

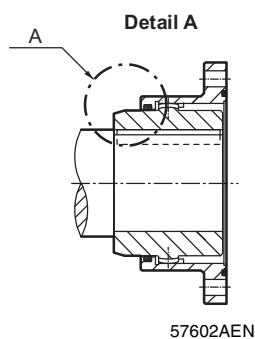


4. For couplings larger than the MS-325 or MT-260 types, you have to grease the O-rings or seals [6] before inserting them in the grooves of the cover [7]. Next, place the covers [7] onto the shafts.

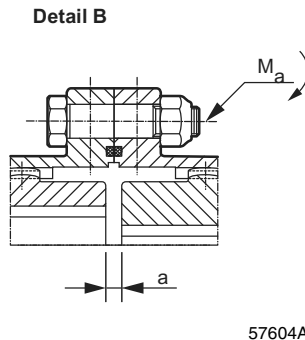


Before installing the hubs [1], heat them but do not exceed 110 °C. Do not use an open flame burner.

5. Install the hubs [1] on their respective shaft with the longest chamfer hub end towards the machine bearing (see detail A). Hub faces have to be flush with the shaft end.



6. Align the shafts to be connected with the coupling hubs and check the spacing "a" between the hubs (see detail B). Refer to the table on page 73) for the according values..



7. Align the two shafts. Check for correct alignment using a dial indicator. The alignment precision depends on the running speed.
8. Allow the hubs [1] to cool before tightening the sleeves [2, 3 or 4, 5) over the hubs. Before installing the sleeves [2, 3 or 4,5], apply grease onto the coupling hub teeth [1].
9. Install the O-ring [10] and tighten the steeves to the recommended tightening torque (see detail B). It is recommended to grease the O-ring. Make sure that the flange lubrication holes are positioned at an angle of 90° to each other.

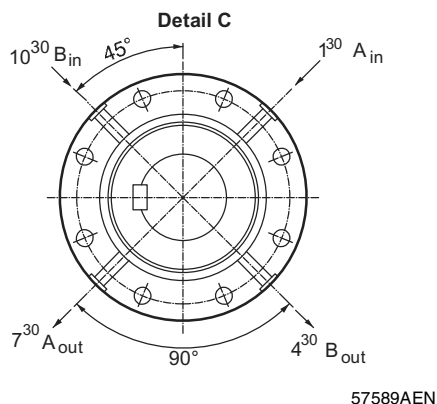


Mechanical Installation Options

Mounting of couplings

10. To fill the grease, remove both plugs [9] from the sleeve [2, 3 or 4, 5]. Next, proceed as follows:

Turn the coupling in such a way that the flange lubrication holes are in 1:30, 4:30, 7:30, 10:30 o'clock positions if the coupling were seen as a clock face. Remove the 1:30 and 7:30 position plugs [9] and pump grease into the 1:30 position holes until grease leaks out from the lower 7:30 position hole (see detail C). During this process it is recommended to remove the 10:30 position plug to vent the inside. For grease quality and more accurate quantity, → Section Recommended Lubrication and Quantity. If running conditions differ from those in → Section Recommended Lubrication and Quantity, consult SEW. For HAD, MTD, MSD, MTX, MTXL, MSXL, HAXL, MTCO and MSCO types, each coupling half must be lubricated separately. For MS-VS, MTV types, consult SEW.



Maintenance

Every 3000 operating hours.

If longer intervals are required, contact SEW. Proceed as mentioned under 11.

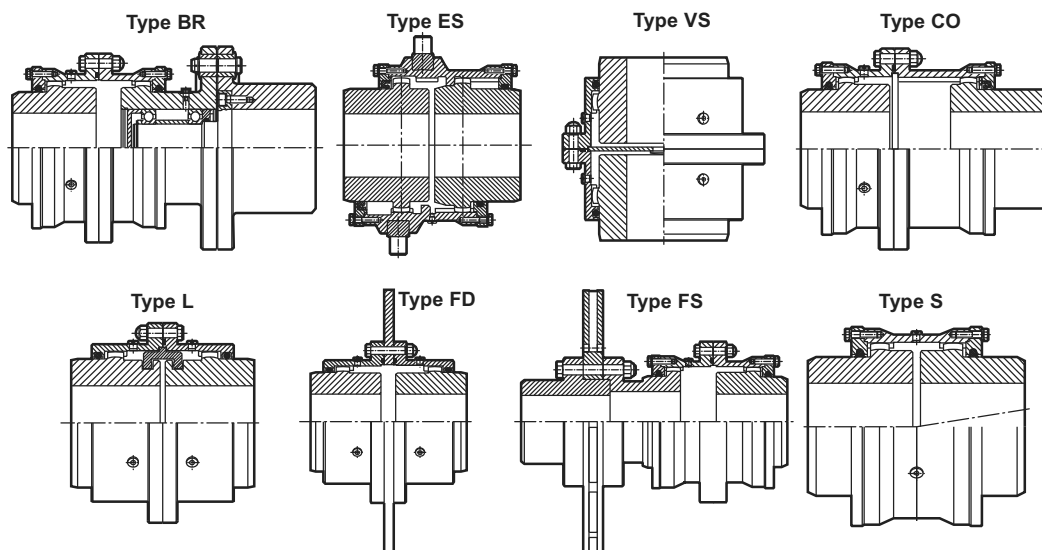
Disassembly and condition check

Every 8000 operating hours or every 2 years.

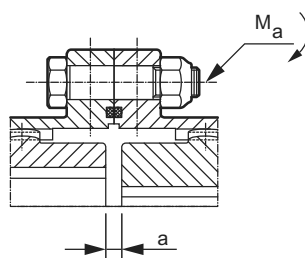
1. Before moving the sleeves, clean the hub surfaces near the O-rings [6] free from rust or dirt.
2. Remove the bolts [11] and the O-ring [10].
3. Check the gearing and sealing.
4. Check for correct alignment.



Mounting tolerance



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MT, MS and MTN types					
Size	a [mm]	Size	a [mm]	Size	a [mm]
MT-MTN-42, MS-5	6±1	MT-MTN-205, MS-430	12±3	MT-460, MS-MN-5250	20±4
MT-MTN-55, MS-10	6±1	MT-MTN-230, MS-600	12±3	MT-500, MS-MN-6500	25±4
MT-MTN-70, MS-20	6±2	MT-MTN-260, MS-800	12±3	MT-550, MS-MN-9500	25±4
MT-MTN-90, MS-35	8±2	MT-280, MS-MN-1150	16±3	MT-590, MS-MN-11000	25±4
MT-MTN-100, MS-60	8±2	MT-310, MS-MN-1500	16±3	MT-620, MS-MN-13500	30±6
MT-MTN-125, MS-105	8±2	MT-345, MS-MN-2100	16±3	MT-650, MS-MN-17000	30±6
MT-MTN-145, MS-150	10±2	MT-370, MS-MN-2650	20±4	MT-680, MS-MN-19000	30±6
MT-MTN-165, MS-210	10±3	MT-390, MS-MN-3400	20±4	MT-730, MS-MN-22500	30±6
MT-MTN-185, MS-325	10±3	MT-420, MS-MN-4200	20±4	MT-800, MS-MN-27000	30±6



Mechanical Installation Options

Mounting of couplings

MT and MS-MTN types					
Size	Size Tightening Torque M_A [Nm]	Size	Size Tightening Torque M_A [Nm]	Size	Size Tightening Torque M_A [Nm]
MT-42	8	MT-205	325	MT-460, MS-MN-5250	760
MT-55	20	MT-230	325	MT-500, MS-MN-6500	1140
MT-70	68	MT-26	565	MT-550, MS-MN-9500	1140
MT-90	108	MT-280, MS-MN-1150	375	MT-590, MS-MN-11000	1140
MT-100	108	MT-310, MS-MN-1500	375	MT-620, MS-MN-13500	1800
MT-125	230	MT-345, MS-MN-2100	660	MT-650, MS-MN-17000	1800
MT-145	230	MT-370, MS-MN-2650	660	MT-680, MS-MN-19000	1800
MT-165	230	MT-390, MS-MN-3400	760	MT-730, MS-MN-22500	1800
MT-185	325	MT-420, MS-MN-4200	760	MT-800, MS-MN-27000	1800

