSEMBLY

Ref. No.	Part No.	Description	Qty.
1	CH-1060	Cover	1
2	See Table	Support Band 12 GA. thru 36" B.W. 10 GA. 42" B.W. +	1
3	—	5/16" - 18 Hex Hd. 1" long	5
4	—	5/16" - 18 Hex Nut	5
5	—	5/16" Lock Washer	4
6	—	5/16" Flat Washer	9
7	CHIB-1	Inspection Bar 10 GA. GALV.	1
8	CHBB-1	Base Bracket 3/16" H.D.G.	2
9	—	1/2" x 6" Eyebolt	4
10	—	1/2" - 13 Hex Flange Nut/Serations	8
11	—	1/2" Lock Washer	4

(ALL STANDARD PARTS ARE ZINC PLATED
OR HOT DIPPED GALV.)

**STANDARD COVERS ARE GALVANIZED STEEL. ALUMINUM, STAINLESS STEEL, AND PAINTED AVAILABLE.
ALL DIMENSIONS ARE STANDARD. OTHER OPTIONS ARE AVAILABLE ON REQUEST.**

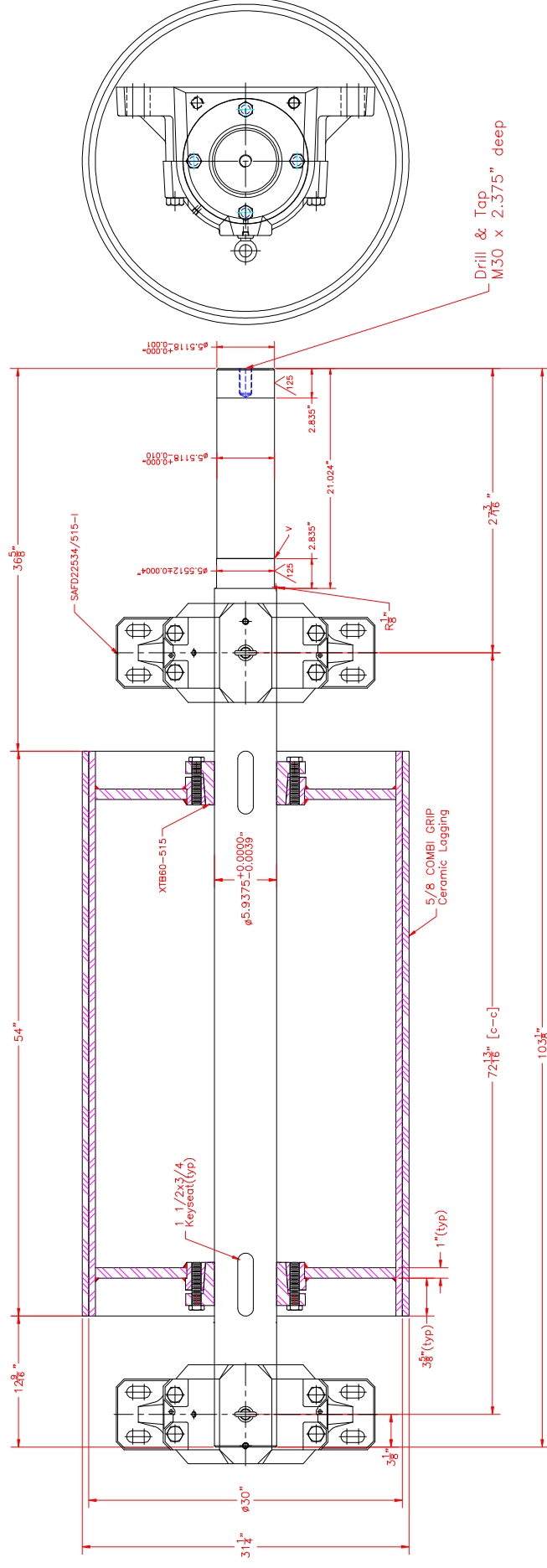
SPECIFICATIONS

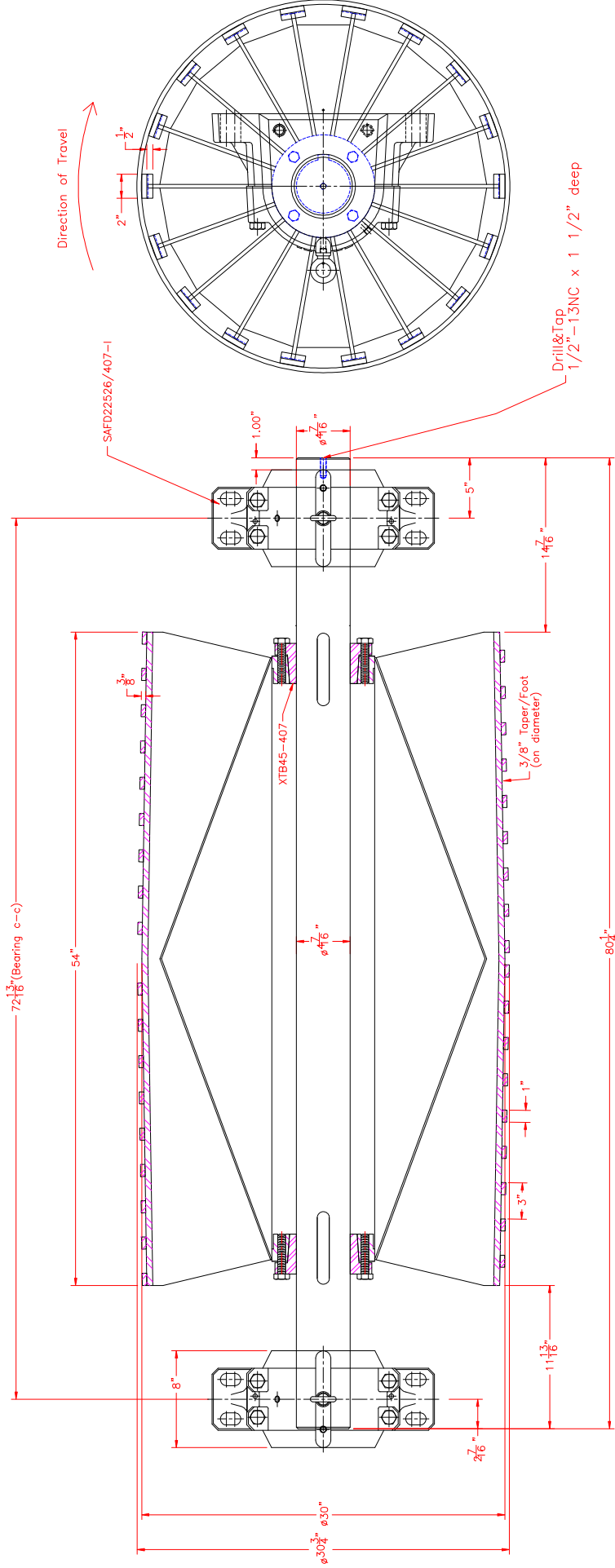
Assembly No.	Belt Width	A	B	C	D	Wt. Lbs.
CH-18	18"	16-1/4"	19-1/4"	27"	6"	52
CH-20	20"	17-1/4"	20"	29"	6"	54
CH-24	24"	19-1/4"	21-7/8"	33"	6"	58
CH-30	30"	22-1/4"	24"	39"	6"	65
CH-36	36"	25-1/4"	26-1/8"	45"	6"	71
CH-42	42"	28-1/4"	28-1/4"	51"	6"	78
CH-48	48"	31-1/4"	30-3/8"	57"	6"	84
CH-54	54"	34-1/4"	32-1/2"	63"	6"	90
CH-60	60"	37-1/4"	34-5/8"	69"	6"	97
CH-72	72"	43-1/4"	39"	81"	6"	108

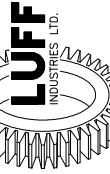
INSTALLATION PROCEDURE:

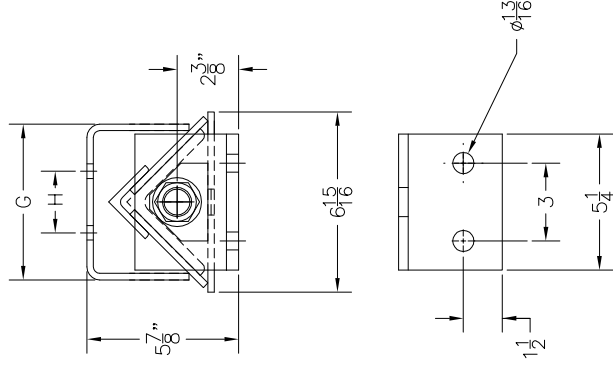
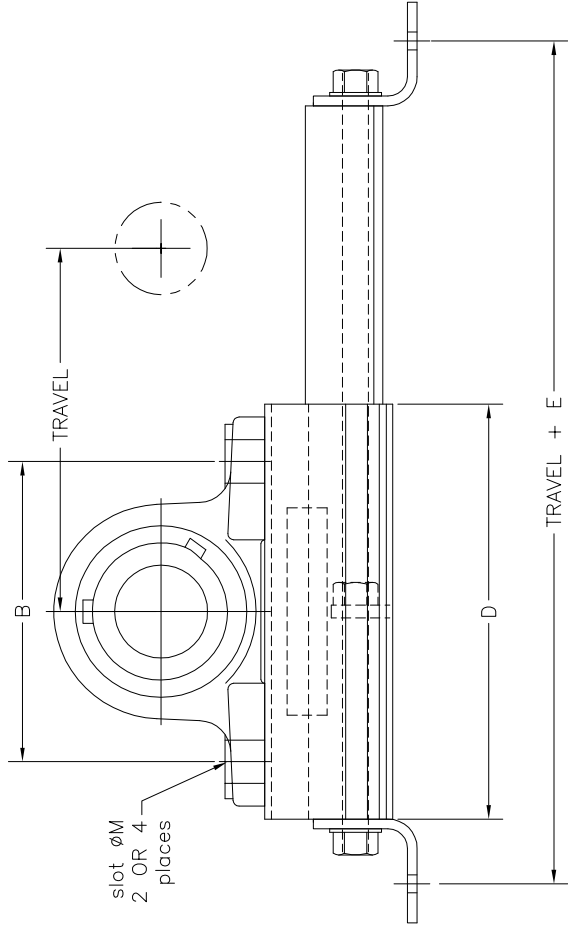
1. BOLT BASE BRACKETS AND INSPECTION BARS TO SUPPORT BANDS.
2. LOCATE SUPPORT BANDS ON 4'0" CENTER ON CONVEYOR.
3. DRILL 11/16" DIA. HOLES IN CONVEYOR TO MATCH BASE BRACKET.
4. BOLT BANDS TO CONVEYOR WITH INSPECTION BAR ON DESIRED SIDE.
5. FASTEN COVERS TO SUPPORT BANDS USING EYEBOLTS WITH NUTS AND LOCK WASHERS (WING NUTS ON OPENING SIDE OPTIONAL.)

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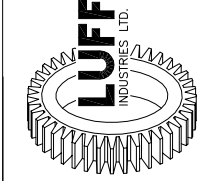
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								TOLERANCES unless otherwise noted	
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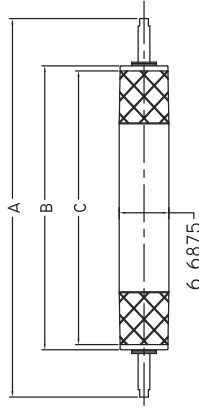


Part No.	B	D	E	G	H	M
PSHD-107-TRAVEL	6 5/8	9	14	4		9/16
PSHD-115-TRAVEL	7 3/8	11	16	4		11/16
PSHD-203-TRAVEL	9	12	17	4 3/4		3/4
PSHD-207-TRAVEL	9	12	17	4 3/4		3/4
PSHD-215-TRAVEL	10 1/4	14	19	5		7/8
PSHD-307-TRAVEL	12	16	24	6		1
PSHD-315-TRAVEL	13 1/2	17 1/2	22 1/2	6	2 3/4	7/8
PSHD-407-TRAVEL	15 1/4	19	24	6	3 1/4	1
PSHD-415-TRAVEL	16 1/2	21	26	7	3 3/8	1 1/8



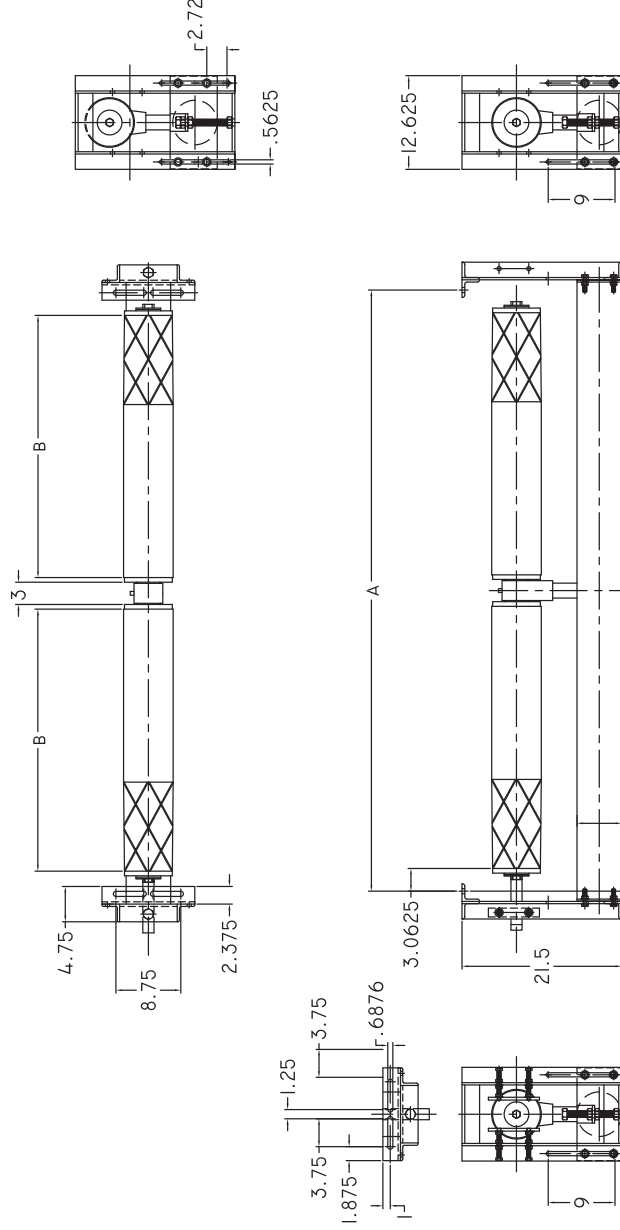
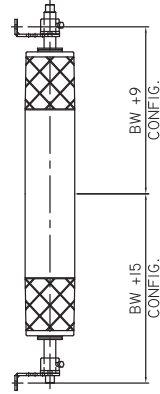
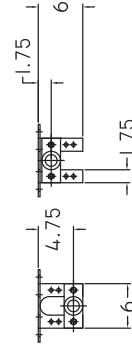
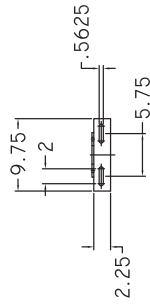
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						TOLERANCES unless otherwise noted				Customer	
						MACHINING		FABRICATION			
						FRACTIONAL	± 1/32	0" – 24"	± 1/16		
						.X	±.030	24" – 120"	± 1/8		
						.XX	±.015	120" – MORE	± 1/4		
						.XXX	±.005				
REV No	DATE	MADE BY	DESCRIPTION					DRAWING No: 629		REV: 0	

6.3 Asgco Components



FLAT RETURN IDLER

BELT WIDTH	PART NUMBER	A	B	C
18	ASG-TIFR-45	33	20 5/8	19 1/4
20	ASG-TIFR-50	35	22 5/8	21 1/4
24	ASG-TIFR-60	39	26 3/8	25
26	ASG-TIFR-65	41	28 5/8	27 1/4
30	ASG-TIFR-75	45	32 3/8	31
32	ASG-TIFR-80	47	34 3/8	33
36	ASG-TIFR-90	51	38 1/4	36 7/8
42	ASG-TIFR-105	57	44 1/8	42 3/4
48	ASG-TIFR-120	63	50 1/8	48 3/4
54HD	ASG-TIFRHD-135	69	56	54 3/4
60HD	ASG-TIFRHD-150	75	61 7/8	60 1/2



DUAL RETURN IDLER

BELT WIDTH	PART NUMBER	A	B
48	ASG-TIDR-120	57	24
54	ASG-TIDR-135	63	27
60	ASG-TIDR-150	69	29
66	ASG-TIDR-165	75	32
72	ASG-TIDR-180	81	35
78	ASG-TIDR-200	87	39
84	ASG-TIDR-210	93	41
90	ASG-TIDR-220	99	45
96	ASG-TIDR-240	105	47

ITEM NO.	QTY.	DESCRIPTION	MATERIAL SPECIFICATIONS	DRAWING OR PART NO.

ASGCO MANUFACTURING, INC.
301 GORDON STREET
ALLENTOWN, PA 1802
800-544-4000

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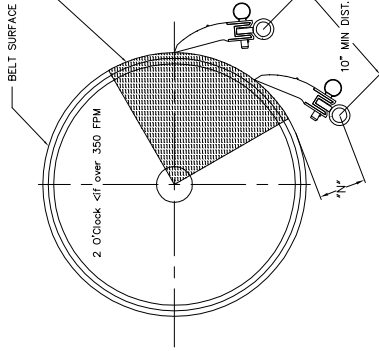
DATE: 12-06-05
SCALE: FULL
CHECKED: G.T. MOTT
DRAWN BY: G.T. MOTT

PROJECT: TRU-TRAINER RETURN
FLAT RETURN AND DUAL ROLL RETURN

PROJECT: DIMENSIONAL DRAWING

DWG. NO.

SHADED AREA REPRESENTS NORMAL INSTALLATION LOCATION



Installation Dimensions

"N" Dimension Pulley Diameter Inches [mm]	"N" Dimension Inches [mm]
12" [300mm]	4-3/4" [120mm]
14" [350mm]	4-1/2" [115mm]
16" [400mm]	4-1/4" [110mm]
18" [450mm]	4" [100mm]
20" [500mm]	3-3/4" [95mm]
24" [600mm]	3-1/2" [90mm]
30" [750mm]	3-1/4" [85mm]
36" [900mm] PLUS	



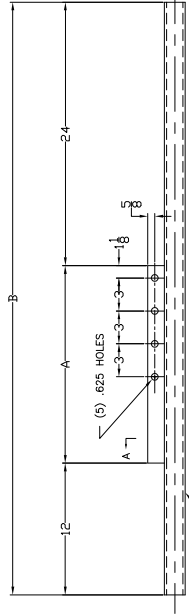
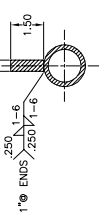
CHUTE WALL CUT-OUT NECESSARY
TO INSTALL SKALPER TUBE WITHOUT
EXTRA WIDE TUBE BRACE



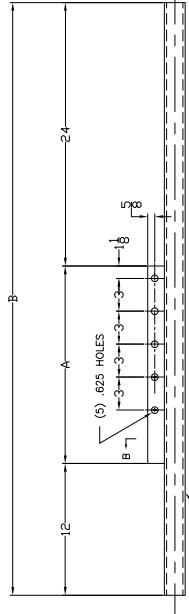
CHUTE WALL CUT-OUT NECESSARY
TO INSTALL SKALPER TUBE WITH
EXTRA WIDE TUBE BRACE

SECTION A-A
SCALE: 1/2" = 1"

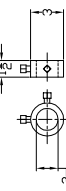
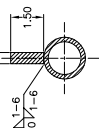
ASG-SK4-XXX	A	B
-XXX 18"	18"	54"
-20A 20"	20"	60"
-24A 24"	24"	72"
-30A 30"	30"	84"
-36A 36"	36"	102"



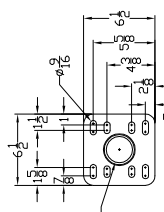
SECTION B-B
SCALE: 1/2" = 1"



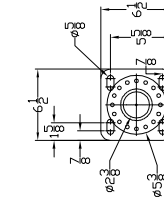
SECTION C-C
SCALE: 1/2" = 1"



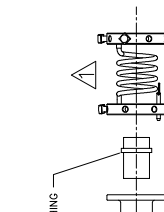
OFF SIDE RETAINER COLLAR



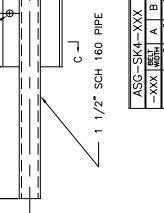
OPPOSITE SIDE MOUNTING BRACKET 304-SS



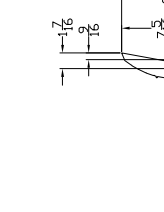
EZ-TORQUE MOUNTING BRACKET 304-SS



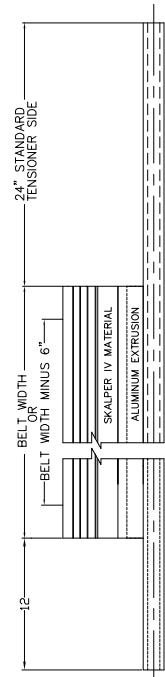
TENSION SIDE BUSHING



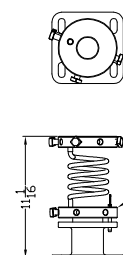
E-Z TORQUE TENSIONER ASSEMBLY



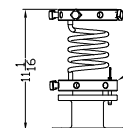
SKALPER 4 BLADE



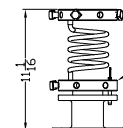
24" STANDARD TENSIONER SIDE



E-Z TORQUE TENSIONER



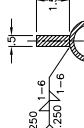
OPPOSITE SIDE SQUARE BRACKET



OPPOSITE SIDE SHORT BUSHING

SECTION C-C
SCALE: 1/2" = 1"

ASG-SK4-XXX	A	B
-XXX 18"	18"	54"
-20A 20"	20"	60"
-24A 24"	24"	72"
-30A 30"	30"	84"
-36A 36"	36"	102"



2" X 2" X 2" X .25" TEE



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ENGINEERING DEPARTMENT AT
(610) 821-0216 www.ASGCO.com

REV.	DATE	REV. INDICATION	CHKD	DONE
1	2/9/10	ADDED NEW EZ TORQUE TENSIONER	BY	BY
2	12/8/11	REVISED N DIMENSION CHART AND MH	BY	BY
		INCREASED TEXT SIZE	BY	BY

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WITHOUT THE WRITTEN PERMISSION OF ASGCO

PROJECT	DIMENSIONAL DRAWING	1 OF 1
SKALPER IV BELT CLEANING SYSTEM		

ASGCO MANUFACTURING, INC.
301 GORDON STREET
ALLENTOWN, PA 18102
610-821-0216

DRAWN BY: C.A.R.
CHECKED: S.T. WITT
DATE: 9/1/06

SCALE: 1/4" = 1"

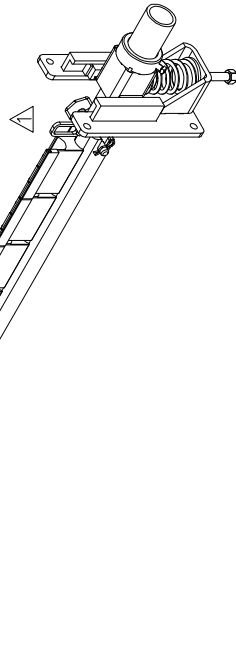
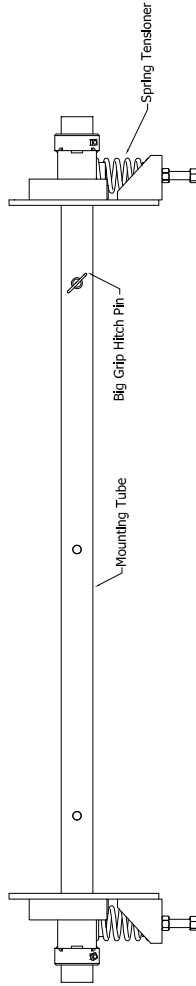
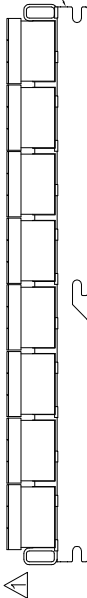
RAZOR-BACK BLADE & TUBE DETAIL

BW	A	No. BLADES
48	78	8
54	84	9
60	90	10
66	96	11
72	102	12
84	114	14
96	126	16

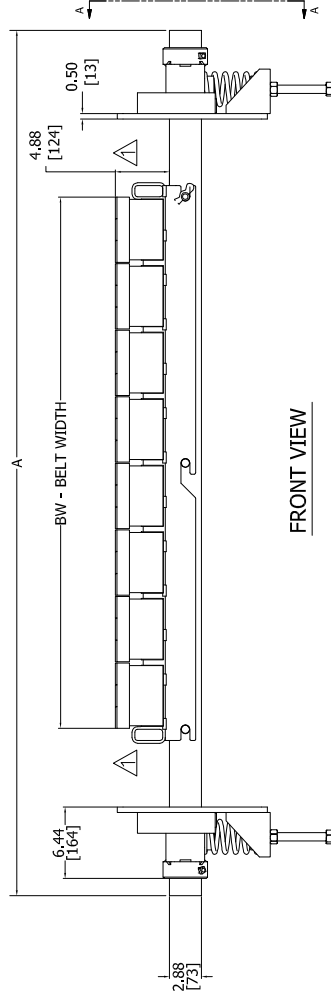
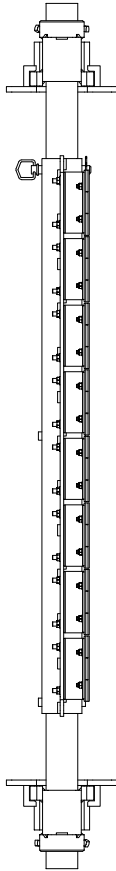
MDX C-Tip Blade

Razor-Back Cushion
(ASG-CUS-RZ-6C)

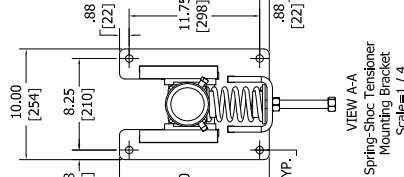
Blade Holder,
Cartridge



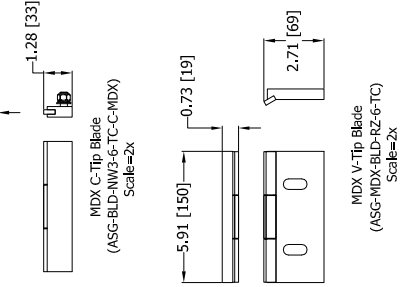
TOP VIEW



FRONT VIEW



VIEW A-A
Spring-Shoc Tensioner
Mounting Bracket
Scale=1 / 4



MDX C-Tip Blade
(ASG-BLD-NW3-6-TC-C-MDX)
Scale=2x

MDX V-Tip Blade
(ASG-MDX-BLD-RZ-6-TC)
Scale=2x

REV. NO.	DATE	REV. INDICATION	CHKD BY.	DATE	BY.
1	12/13/11	ADDED CARTRIDGE HANDLES	WH	DH	

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DATE	CHECKED BY	SCALE	DRAWN BY
8/18/10	N/A		L. WILLIAMS

ASGCO MANUFACTURING, INC.
301 GORDON STREET
ALBERTA, AL 36102
800-334-4000

PROJECT: RAZORBACK MDX SECONDARY CLEANER WITH SPRING-SHOC TENSIONER

DWG. NO. 1 OF 1

TYPICAL MOUNTING POSITION
TYPICAL FOR C-TIP & V-TIP INSTALLATION

* SHOWN: TYPICAL RAZOR-BACK MDX WITH
SPRING TENSIONER AND MDX C-TIPS, 48in BW

6.4 Crouse-Hinds Pull Switches

Cl. I, Div. 1 & 2, Groups C, D
Cl. II, Div. 1, Groups E, F, G
Cl. II, Div. 2, Groups F, G
Cl. III
NEMA 3, 4, 7CD, 9EFG

Explosionproof
Dust-Ignitionproof
Raintight
Wet Locations

Applications:

AFU and AFUX conveyor control switches are used:

- As emergency or normal "STOP" switch for conveyor lines, cranes, unloaders, bulk handling systems and similar equipment
- In steel mills, mining and ore and coal handling operations, automotive and other assembly lines, warehouses, loading docks and various process industry facilities
- In the control circuit of magnetic motor starters to shut down motor-driven conveyors or other machinery when switch is actuated

AFU series complies with requirements for use in Class II areas having combustible dusts that may or may not be electrically conductive.

AFU series are also gasketed for use in hosedown areas even when combustible dusts are present.

AFUX series complies with requirements for use in NEC Class I areas which are hazardous due to the presence of flammable vapors or gases. AFUX series also complies with requirements for use in NEC Class I areas which are hazardous due to the presence of flammable vapors or gases. AFUX series also complies with requirements for use in NEC Class II hazardous areas, or for use in NEC hazardous areas classified simultaneously as Class I and Class II.

Features:

- Furnished with one or two end units, each containing 2-NO and 2-NC contact arrangements.
- Precision switches provide maintained contact (switches have a snap action mechanism).
- Enclosure has three 1" conduit hubs – two for horizontal through feed and one at the bottom. Cast mounting lugs on 1½" centers permit attachment to the web of a standard 3" angle iron.
- In installation, the actuating line or cable is connected from a fixed point to the loop on the end unit. A pull on the line of the required operating force and with a total movement of ½" actuates the plunger, opens the switch and trips the red painted indicating arm forward, which locks the plunger in the actuated (switch open) position. Returning the indicating arm to its normal position resets the mechanism. A typical installation would include single end switch units at each end of the conveyor with double end switch units between.
- Depending on the size and length of line, supports at properly spaced intervals may be necessary to ensure that the line or cable weight alone will not actuate switch.

Certifications and Compliances:

AFU Series

- NEC/CEC:
 - Class II, Division 1, Groups E, F, G
 - Class II, Division 2, Groups F, G
 - Class III
- Encl. 3, 5
- NEMA: 3, 4, 9EFG
- IP66
- UL Standard: 698
- CSA Standard: 22.2 No. 30

AFUX Series

- NEC:
 - Class I, Division 1 & 2, Groups C, D
 - Class II, Division 1, Groups E, F, G
 - Class II, Division 2, Groups F, G
 - Class III
- NEMA: 3, 7CD, 9EFG
- IP65
- UL Standard: 698
- cUL

Standard Materials:

- Enclosure – Feraloy® iron alloy
- Plunger – stainless steel
- Loop – bronze
- Indicating arm – steel

Standard Finishes:

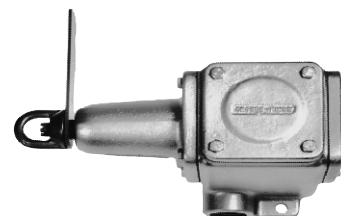
- Feraloy iron alloy – electrogalvanized and aluminum acrylic paint
- Steel – electrogalvanized with chromate finish (red acrylic paint on indicating arm)
- Bronze – natural

Options:

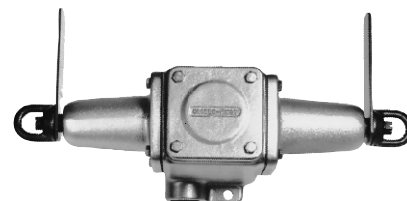
Description	Suffix
Finish: Corro-free™ epoxy powder coat – for coating outside only.	S752

Electrical Rating:

- Control circuit switch – 15 AMP, 600 VAC max.



AFU0333-50 Single end left



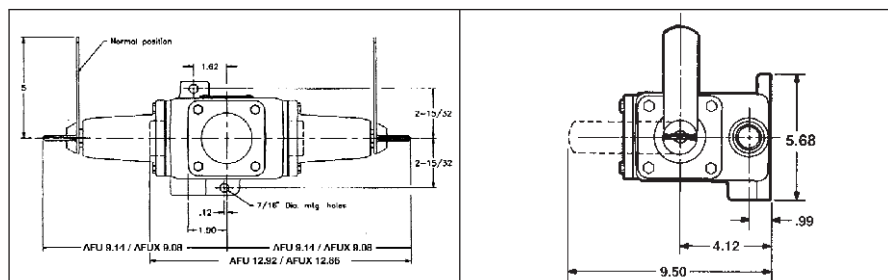
AFU0333-66 Double end

Ordering Information

Description	Maximum Weight of Unsupported Line or Cable Without Actuating Switch† (lbs.)	Total Operating Force Required (lbs.)	Contact Arrangements With 2-NO, 2-NC in Each End Unit	
			Cat. #	Cat. #
Single end left	15	25	AFU0333 50	AFUX0333 50
Single end left	25	50	AFU0333 60	AFUX0333 60
Single end right	15	25	AFU0333 05	AFUX0333 05
Single end right	25	50	AFU0333 06	AFUX0333 06
Double end	15	25	AFU0333 55	AFUX0333 55
Double end	25	50	AFU0333 66	AFUX0333 66

†A galvanized steel aircraft cable, supported every 10' is recommended.

Dimensions In Inches*:



*Dimensions are approximate, not for construction purposes.

6.5 Conveyor Components

Co. Alignment Switch



CONVEYOR COMPONENTS COMPANY

130 Seltzer Road, PO Box 167 • Croswell, MI 48422 USA

PHONE: (810) 679-4211 • TOLL FREE (800) 233-3233 • FAX: (810) 679-4510

Email: info@conveyorcomponents.com • <http://www.conveyorcomponents.com>

CT PROBE INSTRUCTIONS MODELS CT-200, CT-201, CT-200G, CT-201G, CT-200N, CT-201N AND OPTIONS

PROBE SPECIFICATIONS:

The standard heavy-duty probe model CT-201 and the intrinsically safe probe model CT-201G are 9" long each.

The compact probe model CT-200 and the intrinsically safe probe model CT-200G are 6" long each.

Each probe contains one SP/ST, normally closed, mercury switch.

The CT-200N and CT-201N contain non-mercury switches.

Probes are available in optional stainless steel construction and with a paddle for use in applications where the materials are moving.

CT-200, CT-201 Probe ratings: 1.7 A @ 120VAC, 0.75 A @ 220VAC, 1.7 A @ 0-50VDC

Probe signal voltage: 15 VDC

Probe actuation angle: 15° from vertical

CT-200G, CT-201G (UL) ratings: 1.7 A @ 120VAC, 1.5mA @ 5VDC

Probe signal voltage: 15 VDC

Probe actuation angle: 15° from vertical

CT-200N, CT-201N ratings: 0.25 A max., 60 V max., 3 VA max.

Probe signal voltage: 15 VDC

Probe actuation angle: Break 25° +/- 10° from vertical; Remake 8° min.

WARNING: Probe models CT-200G and CT-201G are intrinsically safe only when properly connected to Conveyor Components Company manufactured intrinsically safe CT control models CT-103 and CT-104.

WIRING:

All wiring should be in compliance with applicable Local, Federal, and State codes. Probe connection cable is 16-2 type SO and is attached to the probe. Probe cable length is supplied as specified per order, and may be spliced.

Intrinsically safe probes are attached to 16-3 type SO connection cable, and the cable length is supplied as specified per order up to a maximum of 175 ft. The cable for intrinsically safe probes may be spliced, with the total cable length up to 175 ft maximum.

PROBE INSTALLATION:

The probe should be suspended using a fixed support at a position where it will easily intercept the bulk material at the desired indication point. There must be a free flow of material both to and away from the probe. In some installations, it is necessary to install a baffle or shield above the probe assembly to protect it from product surges.

Figure1: PROBE DIMENSIONS

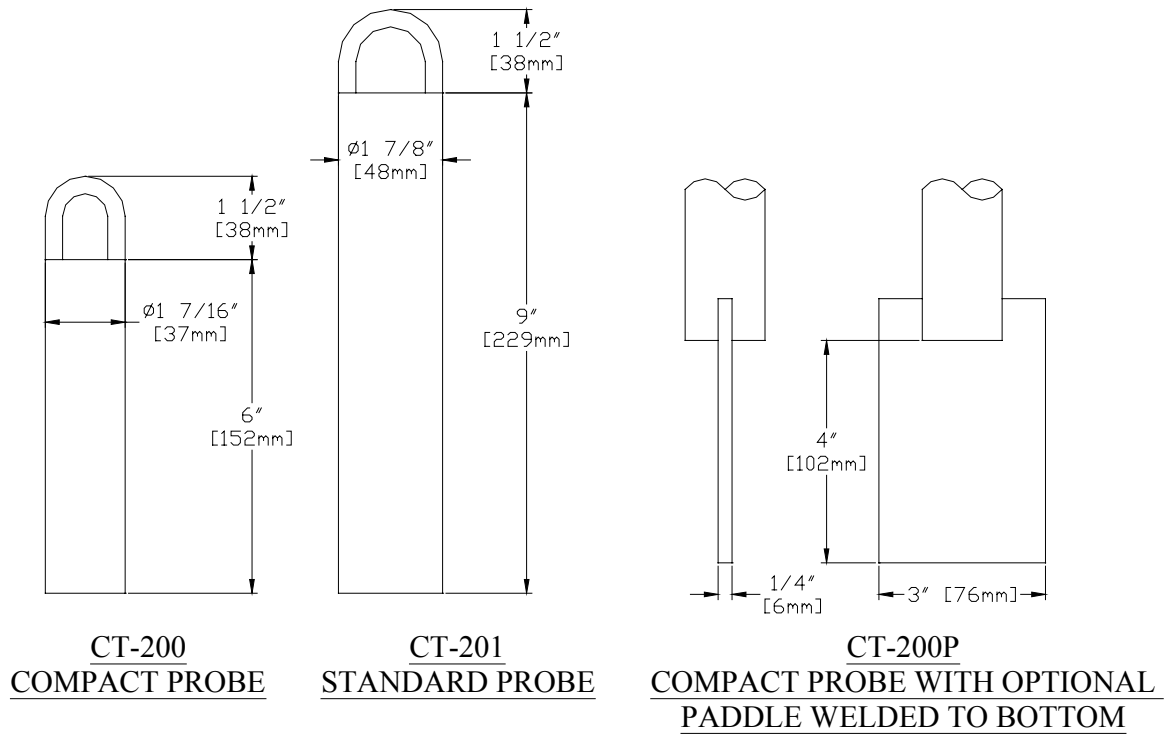
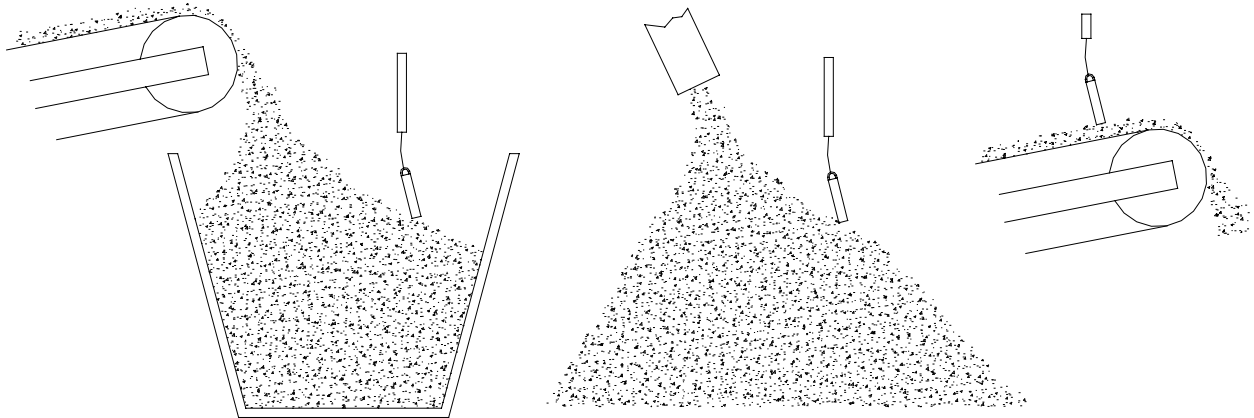


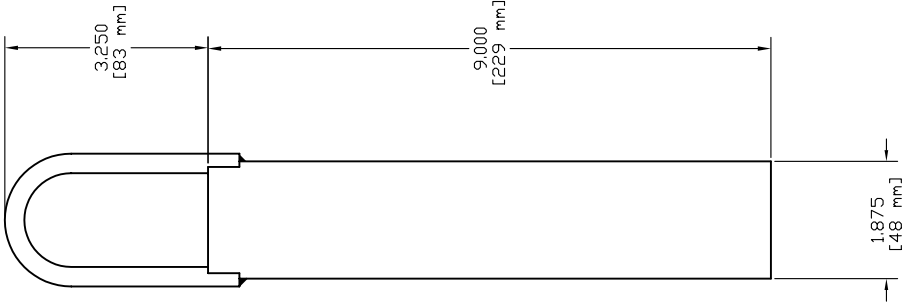
Figure2: TYPICAL INSTALLATIONS



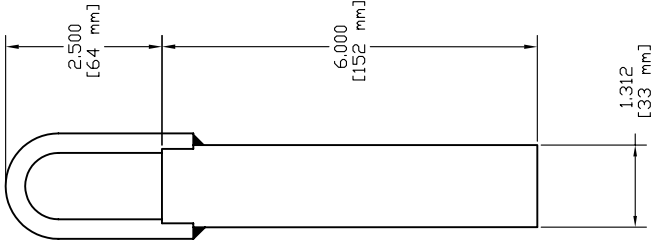
REVISIONS

REV.	E.C.O.	DATE	BY	APP'D
-	----	-/-/-	---	---

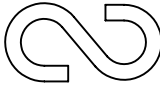
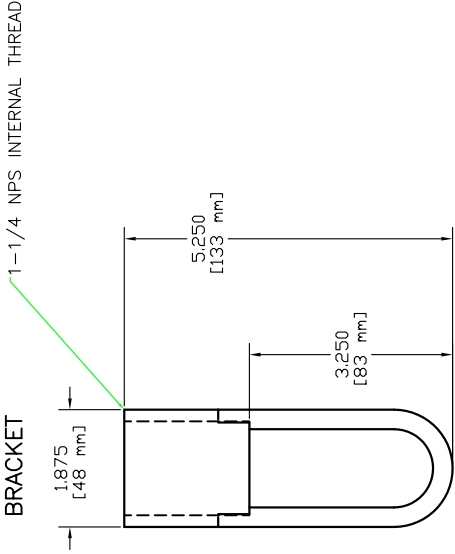
CT-201
STANDARD
PROBE



CT-200
COMPACT
PROBE



CT-400
MOUNTING
BRACKET



CT-500
S-HOOK

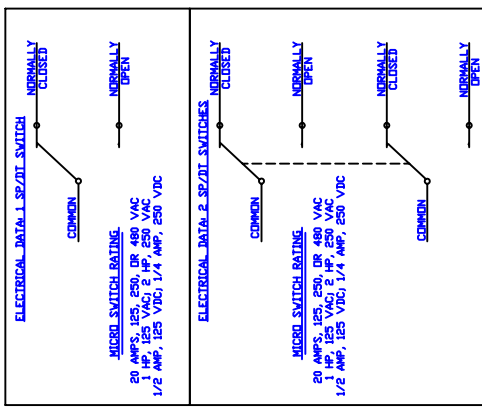
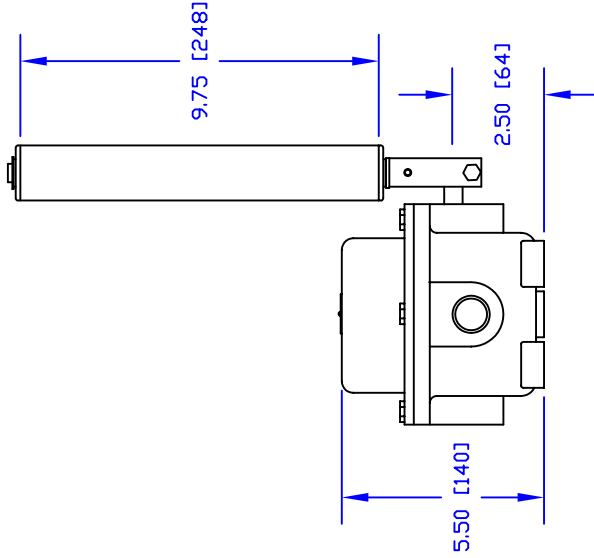
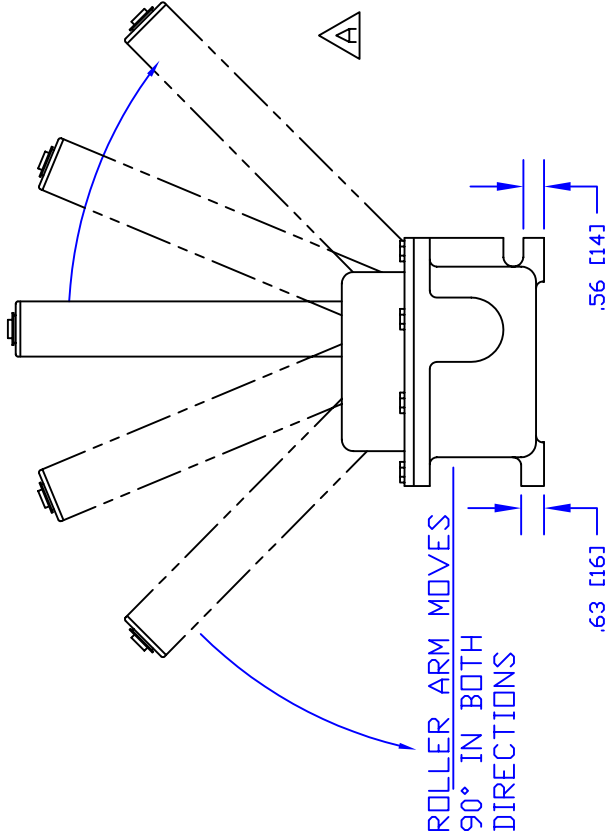
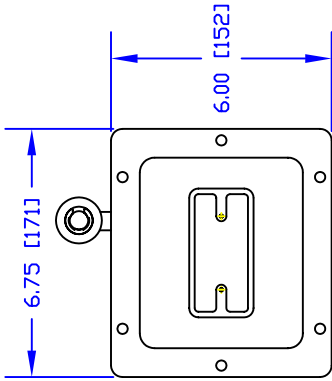
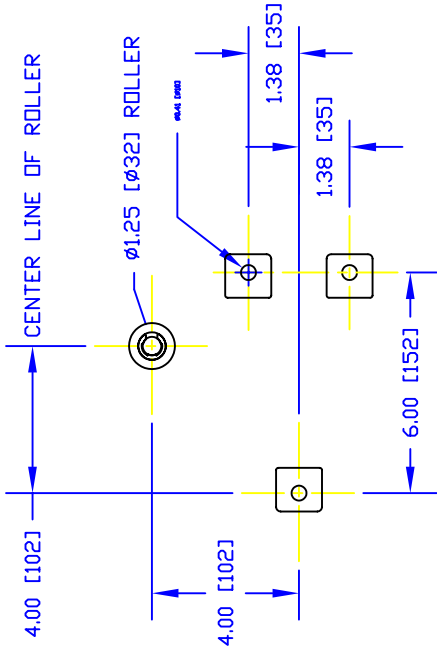
CONVEYOR COMPONENTS COMPANY
130 SELTZER RD., CROSWELL, MICH. 48422

THIS PRINT HAS NO SCALE & SHOULD NOT BE SCALED

DRAWN GL	04/11/07	THIS DRAWING WAS COMPUTER GENERATED IN FULL SCALE	
CHECK	---	DATE	---
APPROV. JK	04/11/07	CT PROBE GENERAL PRODUCT DRAWING	
THIS PRINT IS THE PROPERTY OF CONVEYOR COMPONENTS COMPANY AND MUST NOT BE USED IN ANY MANNER WITHOUT WRITTEN PERMISSION. PLEASE RETURN ON DEMAND.		PART NO.	REV
		D0020025	---

REVISIONS

REV.	E.C.D.	DESCRIPTION	DATE	BY	APP'D
A	2173	CHANGE COVER	07/16/03	GL	JK



6.6 - 4B M800 Elite Speed Switch

M800 Elite Speed Switch

BETTER BY DESIGN

M800 Elite Speed Switch

Monitors Rotating Machinery for Dangerous Underspeed Conditions

APPLICATION

The M800 Elite Speed Switch is the industry standard inductive proximity sensor for monitoring shaft underspeed conditions. With two underspeed relay contact outputs and a pulse output, the self contained unit provides the user with easy on site installation and consistent reliability. Totally sealed and simple to calibrate, the M800 Elite works in the harshest of conditions. Used on conveyors, bucket elevators, airlocks, mixers, fans, grinders and many other machines.

METHOD OF OPERATION

An inductive sensing device located in the nose of the M800 Elite enclosure will detect a metal target. This target can be an existing bolt head or device attached to a shaft. During installation the M800 Elite is set to the normal machine shaft RPM by calibrating with the magnet provided. The internal microprocessor sets the under speed relays to operate at exactly 10% and 20% below normal machine shaft RPM. So users are able to use the relay contacts to provide a warning when the shaft starts to slow down (10% underspeed) and provide an automatic shutdown at 20%. If required, the M800 Elite has an additional pulsed output, which can be connected to display actual shaft RPM on a PLC or speed display.

FEATURES

- ▶ Universal Voltage (24 – 240 VAC/VDC)
- ▶ Dual Set-Points: 10% and 20%
- ▶ Totally Sealed Construction: Submersible
- ▶ Microprocessor Accuracy
- ▶ Built In Conduit Adaptor (1/2" NPT)
- ▶ LED Indication
- ▶ CSA / NRTL Class II, Div. 1 Groups E, F & G Approved
- ▶ IP67 Protection

PART NUMBERS/ACCESSORIES

- ▶ M8001V10C M800 Elite Speed Switch
- ▶ WG1-4B-4 Whirligig® Shaft Sensor Mount
- ▶ MAG2000 Mag-Con™ Magnetic Connector for Whirligig
- ▶ TACH3V5 Tacho Display



**NEW
PRODUCT**



ATEX Approved
Versions Available



Whirligig® with Optional
Mag-Con™ Connector



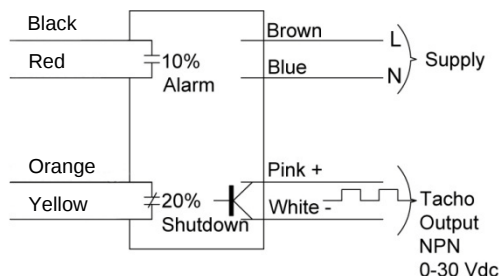
M800 Elite
Installed on Shaft
with Whirligig®

Whirligig: U.S. Pat # 6,109,120
Mag-Con: U.S. Pat # 6,964,209

M800 Elite Speed Switch

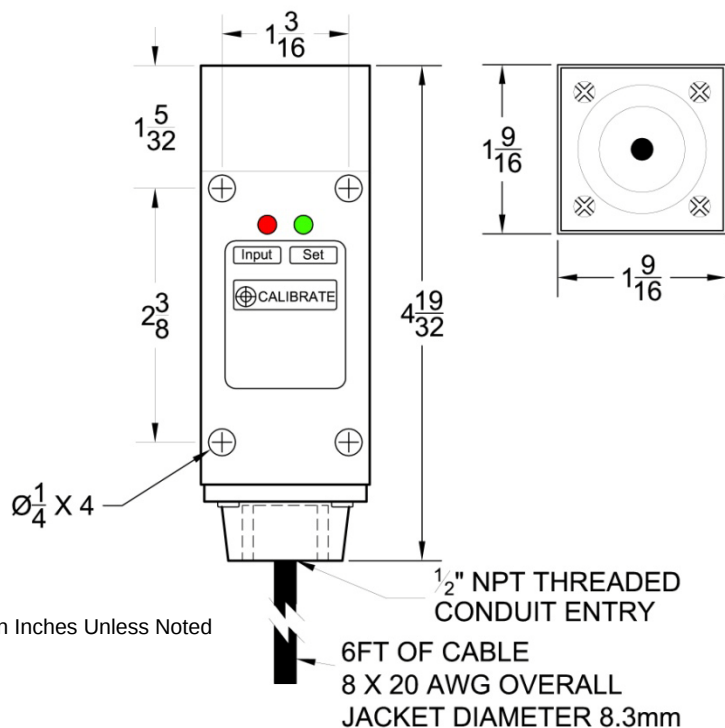
BETTER BY DESIGN

CONNECTIONS



The diagram above shows the state of the internal contacts when power is applied to the M800. See installation manual for onsite wiring procedure. The alarm contact closes when the speed falls below 10% of set speed. The shutdown contact opens when the speed falls below 20% of set speed or power supply is interrupted. The unit can be used with or without the tacho output. High clarity 6 digit tachometer/speed displays are available for connection to the unit.

DIMENSIONS



All Dimensions In Inches Unless Noted



Front View of M800 Elite Showing :

- Input LED (Red)
- Set LED (Green)
- Calibrate Point (Magnetic)

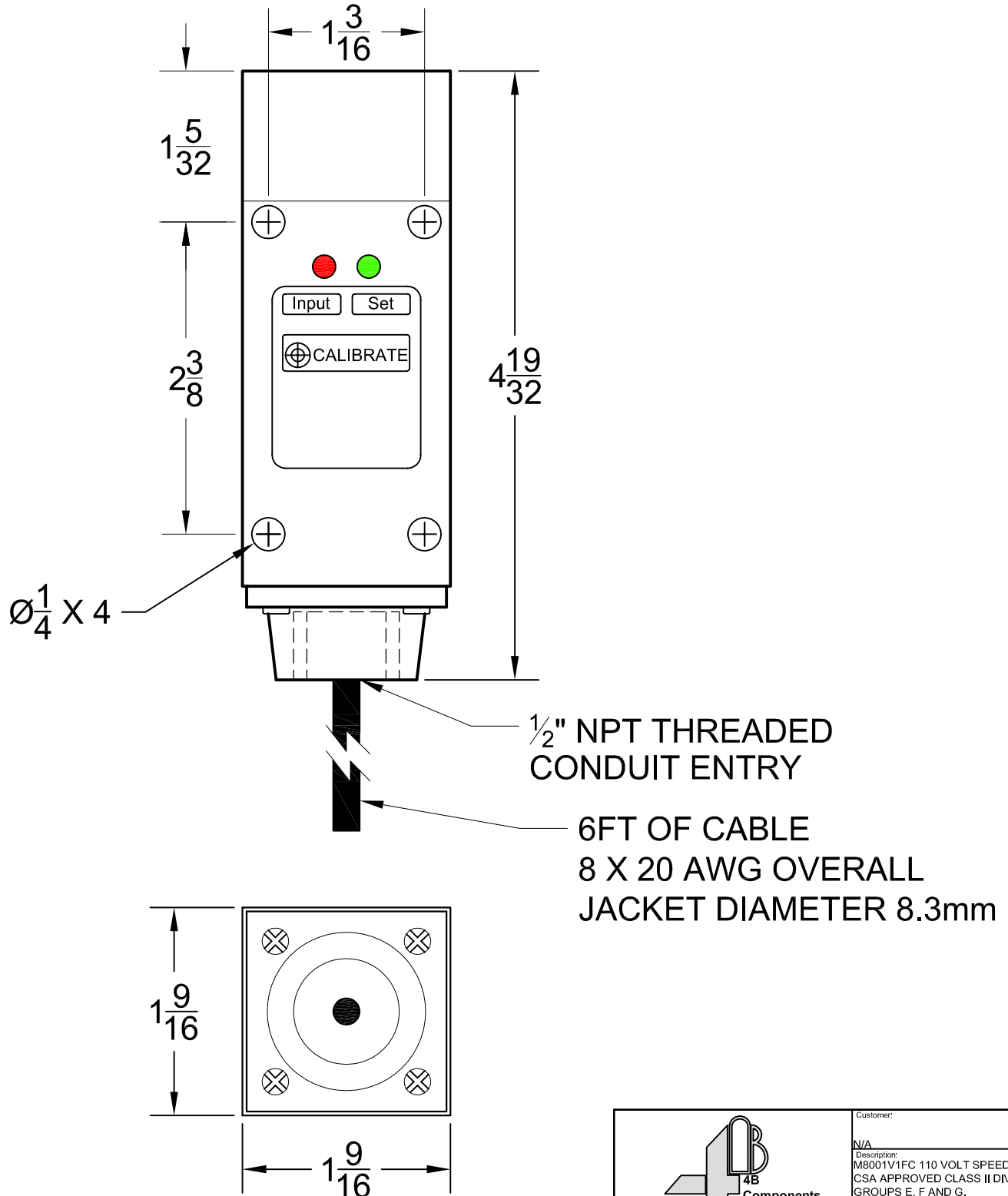
TECHNICAL SPECIFICATIONS

M800 Elite Speed Switch - Underspeed Sensor

M8001V10C	
Power Supply:	24 - 240 VAC/VDC universal voltage
Power Consumption:	6 VA
Fuse:	5 amp maximum
Speed Range:	10 - 3,600 PPM (pulses per minute)
Sensing Range:	11/32" (9mm) max. ferrous target 7/32" (6mm) max. non-ferrous target
Start Up Delay:	User selectable 0 - 15 seconds
Contact Rating:	3A 240 VAC non-inductive
Calibration:	Magnetic
Trip Point:	10% underspeed alarm, 20% underspeed shutdown. Alternate 5% alarm and 10% shutdown available.
Outputs:	1. Normally open (powered up) contact closing when speed falls by 10% 2. Normally closed contact opening when speed falls by 20% 3. Tacho output opto-isolated to 30v, 100mA max.
LED Indicator:	Red LED indicates input pulses. Green LED shows output at nominal speed and acts as a calibration aid.
Cable:	6' (2m) 8 conductor
Approval:	CSA / NRTL Class II Div 1 Groups E, F & G (US and Canada)
Protection:	IP67

Note:

All dimensions in inches.