MS-MTN types			
Size	Size Tightening Torque M_A [Nm]	Size	Size Tightening Torque M_A [Nm]
MS-5, MTN-42	20	MS-150, MTN-145	108
MS-10, MTN-55	39	MS-210, MTN-165	108
MS-20, MTN-70	39	MS-325, MTN-185	325
MS-35, MTN-90	68	MS-430, MTN-205	325
MS-60, MTN-100	68	MS-600, MTN-230	325
MS-105, MTN-125	68	MS-800, MTN-260	375



Recommended Lubricants and Quantity

	Company	Oil
Normal operation conditions	Amoco	Amoco coupling grease
	Castrol	Spheerol BN 1
	Cepsa-Krafft	KEP 1
	Esso-Exxon	Unirex RS 460, Pen-0- Led EP
	Fina	Ceran EP-0
	Klüber	Klüberplex GE 11-680
	Mobil	Mobilgrease XTC, Mobiltemp SHC 460 spezial
	Shell	Shell Albida GC1
	Texaco	Coupling grease KP 0/1 K-30
	Verkol	Verkol 320-1 Grado 1
Normal speed and heavy duty operation	Klüber	Klüberplex GE 11-680
	Texaco	Coupling grease KP 0/1 K-30
HIGH SPEED¹⁾	Amoco	Coupling grease
	Esso-Exxon	Unirex RS-460
	Klüber	Klüberplex GE 11-680
	Mobil	Mobilgrease XTC
	Texaco	Coupling grease KP 0/1 K-30

1) Circumferential speed > 80 m/s

Greases for operation between 0°C and 70°C.

The couplings are supplied with a protective grease only, which is not sufficient for normal operation.

Before mounting the coupling, apply approx. 70 % of the grease quantity manually between hub and sleeve teeth as well as to the surrounding area. After mounting, press the remaining 30 % of the grease into the flange lubrication holes.

Class NLGI 0 grease is recommended for speeds below 300 rpm and NLGI 00 for very low speeds. In both cases, the greases must have good adherence. More frequent lubrication intervals than advised in this operating instructions are required for high temperatures, low speeds, and reversing drives.



Mechanical Installation Options

Mounting of couplings

MT type					
Size	Quantity ¹⁾ [kg]	Size	Quantity ¹⁾ [kg]	Size	Quantity ¹⁾ [kg]
MT-42	0.04	MT-205	2.20	MT-460	11.50
MT-55	0.06	MT-2300	2.80	MT-500	11.50
MT-70	0.17	MT-260	4.50	MT-550	14.50
MT-90	0.24	MT-280	3.00	MT-590	23.00
MT-100	0.36	MT-310	3.60	MT-620	23.00
MT-125	0.50	MT-345	4.50	MT-650	30.00
MT-145	0.70	MT-370	5.00	MT-680	36.00
MT-165	1.30	MT-390	9.00	MT-730	38.00
MT-185	1.75	MT-420	9.80	MT-800	46.00

1) Quantity per complete coupling types MT, MTCL, MTL, MSL, MTK, MSK, MTBR, MSBR, MTFD, MSFD, MTF, MSF, MTB, MTST-B, MTN.

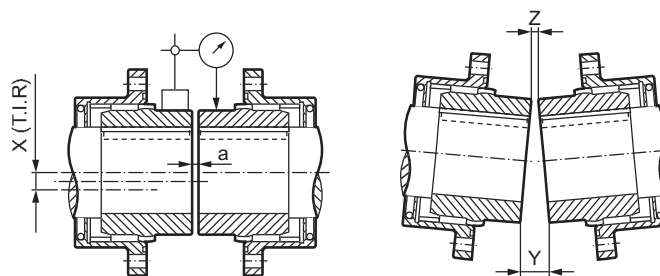
MS and MN type					
Size	Quantity ¹⁾ [kg]	Size	Quantity ¹⁾ [kg]	Size	Quantity ¹⁾ [kg]
MS-5, MTN-42	0.07	MS-430, MTN-205	1.60	MS-MN-5250	10.50
MS-10, MTN-55	0.10	MS-600, MTN-230	2.00	MS-MN-6500	11.40
MS-20, MTN-70	0.12	MS-800, MTN-260	2.00	MS-MN-9500	14.00
MS-35, MTN-90	0.22	MS-MN-1150	3.40	MS-MN-11000	21.00
MS-60, MTN-100	0.30	MS-MN-1500	3.66	MS-MN-13500	22.00
MS-105, MTN-125	0.40	MS-MN-2100	4.60	MS-MN-17000	28.00
MS-150, MTN-145	0.60	MS-MN-2650	5.30	MS-MN-19000	34.00
MS-210, MTN-165	1.00	MS-MN-3400	8.20	MS-MN-22500	40.00
MS-325, MTN-185	1.10	MS-MN-4200	8.60	MS-MN-27000	45.00

1) Quantity per complete coupling types MT, MTCL, MTL, MSL, MTK, MSK, MTBR, MSBR, MTFD, MSFD, MTF, MSF, MTB, MTST-B, MTN.

For types MTD, MSD, HAD, MTX, MSX, HAX, MSXL, MTXL, MTBRX, MSBRX, MTSR-P, apply the given quantity divided by 2 to each coupling half. Example: MTX-125, 0.25 kg for each half. For types MSS, MTS, MSC, MTCO, MSCO, MTES, vertical couplings and disengaging couplings, consult our Technical Department



Alignment precision



57588AXX

Types		Speed [rpm]									
MT	MS-MN	0-250		250-500		500-1000		1000-2000		2000-4000	
		x _{max}	(y-z)	x _{max}	(y-z)	x _{max}	(y-z)	x _{max}	(y-z)	x _{max}	(y-z)
		[mm]									
42-90	5-35	0.25	0.25	0.25	0.25	0.25	0.25	0.15	0.20	0.08	0.10
100-185	60-325	0.50	0.60	0.50	0.60	0.25	0.35	0.15	0.20	0.08	0.10
205-420	430-4200	0.90	1.00	0.50	0.75	0.25	0.35	0.15	0.20	-	-
420-	5250-	1.50	1.50	1.0	1.00	0.50	0.50	-	-		



5.3 Backstop FXM

The purpose of a backstop is to prevent undesirable reverse rotation. During operation, the backstop permits rotation in one specified direction of rotation only.



- **Do not start up the motor in blocking direction. Ensure correct connection of power supply with motor to achieve the desired direction of rotation! Running the motor in blocking direction might destroy the backstop!**
- **Contact SEW-EURODRIVE if you want to alter the blocking direction!**

The maintenance-free FXM type backstop is a centrifugally operated backstop with sprags that lift off. Once the lift-off speed is reached, the sprags completely lift off from the contact surface of the outer ring. The backstop is lubricated with gear oil. An arrow on the gear unit housing indicates the permitted direction of rotation [1] (→ following figure).

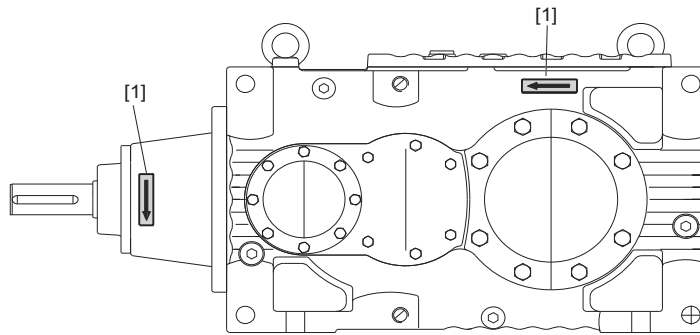


Figure 50: Arrow on the gear unit housing indicating the permitted direction of rotation

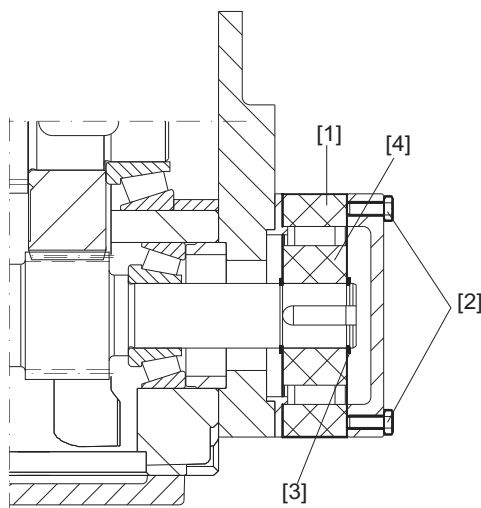
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Changing the direction of rotation

To change the direction of rotation, turn the inner ring with the sprags by 180°. Pull out the inner ring with the sprags using a pulling-off device (not included in the scope of delivery) and replace turned by 180°.