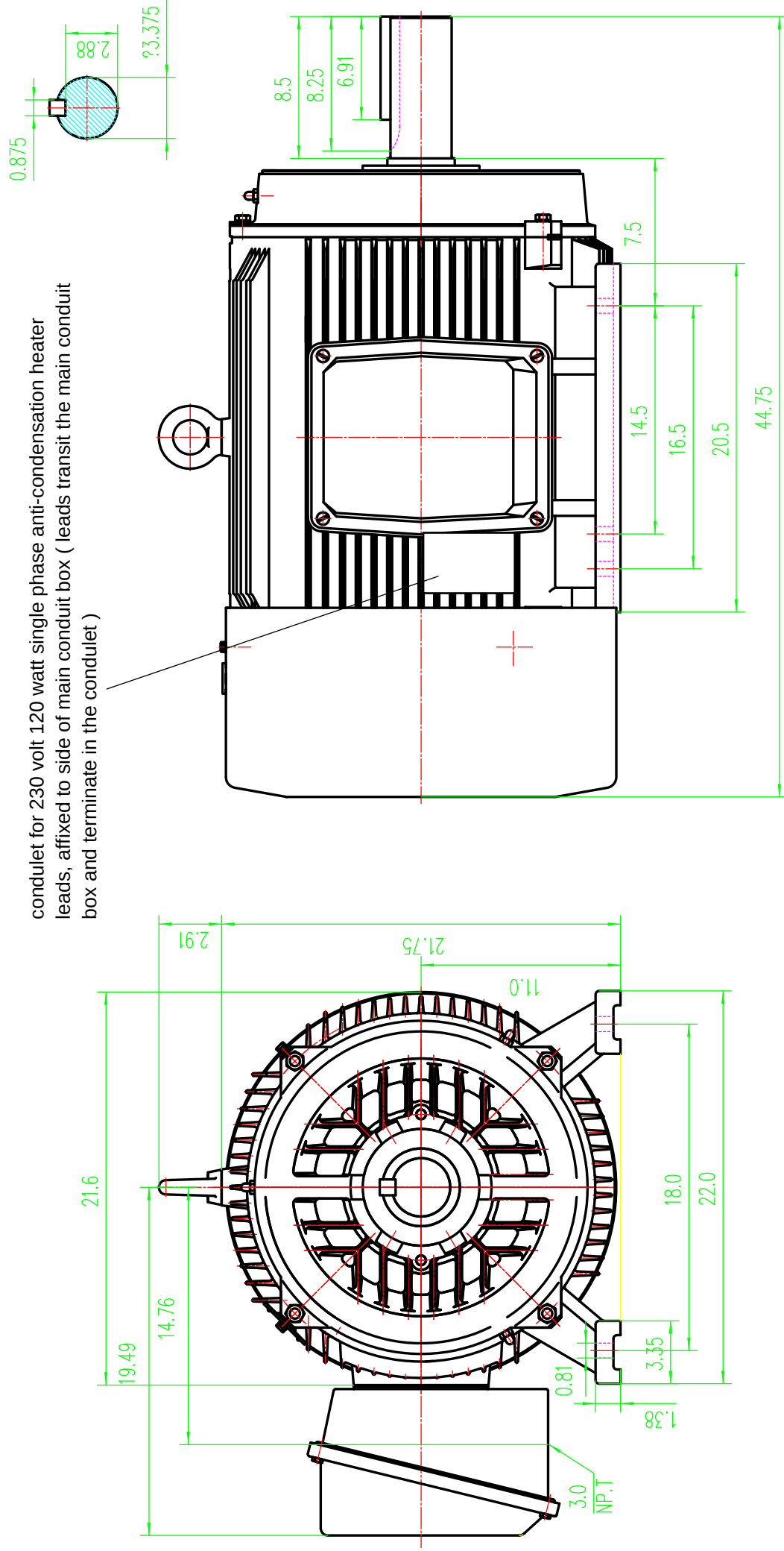


 729 Sabrina Drive - East Peoria, IL 61611 USA Tel: 309-698-5611 Fax: 309-698-5615 Email: 4b-usa@go4b.com						Customer:	
Drawn By: DAVID BYARD						N/A	
Date: 08/07/2009						Description: M8001V1FC 110 VOLT SPEEDSWITCH. CSA APPROVED CLASS II DIV I GROUPS E, F AND G.	
Date: 02/12/2010						Sales Order #	Scale:
Date: 02/12/2010						Drawing #	NTS
Date: 02/12/2010						M8001V1FC	0
Change Note	Rev	Date	Drawn	Check	Brief Description		

6.7 Ultraline 150 HP Electric Motor

DATA SHEET

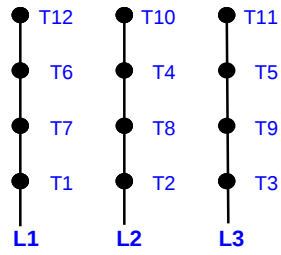
Cat. No.	MUV452-BB-230SH		
Manufacturer	ULTRAline		
Series	PE		
Construction	cast iron motor		
Frame Size	445T		
IP	54		
IC	411		
Insulation class	F		
Output	111.9	kW	150 HP
Poles	4		
Voltage	460	V	
Connection	DELTA		
Frequency	60	Hz	
Full load current	166.6	amps	
Efficiency at full load	95.8	%	
Power factor at full load	0.88		
Speed at full load	1790	rpm	
Full load torque in newton metres	597.0	Nm	
Locked rotor current as a percentage of full load current	589	%	
Locked rotor torque as a percentage of full load torque	165	%	
Breakdown torque as a percentage of full load torque	235	%	
DE. Bearing	6318		
N.D.E. Bearing	6316		
Approx Weight	905	kg	
Environment Conditon			
Ambinent temperature	40	°C	
Altitude above sea level	1000	m	
Mounting method(IM)	B3	horizontal	



conduit for 230 volt 120 watt single phase anti-condensation heater leads, affixed to side of main conduit box (leads transit the main conduit box and terminate in the conduit)

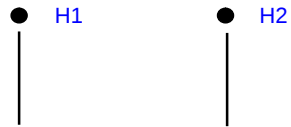
ULTRAline PE Series, frame size 445T,
Cat. No. MUV452-BB-230SH

150 HP 460 volt 3 phase motor connections



460 volt, 3 phase

230 volt motor single phase anti-condensation heater connections

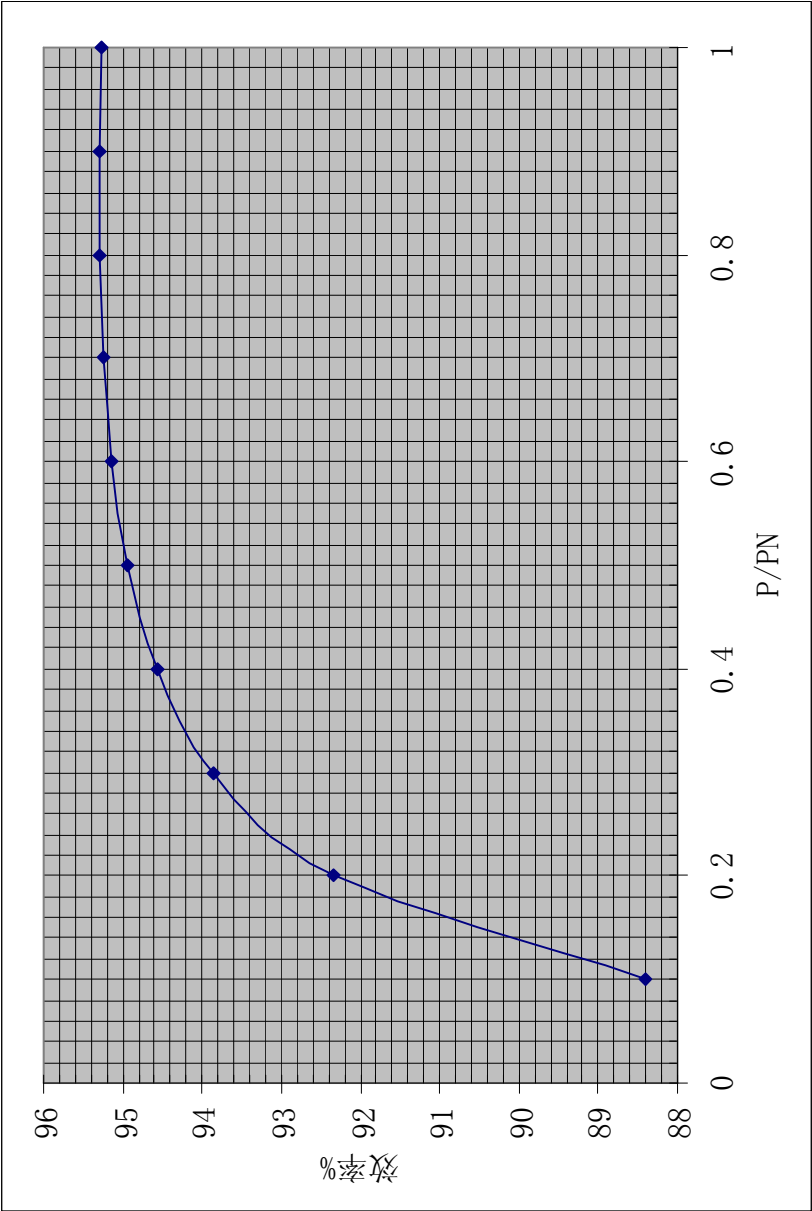


230 volt, 1 phase

Efficiency Curve

MUV452-BB-230SH 150HP 460V 60Hz 4 POLE

EFF.



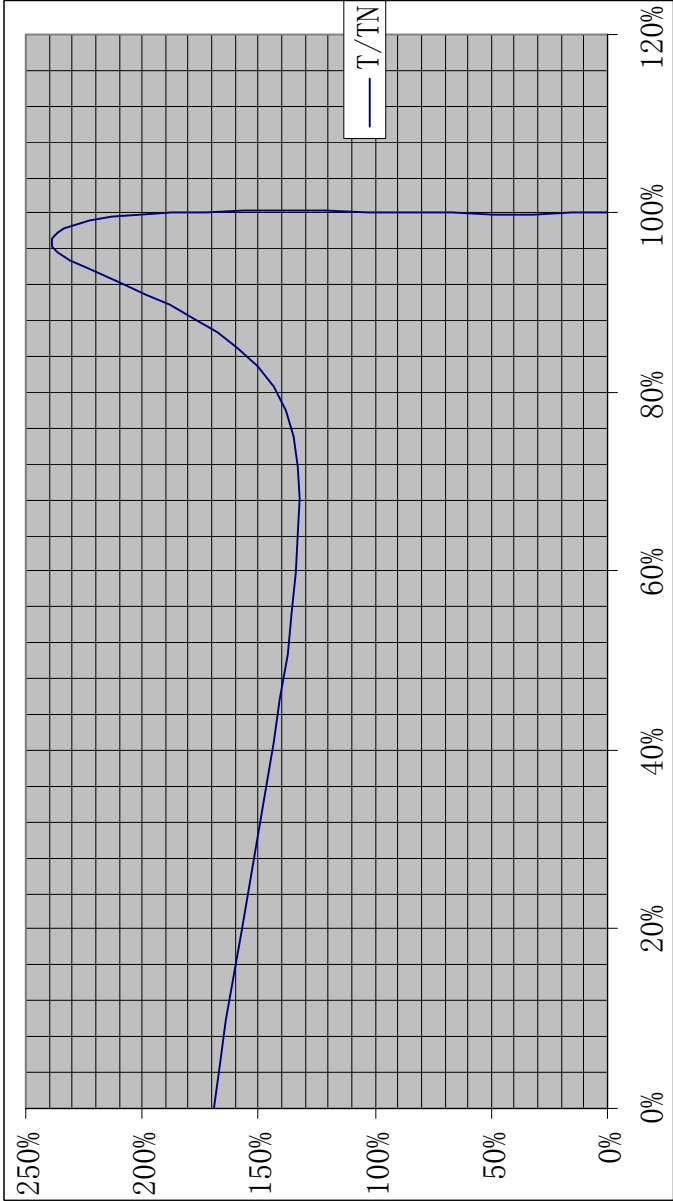
OUTPUT/RATED LOAD

MUV452-BB-230SH

150 VOLTS 460 RPM 1790

FRAME 445T HZ 60 PHASE 3 DESIGN F

TORQUE VS. SPEED



% SYNCHRONOUS SPEED

% FULL LOAD TORQUE

6.8 Goodyear Pylon

Pylon®

PLYLON

DESCRIPTION:

Pylon® is a polyester reinforced conveyor belt that provides an economical alternative to Pylon Plus® in less-demanding applications.

Markets

- Aggregate
- Cement
- Crushed Stone
- Hard Rock
- Power Generation
- Sand and Gravel
- Steel Production

Applications

- Block Plants
- Load Out
- Radial Stackers
- Ready Mix
- Stacker Conveyors
- Trash and Recycling Plants
- Wash Plant

Cover Compounds

- 6740A
- ARMA®-SBR
- Defender®
- HT Nitrile
- OMEGA®

(See pages 82-87 for more specific details.)

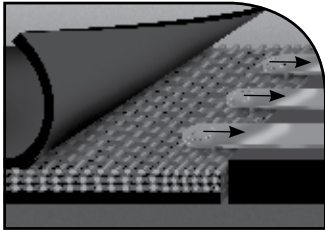
See the process diagram for Aggregate, Hard Rock Mining, Sand and Gravel markets on page 7 for alternative belt recommendations.

Tension Range

220 PIW to 440 PIW

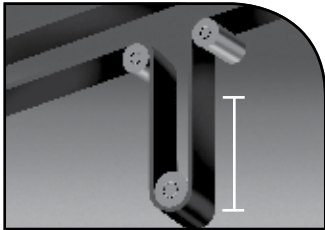
GET A LOWER
COST-PER-TON CONVEYED.

Features & Benefits



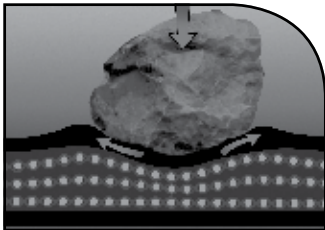
Excellent fastener retention

Pylon belt constructions offer superior mechanical fastener holding. Heavy polyester/ polyester cords positioned for maximum strength resist fastener pull-out even in abusive conditions.



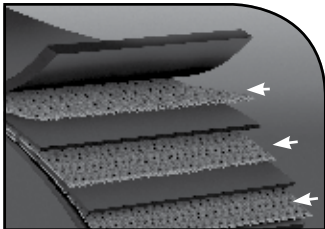
Reduced stretch

The combination of fabric design and dip process provides lower elasticity and permanent elongation on all specifications. This minimizes take-up concerns and reduces the number of splices at break-in. Contact your local GTM to calculate permanent and elastic elongation requirements for your specific systems.



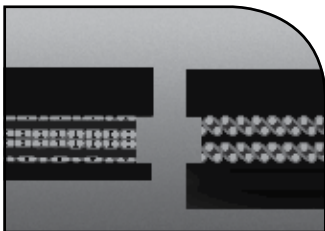
High-strength crimped cords absorb impact

By straightening on impact, the crimped warp cords enable the fabric to absorb impact loads and resist tearing. Pylon belting maintains the integrity of mechanical or vulcanized splices under demanding conditions.



Polyester/Polyester fabric carcass

Pylon belting is designed to handle sand, gravel, and small stone applications. The polyester fabric reinforcement provides greater breaking strength, impact and tear resistance than competitive brands.



Variety of cover compounds and cover gauges

Protect your product with the proper compound and cover gauge for the application.

PLYLON CONVEYOR BELT DATA - Imperial

	PLYLON 220/2	PLYLON 330/3	PLYLON 440/4
Number of Plies	2	3	4
Fabric Type*	P/P	P/P	P/P
Vulcanized & Fastener Rating (piw)	220	330	440
Carcass Gauge (in.)	0.120	0.162	0.219
Carcass Weight (lbs/sq.ft.)	0.73	0.98	1.32
Approx 1/32" cover wt (lbs/sq.ft.)	0.19	0.19	0.19
Avg. Permanent Elongation (%) **	0.80	0.80	0.80
Elastic modulus (piw)	23,000	34,500	46,000
Step Length (in.)	10	10	10
Recommended Fastener Plate	140	190	BR-10
Hinge	R2	R2	R5
Hinge	U35A	U35A	U35

Plylon rated belt tension can exceed 100%, with a maximum of 150%, during starting and stopping conditions.

Fastener size recommendation may vary due to cover thickness, pulley diameters and system tension. Consult your GTM or fastener manufacturer.

*P/P = Polyester/Polyester

** Average Permanent elongation values at 100% of rated belt tension are based on ISO 9856 test procedure. Consult your GTM or GAD for elastic & total elongation calculations.

PLYLON LOAD SUPPORT (Maximum Belt Width) (in.)

PIW/Plies	Material Weight Trough Idlers	0-40 lbs/cu.ft.			41-80 lbs/cu.ft.			81-120 lbs/cu.ft.			Over 120 lbs/cu.ft.		
		20 deg	35 deg	45 deg	20 deg	35 deg	45 deg	20 deg	35 deg	45 deg	20 deg	35 deg	45 deg
220/2		48	42	36	48	36	36	42	36	30	36	30	NR
330/3		60	54	48	60	48	42	54	48	42	48	42	36
440/4		72	60	54	66	60	48	60	54	48	54	48	42

On systems with troughing idler spacing greater than 5 ft. OR idler roll gap greater than 1/2", consult your GTM.

PLYLON TROUGHABILITY (Minimum Belt Width) (in.) (Table based on ISO 703 Testing Procedure)

Idlers	PLYLON 220/2	PLYLON 330/3	PLYLON 440/4
20 degree idlers	18	18	24
35 degree idlers	18	24	30
45 degree idlers	24	30	36

If top cover and pulley cover are balanced (ie. 3/16"x3/16") or less than 1/16" differential (ie. 3/16"x5/32"), add 6" to the minimum belt width.

6" narrower widths are possible if the belt is broken in for an extended period of time fully loaded. Consult your GTM.

Additional break in time is required when the belt has been stored prior to insulation in ambient temperatures of less than 50 degrees Fahrenheit

Above tables are based on top cover gauge equal or greater than the bottom (pulley) cover gauge

PLYLON MINIMUM PULLEY DIAMETERS (in.)

	PLYLON 220/2	PLYLON 330/3	PLYLON 440/4
Number of Plies	2	3	4
Over 80% Tension	16	18	24
60% to 80% Tension	14	16	20
40% to 60% Tension	10	12	16
Up to 40 % tension	10	12	16
Tails and Snubs	10	12	16

PLYLON ELEVATOR DATA - IMPERIAL

	PLYLON 220/2	PLYLON 330/3	PLYLON 440/4
Number of Plies	2	3	4
Fabric Type*	P/P	P/P	P/P
Industrial Service tension Capacity (piw)	170	250	350
Carcass Gauge (in.)	0.120	0.162	0.219
Carcass Weight (lbs/sq.ft.)	0.73	0.98	1.32
Approx 1/32" cover wt (lbs/sq.ft.)	0.19	0.19	0.19
Elastic modulus (piw)	23,000	34,500	46,000

Plylon rated belt tension can exceed 100%, with a maximum of 150%, during starting and stopping conditions.

Consult Goodyear for fastener manufacturer.

*P/P = Poly/Poly

PLYLON MAXIMUM BUCKET PROJECTION (in.)

	PLYLON 220/2	PLYLON 330/3	PLYLON 440/4
Number of Plies	2	3	4
Spaced Industrial Max. Bucket Projection	6	7	10
Continuous Industrial Max. Bucket Projection	5	7	10

PLYLON CONVEYOR BELT DATA - Metric

	PLYLON 220/2	PLYLON 330/3	PLYLON 440/4
Number of Plies	2	3	4
Fabric Type*	P/P	P/P	P/P
Vulcanized & Fastener Rating (kN/m)	39	58	77
Carcass Gauge (mm)	3.05	4.11	5.56
Carcass Weight (kg/sq.m)	3.6	4.8	6.4
Approx 1 mm cover wt (kg/sq.m)	1.2	1.2	1.2
Avg. Permanent Elongation (%) **	0.80	0.80	0.80
Elastic modulus (kN/m)	4028	6042	8056
Step Length (mm)	250	250	250
Recommended Plate Fastener	140	190	BR-10
Hinge	R2	R2	R5
Hinge	U35A	U35A	U35

Plylon rated belt tension can exceed 100%, with a maximum of 150%, during starting and stopping conditions.

Fastener size recommendation may vary due to cover thickness, pulley diameters and system tension. Consult your GTM or fastener manufacturer.

*P/P = Polyester/Polyester

** Average Permanent elongation values at 100% of rated belt tension are based on ISO 9856 test procedure. Consult your GTM or GAD for elastic & total elongation calculations.

PLYLON LOAD SUPPORT (Maximum Belt Width) (mm)

PIW/Plies	Material Weight	0-40 lbs/cu.ft.			41-80 lbs/cu.ft.			81-120 lbs/cu.ft.			Over 120 lbs/cu.ft.		
	Trough Idlers	20 deg	35 deg	45 deg	20 deg	35 deg	45 deg	20 deg	35 deg	45 deg	20 deg	35 deg	45 deg
220/2		1200	1050	900	1200	900	900	1050	900	750	900	750	NR
330/3		1500	1400	1200	1500	1200	1050	1400	1200	1050	1200	1050	900
440/4		1850	1500	1400	1850	1400	1200	1500	1400	1200	1500	1200	1050

On systems with troughing idler spacing greater than 1.5 m OR idler roll gap greater than 12.7mm, contact your GTM.

PLYLON TROUGHABILITY (Minimum Belt Width) (mm) (Table based on ISO 703 Testing Procedure)

Idlers	PLYLON 220/2	PLYLON 330/3	PLYLON 440/4
20 degree idlers	350	450	600
35 degree idlers	450	600	750
45 degree idlers	600	750	900

If top cover and pulley cover are balanced (ie. 5mm x 5mm) or less than 2 mm differential (ie. 4mm x 3mm), add 150 mm to the minimum belt width.

150mm narrower widths are possible if the belt is broken in for an extended period of time fully loaded. Consult your GTM.

Additional break in time is required when the belt has been stored prior to insulation in ambient temperatures of less than 10 degrees Centigrade.

Above tables are based on top cover gauge equal or greater than the bottom (pulley) cover gauge.

PLYLON MINIMUM PULLEY DIAMETERS (mm)

	PLYLON 220/2	PLYLON 330/3	PLYLON 440/4
Number of Plies	2	3	4
Over 80% Tension	400	450	600
60% to 80% Tension	350	400	500
40% to 60% Tension	250	300	400
Up to 40 % tension	250	300	400
Tails and Snubs	250	300	400

PLYLON ELEVATOR BELT DATA - METRIC

	PLYLON 220/2	PLYLON 330/3	PLYLON 440/4
Number of Plies	2	3	4
Fabric Type	P/P	P/P	P/P
Industrial Service tension Capacity (Kn/M)	30	44	61
Carcass Gauge (mm)	3.05	4.11	5.56
Carcass Weight (kg/sq.m)	3.6	4.8	6.4
Approx 1 mm cover wt (kg/sq.m)	1.2	1.2	1.2
Elastic modulus (kN/m)	4028	6042	8056

Plylon rated belt tension can exceed 100%, with a maximum of 150%, during starting and stopping conditions.

Consult Goodyear for fastener manufacturer.

*P/P = Poly/Poly

PLYLON MAXIMUM BUCKET PROJECTION (mm)

	PLYLON 220/2	PLYLON 330/3	PLYLON 440/4
Number of Plies	2	3	4
Spaced Industrial Max. Bucket Projection	150	180	250
Continuous Industrial Max. Bucket Projection	125	180	250

7. INSTRUCTION GUIDES

7.1 SEW Gear Unit Operating Instructions



SEW
EURODRIVE



Industrial Gear Units of the MC.. Series

GD110000

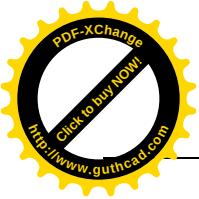
Edition 11/2005

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1 Important Information about the Operating Instructions

1.1 Important information and designated use

Integral part of the product

The operating instructions are part of the MC.. industrial gear units and contain important information for operation and service. The operating instructions are written for assembly, installation, startup and service employees who are involved in the installation and maintenance of MC.. industrial gear units.

Designated use

The designated use refers to the procedure specified in the operating instructions.

The MC.. industrial gear units are units run by motors for industrial and commercial systems. Gear unit utilizations other than those specified and areas of application other than industrial and commercial systems can only be used after consultation with SEW-EURODRIVE.

In compliance with the EG Machinery Directive 2006/42/EC, the MC.. industrial gear units are components for installation in machinery and systems. In the scope of the EG directive, you must not take the machinery into operation in the designated fashion until you have established that the end product complies with the Machinery Directive 2006/42/EC.

Qualified personnel

MC.. industrial gear units may represent a potential hazard for persons and material. Consequently, assembly, installation, startup and service work may only be performed by trained personnel who are aware of the potential hazards.

The personnel must be appropriately qualified for the task in hand and must be familiar with the assembly, installation, startup and operation of the product. The personnel must read the operating instructions, in particular the safety notes section, carefully and ensure that they understand and comply with them.

Liability for defects

Incorrect handling or any action performed that is not specified in these operating instructions could impair the properties of the product. In this case, you lose any right to claim under limited warranty against SEW-EURODRIVE GmbH & Co KG.

Product names and trademarks

The brands and product names contained within these operating instructions are trademarks or registered trademarks of the titleholders.

Waste disposal



(Please follow the latest instructions):

- Housing parts, gears, shafts and roller bearings of the gear units must be disposed of as steel scrap. This also applies to gray-cast iron parts if there is no special collection.
- Collect waste oil and dispose of it according to the regulations in force.



Important Information about the Operating Instructions

Explanation of symbols

1.2 Explanation of symbols



Hazard

Indicates an imminently hazardous situation which, if not avoided, **WILL** result in death or serious injury.



Warning

Indicates an imminently hazardous situation caused by the product which, if not avoided, **WILL** result in death or serious injury. You will also find this signal to indicate the potential for damage to property.



Caution

Indicates a potentially hazardous situation which, if not avoided, **MAY** result in minor injury or damage to products.



Note

Indicates a reference to useful information, e.g. on startup.



Documentation reference

Indicates a reference to a document, such as operating instructions, catalog, data sheet.

1.3 Operating notes



- It is essential to contact SEW-EURODRIVE regarding a subsequent change of mounting position!
- The industrial gear units of the MC.. series are delivered without oil fill. Refer to the information on the nameplate!
- Refer to the instructions in the sections "Mechanical Installation" and "Startup"!



2 Safety Notes

2.1 Preface



The following safety notes are concerned with the use of MC.. industrial gear units.
If using gearmotors, please also refer to the safety notes for motors in the corresponding operating instructions.

Please also consider the supplementary safety notes in the individual sections of these operating instructions.

2.2 General information



Never install damaged products or take them into operation.

Submit a complaint to the shipping company immediately in the event of damage.

During or after operation, industrial gear units and motors have:

- Live parts
- Moving parts
- Hot surfaces (may be the case)

Only qualified personnel may carry out the following work:

- Installation / assembly
- Connection
- Startup
- Maintenance
- Servicing

The following information and documents must be observed during these processes:

- Relevant operating instructions and wiring diagrams
- Warning and safety signs on the gear unit
- System-specific regulations and requirements
- National / regional regulations governing safety and the prevention of accidents



Serious injuries and property damage may result from:

- Improper use
- Incorrect installation or operation
- Unauthorized removal of necessary protection covers or the housing



Safety Notes

Personal protective equipment

Transportation

Inspect the shipment for any damage in transit as soon as you receive the delivery. Inform the shipping company immediately. It may be necessary to preclude startup.

Startup / operation



Check that the direction of rotation is correct in decoupled status. Listen out for unusual grinding noises as the shaft rotates

Secure the key for test mode without output elements. Do not deactivate monitoring and protection equipment even for testing.

Switch off the main motor if in doubt whenever changes occur in relation to normal operation (e.g. increased temperature, noise, vibration). Determine the cause and contact SEW-EURODRIVE, if required.

Inspection / maintenance

Refer to the instructions in Sec. "Inspection and Maintenance."

2.3 Personal protective equipment

Always wear the following when carrying out work on the gear unit:

- Tight-fitting clothing (not prone to tear, no loose sleeves, no rings, etc.).
- Safety glasses for protecting the eyes from falling objects and liquids.
- Safety shoes for protection against heavy falling objects and slipping on a slippery floor.
- Hearing protection for protection against hearing damage for sound pressure levels exceeding 80 dB (A).

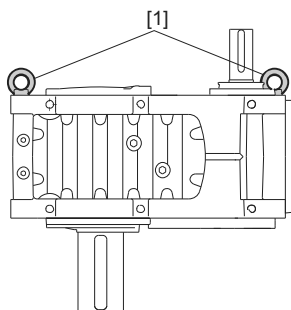


2.4 Transport of industrial gear units

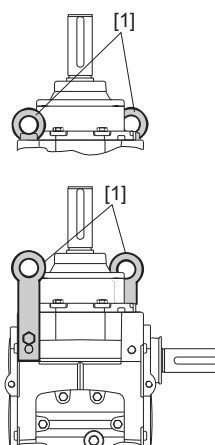
Transport eyebolts

Tighten screwed in transport eyebolts [1] firmly. They are only designed for the weight of the industrial gear unit including the motor connected via motor adapter; do not attach any additional loads.

**Vertical mounting position
(V)**



**Upright mounting position
(E)**



**Horizontal mounting position
(L)**

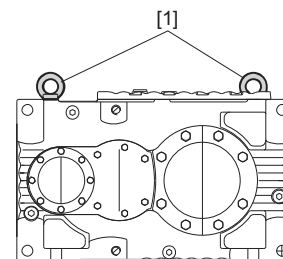


Figure 1: Positions of transport eyebolts

51375AXX



- The main gear unit must only be lifted using lifting ropes or chains on the two screwed in transport eyebolts on the main gear unit. The weight of the gear unit is indicated on the nameplate or the dimension sheet. The loads and regulations specified on the nameplate must always be observed.
- The length of the lifting chains or ropes must be dimensioned in such a way that the angle between the chains or ropes does not exceed 45°.
- Eyebolts on the motor, auxiliary gear unit or primary gear unit must not be used for transport (→ following figures)!

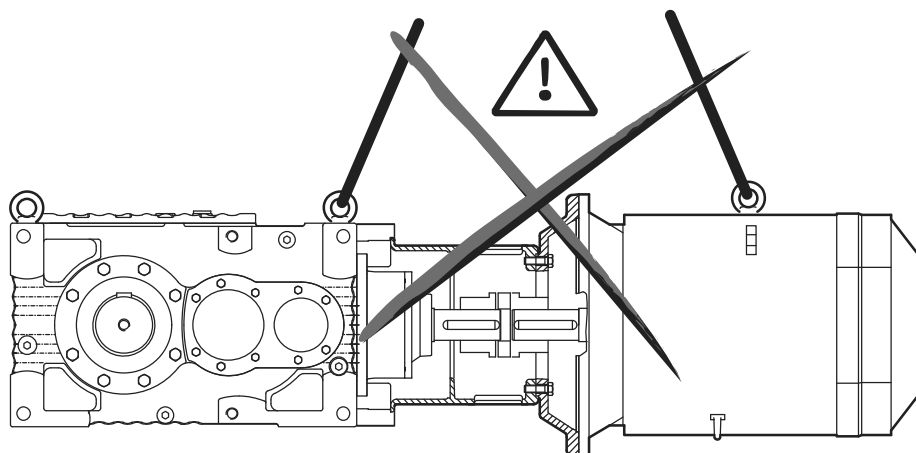


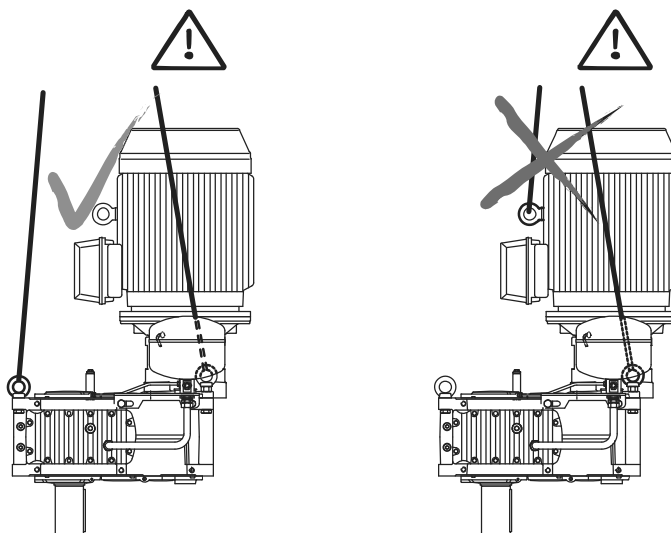
Figure 2: Do not use eyebolts on the motor for transport

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Safety Notes

Transport of industrial gear units



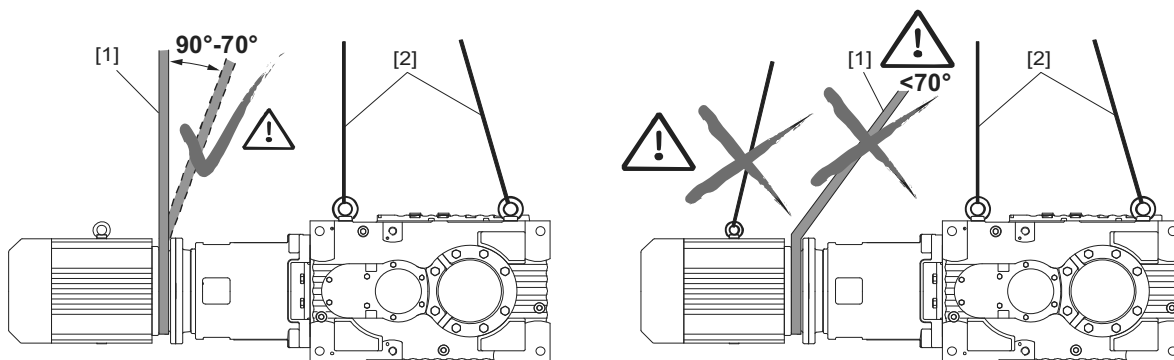
52112AXX

Figure 3: Do not use eyebolts on the motor for transport

- Use suitable, sufficiently rated handling equipment if necessary. Before startup, remove securing devices used for transport.

Transport of MC.. industrial gear units with motor adapter

Industrial gear units of the MC.P.. / MC.R.. series with motor adapter (→ following figure) must **only** be transported using **lifting ropes/chains [2] or lifting belts [1]** at an angle of 90° (vertically) to 70°.



52110AXX

Figure 4: Transport of industrial gear unit with motor adapter – Do not use eyebolts on the motor for transport



Transport of MC.. industrial gear units on a base plate

Industrial gear units of the **MC series on a base plate** (→ following figure) must **only** be transported with the **lifting ropes [1]** or chains (angle 90°) **vertically** to the base plate:

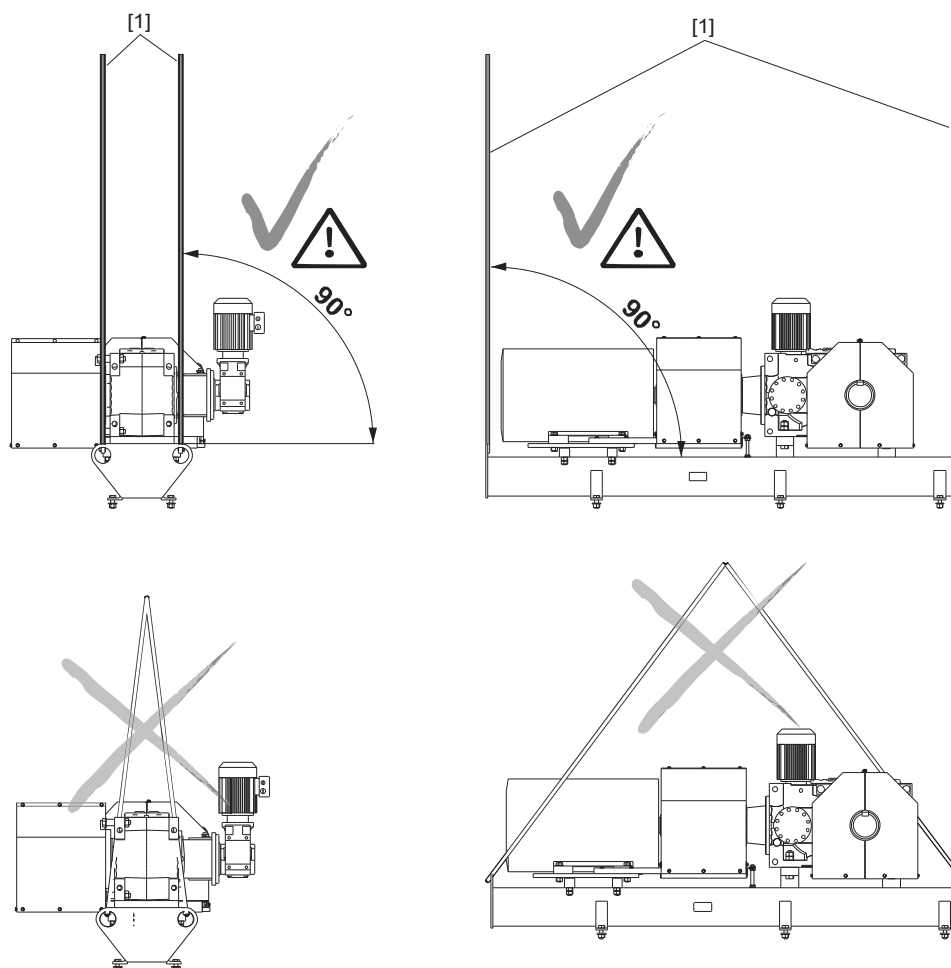


Figure 5: Transport of MC.. industrial gears unit on a base plate

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Transport of MC.. industrial gear units on a swing base

Industrial gear units of the **MC series on a swing base** (→ following figures) must **only** be transported using **lifting belts [1]** and **lifting ropes [2]** at an **angle of 90° (vertically) to 70°**.

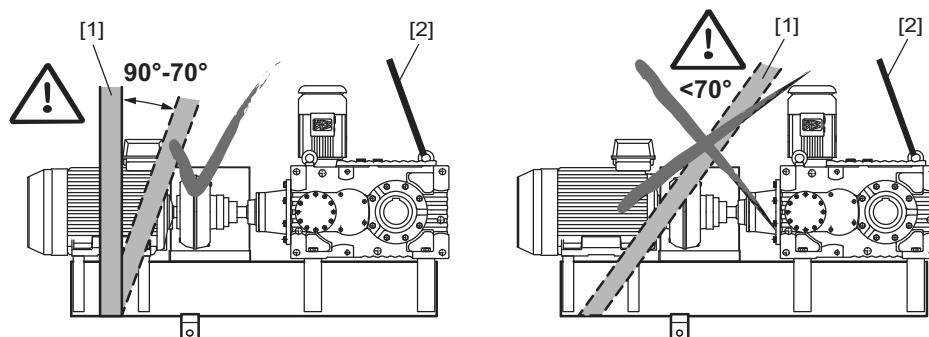


Figure 6: Transport of MC.. industrial gear unit on a swing base

52081AXX



Safety Notes

Transport of industrial gear units

Transport of MC.. industrial gear units with V-belt drive

Industrial gear units of the **MC series with V-belt drive** must **only** be transported using **lifting belts [1]** and **lifting ropes [2]** at an **angle of 90° (vertically)**. The eyebolts on the motor must **not** be used for transport.

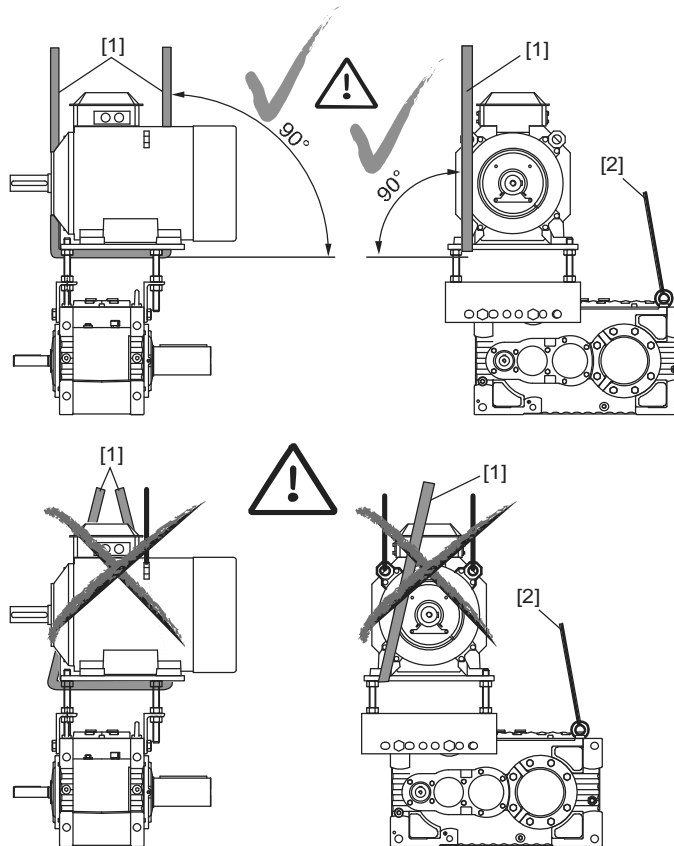


Figure 7: Transport of MC.. with V-belt drive

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2.5 Corrosion and surface protection



The information in this chapter is valid for MC units assembled in Europe. For other regions, other painting systems might be applied. Please contact your local SEW-EURO-DRIVE assembly center for MC.. units.

Introduction

The corrosion and surface protection of gear units comprises the following three basic features:

1. Painting system
 - Standard painting system K7 E160/2
 - High-resistant painting system K7 E260/3 as option
2. Gear unit corrosion protection with
 - interior protection and
 - exterior protection
3. Gear unit packing
 - Standard packing (palette)
 - Wooden box
 - Seaworthy packing

Standard painting system K7 E 160/2

Painting is performed according to TEKNOS EPOXY SYSTEM K7, which is based on the high-solid epoxy paint TEKNOPLAST HS 150.

Two layer system K7 E 160/2	Thickness
• Epoxy primer	60 µm
• Teknoplast HS 150	100 µm
TOTAL	160 µm

Color shade: RAL 7031, blue gray

Guards and shields

Powder coating, epoxy-based coat paint (EP) is used for guards and shields.

Layer thickness 65 µm

Color shade: TM 1310 PK, warning in yellow color

High-resistant painting system K7 E 260/3

Painting is performed according to TEKNOS EPOXY SYSTEM K7, which is based on the high-solid epoxy paint TEKNOPLAST HS 150.

Three-layer system, E 260/3	thickness
• Epoxy primer	60 µm
• Teknoplast HS 150	2x100 µm
TOTAL	260 µm

Optional color shade

Other color shades are possible on request.



Safety Notes

Corrosion and surface protection

Usage of painting system

Environmental pollution	None	Low	Medium	High	Very high
Typical environmental conditions		Unheated buildings where condensation might occur Atmospheres with low pollution, mostly rural areas	Production rooms with high level of moisture and low air pollution City and industrial atmospheres, moderate pollution with sulphur dioxide, coastal areas with low salt load	Industrial areas and coastal areas with moderate salt load Chemical plants	Buildings or areas with almost permanent condensation and high pollution Industrial areas with very high levels of moisture and aggressive atmospheres
Mounting	Indoors	Indoors	Indoors or outdoors	Indoors or outdoors	Indoors or outdoors
Relative humidity	< 90 %	up to 95 %	up to 100 %	up to 100 %	up to 100 %
Recommended painting system	Standard painting system K7 E160/2	Standard painting system K7 E160/2	Standard painting system K7 E160/2	High resistant painting system K7 E260/3	Contact SEW-EURODRIVE

Storage and transport conditions

Industrial gear units of the MC.. series are delivered without oil fill. Different protection systems are required depending on storage period and ambient conditions:

Storage period: up to ... months	Storage conditions Gear unit corrosion protection				Transport conditions Gear unit packing	
	OUTDOORS, roofed	INDOORS, heated (0...+20°C)	Storage area close to sea OUTDOORS, roofed	Storage area close to sea INDOORS	Land transport	Sea transport
6	Standard protection	Standard protection	Contact SEW-EURODRIVE	Long-term protection	Standard packing	Seaworthy packing
12	Contact SEW-EURODRIVE	Standard protection	Contact SEW-EURODRIVE	Long-term protection	Standard packing	Seaworthy packing
24	Long-term protection	Contact SEW-EURODRIVE	Contact SEW-EURODRIVE	Long-term protection	Standard packing	Seaworthy packing
36	Contact SEW-EURODRIVE	Long-term protection	Contact SEW-EURODRIVE	Long-term protection	Standard packing	Seaworthy packing

Standard protection / interior

- Gear units undergo a test run with oil. The oil is drained by SEW-EURODRIVE before dispatch. The remaining layer of oil on the inner parts serves as basic protection.

Standard protection / exterior

- Oil seals and seal surfaces are protected by suitable grease.
- Unpainted surfaces (including spare parts) are covered with a protective coating. Before other equipment is mounted to such surfaces, the protective coating must be removed using a solvent.
- Small spare parts and loose pieces, such as screws, nuts, etc., are supplied in corrosion protected plastic bags (VCI corrosion protection bag).
- Threaded holes and blind holes are covered by plastic plugs.
- The breather plug (position → chapter "Mounting Positions") is already installed.



Standard protection / packing

Standard packing is used: The gear unit is delivered on a pallet without cover



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Figure 8: Standard protection / packing



- If the gear unit is stored longer than 6 months, it is recommended to regularly check the protective coating of unpainted areas as well as the paint coat. Areas with removed protection coating or paint have to be repainted, if necessary.
- The LSS must be rotated at least one turn in such a way that the position of the roller elements in the bearings of LSS and HSS changes. This procedure has to be repeated every 6 months until startup.

Long-term protection / interior



The following procedure is applied in addition to the "standard protection":

- A VPI solvent is sprayed through the oil filling hole
- The breather plug is replaced with a screw plug (before startup, the screw plug must be replaced again by the breather plug, which is attached to the gear unit separately)
- **Never open the gear unit near open flames, sparks and hot objects because solvent vapors might be ignited.**
- **Take preventive measures to protect people from solvent vapors. It is absolutely crucial that open flames are avoided when the solvent is applied and when the solvent evaporates.**



Safety Notes

Corrosion and surface protection

Long-term protection / exterior

- Oil seals and seal surfaces are protected through suitable grease
- Unpainted surfaces (including spare parts) are covered with a protective coating. Before other equipment is mounted to such surfaces, the protective coating must be removed using a solvent.
- Small spare parts and loose pieces, such as screws, nuts, etc., are supplied in corrosion protected plastic bags (VCI corrosion protection bag).
- Threaded holes and blind holes are covered by plastic plugs
- The breather plug (Position → chapter "Mounting Positions") is already installed.

Long-term protection / packing

- Seaworthy packing is used: The gear unit is packed in a seaworthy plywood box with a wooden frame



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Figure 9: Long-term protection / packing



- If the gear unit is stored for longer than 6 months, it is recommended to regularly check the protective coating of unpainted areas as well as the paint coat. Areas with removed protection coating or paint have to be repainted, if necessary.
- The LSS must be rotated at least one turn in such a way that the position of the roller elements in the bearings of LSS and HSS changes. This procedure must be repeated every 6 months until startup.
- The interior long-term protection with the VPI solvent has to be repeated every 24 / 36 months (according to the table "Storage and transport conditions") until startup.

Alternative packing

Optionally, the gear unit can be supplied in a wooden box with standard gear unit protection.

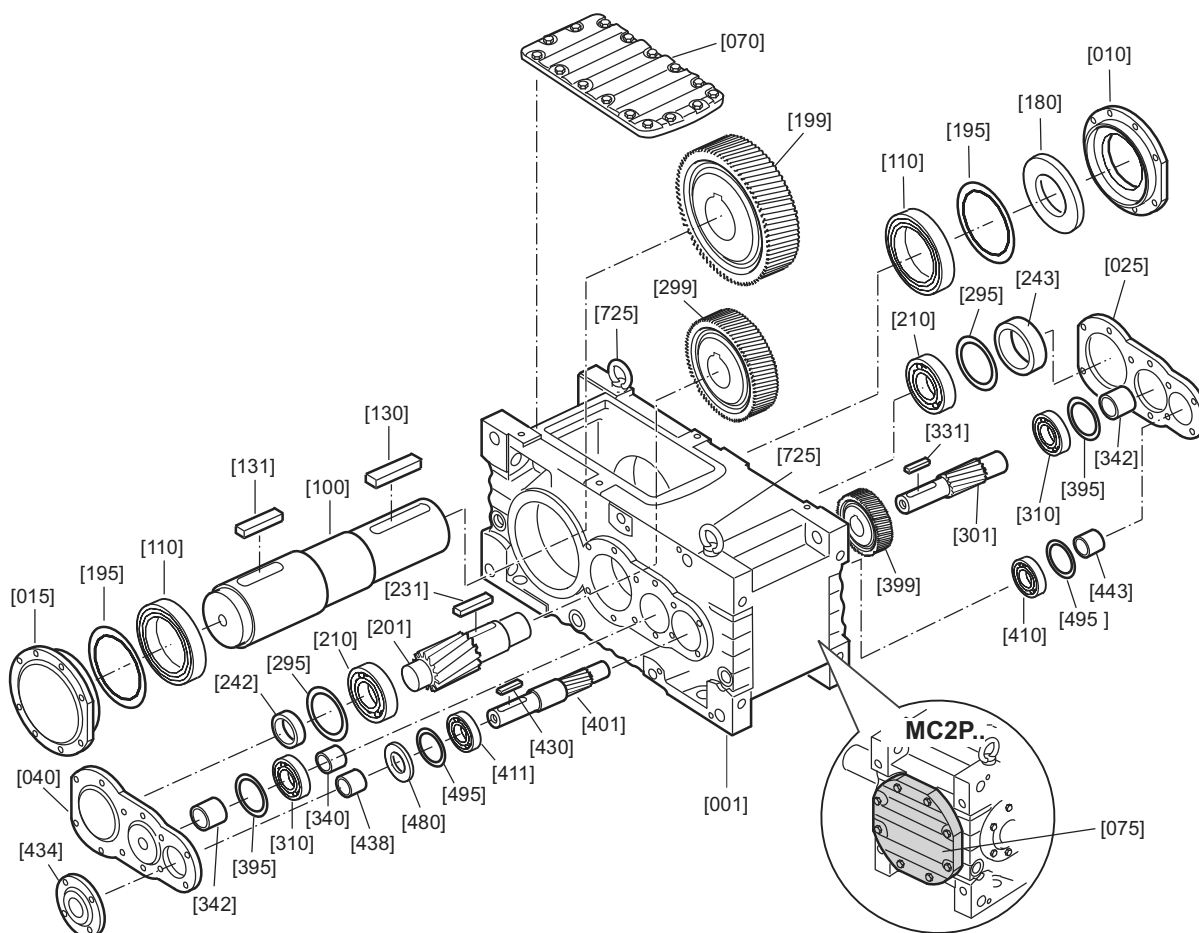


3 Gear Unit Design



The following illustrations serve to explain the general design. Their only purpose is to facilitate the assignment of components to the spare parts lists. Discrepancies are possible depending on gear unit size and version!

3.1 Basic design of industrial gear units of the MC..P.. series



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Figure 10: Basic design of industrial gear units of the MC..P.. series

[001] Gear unit housing	[131] Key	[299] Gear wheel	[410] Bearing
[010] Bearing cover	[180] Oil seal	[301] Pinion shaft	[411] Bearing
[015] Bearing cover	[195] Shim	[310] Bearing	[430] Key
[025] Bearing cover	[199] Output gear wheel	[331] Key	[434] Cover
[040] Bearing cover	[201] Pinion shaft	[340] Distance bushing	[438] Bushing
[070] Housing cover	[210] Bearing	[342] Distance bushing	[443] Distance bushing
[075] Assembly cover	[231] Key	[395] Shim	[480] Oil seal
[100] Output shaft	[242] Distance piece	[399] Gear wheel	[495] Shim
[110] Bearing	[243] Distance piece	[401] Input shaft	[725] Lifting eyebolt
[130] Key	[295] Shim		



3.2 Basic design of industrial gear units of the MC..R.. series

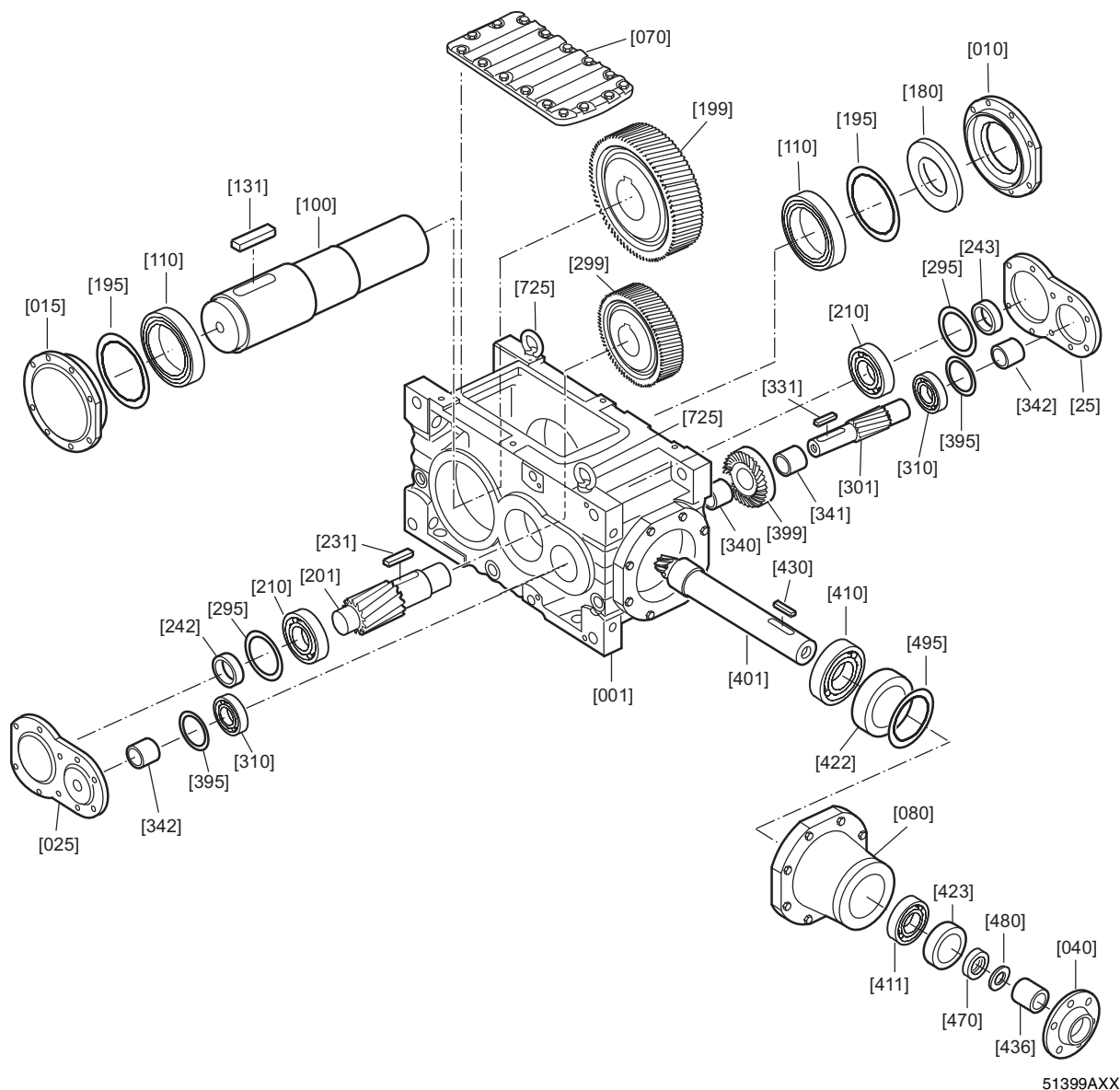


Figure 11: Basic design of industrial gear units of the MC..R.. series

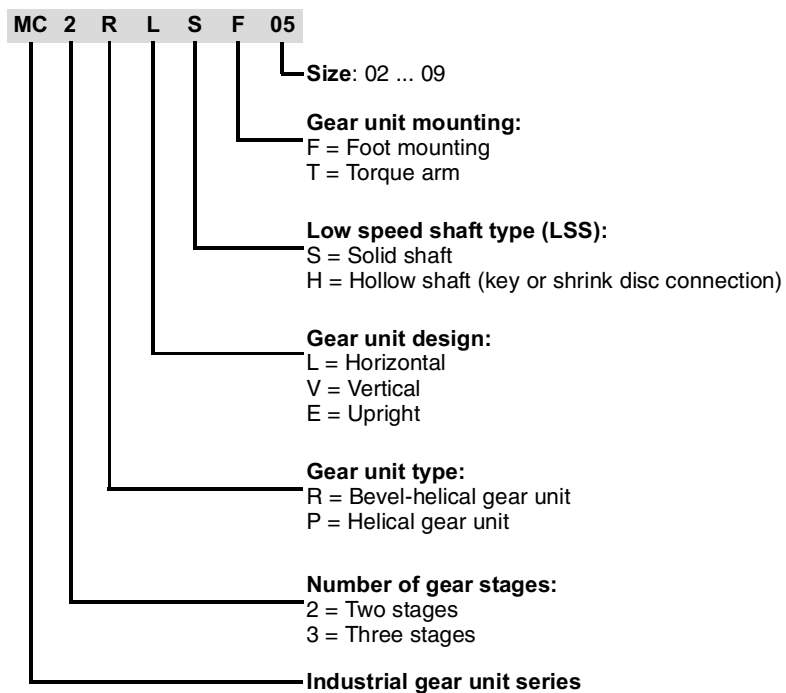
[001] Gear unit housing	[131] Key	[299] Gear wheel	[410] Bearing
[010] Bearing cover	[180] Oil seal	[301] Pinion	[411] Bearing
[015] Bearing cover	[195] Shim	[310] Bearing	[422] Bearing bushing
[025] Bearing cover	[199] Output gear wheel	[331] Key	[423] Bearing bushing
[040] Cover	[201] Pinion shaft	[340] Distance bushing	[430] Key
[070] Housing cover	[210] Bearing	[341] Distance bushing	[436] Sleeve
[080] Bearing cover	[231] Key	[342] Distance bushing	[470] Tightening nut
[100] Output shaft	[242] Distance bushing	[395] Shim	[480] Oil seal
[110] Bearing	[243] Distance bushing	[399] Bevel gear	[495] Shim
[130] Key	[295] Shim	[401] Bevel pinion shaft	[725] Lifting eyebolt