... backstop
mounted outside
the gear unit



51640AXX

Figure 51: Changing the direction of rotation with backstop mounted outside the gear unit

- [1] Outer ring [2] Retaining screws
[3] Circlip [4] Inner ring with cage and sprags

- Drain the gear oil (→ Sec. "Inspection and Maintenance").
- Loosen the retaining screws [2] of the backstop.
- Remove the outer ring [1]. To facilitate dismounting, slightly turn the outer ring [2] in freewheeling direction.
- Remove circlip [3], and inner ring with cage and sprags [4].
- Turn the inner ring [4] with the sprags by 180° and replace the parts in reverse order. When mounting the backstop, do not apply pressure to the cage with the sprags but to the inner ring [4] only. Use the threaded holes on the inner ring [4] for mounting.
- Lock the inner ring [4] with the circlip [3] in axial direction. Mount the outer ring [1] using the retaining screws [2]. Observe the tightening torques specified in the table below:

Screw size	Tightening torque [Nm]
M5	6
M6	10
M8	25
M10	48
M12	84
M16	206
M20	402
M24	696
M30	1420

- Alter the direction arrow on the gear unit housing (Figure 50).
- Refill the gear oil (→ Sec. Lubricants). Check the oil level.
- After mounting, check that the backstop runs smoothly.



... with backstop
mounted inside the
gear unit

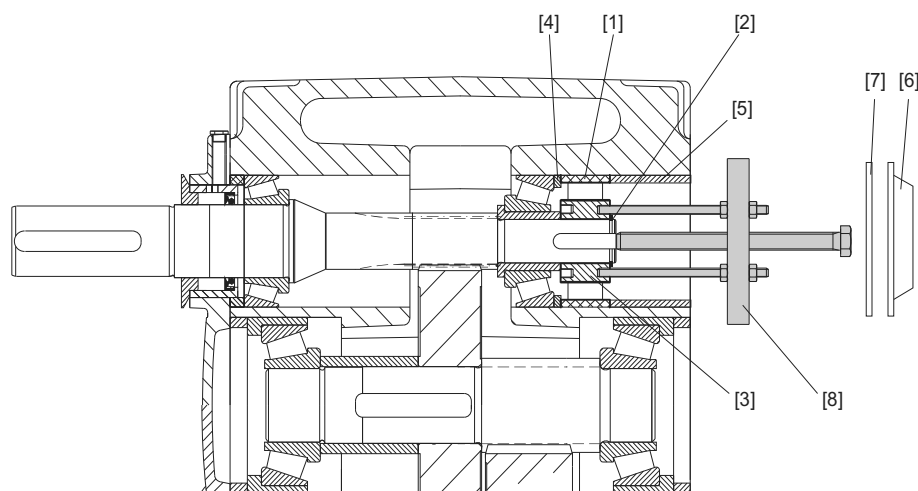


Figure 52: Changing the direction of rotation with backstop mounted inside the gear unit 51645AXX

- | | |
|-------------------------------------|------------------------|
| [1] Outer ring | [5] Sleeve |
| [2] Circlip | [6] Bearing cover |
| [3] Inner ring with cage and sprags | [7] Shims |
| [4] Spacer | [8] Pulling-off device |

- Drain the gear oil (→ Sec. "Inspection and Maintenance").
- Remove bearing cover [6], shims [7] and sleeve [5]. It is important that shims [7] and sleeve [5] between bearing cover [6] and outer ring [1] are not mixed up because they must be assembled in the correct order.
- Remove the circlip [2] from the input shaft.
- Remove the inner ring with the cage and the sprags [3] using a suitable pull-off device [8]. Use the threaded holes on the inner ring [3] for removal.
- Turn the inner ring [3] with the sprags by 180° and replace the parts in reverse order. When mounting the backstop, do not apply pressure to the cage with the sprags but to the inner ring [3] only.
- When mounting the backstop, turn it in freewheeling direction so that the sprags move into the outer ring.
- Secure the inner ring [3] with the circlip [2] in axial direction.
- Mount sleeve [5], shims [7] and bearing cover [6] in reverse order.
- Change the direction arrow on the gear unit housing.
- Refill the gear oil (→ Sec. Lubricants). Check the oil level.
- After mounting, check that the backstop runs smoothly.



5.4 Shaft end pump SHP

Usage

If pressure lubrication is required (→ section "Lubrication"), the maintenance-free shaft end pump SHP with external piping is the preferred solution for gear unit sizes 04...09.

The maintenance-free shaft end pump SHP.. can be used to lubricate gear unit parts of gear unit sizes 04 to 09 that are not submerged in the oil bath. The shaft end pump can be operated in both directions of rotation.



A minimum input speed is required for correct functioning of the shaft end pump. It is therefore absolutely mandatory to contact SEW in case of variable input speeds (e.g. with inverter controlled drives) or when changing the input speed range of an already delivered gear unit with shaft end pump.

Pump position

The pump is mounted externally to the gear unit and is directly driven by the input shaft (HSS) or intermediate shaft of the gear unit. A high reliability of the pump function is ensured in this way. The pump position depends on the

- number of gear unit stages
- gear unit type (helical or bevel-helical)
- shaft position of the gear unit
- LSS type



Check for interference of the shaft end pump with other surrounding structures.

The following tables indicate the position of the pump:



Mechanical Installation Options

Shaft end pump SHP

	Shaft positions			
	23	13 ¹⁾	24 ¹⁾	14
MC2P • Solid shaft • Hollow shaft with keyway • Hollow shaft with shrink disc				
MC3P • Solid shaft • Hollow shaft with keyway • Hollow shaft with shrink disc				

1) The maximum permitted external loads on the LSS are lower

	Shaft positions			
	03	04	03 ¹⁾	04 ¹⁾
MC2R • Solid shaft				
MC2R • Hollow shaft with keyway				
MC2R • Hollow shaft with shrink disc				
MC3R • Solid shaft • Hollow shaft with keyway • Hollow shaft with shrink disc				

1) The maximum permitted external loads on the LSS are lower.



Pump suction



- It is essential that the gear unit is sufficiently lubricated from the very beginning!
- Do not change the diameter of the tube / pipe connection!
- Do not open the pressure line [PRE]!
- If the shaft end pump does not build up pressure with in 10 seconds after the gear unit has been started (flow switch or - visual indicator) please contact SEW-EURODRIVE.

Shaft end pump mounted on top of the MC.V.. gear unit



Danger of dry-start with shaft end pump mounted on top of gear unit.