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3.3 Unit designation / nameplates

Sample unit designation





Gear Unit Design

Unit designation / nameplates

Example: Nameplate of the MC.. series industrial gear unit, SEW-EURODRIVE

SEW-EURODRIVE		Bruchsal / Germany	
Type	MC3RLSF02		
Nr. 1	03 30764647	Nr. 2	K3463
	norm.	min.	max.
PK1 [kW]	16.5	16.5	16.5
FS	3.64		
MK2 [kNm]	2.04	2.04	2.04
FR1 [kN]	0		
n1 [1/min]	1500	1500	1500
FR2 [kN]	0		
n2 [1/min]	73.8	73.8	73.8
FA1 [kN]	0		
Operation instructions have to be observed!			
FA2 [kN]	0		
Made by	SEW-Finland		Mass [kg]
219			
Qty of greasing points	2	Fans	0
Lubricant	Mineral Oil ISO VG 460 EP2AO - 7 ltr.		Year
2003			

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Typ		Unit designation
Nr. 1		Serial number 1: Eurodrive order number (e.g. SAP-order number)
Nr. 2		Serial Number 2: (factory / assembly center manufacturing number)
P _{K1}	norm.	Running power on gear unit input @ n ₁ norm.
	min.	Running power on gear unit output @ n ₁ min.
	max	Running power on gear unit output @ n ₁ max.
M _{K2}	norm.	Running torque on gear unit output @ n ₁ norm.
	min.	Running torque on gear unit output @ n ₁ min.
	max	Running torque on gear unit output @ n ₁ max.
n ₁	norm.	Input speed (HSS)
	min.	Minimum existing input speed (HSS)
	max	Maximum existing input speed (HSS)
n ₂	norm.	Output speed (LSS)
	min.	Minimum existing output speed (LSS)
	max	Maximum existing output speed (LSS)
Made by		Location of gear unit assembly / manufacturing
norm.		normal operation point
min.		minimum operation point
max.		maximum operation point
i		Exact gear unit reduction ratio
F _S		Service factor
F _{R1}	[kN]	Existing radial load on HSS
F _{R2}	[kN]	Existing radial load on LSS
F _{A1}	[kN]	Existing axial load on HSS
F _{A2}	[kN]	Existing axial load on LSS
Mass	[kg]	Gear unit weight



Qty of greasing points:		Number of points that require regreasing (e.g. in case of regreaseable labyrinth seals or drywell sealing system)
Fans		Number of cooling fans mounted on gear unit
Lubricant		Oil grade and viscosity class / oil volume
Year		Year of assembly
IM		Mounting Position: Housing orientation and mounting surface
TU		Temperature permitted range of ambient

Example: Nameplate of the MC.. series industrial gear unit, SEW-EURODRIVE

SEW-EURODRIVE
Bruchsal/Germany

Typ MC3RLHF07

Nr. 1 01.3115835301.0001.02

Nr. 2 T34567

Pe kW 55

MN2 kNm 35.6

Fs 1.6

kg 780

i 1: 61.883 : 1

Year 2004

n r/min 1480/23.9

Lubricant CLP 220 Miner..Oil/ca. 33 liter4

Number of greasing points: 4

Made by SEW

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Typ		Unit designation
Nr. 1		Serial number 1
Nr. 2		Serial number 2
P _e	[kW]	Absorbed power on the input shaft
F _S		Service factor
n	[r/min]	Input/output speed
kg		Weight
i		Exact gear unit reduction ratio
Lubricant		Oil grade and viscosity class / oil volume
M _{N2}	[kNm]	Rated torque of the gear unit
Year		Year of manufacture
Number of greasing points		Number of points that require regreasing



Gear Unit Design

Unit designation / nameplates

Example: Nameplate of the MC series industrial gear unit, SEW-EURODRIVE China

SEW-EURODRIVE					
Type	MC3PLHF04				
S.O.	351012345 . 01 . 35001			IM	13
Pe	PK1 = 55	kW	Ma	6 . 65	KNM
ne	1500	r/min	na	65	r/min
i	23 . 2042				
ISO VG460					
Refer to lubrication schedule					

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Type		Unit designation
IM		Shaft position
P _e	[kW]	Absorbed power on the input shaft
M _a	[Nm]	Output torque on the output shaft
n _e	[r/min]	Input speed
n _a	[r/min]	Output speed
i		Exact gear unit reduction ratio
S.O.		Order number

Example: Nameplate of the MC series industrial gear unit, SEW-EURODRIVE Singapore

SEW-EURODRIVE				PTE LTD Singapore			
Type	MC3PLHF04						
S.O.	351012345 . 01 . 35001			IM	13		
Pe	PK1 = 55	kW	Ma	6 . 65	KNM		
ne	1500	r/min	na	65	r/min		
i	23 . 2042						
ISO VG460							
Refer to lubrication schedule				Assembled in Singapore			

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Type		Unit designation
IM		Shaft position
P _e	[kW]	Absorbed power on the input shaft
M _a	[Nm]	Output torque on the output shaft
n _e	[r/min]	Input speed
n _a	[r/min]	Output speed
i		Exact gear unit reduction ratio
S.O.		Order number



Example: Nameplate of the MC series industrial gear unit, SEW-EURODRIVE Brazil

SEW DO BRASIL LTDA		Rod. Pres. Dutra Km 208 CEP07210-000 GUARUHOS-SP C.G.C. 46.648.061/0001-99		
Typo	MC3PLS07			
No	7001.11383446/301.001		IM	13
Pe	148	KW	Ma	19.100 Nm
ne	1780	rpm	na	70.6 rpm
i	25.2024		kg	
fs	1.45			
OLEO ISO VG 460 EP - 45 LITROS				
BR1				
Lubrificação conforme Manual Indústria Brasileira			Use Mobil	

51598AXX

Typo		Unit designation
No		Order number
P _e	[kW]	Absorbed power on the input shaft
M _a	[Nm]	Output torque on the output shaft
n _e	[rpm]	Input speed
n _a	[rpm]	Output speed
i		Exact gear unit reduction ratio
IM		Shaft position
f _s		Service factor



Gear Unit Design

Unit designation / nameplates

Example: Nameplate of the MC series industrial gear unit, SEW-EURODRIVE USA

SEW-EURODRIVE, INC. USA		Compact Reducer			
Type	MC3PESF03				
S.O.	870111234 . 02 . 02 . 001				
In	1750	rpm	Out	15 . 1	rpm
HP	15		Torque	60 . 442	lb-in
Ratio	116 . 9634		Service Factor	1 . 50	
Shaft Position	24		Min Amb	0	°C
			Max Amb	40	°C
Lubrication	SYN. ISOV6460-7EP: 8 GALS				
See Operating Instructions					

51349AXX

Type		Unit designation
In	[rpm]	Input speed
Out	[rpm]	Output speed
HP	[HP]	Absorbed power on the output shaft
Torque	[lb-in]	Output torque
Ratio		Exact gear unit reduction ratio
Service Factor		Service factor
Shaft Position		Shaft position
Min Amb	[°C]	Minimum ambient temperature
Max Amb	[°C]	Maximum ambient temperature
Lubrication		Oil grade and volume
S.O.		Shop order number



Example: Nameplate of the MC series industrial gear unit, SEW-EURODRIVE Chile

SEW EURODRIVE		LAS ENCINAS 1295 LAMPA SANTIAGO - CHILE			
Tipo	MC3 PLSF05				
N°	56131918040156RCH0113			F.C.	IM1 4
P _e	55	KW	Ma	19900	Nm
n _e	1750		na	53.8	rpm
i	32.528		Øa	120	mm.
f.s.	2.15		Peso	517	Kg.
Identif. (Tag)	GRASA EP 2				
Tipo Lubr.	ISOVG220 MINERAL			Lubricado con:	
Cant Lubr.	24	Lts			
Lubricación según manual instrucciones.			Fono : 7577000 Fax : 7577001		

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Tipo		Unit designation
N°		Serial number 1
F.C.		Shaft position
P _e	[kW]	Input power
n _e		Input speed
i		Exact gear unit reduction ratio
f.s.		Service factor
Identif.		Grease type
Tipo Lubr.		Oil grade and viscosity class
Cant Lubt.		Oil quantity
Ma	[Nm]	Gear unit nominal torque
na	[rpm]	Output speed
Ø a	[mm]	LSS shaft diameter
Peso	[Kg]	Weight of gear unit



3.4 Mounting positions

The following features clearly define the mounting position and corresponding design of MC units:

- Mounting surface (F1...F6) → chapter 3.5
- Housing orientation (M1...M6) → chapter 3.6

In addition, the shaft positions (0...4) have to be defined → chapter 3.7

The gear designs "horizontal LSS (L)", "vertical LSS (V)", "upright mounting (E)" are associated with the housing orientation

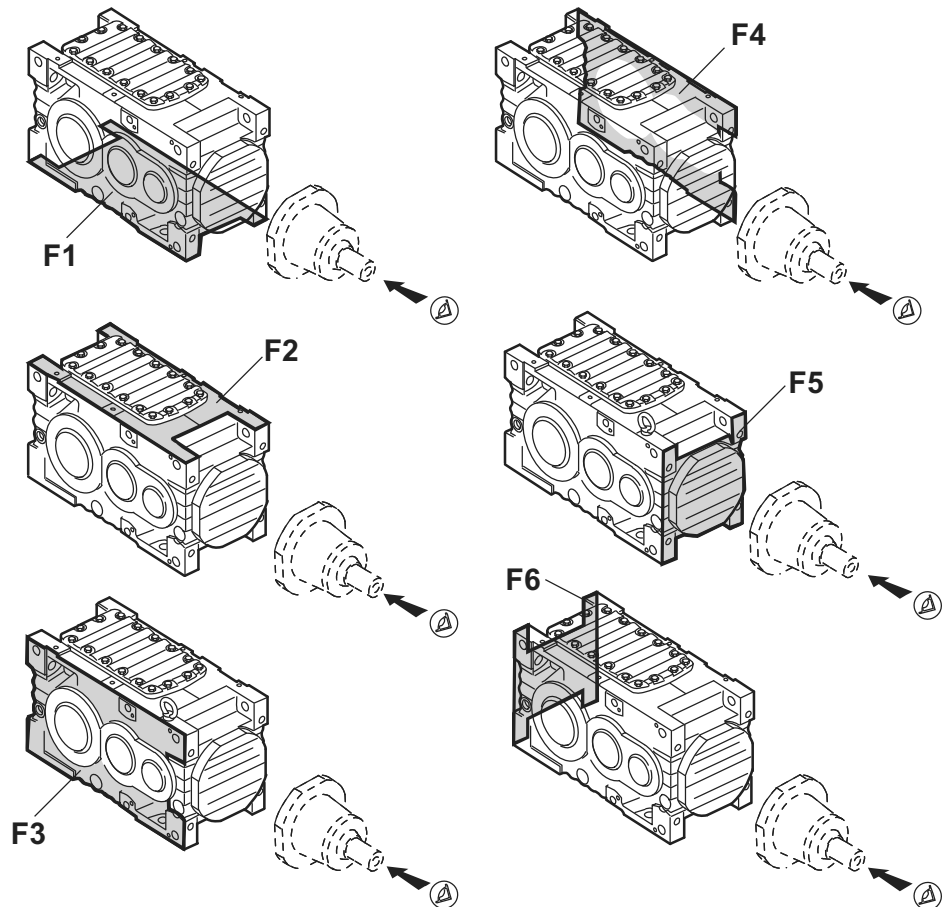
3.5 Mounting surface

Definition

The mounting surface is defined as the surface(s) of the foot or flange mounted gear unit to which the customer's machine is mounted.

Designations

Six different mountings surfaces have been defined (designations "F1" to "F6"):



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Figure 12: Mounting surface



3.6 Housing orientation M1...M6

The housing orientation is defined as the position of the housing in space and is defined using the designations M1...M6.

Each housing orientation corresponds to a certain

- gear unit design (L, V, E)
- standard mounting surface (F1...F6)



The housing orientation is defined separately for

- MC.P.. helical units
- MC.R.. bevel-helical units



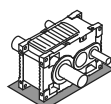
Unless specified otherwise, the **standard correlation** of

- gear unit design and
- housing orientation and
- mounting surface

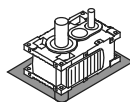
is as follows (foot mounted gear units):

Standard correlation of gear unit design and housing orientation

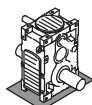
MC..PL: M1, F1



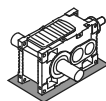
MC..PV: M5, F3



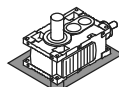
MC..PE: M4, F6



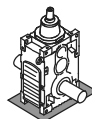
MC..RL: M1, F1



MC..RV: M5, F3



MC..RE: M4, F6



For gear units with mounting flange on the LSS, the standard position of the flange depends on the shaft position of the LSS unless specified otherwise:

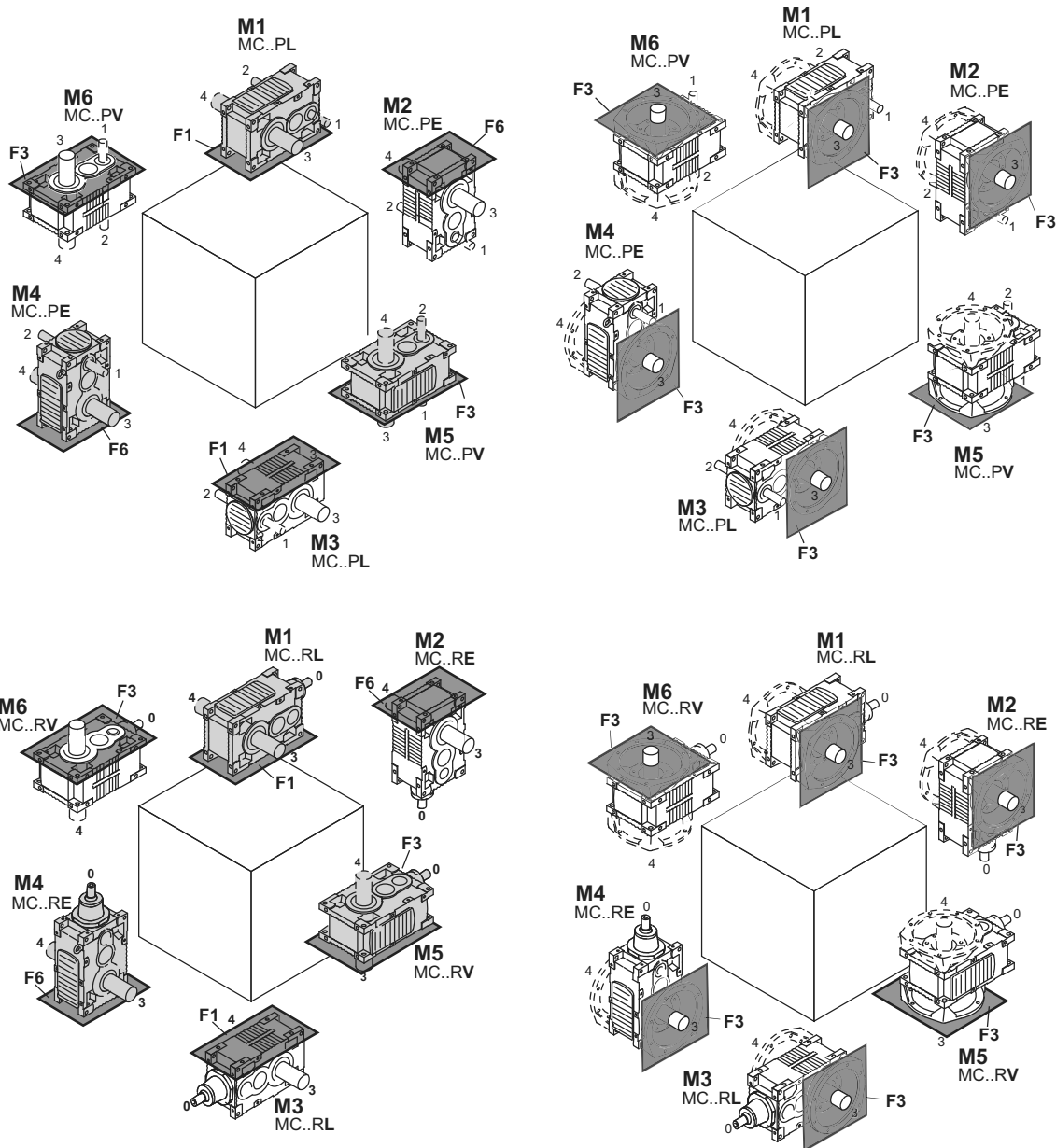
- Shaft position 3 → LSS mounting flange F3
- Shaft position 4 → LSS mounting flange F4



Gear Unit Design

Housing orientation M1...M6

**Housing
orientation and
standard
mounting surface**



- The units marked in gray are standard design.
- Other mounting surfaces are possible in conjunction with a certain housing orientation. Please refer to order-specific dimension drawing.



It is not allowed to change the housing orientation and/or mounting surface deviating from the order.



3.7 Shaft positions



The shaft positions (0, 1, 2, 3, 4) and directions of rotation shown in the following figures apply to output shafts (LSS) of the types **solid shaft and hollow shaft**. For other shaft positions or gear units with backstop, contact SEW-EURODRIVE.

The following shaft positions (0, 1, 2, 3, 4) are possible:

Shaft positions MC.P.S..

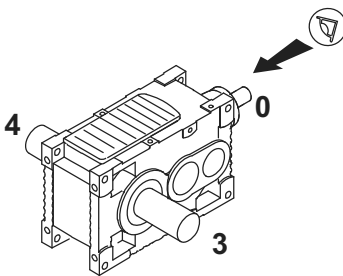
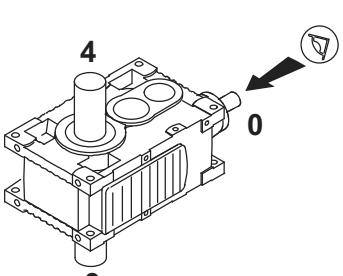
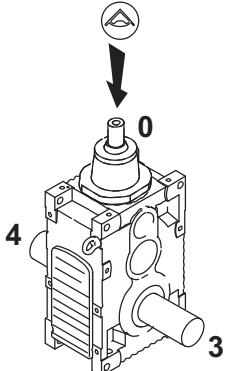
Housing orientation		
M1	M5	M4
Horizontal LSS (L)	Gear unit design Vertical LSS (V)	Upright mounted (E)

Shaft positions MC.P.H..

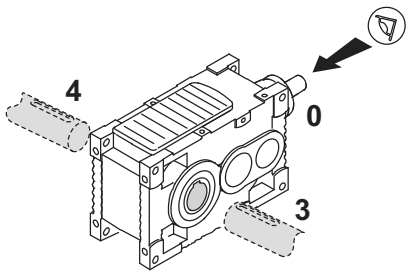
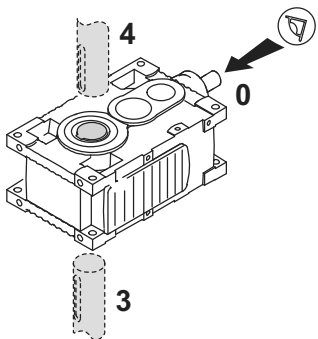
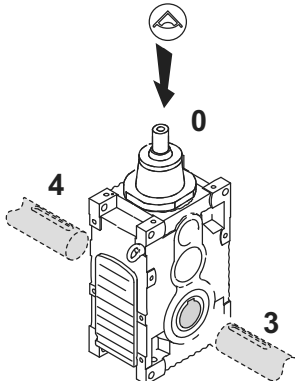
Housing orientation		
M1	M5	M4
Horizontal LSS (L)	Gear unit design Vertical LSS (V)	Upright mounted (E)



Shaft positions MC.R.S..

M1	Housing orientation		M4
	M5		
Horizontal LSS (L)	Gear unit design Vertical LSS (V)		Upright mounted (E)
			

Shaft positions MC.R.H..

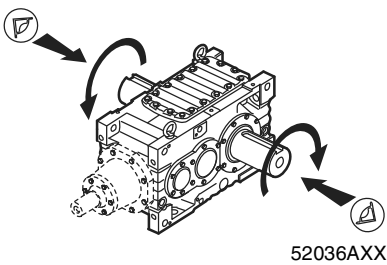
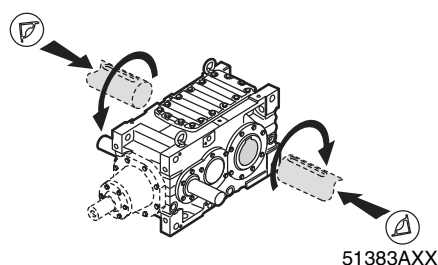
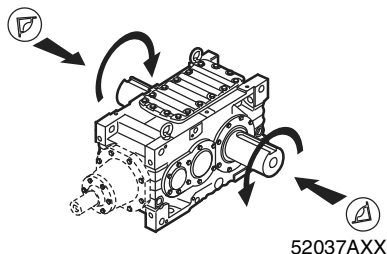
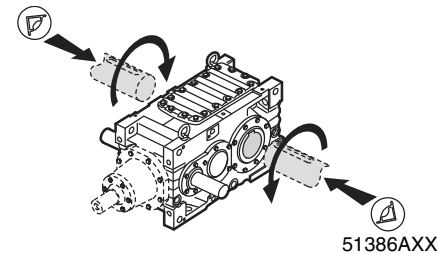
M1	Housing orientation		M4
	M5		
Horizontal LSS (L)	Gear unit design Vertical LSS (V)		Upright mounted (E)
			



3.8 Direction of rotation

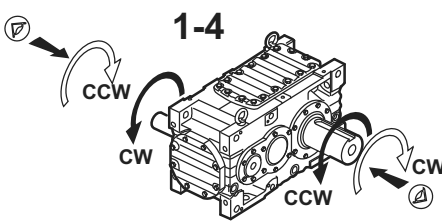
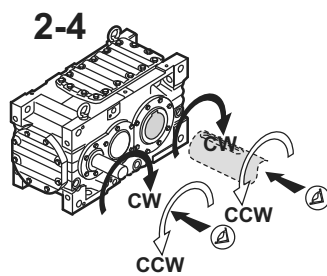
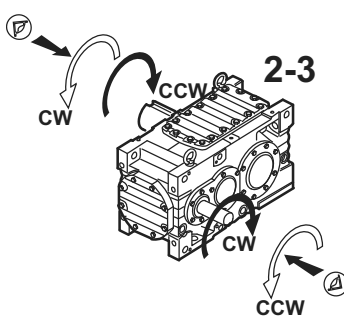
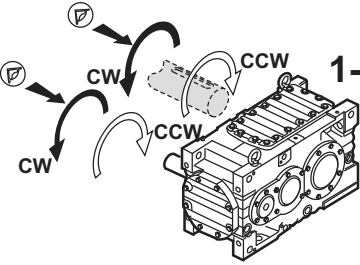
Directions of rotation

The directions of rotation of the outputs shaft (LSS) are defined as follows:

Direction of rotation	Gear unit version	
	MC.P.S.. MC.R.S..	MC.P.H.. MC.R.H..
Clockwise (CW)	 52036AXX	 51383AXX
Counter-clockwise (CCW)	 52037AXX	 51386AXX

Shaft positions and corresponding directions of rotation of MC2P..

The following figures show shaft positions and corresponding directions of rotation for industrial gear units of the MC2P.. series.

Two stages	
 51391AXX	 51391AXX
 51392AXX	 51392AXX

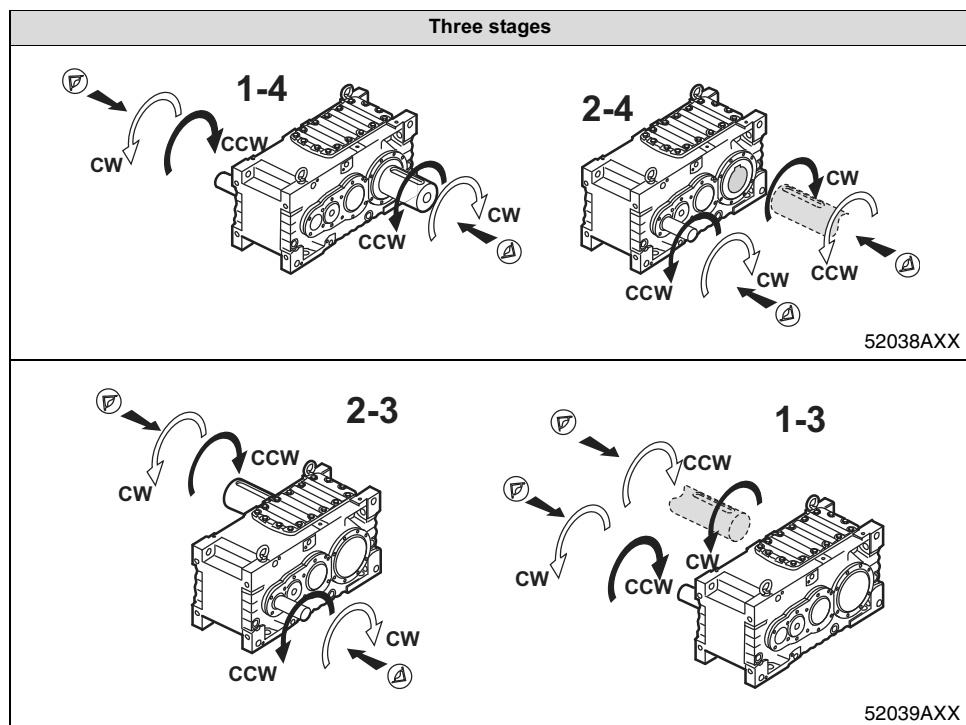


Gear Unit Design

Direction of rotation

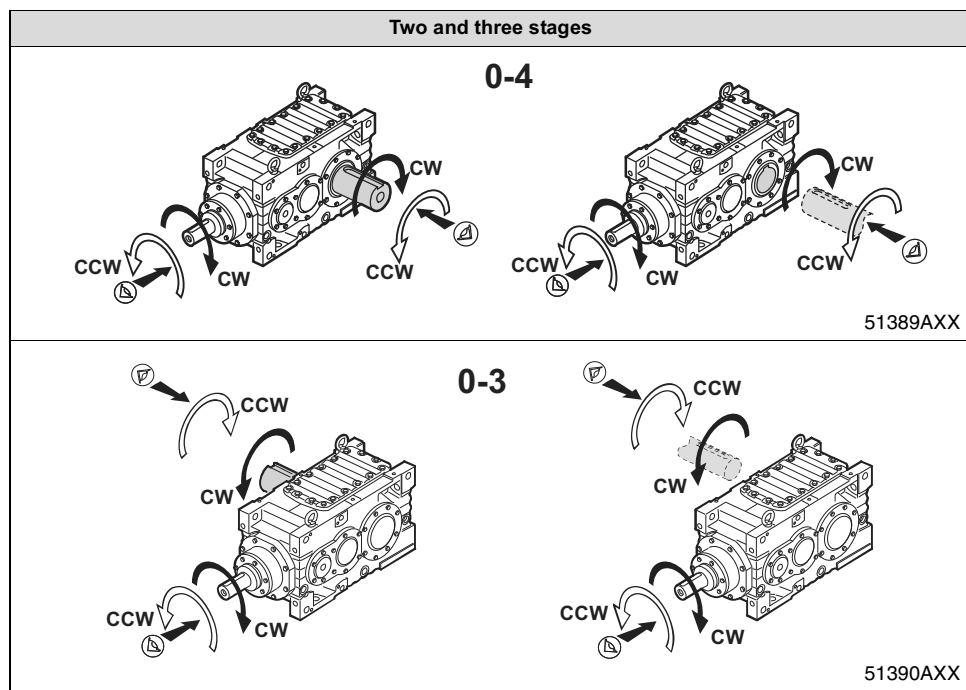
Shaft positions and corresponding directions of rotation of MC3P..

The following figures show shaft positions and corresponding directions of rotation for industrial gear units of the MC3P.. series.



Shaft positions and corresponding directions of rotation of MC.R.. without backstop

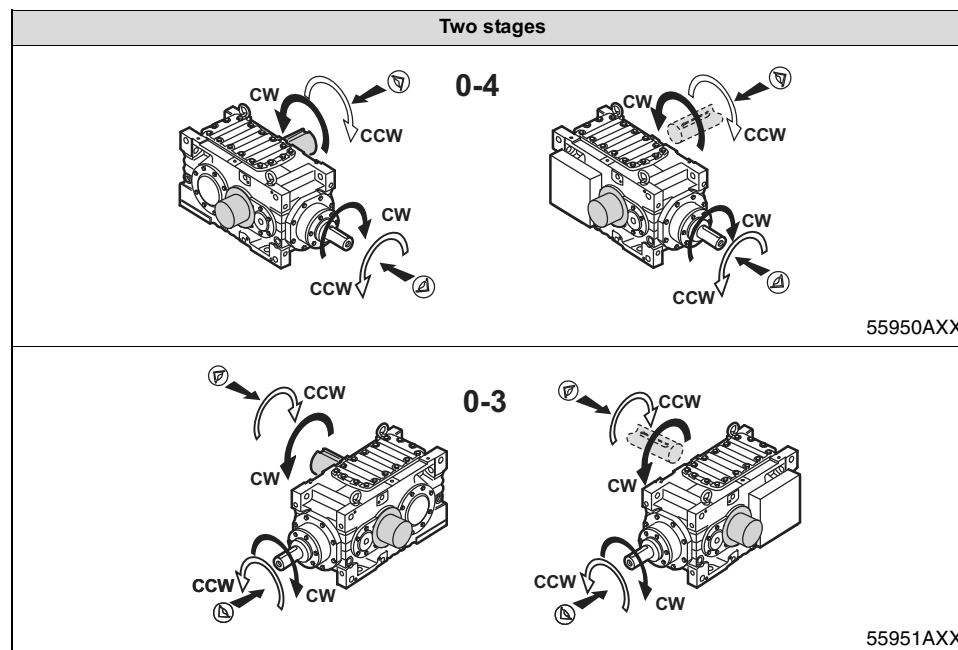
The following figures show shaft positions and corresponding directions of rotation for industrial gear units of the MC.R.. two and three stage series without backstop.





**Shaft positions
and correspond-
ing directions of
rotation of
MC2RS.. /
MC2RH.. keyway
with backstop**

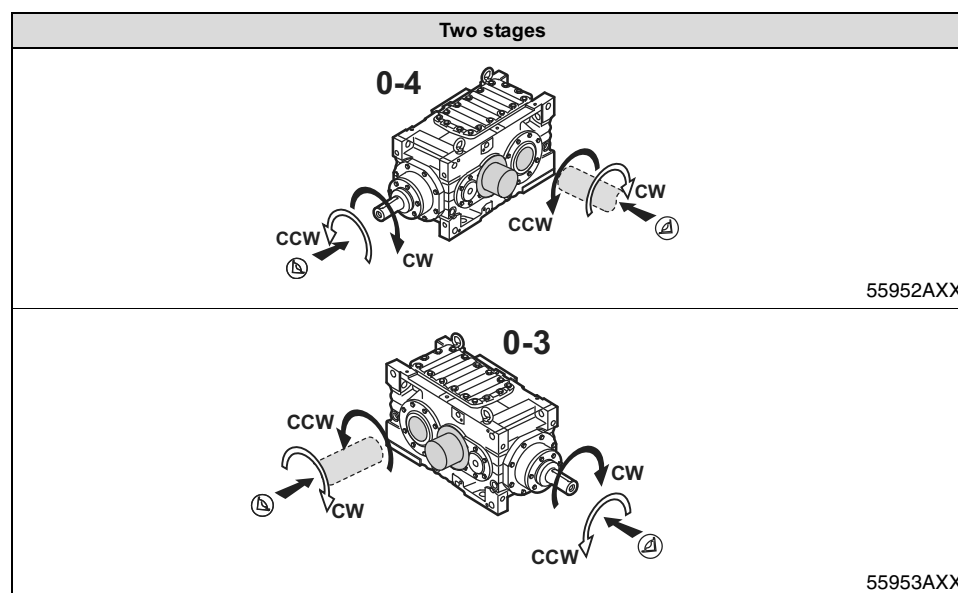
The following figures show shaft positions and corresponding directions of rotation for two-stage gear units with backstop of the types MC.RS.. and MC.RH.. with keyway.



Only one direction of rotation is possible, which has to be defined in the order. The permitted direction of rotation is indicated on the housing.

**Shaft positions
and correspond-
ing directions of
rotation of
MC2RH.. /SD
shrink disc units
with backstop**

Below figures show shaft positions and corresponding directions of rotation for two-stage gear units with backstop of the type MC.RS.. with shrink disc.



Only one direction of rotation is possible, which has to be specified in the order. The permitted direction of rotation is indicated on the housing.

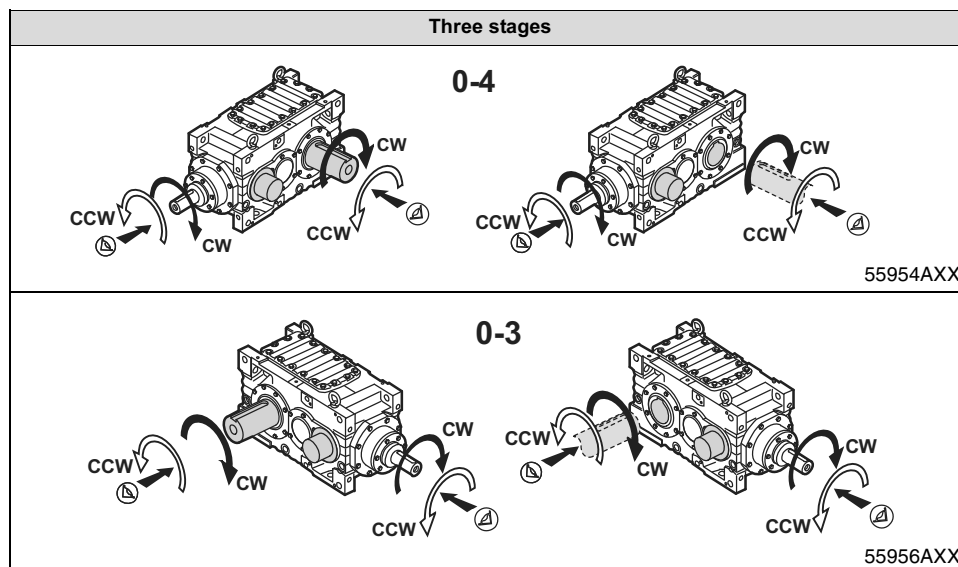


Gear Unit Design

Direction of rotation

Shaft positions and corresponding directions of rotation of MC3R.. industrial gear units back-stop on driven machine end

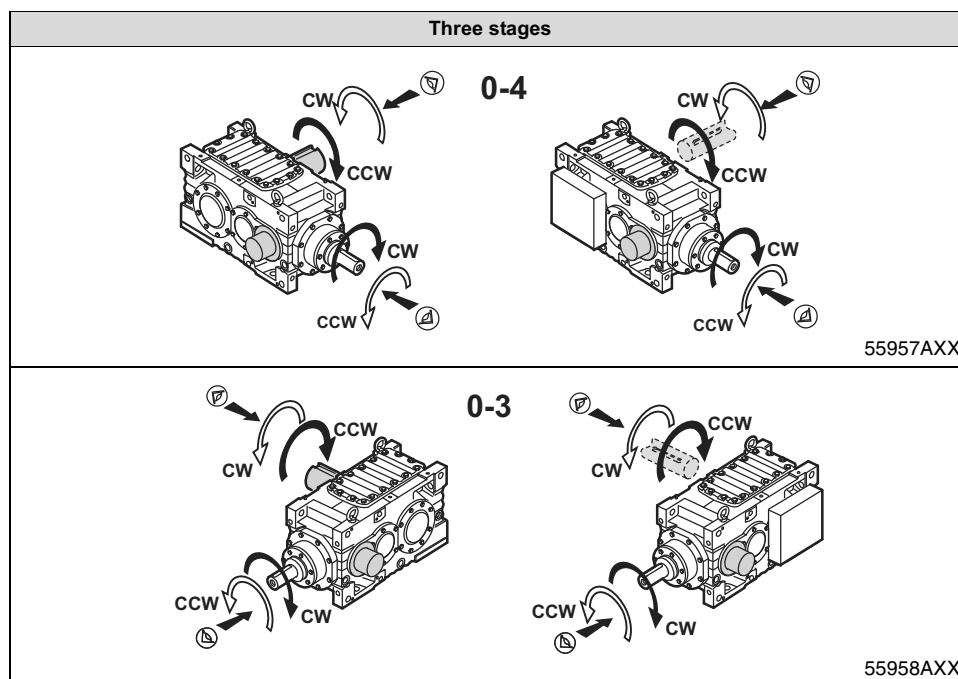
The following figures show shaft positions and corresponding directions of rotation for MC.RS.. and MC.RH.. units with keyway and backstop.



Only one direction of rotation is possible, which has to be specified in the order. The permitted direction of rotation is indicated on the housing.

Shaft positions and corresponding directions of rotation of MC3R.. Backstop opposite to driven machine end

The following figures show shaft positions and corresponding directions of rotation for MC.RS.. and MC.RH.. units with keyway and backstop.



Only one direction of rotation is possible, which has to be specified in the order. The permitted direction of rotation is indicated on the housing.



3.9 Lubrication of industrial gear units

Depending on the **mounting position**, the **lubrication types "splash lubrication" or "bath lubrication"** are used for industrial gear units of the MC.. series.

Splash lubrication

Splash lubrication is used for industrial gear units of the MC.. series in horizontal mounting position (unit designation MC..**L**..). With splash lubrication, the oil level is low. With this lubrication method, oil is splashed onto the bearings and gearing components.

Oil bath lubrication

Oil bath lubrication is used for industrial gear units of the MC.. series in horizontal mounting position (unit designation MC..**V**..) and upright mounting position (unit designation MC..**E**..). With oil bath lubrication, the oil level is so high that the bearings and gearing components are completely submerged in the lubricant.

Oil expansion tanks are **always** used for industrial gear units of the MC.PV.., MC.RV.. and MC.RE.. series with **oil bath lubrication**. **Oil expansion tanks allow the lubricant to expand when the gear unit heats up during operation.**

Disregarding the mounting position, a steel oil expansion tank is used when the unit is installed outdoors and when the ambient conditions are very humid. This tank can be used both for the version with solid shaft and hollow shaft. A membrane in the oil expansion tank separates the oil in the gear unit from the humid ambient air and thus ensures that no humidity can build up in the gear unit.

Symbols used

The following table shows which symbols are used in the subsequent figures and what they mean.

Symbol	Meaning
	Breather plug
	Inspection opening
	Oil dipstick
	Oil drain plug
	Oil filling plug
	Oil sight glass
	Air outlet screw



Oil bath lubrication upright mounting position

The steel oil expansion tank [6] is used for industrial gear units of the **MC series in upright mounting position** (unit designation **MC.PE..** or **MC..RE..**).

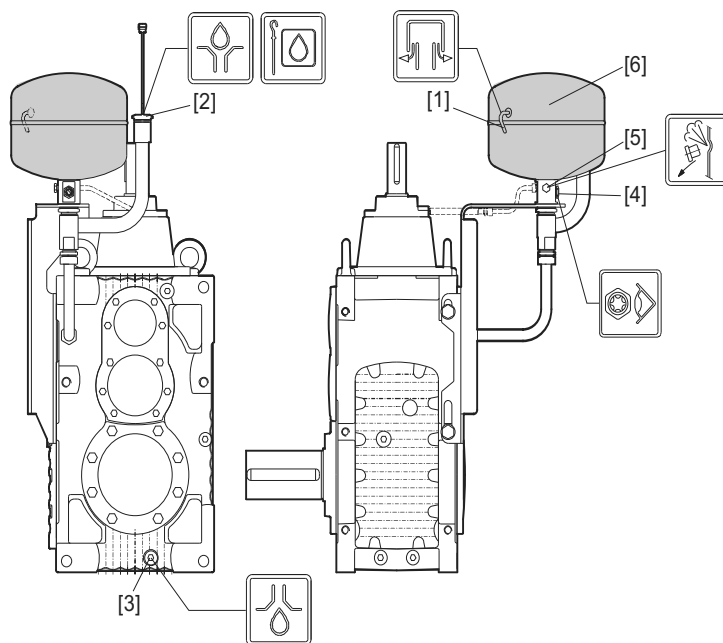


Figure 13: MC.PE../MC.RE.. industrial gear units with steel oil expansion tank

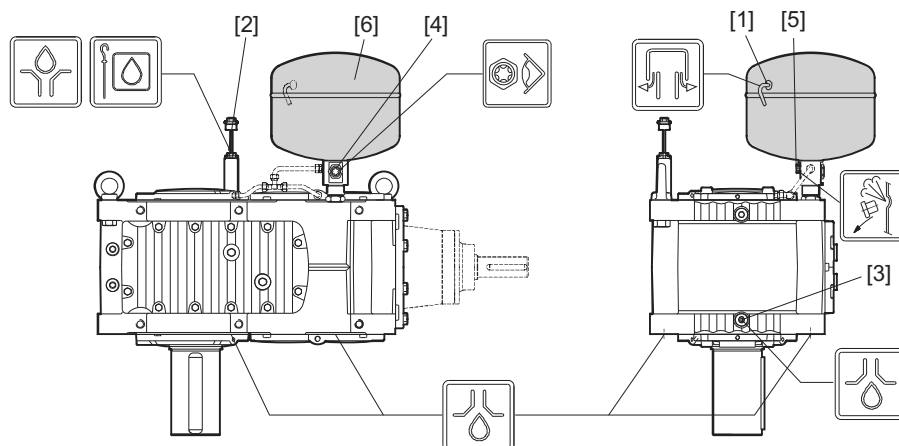
51586AXX

- | | |
|--------------------|------------------------------|
| [1] Breather | [4] Oil sight glass |
| [2] Oil dipstick | [5] Air outlet screw |
| [3] Oil drain plug | [6] Steel oil expansion tank |



Oil bath lubrication vertical mount- ing position

The steel oil expansion tank [6] for industrial gear units of the **MC series in vertical mounting position** (unit designation **MC.PV.. / MC.RV..**) is located on the side of the assembly cover.

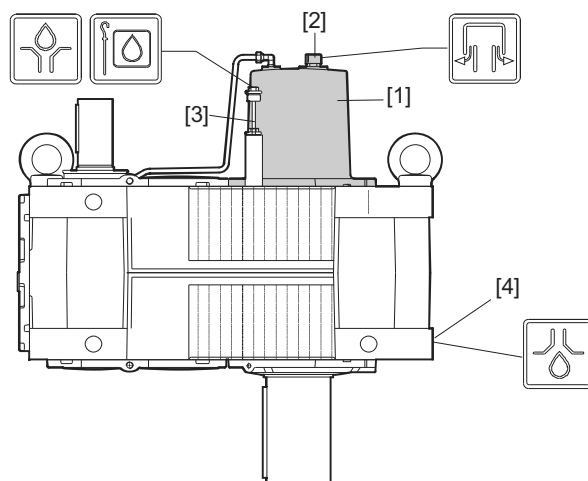


51588AXX

Figure 14: MC.PV../MC.RV.. industrial gear unit with steel oil expansion tank

- | | |
|--------------------|------------------------------|
| [1] Breather | [4] Oil sight glass |
| [2] Oil dipstick | [5] Air outlet screw |
| [3] Oil drain plug | [6] Steel oil expansion tank |

In **dry environmental conditions**, a **cast iron oil expansion tank [1]** is used. This oil expansion tank is only used for the vertical mounting position with the **solid output shaft pointing downwards** (unit designation MC.PVSF.. or MC.RVSF..).



51589AXX

Figure 15: MC.PVSF../MC.RVSF.. industrial gear unit with cast iron oil expansion tank

- | | |
|----------------------------------|--------------------|
| [1] Cast iron oil expansion tank | [3] Oil dipstick |
| [2] Breather plug | [4] Oil drain plug |



Gear Unit Design

Lubrication of industrial gear units

Pressure lubrication

If requested, pressure lubrication is possible as lubrication method **disregarding the mounting position**.

With pressure lubrication, the oil level is low. For sizes 04 to 09, the gearing components and bearings not submerged in the oil bath are lubricated through a shaft end pump (→ Sec. "Shaft end pump"), or, with sizes 02 to 09, through a motor pump (" Sec. → Motor pump").

The lubrication method "pressure lubrication" is used when

- oil bath lubrication is not desired for upright or vertical mounting positions
- input speeds are very high
- the gear unit must be cooled by an external oil/water (→ Sec. "Oil/water cooling system") or oil/air cooling system (→ Sec. "Oil/air cooling system")



For more details on oil expansion tanks, refer to Sec. "Mounting Positions".



4 Mechanical Installation

4.1 Required tools / resources

Not included in the scope of delivery:

- Wrench set
- Torque wrench (for shrink discs)
- Motor attachment to motor adapter
- Mounting device
- Shims and spacing rings if necessary
- Fasteners for input and output elements
- Lubricant (e.g. NOCO® fluid from SEW-EURODRIVE)
- For hollow shaft gear units (→ Sec. "Mounting/removal of hollow shaft gear units with keyed connection): Threaded rod, nut (DIN 934), retaining screw, ejector screw
- Securing components according to Sec. "Gear unit foundation"

Installation tolerances

Shaft end	Flanges
Diametric tolerance in accordance with DIN 748 • ISO k6 for solid shafts with $\varnothing \leq 50$ mm • ISO m6 for solid shafts with $\varnothing > 50$ mm • ISO H7 for hollow shafts for shrink disc • ISO H8 for hollow shafts with keyway • Center hole in accordance with DIN 332, shape DS..	Centering shoulder tolerance: • ISO js7 / H8

4.2 Before you begin

The drive may only be installed if

- the data on the nameplate of the motor match the supply voltage
- the drive is not damaged (no damage resulting from transport or storage) and
- the following requirements have been properly met:
 - **with standard gear units:**
ambient temperature according to the lubricant table in Sec. "Lubricants" (see standard), no oil, acid, gas, vapors, radiation, etc.
 - **with special versions:**
drive configured in accordance with the ambient conditions (→ order documents)

4.3 Preliminary work

Output shafts and flange surfaces must be completely free of anti-corrosion agents, contamination or other impurities (use a commercially available solvent). Do not let the solvent get in contact with the sealing lips of the oil seals: danger of damage to the material!



4.4 Gear unit foundation

Foundation for foot-mounted gear units

To ensure quick and successful mounting, the type of foundation should be correctly selected and the mounting carefully planned in advance. Foundation drawings with all necessary construction and dimension details should be available.

SEW-EURODRIVE recommends foundation methods shown in the following figures. A customer's own foundation method must be equally adequate.

When mounting a gear unit onto steel framework, special attention should be paid to the rigidity of this framework to prevent destructive vibrations and oscillations. The foundation must be dimensioned according to weight and torque of the gear unit by taking into account the forces acting on the gear unit.

Example 1

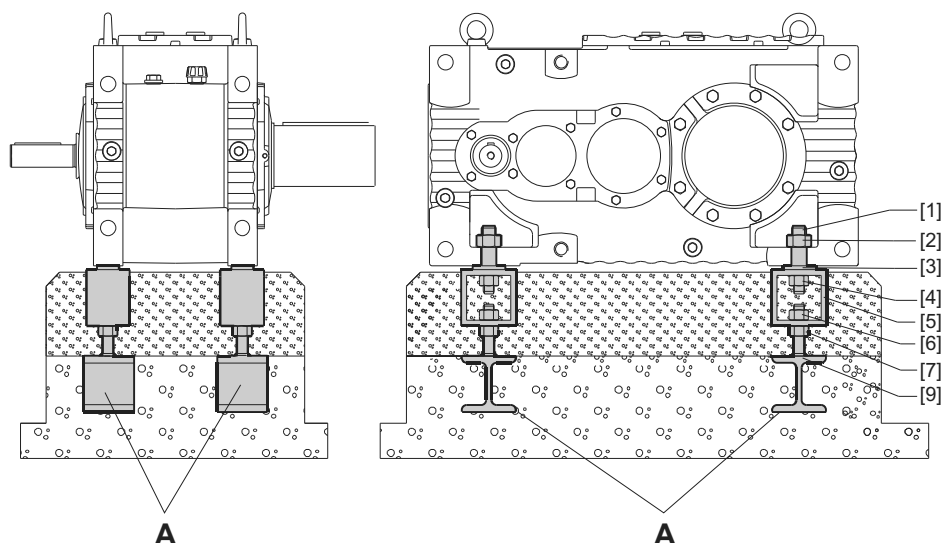


Figure 16: Reinforced concrete foundation for MC.PL.. / MC.RL.. industrial gear units

51403AXX

Pos. "A" → Sec. "Concrete base"

- [1] Hex head screw or stud
- [2] Hex nut if [1] is a stud or an upside-down screw
- [3] Shims (about 3 mm space for shims)
- [4] Hex nut
- [5] Foundation bracket
- [6] Hex nut
- [7] Hex nut and foundation screw
- [9] Supporting girder



Example 2

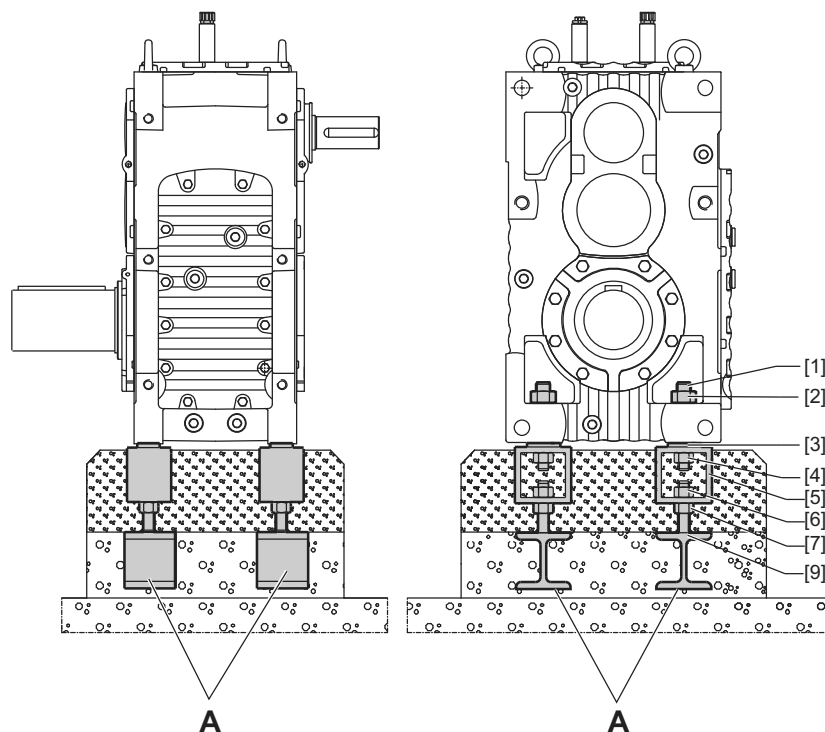


Figure 17: Reinforced concrete foundation for MC.PE.. / MC.RE.. industrial gear units

51406AXX

Pos. "A" → Sec. "Concrete base"

- [1] Hex head screw or stud
- [2] Hex nut if [1] is a stud or an upside-down screw
- [3] Shims (about 3 mm space for shims)
- [4] Hex nut
- [5] Foundation bracket
- [6] Hex nut
- [7] Hex nut and foundation screw
- [9] Supporting girder



Example 3

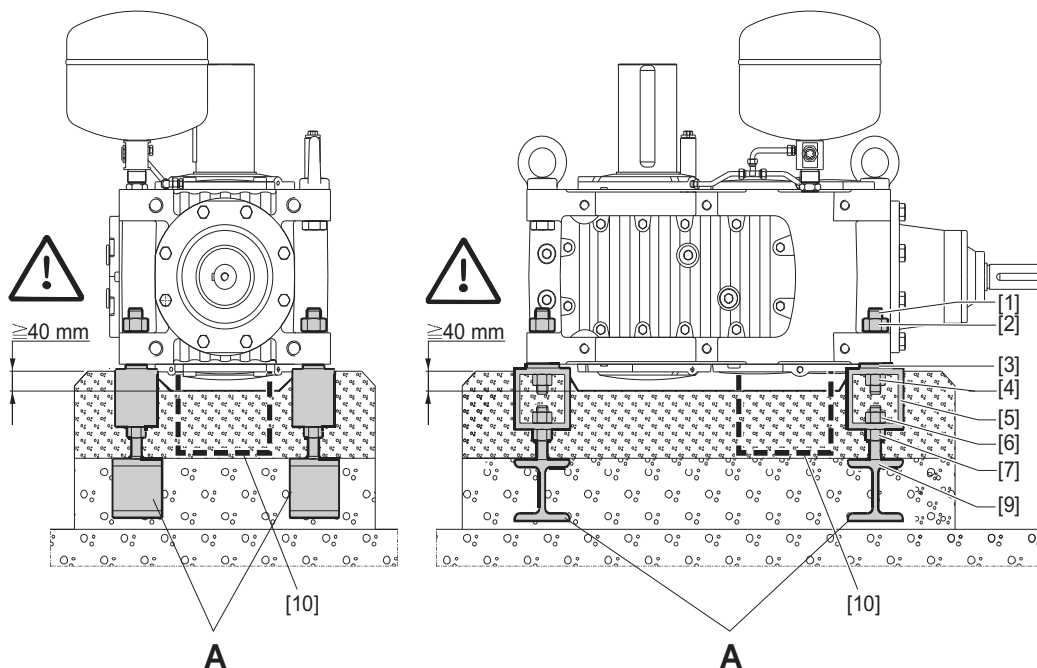


Figure 18: Reinforced concrete foundation for MC.PV.. / MC.RV.. industrial gear units

51413AXX

Pos. "A" → Sec. "Concrete base"

- [1] Hex head screw or stud
- [2] Hex nut if [1] is a stud or an upside-down screw
- [3] Shims (about 3 mm space for shims)
- [4] Hex nut
- [5] Foundation bracket
- [6] Hex nut
- [7] Hex nut and foundation screw
- [9] Supporting girder
- [10] Shaft end pump (optional)



Important for MC.PV.. / MC.RV.. gear unit types:

- The mounting clearance between bearing cover and gear unit foundation must be at least 40 mm.
- The mounting clearance must be dimensioned adequately if the gear unit is equipped with a shaft end pump [10] (→ Sec. "Shaft end pump")

Concrete base

The concrete base for the gear unit must be reinforced and interlocked with the concrete using steel clamps, steel rods or steel elements. Only the supporting girders are embedded in the concrete (Pos. "A" → following figure).