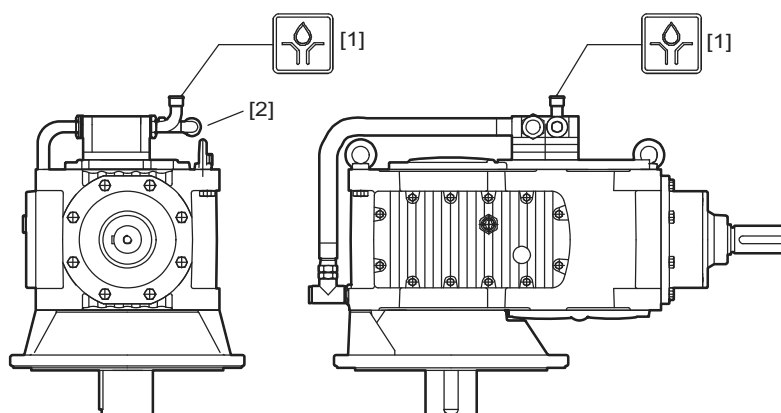


Figure 53: Shaft end pump mounted top of the gear unit

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[1] separate suction oil filling plug

[2] Flow switch or visual flow indicator (not visible in drawing)

It is essential that the oil pump begins to pump oil at the same time when the main motor begins to rotate. If the pump does not begin to pump oil immediately when gear unit begins to rotate, the separate suction oil filling plug of the pump [1] must be opened and some oil (1-4 liter) must be poured in. When oil begins to circulate (control with flow switch or visual flow indicator [2]) close the separate suction oil filling plug [1].

This procedure is especially important when the gear unit has been standing for a long period and suction pipe and oil pump is full of air.



5.5 Installation with steel frame

For industrial gear units of the MC series in horizontal mounting position (MC2PL., MC3PL., MC2RL., MC3RL.), SEW-EURODRIVE supplies preassembled drive packages on a steel frame (swing base or base frame).

Swing base

A swing base is a steel frame [1] that accommodates gear unit, (hydro) coupling and motor (and brake, if required) such as

- hollow shaft gear unit or
- solid shaft gear unit with flange coupling on the output shaft

The swing base [1] is supported by a torque arm [2] (→ Sec. "Torque arm").

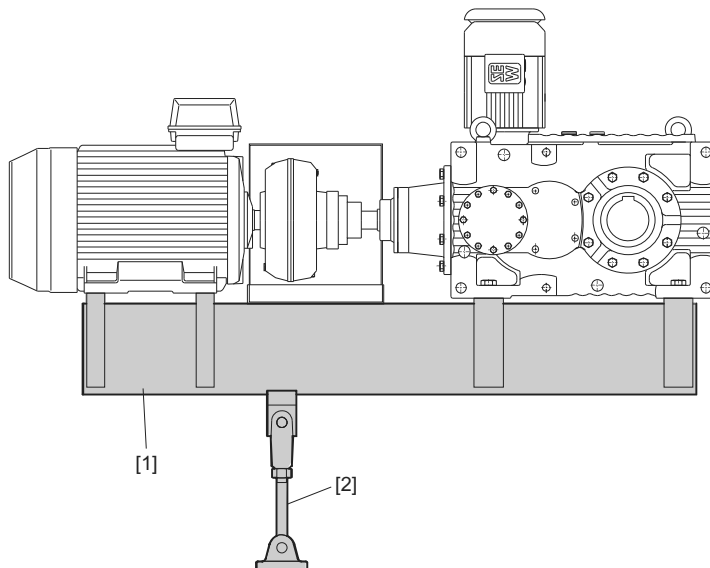


Figure 54: Industrial gear unit of the MC.. series on swing base with torque arm

51691AXX

[1] Swing base

[2] Torque arm



It is essential that

- the system is dimensioned in such a way that the torque of the torque arm can be absorbed (→ Sec. "Gear unit foundation")
- that the swing base is not deformed during installation (hazard of damage to gear unit and coupling)



If the gear unit makes sideways movement during running or if there are noticeable frequent torque peaks, the rigid torque arm should not be used, instead a torque arm with a flexibel bushing should be used. Please contact SEW.



Base frame

A base frame is a steel frame [1] that accommodates gear unit, (hydro) coupling and motor (and brake, if required). The steel frame is supported by several foot mountings [2]. Such a frame is usually used for solid shaft gear units with elastic coupling on the output shaft.

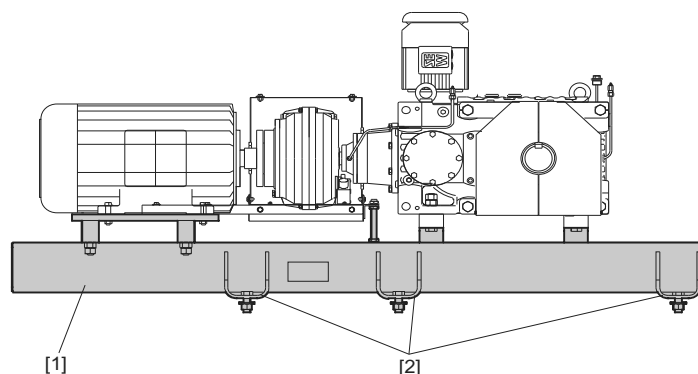


Figure 55: MC.. industrial gear units on base frame with foot mounting

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- [1] Base frame
- [2] Foot mounting



It is essential that

- the support structure of the foot mounting is adequately dimensioned and rigid (→ Sec. "Gear unit foundation")
- that the base frame is not deformed through incorrect alignment (hazard of damage to gear unit and coupling).

5.6 Torque arm



If the gear unit makes sideways movement during running or if there are noticeable frequent torque peaks, the rigid torque arm should not be used, instead a torque arm with a flexible bushing should be used. Please contact SEW-EURODRIVE.

Mounting options

A torque arm is available as option to be mounted directly to the gear unit or to the swing base.



Mechanical Installation Options

Torque arm

Directly mounted to the gear unit

Always mount the torque arm on the side of the driven machine.

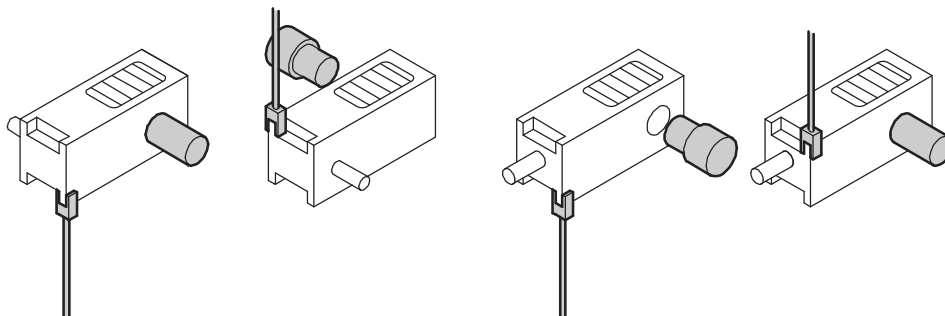


Figure 56: Mounting options for the torque arm

51703AXX

The torque arm can be directly mounted to the gear unit both in the case of tensile strain and compressive stress. Additional strain or stress to the gear unit can be caused by

- eccentricity during operation
- expansion of the driven machine due to heat.

To avoid such strain, the anchor bolt [5418] is equipped with double connection elements that allow sufficient lateral and radial play [1].

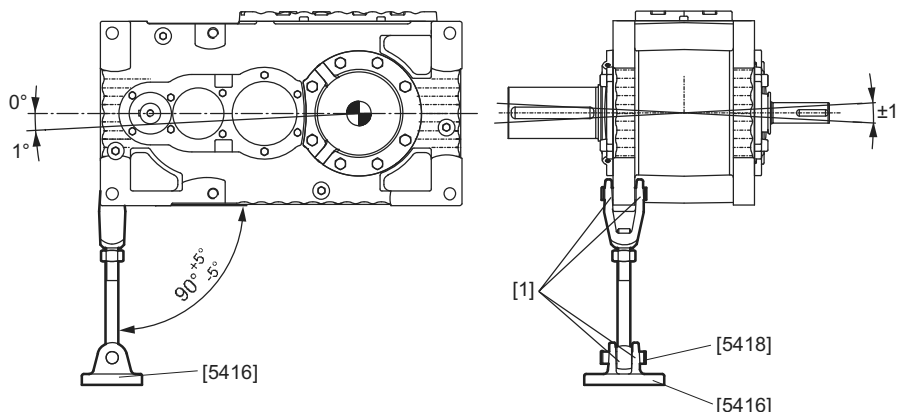


Figure 57: Torque arm directly mounted to the gear unit

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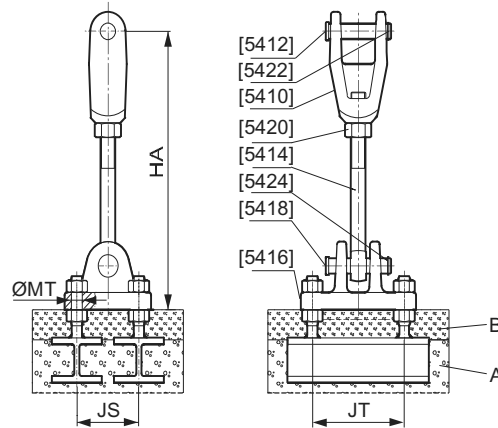
It is essential that there is sufficient play [1] between torque arm and retaining plate [5416] as well as between torque arm and gear unit. This way, no bending force can act on the torque arm and the bearings of the output shaft are not subjected to additional stress.