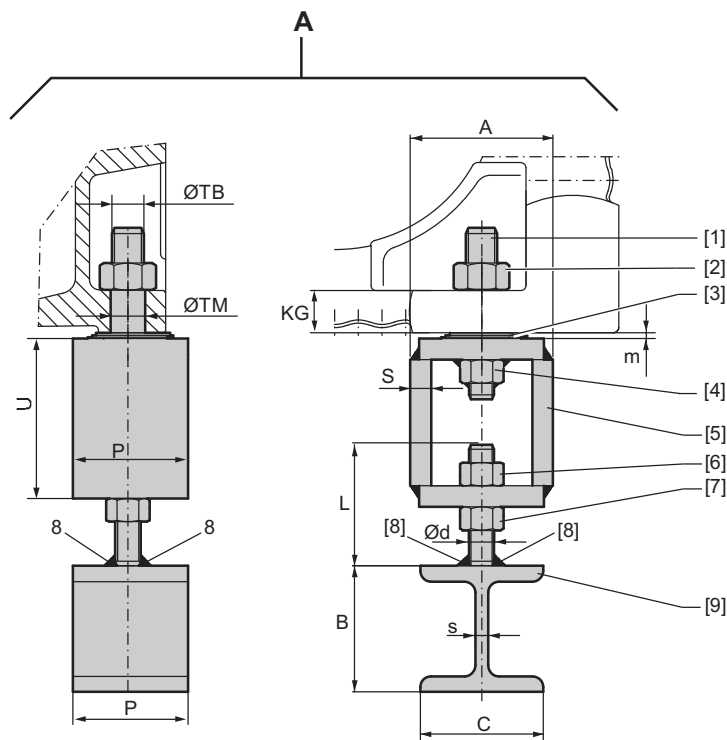


Figure 19: Reinforcing the concrete base (Pos. "A")

51404AXX

- [1] Hex head screw or stud
- [2] Hex nut if [1] is a stud or an upside-down screw
- [3] Shims (about 3 mm space for shims)
- [4] Hex nut
- [5] Foundation bracket
- [6] Hex nut
- [7] Hex nut and foundation screw
- [8] Weld seam
- [9] Supporting girder



Dimensions

Gear unit size	Stud			Foundation frame					Foundation screws		Supporting girders			
	ØTB	ØTM	KG	m	P	U	A	S	Ød	L	P	B	C	s
	[mm]													
02	M20	24	28	3	120	120		20	M24	120	120	100		10
03														
04	M24	28	34			150		30	M30	150		140	12	
05														
06	M30	33	40											
07														
08	M36	39	52											
09														



The minimum tensile strength of the supporting girders and foundation screws must be at least 350 N/mm².

Grouting

The density of the grout must be equal to that of the base concrete. The grout is connected with the concrete base using concrete reinforcement steel.

Before welding the weld seams [9], ensure that

- the concrete base around the supporting girder has dried
- the gear unit with all mount-on components has been aligned to its final position

Tightening torques

Screw / nut	Tightening torque screw / nut [Nm]
M8	19
M10	38
M12	67
M16	160
M20	315
M24	540
M30	1090
M36	1900



Counterflange for flange mounted gear units

Gear units can be supplied with a mounting flange on the LSS. Dependent on the bearing configuration, the two flange types are called

- "Mounting flange"
- "EBD-Mounting flange"

Basically, both flange types are possible for all gear unit designs and mounting positions:

- MC.L..
- MC.V..
- MC.E..

Mounting flange

Solid shaft LSS

Hollow shaft LSS

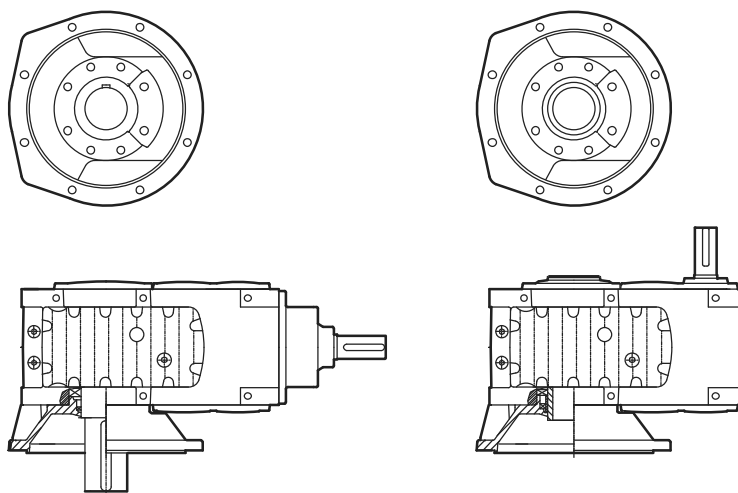


Figure 20: Mounting flange

56611AXX

EBD-Mounting flange

Solid shaft LSS

Hollow shaft LSS

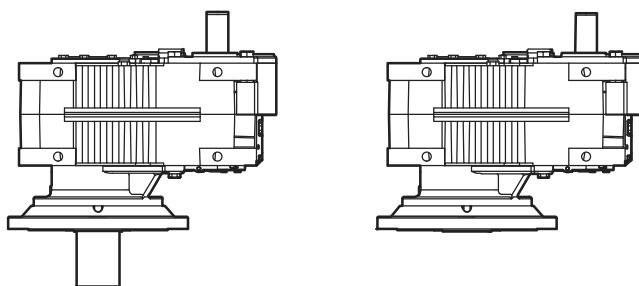


Figure 21: EBD-Mounting flange

56609AXX



Mechanical Installation

Gear unit foundation

The counterflange must have following characteristics:

- Stiff and torsionally rigid, taking into consideration
 - gear unit weight
 - motor weight
 - the torque that has to be transmitted
 - additional forces acting on the gear unit from the customer machine (e.g. axial forces from and towards gear unit from a mixing process)
- Horizontal
- Plain
- Vibration isolating, that means no vibrations are to be transmitted from close-by machines and elements
- Not creating resonance vibrations
- A bore with H7-fitting suiting to the centering shoulder of the gear unit flange according to dimension drawing



The mounting surface of mounting flange and counter flange must be absolutely free of grease or oil and from other contamination (e.g. small textile particles, dust,...)

The alignment of the gear unit LSS in relation to the counterflange has to be as accurate as possible. This has an effect on the lifetime of bearing, shafts and coupling.

Allowable misalignments for the coupling on the LSS can be seen in chapter 5.2 or in a separate coupling manual.

Following bolts of the 8.8-class should be used (Tensile strength 640 N/mm²)

Gear unit size MC..	Mounting flange	EBD-Mounting flange
02	8 x M16	16 x M16
03	8 x M16	16 x M16
04	8 x M16	16 x M16
05	8 x M20	16 x M16
06	8 x M20	16 x M20
07	8 x M20	16 x M20
08	8 x M24	16 x M24
09	8 x M24	16 x M24



4.5 Mounting of solid shaft gear units



Before mounting the gear unit, check the foundation dimensions with those in the corresponding drawings in Sec. "Gear unit foundation."

Mount the gear unit in the following order:

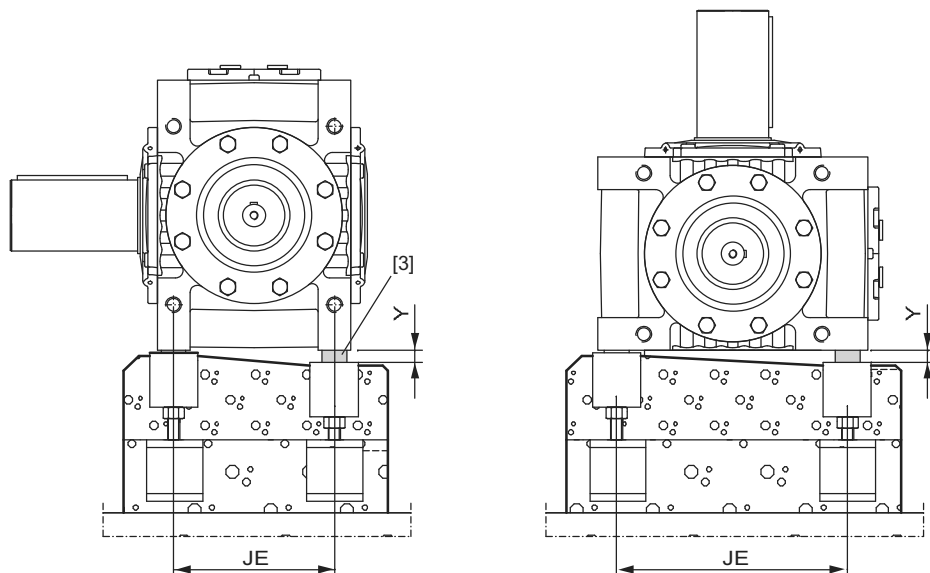
1. Mount the components according to Sec. "Gear unit foundation". The shims [3] facilitate later adjustment and, if necessary, to mount a replacement gear unit.
2. Secure the gear unit at the selected positions on the supporting girders using three foundation screws. Position the foundation screws at maximum possible distance (two screws on one side of the gear unit and one on the other side). Align the gear unit as follows:
 - vertically by lifting, lowering or tilting the unit using the nuts of the foundation screws
 - horizontally by tapping the foundation screws slightly into the required direction
3. After having aligned the gear unit, tighten the three nuts of the foundation screws used for alignment. Carefully insert the fourth foundation screw into the supporting girder and tighten it securely. When doing so, make sure that the position of the gear unit does not change. If necessary, realign the gear unit.
4. Tack-weld the ends of the foundation screws to the supporting girders (at least three welding spots per foundation screw). Tack-weld the foundation screws alternately in both directions (starting from the middle) on each side of the center line of the gear unit. This way, misalignment caused by the welding process is avoided. After having tack-welded all screws, they must be welded all the way round in the above mentioned order. Adjust the nuts on the foundation screws to ensure that the welded foundation screws do not twist the gear unit housing.
5. After having tack-welded the nuts of the retaining screws of the gear unit, check the mounting and carry out grouting.
6. When the grouting concrete has set, check the mounting a last time and adjust, if necessary.



Mechanical Installation

Mounting of solid shaft gear units

**Mounting
accuracy when
aligning**



51590AXX

Figure 22: Mounting tolerances of the foundation

When aligning the gear unit, make sure that the mounting tolerances for the evenness of the foundation are not exceeded (values $y_{\max}$ in below table). If necessary, use shims [3] to align the gear unit on the foundation plate.

JE [mm]	$y_{\max}$ [mm]
< 400	0.035
400 ... 799	0.060
800 ... 1200	0.090
1200 ... 1600	0.125

**Flange mounted
gear units**



Before mounting the gear unit, check if the counterflange fulfils the requirements mentioned in Sec. "4.4 Gear unit foundation - Counterflange for flange mounted gear units"

Mount the gear unit in the following order:

1. Lower the gear unit on the counterflange with suitable lifting means. Especially take care of the guidelines mentioned in Sec. 2.1.
2. Secure the gear unit at the right position on the counterflange using the flange bolts and tighten them crosswise with the full tightening torque (→ sec. 4.4).



4.6 Mounting / removing hollow shaft gear units with keyed connection



- Included in the scope of delivery (→ Figure 23):
 - Circlips [3], end plate [4]
- **Not** included in the scope of delivery (→ Figure 23 / Figure 24 / Figure 25):
 - Threaded rod [2], nut [5], retaining screw [6], ejector screw [8]

Selecting the adequate thread and length of the threaded rod as well as the retaining screw depends on the design of the customer's machine.

Thread sizes

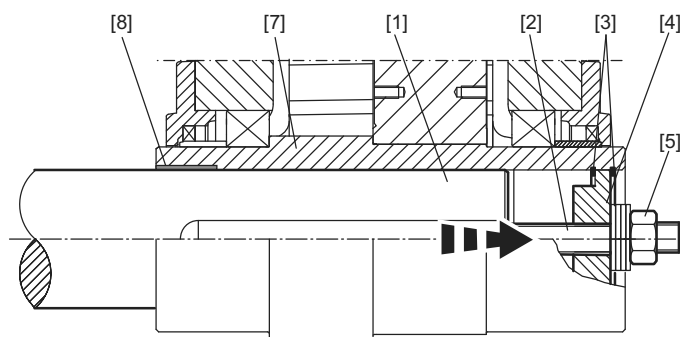
SEW-EURODRIVE recommends the following thread sizes:

Gear unit size	Thread size for • threaded rod [2] • nut (DIN 934) [5] • retaining screw [6]
02 - 06	M24
07 - 09	M30

The thread size of the ejector screw depends on the end plate [4]:

Gear unit size	Thread size of ejector screw [8]
02 - 06	M30
07 - 09	M36

Mounting the hollow shaft gear unit onto the customer's shaft



56813AXX

Figure 23: Mounting of hollow shaft gear unit with keyed connection

- | | |
|----------------------|------------------|
| [1] Customer's shaft | [5] Nut |
| [2] Threaded rod | [7] Hollow shaft |
| [3] Circlips | [8] Bushing |
| [4] End plate | |

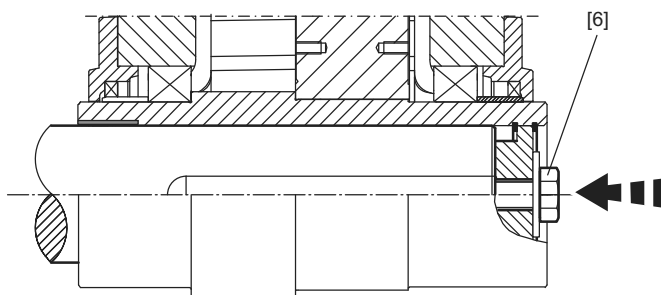
- To mount and secure the gear unit, attach the circlips [3] and the end plate [4] on the hollow shaft bore.



Mechanical Installation

Mounting / removing hollow shaft gear units with keyed connection

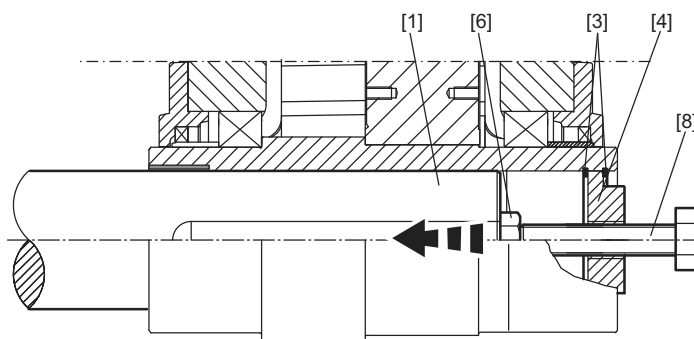
- Apply NOCO® fluid to the hollow shaft [7] and the shaft end of the customer's shaft [1].
- Push the gear unit onto the customer's shaft [1]. Thread the threaded rod [2] into the customer's shaft [1]. Tighten the customer's shaft [1] with the nut [5] until the shaft end of the customer's shaft [1] and the end plate [4] meet.
- Loosen the nut [5] and unscrew the threaded rod [2]. After having mounted the gear unit, secure the customer's shaft [1] using the retaining screw [6].



56814AXX

Figure 24: Mounted hollow shaft gear unit with keyed connection

Removing the hollow shaft gear unit from the customer's shaft



56815AXX

Figure 25: Removing hollow shaft gear unit with keyed connection

- | | |
|----------------------|---------------------|
| [1] Customer's shaft | [6] Retaining screw |
| [3] Circlips | [8] Ejector screw |
| [4] End plate | |

- Remove the retaining screw [Figure 24, Pos. 6].
- Remove the outer circlip [3] and the end plate [4].
- Thread the retaining screw [6] into the customer's shaft [1].
- Flip the end plate [4] and remount the end plate and the outer circlip [3].
- Thread the ejector screw [8] into the end plate [4] to remove the gear unit from the customer's shaft [1].



4.7 Mounting / removing hollow shaft gear units with shrink disc

A shrink disc serves as connecting element between the hollow shaft of the gear unit and the customer's shaft. For the shrink disc type used (designation: RLK608), refer to section "Identifying shrink disc type"



- Included in the scope of delivery (→ Figure 31):
 - Circlip [3], end plate [4]
- **Not** included in the scope of delivery (→ Figure 31 / Figure 32 / Figure 35):
 - Threaded rod [2], nut [5], retaining screw [6], ejector screw [8]

Selecting the appropriate thread and length of the threaded rod as well as the retaining screw depends on the design of the customer's machine.

Thread sizes

SEW-EURODRIVE recommends the following thread sizes:

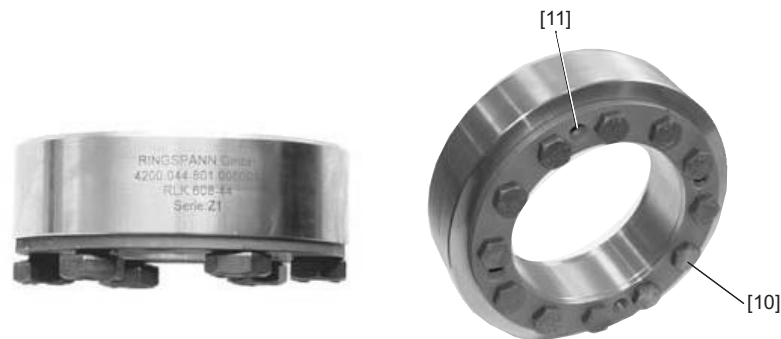
Gear unit size	Thread size for • threaded rod [2] • nut (DIN 934) [5] • retaining screw [6]	→ Figure 32, 33
02 - 06	M24 M30	
07 - 09		

The thread size of the ejector screw depends on the end plate [4]:

Gear unit size	Thread size of the ejector screw [8]
02 - 06	M30
07 - 09	M36

Identifying shrink disc type

Normally, the shrink disc type RLK608 is used. It has a metallic colour shade. The letters "RLK 608-..." are engraved:



56612AXX

Figure 26: shrink disc type RLK608

- [10] Locking screw
[11] Forcing thread



Order-specific, other shrink disc types could be used. In this case please refer to the separate, shrink disc-specific manual.

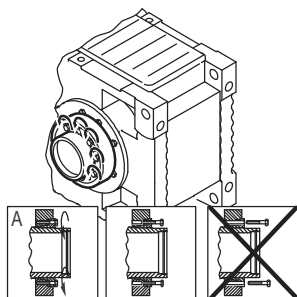


Mechanical Installation

Mounting / removing hollow shaft gear units with shrink disc

Mounting the shrink disc

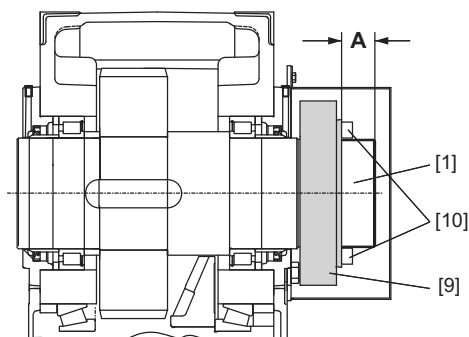
- Do not tighten the locking screws [10] before the customer's shaft [1] has been mounted, else the hollow shaft could be deformed!



56817AXX

Figure 27: Shrink disc locking screws before customer's shaft mounting

- Slide the shrink disc [9] with untightened screws onto the hub of the hollow shaft bore. Position the customer's shaft [1] in the hollow shaft bore. Next move the shrink disc [9] by dimension A (→ following figure, Sec. "Dimension A") from the shaft end of the hollow shaft:



51986AXX

Figure 28: Mounting the shrink disc

[1] Customer's shaft

[10] Locking screws

[9] Shrink disc



It is essential to make sure that the clamping area of the shrink disc is free from grease.

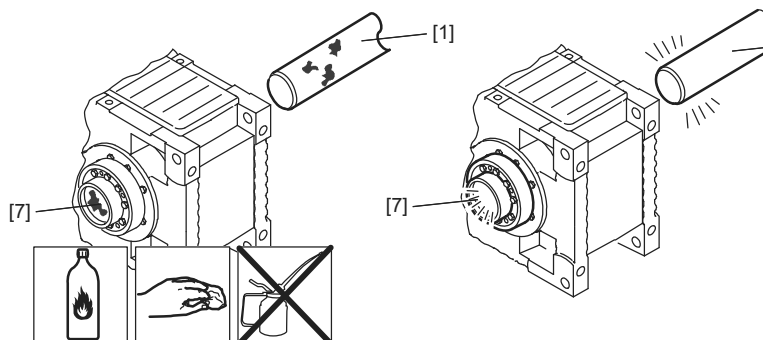
Dimension A

Gear unit size MC..	Shrink disc type RLK608 Dimension A [mm]
02	39
03	45
04	44
05	42
06	44
07	50
08	51
09	49



Mounting the hollow shaft gear unit onto the customer's shaft

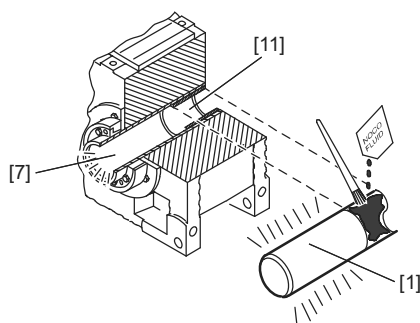
- Before mounting the gear unit, degrease the hollow shaft bore and the customer's shaft [1].



56820AXX

Figure 29: Degrease of hollow shaft bore and customer's shaft

- Apply a small amount of NOCO® fluid on the customer's shaft to the area of the bushing [11].



56811AXX

Figure 30: Application of NOCO® fluid on customer's shaft

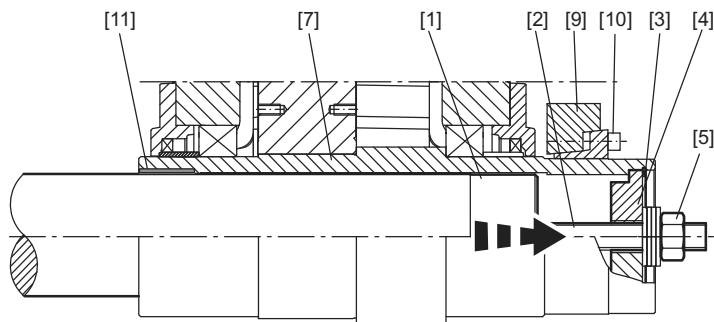


Never apply NOCO® fluid directly to the bushing as the paste may be able to get into the clamping area of the shrink disc when the input shaft is put on.



Mechanical Installation

Mounting / removing hollow shaft gear units with shrink disc

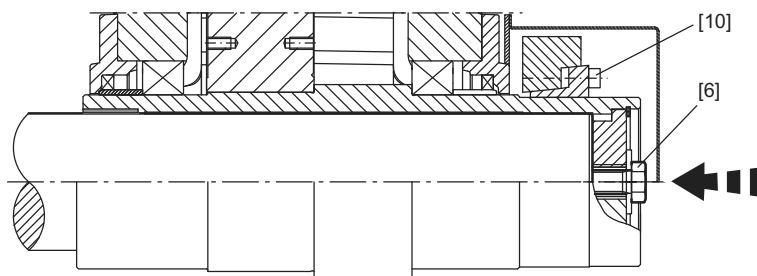


56816AXX

Figure 31: Mounting of hollow shaft gear unit with shrink disc

- | | |
|----------------------|---------------------|
| [1] Customer's shaft | [7] Hollow shaft |
| [2] Threaded rod | [9] Shrink disc |
| [3] Circlip | [10] Locking screws |
| [4] End plate | [11] Bushing |
| [5] Nut | |

- To mount and secure the gear unit, attach the circlips [3] and the end plate [4] on the hollow shaft bore.
- Push the gear unit onto the customer's shaft [1]. Thread the threaded rod [2] into the customer's shaft [1]. Tighten the customer's shaft [1] with the nut [5] until the shaft end of the customer's shaft [1] and the end plate [4] meet.
- Loosen the nut [5] and unscrew the threaded rod [2]. After having mounted the gear unit, secure the customer's shaft [1] using the retaining screw [6].



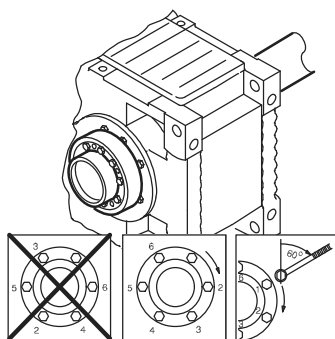
56817AXX

Figure 32: Mounted hollow shaft gear unit with shrink disc, shrink disc unclamped



Tightening shrink disc type RLK608

Tighten the locking screws by hand whilst aligning the shrink disc. Tighten the clamping screws one by one in a clockwise direction (not crosswise) by only 1/4 revolution each.



56812AXX

Figure 33: Order of locking screws tightening

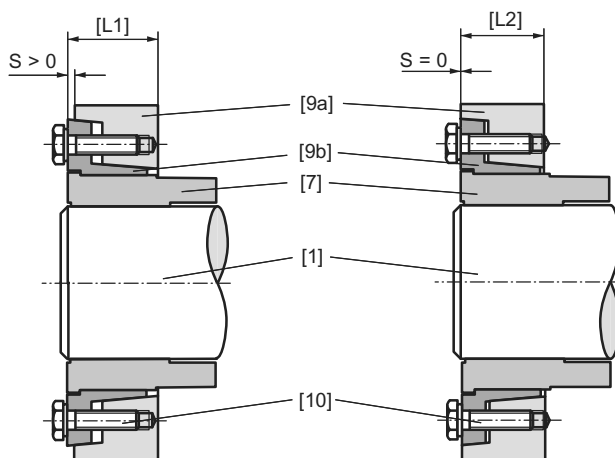


The screws of shrink discs with slitted cone bushing has to be tightened in that way that you start with the screw on one side of the slit and continue with the screw on the other side of the slit.

Continue tighten the screws by 1/4 revolution in several stages until the screw- side faces of the outer ring and the inner ring are in line like shown in Figure 34.



The assembly is defined by the axial movement of the cone bushing and can be done without a torque wrench.



56886AXX

Figure 34: Tightening shrink disc type RLK608

[L1] State at time of delivery (pre assembled)

[L2] Ready for operation (final assembly)

[9a] Cone

[9b] Cone bushing

[7] Hollow shaft

[1] Customer's shaft

[10] Locking screws



Mechanical Installation

Mounting / removing hollow shaft gear units with shrink disc

Removing the shrink disc



Loosen the locking screws [10] by 1/4 revolution each in sequence in several levels evenly, so that tilting of the clamping surface is avoided.

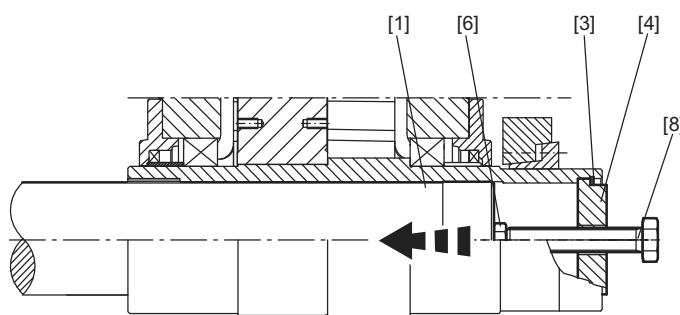
Never unscrew the locking screws completely from the tapped hole, since otherwise danger of accident exists.

If the cone bushing and cone ring do not loosen from each other by themselves:

Take the required quantity of locking screws and bolt them evenly into the removing thread bores. Tighten the locking screws in several levels until the cone bushing is separated from the cone ring.

Take the shrink disc off from the hollow shaft.

Removing the hollow shaft gear unit from the customer's shaft



56818AXX

Figure 35: Removing the hollow shaft gear unit with shrink disc connection

- | | |
|----------------------|---------------------|
| [1] Customer's shaft | [6] Retaining screw |
| [3] Circlip | [8] Ejector screw |
| [4] End plate | |

- Remove the retaining screw [Figure 32, Pos. 6].
- Remove the outer circlip [3] and the end plate [4].
- Thread the retaining screw [6] into the customer's shaft [1].
- Flip the end plate [4] and remount the end plate and the outer circlip [3].
- Thread the ejector screw [8] into the end plate [4] to remove the gear unit from the customer's shaft [1].

Cleaning and lubrication

Clean the shrink disc after the disassembly and

- grease afterwards the locking screws [10] on the thread and under the head with paste which consist MoS₂, e.g. "gleitmo 100" from FUCHS LUBRITECH (www.fuchs-lubritech.de).
- Coat the conical surfaces and the screw-side face of the cone bushing with a thin film (0.01 ... 0.02 mm) with the solid film lubricant "gleitmo 900" from FUCHS LUBRITECH (www.fuchs-lubritech.de) or with an equal product from other supplier.

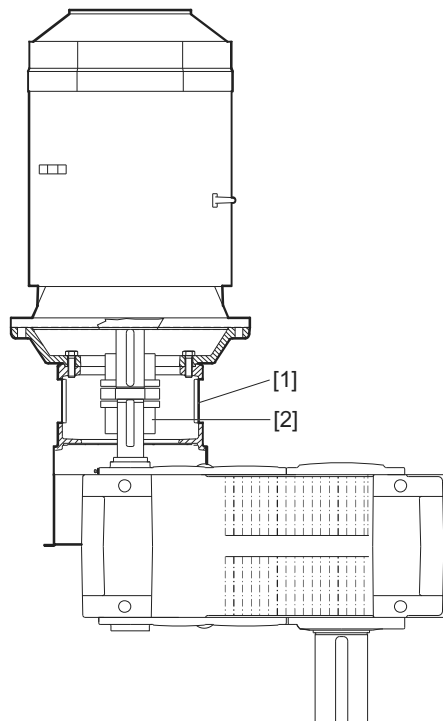


Spray the solid film lubricant on the surface till the color of the solid film lubricant is just thick enough to cover the surface (in this case the thickness will be about 0.01 ... 0.02 mm)



4.8 Mounting a motor with motor adapter

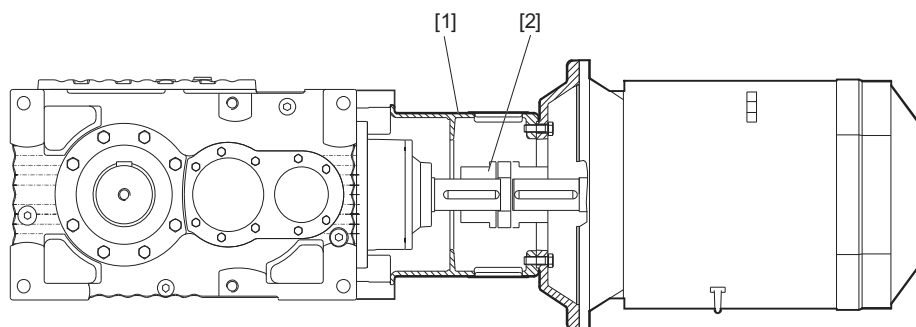
Motor adapters [1] are available for mounting IEC motors of sizes 132 to 315 to industrial gear units of the MC series.



51594AXX

Figure 36: Motor adapter for MC.P.. industrial gear units

- [1] Motor adapter
- [2] Coupling



51593AXX

Figure 37: Motor adapter for MC.R.. industrial gear units

- [1] Motor adapter
- [2] Coupling



For mounting couplings [2], refer to the notes in Sec. "Mounting of couplings."



Mechanical Installation

Mounting a motor with motor adapter



When selecting a motor, **take into account the permitted motor weight**, the **gear unit design** and the **type of gear unit mounting** according to the following tables.

The following applies to all tables:

G_M = Motor weight

G_G = Gear unit weight

Mounting type	Series / industrial gear unit design	
	 MC.PL..	 MC.RL..
Foot-mounted	$G_M \leq G_G$	$G_M \leq G_G$
Shaft-mounted	$G_M \leq 0.5G_G$	$G_M \leq G_G$
Flange-mounted	$G_M \leq 0.5G_G$	$G_M \leq G_G$

Mounting type	Series / industrial gear unit design	
	 MC.PV..	 MC.RV..
Foot-mounted	$G_M \leq 1.5G_G$	$G_M \leq G_G$
Shaft-mounted	$G_M \leq G_G$	$G_M \leq G_G$
Flange-mounted	$G_M \leq G_G$	$G_M \leq 0.75G_G$

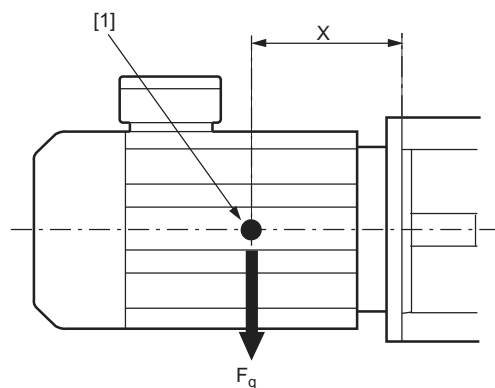
Mounting type	Series / industrial gear unit design	
	 MC.PE..	 MC.RE..
Foot-mounted	$G_M \leq G_G$	$G_M \leq 1.5G_G$
Shaft-mounted	$G_M \leq G_G$	$G_M \leq G_G$
Flange-mounted	$G_M \leq G_G$	$G_M \leq G_G$



These tables are only valid for stationary operation. If gear unit is moving during (e.g. travel drives) please contact SEW-EURODRIVE.



These tables only apply to the following correlation of motor size/weight F_q and dimension "x".



56753AXX

[1] Center of gravity of the motor

Motor size		F_q	x
IEC	NEMA	[N]	[mm]
132S	213/215	579	189
132M	213/215	677	208
160M	254/286	1059	235
160L	254/286	1275	281
180M	254/286	1619	305
180L	254/286	1766	305
200L	324	2354	333
225S	365	2943	348
225M	365	3237	348
250M	405	4267	395
280S	444	5984	433
280M	445	6475	433
315S	505	8142	485
315M	505	8927	485
315L		11772	555

The maximum approved weight of the attached motor F_q has to be reduced in a linear manner if the center of gravity distance x is increased. $F_{q \max}$ cannot be increased if the center of gravity distance is reduced.



Contact SEW-EURODRIVE in the following cases:

- When retrofitting motor adapters with a cooling air fan (not for motors of sizes 132S and 132M).
- If motor adapter is removed, re-alignment is necessary.



5 Mechanical Installation Options

5.1 Important installation instructions



Disconnect the motor from the power supply before starting work and secure it against unintentional restart!

Important installation notes



- Only use a mounting device for installing input and output elements. Use the center bore and the thread on the shaft end for positioning purposes.
- **Never mount couplings, pinions, etc. onto the shaft end by hitting them with a hammer (damage to bearings, housing and the shaft!).**
- **Observe correct tension of the belt for belt pulleys (in accordance with manufacturer's specifications).**
- Power transmission elements should be balanced after insertion and must not give rise to any impermissible radial or axial forces.

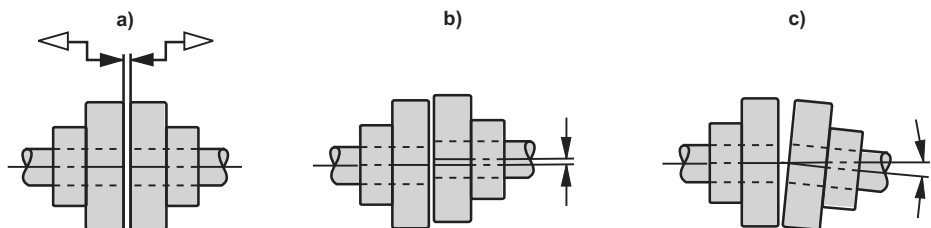


Note:

Installation is easier if you first apply lubricant to the output element or heat it up briefly (to 80-100°C).

Adjust the following misalignments when mounting couplings:

- axial misalignment (maximum and minimum clearance)
- offset misalignment (concentric running fault)
- angular misalignment



03356AXX

Figure 38: Clearance and misalignment when mounting the coupling



Input and output elements such as couplings must be equipped with a protection cover!

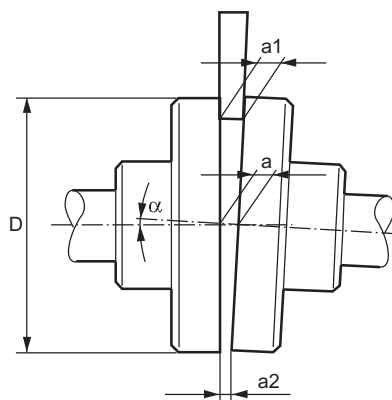


Note:

The following methods for measuring angular and axial misalignment are important for complying with the mounting tolerances specified in Sec. "Mounting of couplings"!

Measuring of angular misalignment with a feeler gauge

The following figure shows the measurement for angular misalignment (α) using a feeler gauge. When using this method, an accurate result is only achieved when the deviation of the coupling faces is eliminated by turning both coupling halves by 180° and the average value is then calculated from the difference ($a_1 - a_2$).

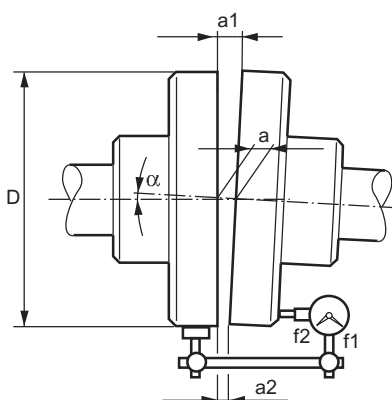


52063AXX

Figure 39: Measuring angular misalignment using a feeler gauge

Measuring of angular misalignment using a micrometer dial

The following figure shows the measurement for angular misalignment using a micrometer dial. This measuring method provides the same result as described under "Measuring angular offset with a feeler gauge" if the **coupling halves are rotated together**, for instance with one coupling pin, so that the needle of the micrometer dial does not move noticeably on the measuring surface.



52064AXX

Figure 40: Measuring angular misalignment using a micrometer dial

A prerequisite for this measuring method is that there is no axial play in the shaft bearings when the shafts rotate. If this condition is not fulfilled, the axial play between the faces of the coupling halves must be eliminated. As an alternative, you can use two micrometer dials positioned on the opposite sides of the coupling (to calculate the difference of the two micrometer dials when rotating the coupling).



Mechanical Installation Options

Important installation instructions

Measuring of offset misalignment using straight-edge and micrometer dial

The following figure shows the measurement for offset misalignment using a straight-edge. Permissible values for eccentricity are usually so small that the best measurement results can be achieved with a micrometer dial. If you **rotate one coupling half** together with the micrometer dial and divide the deviation by two, the micrometer dial will indicate the deviation and as a result the misalignment (dimension "b"), which includes the offset misalignment of the other coupling half.

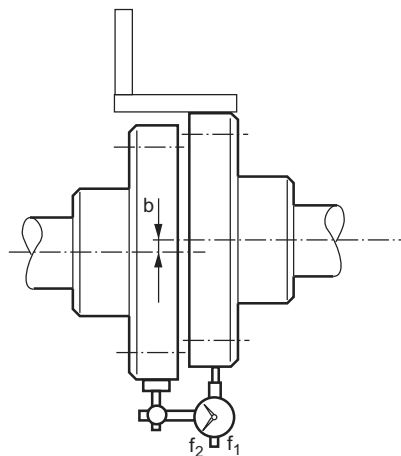


Figure 41: Measuring offset misalignment using straight-edge and micrometer dial 52065AXX

Measuring of offset misalignment using a micrometer dial

The following figure shows the measurement for offset misalignment using a **more accurate measuring method**. The **coupling halves are rotated together** without the tip of the micrometer dial moving on the measuring surface. The offset misalignment is obtained by dividing the deviation indicated on the micrometer dial (dimension "b").

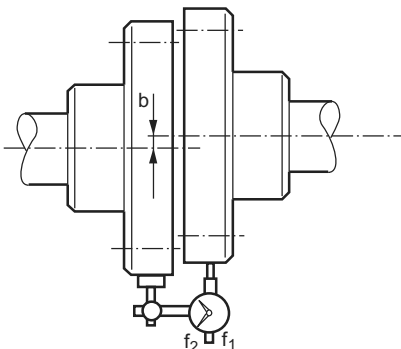
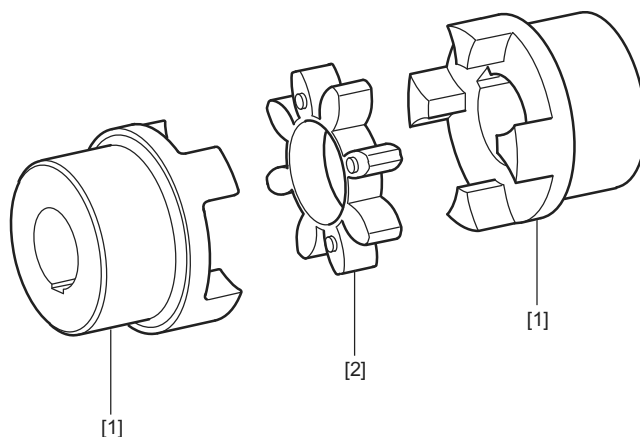


Figure 42: Measuring offset misalignment using a micrometer dial 52066AXX



5.2 Mounting of couplings

ROTEX coupling



51663AXX

Figure 43: Design of the ROTEX coupling

[1] Coupling hub

[2] Ring gear

The low-maintenance, elastic ROTEX coupling is capable of compensating radial and angular misalignment. Careful and exact alignment of the shaft ensures long service life of the coupling.



Mechanical Installation Options

Mounting of couplings

Mounting the
coupling halves
onto the shaft

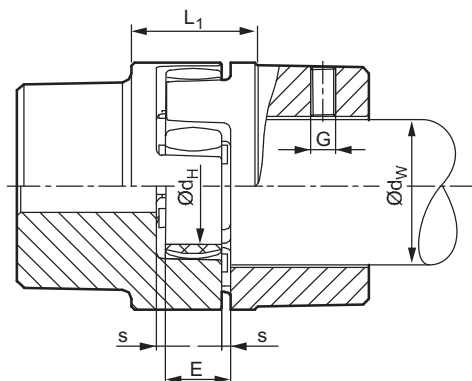


Figure 44: Mounting dimensions of the ROTEX coupling 51689AXX

Coupling size	Mounting dimensions						Locking screw	
	E [mm]	s [mm]	d _H [mm]	d _W [mm]	L ₁ (Alu / GG / GGG) [mm]	L ₁ (steel) [mm]	G	Tightening torque [Nm]
14	13	1.5	10	7	-	-	M4	2.4
19	16	2	18	12	26	-	M5	4.8
24	18	2	27	20	30	-	M5	4.8
28	20	2.5	30	22	34	-	M6	8.3
38	24	3	38	28	40	60	M8	20
42	26	3	46	36	46	70	M8	20
48	28	3.5	51	40	50	76	M8	20
55	30	4	60	48	56	86	M10	40
65	35	4.5	68	55	63	91	M10	40
75	40	5	80	65	72	104	M10	40
90	45	5.5	100	80	83	121	M12	69
100	50	6	113	95	92	-	M12	69
110	55	6.5	127	100	103	-	M16	195
125	60	7	147	120	116	-	M16	195
140	65	7.5	165	135	127	-	M20	201
160	75	9	190	160	145	-	M20	201
180	85	10.5	220	185	163	-	M20	201



The shaft distance must be strictly observed (dimension E) to ensure axial play of the coupling.



Mounting
dimensions
ROTEX coupling in
motor adapter

Tighten the set screws (A) to avoid axial play of the coupling.

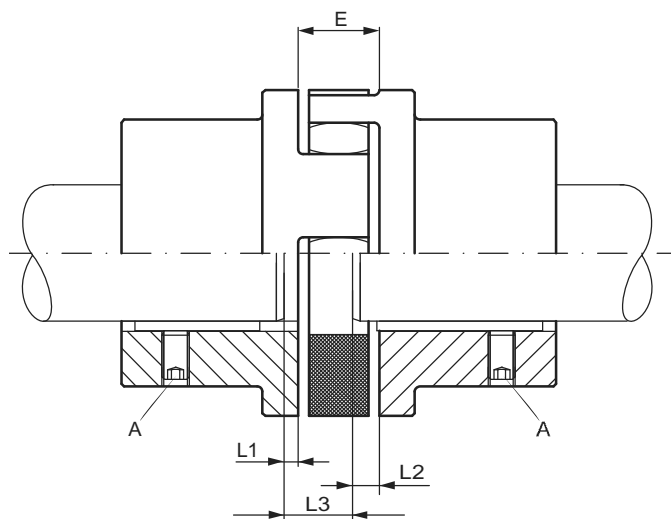


Figure 45: Mounting dimensions of the ROTEX coupling at the HSS (input shaft) – motor adapter

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The mounting dimensions specified in the following table only apply to mounting a ROTEX coupling in a motor adapter. They apply to all gear unit versions and gear ratios.

ROTEX coupling size	IEC motor size	Mounting dimensions			
		E [mm]	L ₁ [mm]	L ₂ [mm]	L ₃ [mm]
R28/38	132	20	0	-17	3
R38/45	160	24	1	0	25
R42/55	180/200	26	-1	0	25
R48/60	225	28	0	-3	25
R55/70	225	30	0	-5	25
R65/75	250/280	35	0	-10	25
R75/90	315	40	0	-15	25
R90/100	315	45	-20	0	25



The shaft distance must be strictly observed (dimension E) to ensure axial play of the coupling.



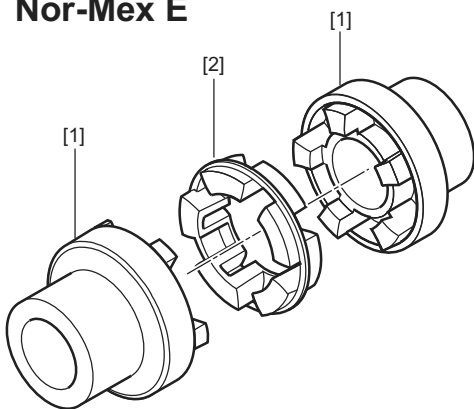
Mechanical Installation Options

Mounting of couplings

Nor-Mex coupling, types G and E

The low-maintenance Nor-Mex couplings types G and E are torsionally flexible couplings capable of compensating axial, angular, and radial shaft misalignments. Torque is transmitted via an elastic element with high damping properties, which is also oil and heat resistant. The couplings can be used for either direction of rotation and can be mounted in any position. The design of the Nor-Mex coupling type G allows to replace the elastic element [5] without movement of the shafts.

Nor-Mex E



Nor-Mex G

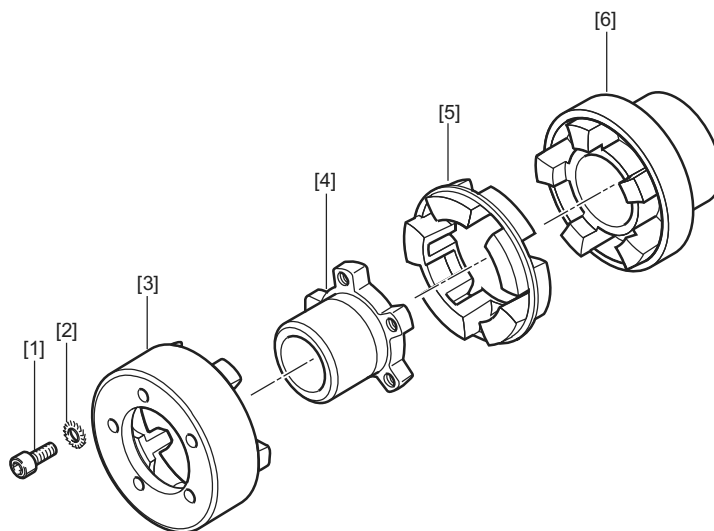


Figure 46: Design of the Nor-Mex E / Nor-Mex G coupling

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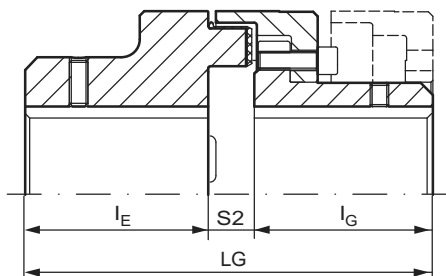
- [1] Coupling hub
- [2] Elastic element

- [1] Socket head screw
- [2] Washer
- [3] Claw ring
- [4] Flange hub
- [5] Elastic element
- [6] Coupling hub



Mounting instructions, mounting dimensions for Nor-Mex G couplings

After having mounted the coupling halves, ensure that the recommended play (dimension S_2 for type G, dimension S_1 for type E) and the overall length (dimension L_G for type G and dimension L_E for type E) corresponds with the dimensions given in the following tables. Accurate alignment of the coupling (→ Sec. 'Mounting tolerances') ensures long service life.



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Figure 47: Mounting dimensions of the Nor-Mex G coupling

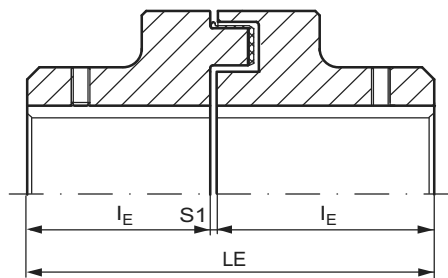
Nor-Mex G Coupling size	Mounting dimensions				Weight [kg]
	l_E [mm]	l_G [mm]	L_G [mm]	Permitted tolerance S_2 [mm]	
82	40	40	92	12±1	1.85
97	50	49	113	14±1	3.8
112	60	58	133	15±1	5
128	70	68	154	16±1	7.9
148	80	78	176	18±1	12.3
168	90	87	198	21±1.5	18.3
194	100	97	221	24±1.5	26.7
214	110	107	243	26±2	35.5
240	120	117	267	30±2	45.6
265	140	137	310	33±2.5	65.7
295	150	147	334	37±2.5	83.9
330	160	156	356	40±2.5	125.5
370	180	176	399	43±2.5	177.2
415	200	196	441	45±2.5	249.2
480	220	220	485	45±2.5	352.9
575	240	240	525	45±2.5	517.2



Mechanical Installation Options

Mounting of couplings

Mounting dimensions of the Nor-Mex E coupling



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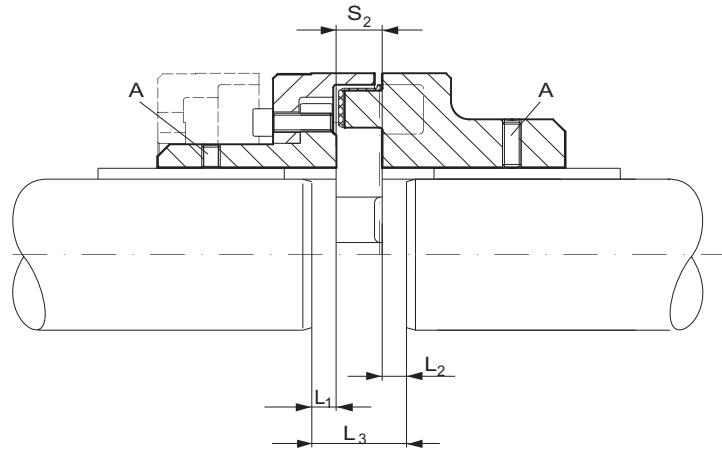
Figure 48: Mounting dimensions of the Nor-Mex E coupling

Nor-Mex E Coupling size	Mounting dimensions			Weight [kg]
	l_E [mm]	L_E [mm]	Permitted tolerance S_1 [mm]	
67	30	62.5	2.5 ± 0.5	0.93
82	40	83	3 ± 1	1.76
97	50	103	3 ± 1	3.46
112	60	123.5	3.5 ± 1	5
128	70	143.5	3.5 ± 1	7.9
148	80	163.5	3.5 ± 1.5	12.3
168	90	183.5	3.5 ± 1.5	18.4
194	100	203.5	3.5 ± 1.5	26.3
214	110	224	4 ± 2	35.7
240	120	244	4 ± 2	46.7
265	140	285.5	5.5 ± 2.5	66.3
295	150	308	8 ± 2.5	84.8
330	160	328	8 ± 2.5	121.3
370	180	368	8 ± 2.5	169.5
415	200	408	8 ± 2.5	237
480	220	448	8 ± 2.5	320
575	240	488	8 ± 2.5	457



Mounting dimensions of the Nor-Mex coupling type G in the motor adapter

Tighten the set screws (A) to avoid axial play of the coupling.



51672AXX

Figure 49: Mounting dimensions of the Nor-Mex coupling on the HSS (input shaft) – motor adapter



The mounting tolerances specified in the following table only apply to mounting a Nor-Mex coupling in a motor adapter.

NOR-MEX coupling size G..		97	97	112	128	148	168	194	214
IEC motor size		132	160	160/180	200	225	250/280	280/315	315
Gear unit size Gear ratio i	Mounting dimension	[mm]							
All All	S ₂	14	14	15	16	18	21	24	26
	L ₃	3	25	25	25	25	25	25	25
MC3R02 i = 14 ... 63	L ₂	-	5	5	5	10	2	1	0
	L ₁	-	6	5	4	-3	2	0	-1
MC3R05 i = 14 ... 63	L ₂	-	5	5	5	4	2	5	0
	L ₁	-	6	5	4	3	2	-4	-1
MC3R08 i = 14 ... 63	L ₂	-	5	5	5	4	2	1	5
	L ₁	-	6	5	4	3	2	1	-6
Other MC.. i = 7.1 ... 112	L ₂	-5	5	5	5	4	2	1	0
	L ₁	-6	6	5	4	3	2	0	-1

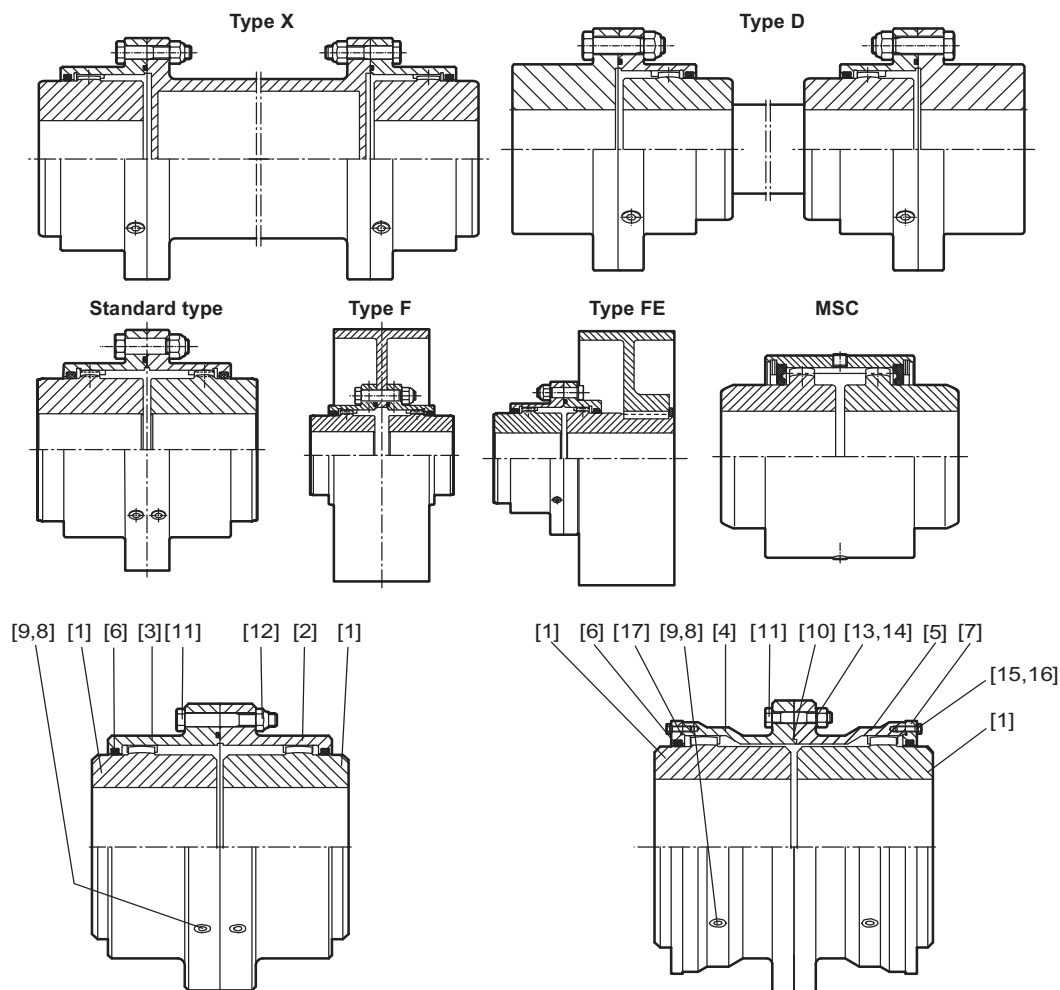


Mechanical Installation Options

Mounting of couplings

Flexible jaw couplings MT, MS-MTN series

Mounting



57599AEN

- | | | |
|---------------------|-----------------------|-------------|
| [1] Coupling hub | [7] Cover | [13] Washer |
| [2] Sleeve | [8] Grease nipple | [14] Nut |
| [3] Sleeve | [9] Grease nipple | [15] Bolts |
| [4] Sleeve (male) | [10] Gasket | [16] Washer |
| [5] Sleeve (female) | [11] Bolt | [17] O-ring |
| [6] Seal or O-ring | [12] Self-locking nut | |

1. Ensure that all parts are clean.
2. Apply a light coat of grease to the O-rings [6] and place them into the grooves of the sleeves [2,3 or 4,5].
3. Apply grease onto the sleeve teeth [2,3 or 4,5]. Place the sleeves onto the shafts without damaging the O-rings [6].