Foundation for the torque arm

To build the foundation for the torque arm directly mounted to the gear unit or mounted to the swing base of the motor, do the following:

- Place the supporting girders horizontally in their fixed locations. Embody the supporting girders in the base concrete [A].
- Reinforce the concrete base [A] and interlock using steel rods. The base concrete (A) must withstand the same load as the weld joints of the foundation screws.
- After having mounted the torque arm, carry out the grouting and bond it to the base concrete with steel rods.



51694AXX

Figure 58: Foundation of the torque arm for mounting the swing base

- | | |
|-----------------------|-----------------------|
| [A] Concrete base | [5416] Anchor plate |
| [B] Grouting | [5418] Anchoring bolt |
| [5410] Anchoring | [5420] Hex nut |
| [5412] Anchoring bolt | [5422] Retaining ring |
| [5414] Eye bolt | [5424] Retaining ring |



All parts except positions A and B are included in the scope of delivery.

The length HA of the torque arm (→ table below) can be selected as required in the range between HA_{min} and HA_{max} . The torque arm is supplied as special version if HA is required longer than HA_{max} .

Gear unit size	HA [mm] min. ... max.	JT [mm]	JS [mm]	Ø MT [mm]
02, 03	360 ... 410	148	100	18
04, 05	405 ... 455			
06, 07	417 ... 467			
08, 09	432 ... 482	188	130	22



Mechanical Installation Options

Mounting of V-belt drive

5.7 Mounting of V-belt drive

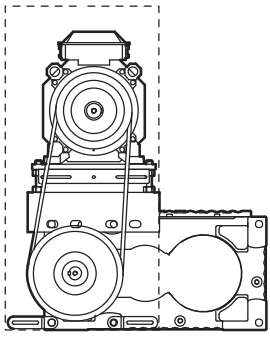
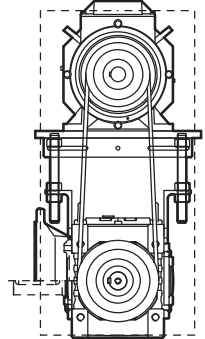
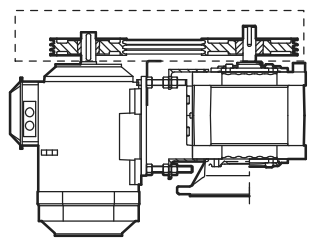
A V-belt drive is used when the overall gear ratio needs to be adjusted. The standard scope of delivery includes motor bracket, belt pulleys, V-belts and belt guard.



Observe the permitted weight for motor and gear unit specified in the following table:

G_M = Motor weight

G_G = Gear unit weight

	MC2P/MC3P	MC2R/MC3R
Upright mounting: Foot mounted $G_M \leq 0.4 \times G_G$ Shaft mounted $G_M \leq 0.4 \times G_G$ Flange mounted $G_M \leq 0.4 \times G_G$	Contact SEW-EURODRIVE	Contact SEW-EURODRIVE
Horizontal LSS mounting: Foot mounted $G_M \leq 1.0 \times G_G$ Shaft mounted $G_M \leq 1.0 \times G_G$ Flange mounted $G_M \leq G_G$	 54046AXX	 54047AXX
Vertical LSS mounting: Foot mounted $G_M \leq 0.4 \times G_G$ Shaft mounted $G_M \leq 0.4 \times G_G$ Flange mounted $G_M \leq 0.4 \times G_G$	 54052AXX	Contact SEW-EURODRIVE



Higher motor weights only allowable if stated in the order specific documents.



G_M = Motor weight

G_G = Gear unit weight

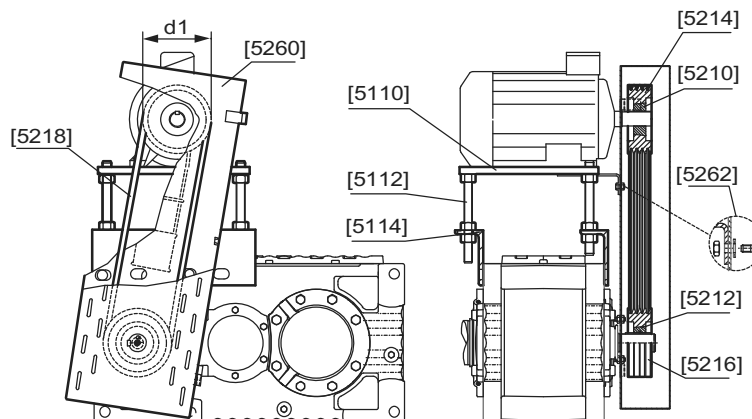


Figure 59: V-belt drive

51695AXX

[5110, 5112] Motor bracket	[5214, 5216] Belt pulleys
[5114] Angle bracket	[5218] V-belt
[5210, 5212] Taper bushing	[5260] Belt guard cover

Installation

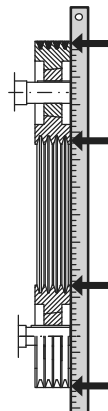
- Mount the motor on the motor bracket (retaining screws not included in the scope of delivery).
- Attach the back plate of the belt guard cover [5260] to the motor bracket [5112, 5114] of the gear unit using screws. Take into account the desired direction of the opening of the belt guard cover [5260]. To adjust the tension of the V-belt, loosen the upper screw [5262] of the backplate of the belt guard cover.
- **Installing the taper bushings [5210, 5212]:**
 - Mount the belt pulleys [5214, 5216] onto motor and gear shaft as closely as possible to the shaft shoulder.
 - Degrease taper bushings [5210, 5212] and belt pulleys [5214, 5216]. Place the taper bushings into the belt pulleys [5214, 5216]. Make sure that the boreholes are aligned.
 - Grease the retaining screws and screw them into the thread of the belt pulley hub.



Mechanical Installation Options

Mounting of V-belt drive

- Clean motor and gear shaft and insert the complete belt pulleys [5214, 5216].
- Tighten the screws. Tap slightly against the sleeve and retighten the screws. Repeat this procedure several times.
- Make sure that the belt pulleys [5214, 5216] are aligned accurately. Check correct alignment using a steel ruler making contact at four points (→ following figure).



51697AXX

- Fill the holes with grease to exclude dirt.
- Draw V-belts [5218] over the pulleys [5214, 5216] and tighten the belts using the adjustment screws in the motor bracket (→ Sec. V-belt tightening).
- The maximum permissible error is 1 mm per 1000 mm span of the V-belt. This way, maximum power transmission is ensured and excessive loads on the gear and motor shafts can be prevented.
- **Check belt tension using a V-belt tension meter:**
 - Measure the length of the V-belt span (= free V-belt length)
 - Measure the perpendicular force causing a 16 mm sag per 1000 mm of the belt. Compare the measured values with those listed in Sec. "V-belt tightening".
- Tighten the lock screws for the motor rack and the belt guard rear plate.
- Mount the belt guard cover using the hinge pins. Secure the hinge pins.

V-belt tightening

V-belt profile	$\varnothing d_1$ [mm]	Force required to offset the V-belt by 16 mm per 1000 mm span length [N]
SPZ	56 - 95 100 - 140	13 - 20 20 - 25
SPA	80 - 132 140 - 200	25 - 35 35 - 45
SPB	112 - 224 236 - 315	45 - 65 65 - 85
SPC	224 - 355 375 - 560	85 - 115 115 - 150



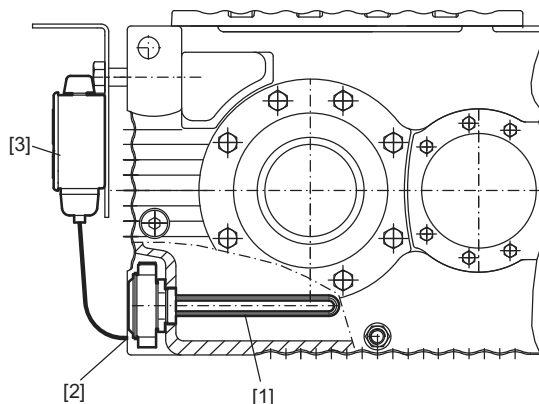
5.8 Oil heater

Purpose and basic design

Oil heating is required to ensure lubrication at startup when the ambient temperature is low (e.g. cold start of the gear unit).

The oil heater consists of 3 basic parts:

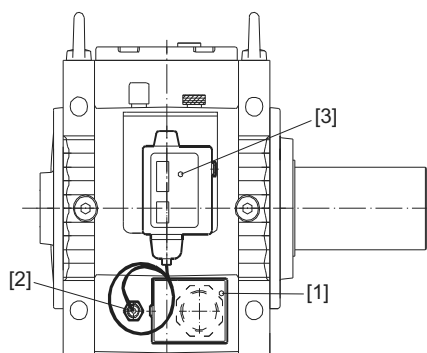
1. Resistor element in the oil bath ("Oil heater") with terminal box
2. Temperature sensor
3. Thermostat



50530AXX

Figure 60: Oil heater for MC.. series industrial gear units

- [1] Oil heater
- [2] Temperature sensor
- [3] Thermostat



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Figure 61: Position of the temperature sensor in gear unit sizes 04 - 06

- [1] Oil heater
- [2] Temperature sensor
- [3] Thermostat



Mechanical Installation Options

Oil heater

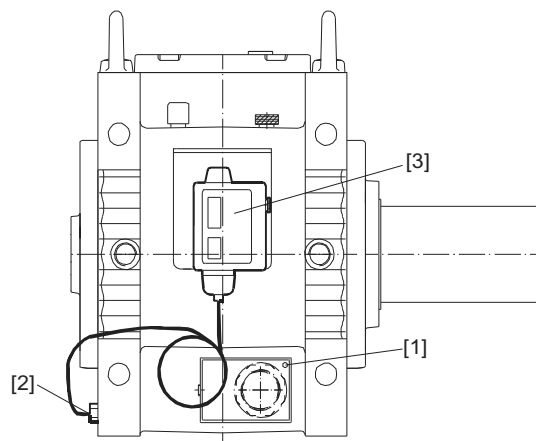


Figure 62: Position of the temperature sensor in gear unit sizes 07 - 09

50539AXX

- [1] Oil heater
- [2] Temperature sensor
- [3] Thermostat

Activation / deactivation behavior

- The oil heater is activated when the factory set temperature is reached. This temperature setpoint depends on the following:
 - for splash/bath lubricated units: on the pour point of the used oil
 - for pressure lubricated units: on the temperature at which the oil viscosity is maximal 2000 cSt

ISO VG	Setpoint for splash/bath lubrication [°C]					
	680	460	320	220	150	100
Mineral oil	–7	–10	–15	–20	–25	–28
Synthetic oil		–30	–35	–40	–40	–45

ISO VG	Setpoint for pressure lubrication [°C]					
	680	460	320	220	150	100
Mineral oil	+25	+20	+15	+10	+5	
Synthetic oil		+15	+10	+5	0	–5

- Is deactivated when the set temperature is exceeded by 8 to 10°C.

The thermostat and the oil heater are normally installed to the gear unit and are ready to operate but without electrical connections. Therefore, the following has to be done before startup:

1. Connect the resistor element ("Oil heater") with the power supply
2. Connect the thermostat with the power supply



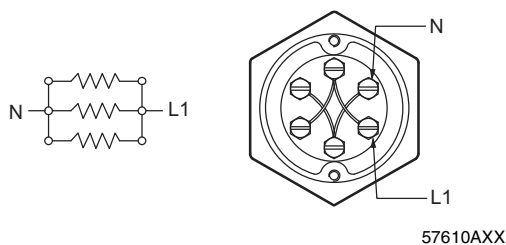
Technical data

Gear unit size	Power consumption oil heater [W]	Voltage supply [V _{Ac}]
04 - 06	600	see separate data sheet ¹⁾
07 - 09	1200	

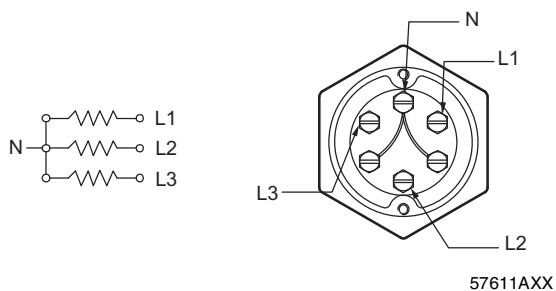
1) use only voltage specified in separate data sheet.

Electrical connection resistor element

Wiring diagram examples with 230/400 V line voltage



1-phase	
Voltage	230 V
Phase voltage	230 V
Main voltage	400 V
Element voltage	230 V

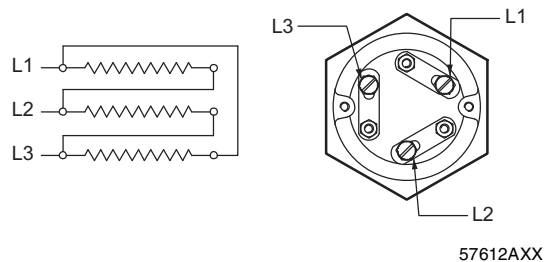


3-phase / star connection	
Voltage	230/400 V
Phase voltage	230 V
Main voltage	400 V
Element voltage	230 V



Mechanical Installation Options

Oil heater



3-phase / delta connection	
Voltage	400 V
Main voltage	400 V
Element voltage	400 V

Basic design thermostat

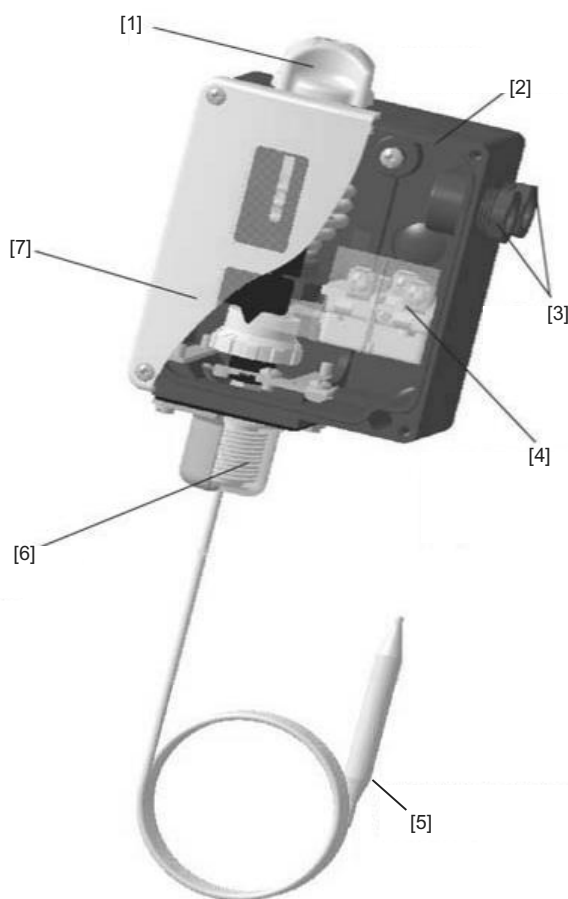


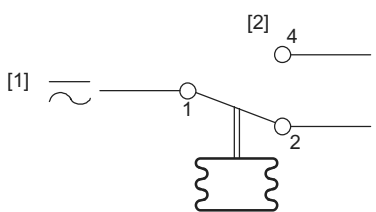
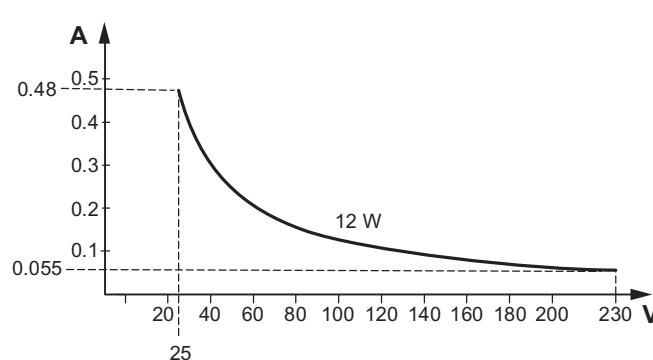
Figure 63: Basic design thermostat (Example)

53993AXX

- [1] Setting range knob
- [2] IP66 enclosure (units with external reset IP54)
- [3] 2 x PG 13.5 cable diameter 6 mm → 14 mm
- [4] SPDT contact system. Exchangeable
- [5] Capillary tube length up to 10 m
- [6] Stainless steel bellows
- [7] Polyamide cover



**Basic design
thermostat**

	RT thermostats
Ambient temperature	–50°C to +70°C
Connection diagram	 [1] Line [2] SPDT
Connection data	Alternating current: AC-1: 10 A, 400 V AC-3: 4 A, 400 V AC-15: 3 A, 400 V
Contact material: AgCdO	Direct current: DC-13: 12 W, 230 V 
Cable entry	2 PG 13.5 for 6 -14 mm diameter cable
Enclosure	IP66 acc. to IEC 529 and EN 60529. Units with external reset IP54. Thermostat housing is made of bakelite acc. to DIN 53470, the cover is made of polyamid.

In the following cases, a contactor must be used:

- a 3-phase voltage supply is used
- 2 heating rods are used
- current ratings exceed nominal values of the thermostat



Mechanical Installation Options

Oil heater

Adjusting the setpoint

The setpoint is normally set at the factory. For adjustments, the following process has to be followed:

The range is set by using the setting knob [1] while at the same time reading the main scale [2]. Tools must be used to set thermostats equipped with a seal cap. The differential is set by the differential disc [3].

The size of the obtained differential can be established by comparing the set main scale value and the scale value on the differential disc with the help of the nomogram for the thermostat concerned.

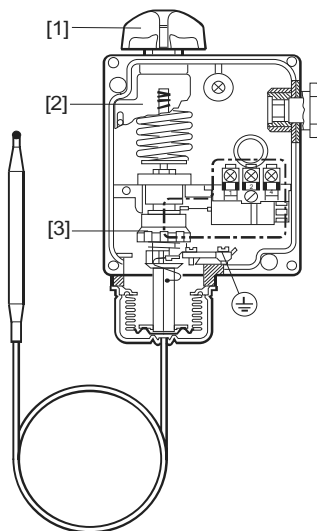


Figure 64: design thermostat

53994AXX

- [1] Setting knob
- [2] Main scale
- [3] Differential setting disc

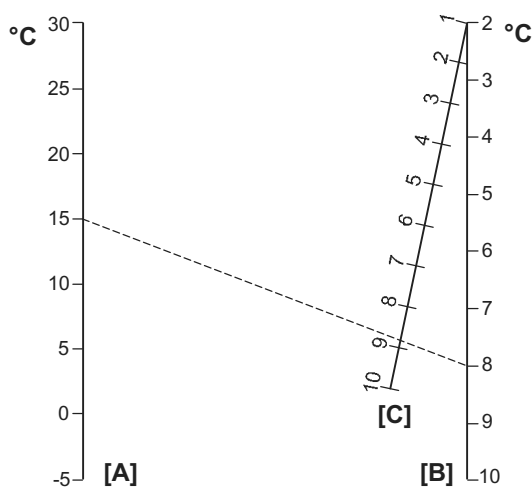


Figure 65: Nomogram for obtained differential

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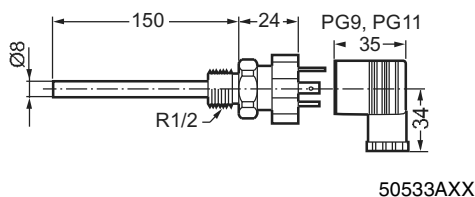
- [A] Range setting
- [B] Obtained differential
- [C] Differential setting



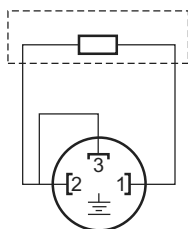
5.9 Temperature sensor PT100

The temperature sensor PT100 can be used to measure the temperature of the oil in the gear unit.

Dimensions



Electrical connection



Technical data

- Sensor tolerance $\pm(0.3 + 0.005 \times t)$, (corresponds to DIN IEC 751 class B), t = oil temperature
- Plug connector DIN 43650 PG9 (IP65)
- The tightening torque for the retaining screw in the back of the plug connector for electrical connection is 25 Nm.



5.10 SPM adapter

SPM adapters are available for measuring the shock pulses of the gear unit bearings. Shock pulses are measured using shock pulse sensors attached to the SPM adapter.

Mounting position

MC.R..: An extended SPM adapter [3] is required if a motor flange or fan is used.

MC.R..: SPM adapters [1] and [2] are attached on the side of the gear unit, SPM adapter [3] is attached on the pinion housing.

MC.P..: SPM adapters [1] and [2] are attached on the side of the gear unit.

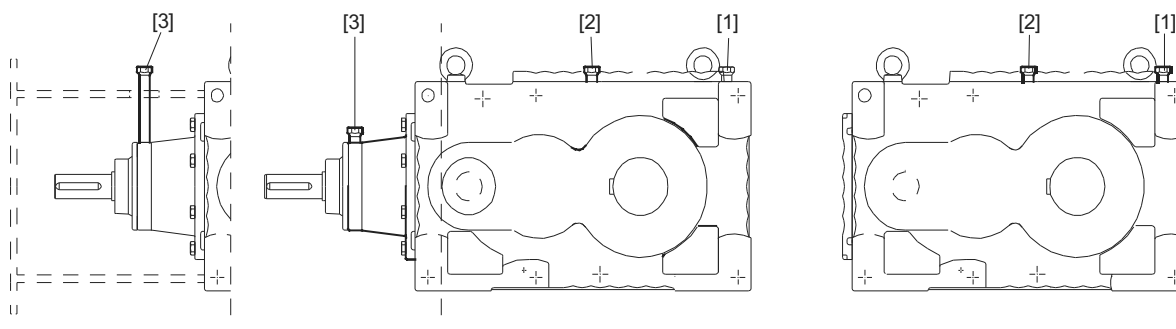


Figure 66: Mounting positions of SPM adapters

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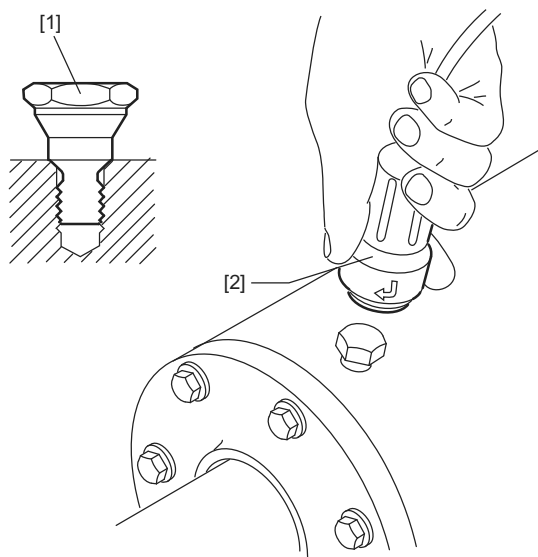


Figure 67: Mounting the shock pulse sensor onto the SPM adapter

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Mounting of shock pulse sensor

- Remove the protection cap of the SPM adapter [1]. Ensure that the SPM adapter [1] is tightened correctly and securely.
- Mount the shock pulse sensor [2] onto the SPM adapter [1].



5.11 Fan

A fan can be mounted if the projected thermal power of the gear unit is exceeded. A fan can be retrofitted if the ambient conditions change after having installed the gear unit. The direction of rotation of the gear unit does not influence the operation of the fan.

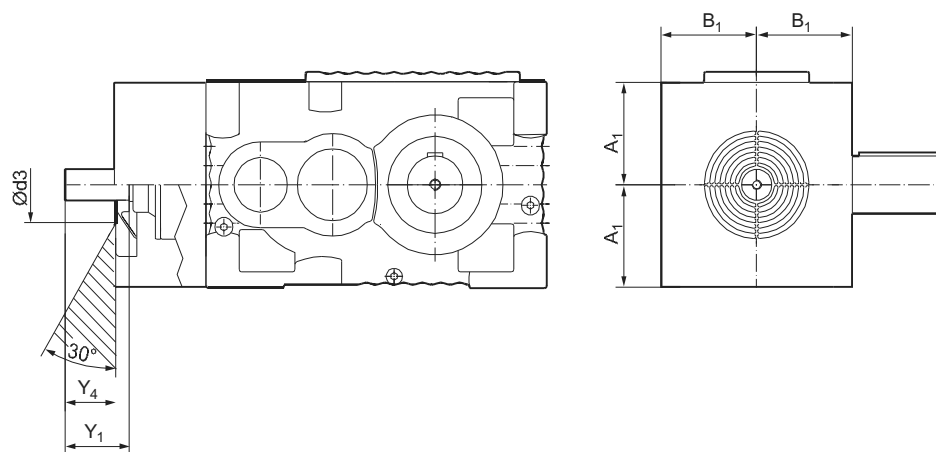


Figure 68: Mounting dimension of the fan

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Make sure that air intake vents are not blocked or covered!

Gear unit type	A ₁	B ₁	Y ₄	Y ₁	Air intake	
					∅ d ₃ [mm]	Angle
MC3RL..02	158	160	70	100	109	30°
MC3RL..03	178	165	82	112	131	
MC3RL..04	198	185	90	120	131	
MC3RL..05	213	195	95	125	156	
MC3RL..06	232	220	100	130	156	
MC3RL..07	262	230	105	135	156	
MC3RL..08	297	255	105	135	198	
MC3RL..09	332	265	110	140	226	



5.12 Flow switch

Usage

The flow switch is an electrical switch used for controlling the correct functioning of a pressure lubrication system (→ Shaft end pump; → Motor pump) by checking the oil flow.

In deliveries since March 1st 2005, the flow switch is a standard feature for all gear units supplied with

- a motor pump
- a shaft end pump with a flow rate of 8.5 l/min or higher.

Shaft end pumps with a flow rate below 8.5 l/min are equipped only with a visual flow control device (→ Visual flow indicator) as standard (available as of 2006).

If flow is more than 8,5 l/min, the gear unit is delivered with visual flow control and flow switch (from beginning of year 2006).

Selection

SEW-EURODRIVE selects the flow switch. As standard, a flow switch of the the type DW-R-20 is used. All the following technical data refer to this type.

Function

The flow pushes against a circular plate attached to a pendulum. The pendulum, which is regulated by a spring, moves on its pivot. A magnet attached to the end of the pendulum operates a movable reed contact. The switch unit itself is separated from the oil.

The flow switch has two switching points:

1. Switching point HIGH (upper limit of flow rate) → contact closed - ON
2. Switching point LOW (lower limit of flow rate) → contact open - OFF

Dimensions

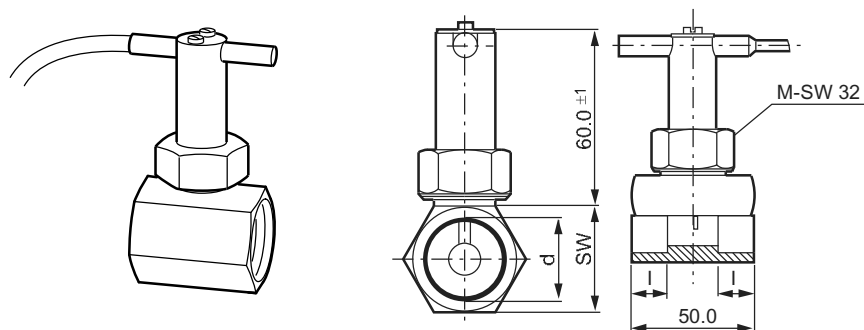


Figure 69: Dimensions

55964AXX

	d Inner thread	NW (rated width)	I	SW	Z	Z	L	H	Z
			[mm]						
Material				A+B+C	A+B	C	D	D	D
Dimension	R ¾ "	20	11	30	50	50	19	109	66

Material abbreviations:

A = Brass

B = Nickel-plated brass

C = Stainless steel

D = Stainless steel / PVC



For determining the exact position of the flow switch, refer to the order-specific dimension drawing

Electrical connection



Figure 70: Electrical connection

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[1] Brown

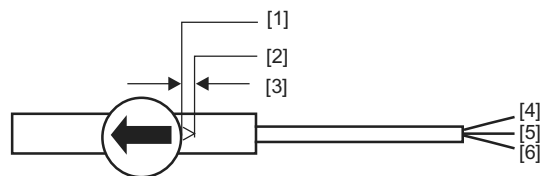
[3] Yellow/green

[2] Blue



Mechanical Installation Options

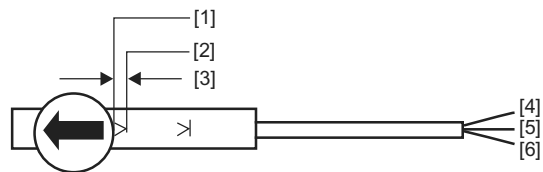
Flow switch



56028AXX

Figure 71: Electrical connection

- | | |
|--------------------------|------------------|
| [1] High switching point | [4] Blue |
| [2] Low switching point | [5] Brown |
| [3] Setting range | [6] Yellow/green |



56029AXX

Figure 72: Electrical connection

- | | |
|--------------------------|------------------|
| [1] High switching point | [4] Blue |
| [2] Low switching point | [5] Brown |
| [3] Setting range | [6] Yellow/green |

Connection data: 230 V; 1.5 A; 80 W, 90 V_{Amax}

Enclosure: IP 65

Maximum temperature of medium: 110°C

Maximum ambient temperature: 70°C

Maximum working pressure: 25 bar

Length of connecting cable: 1.5 m

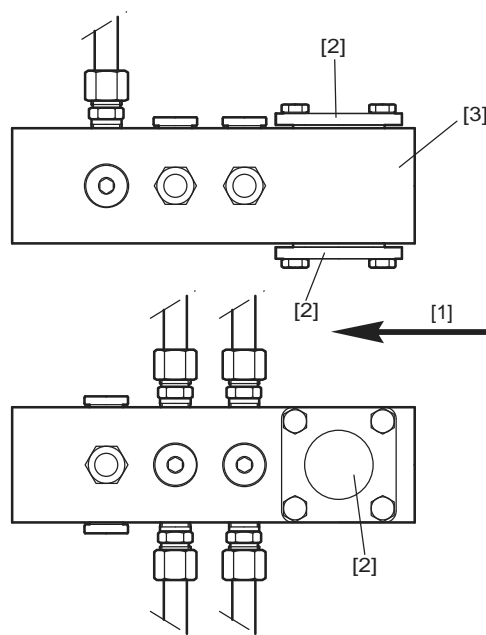
Switch: You can use the switch as normally closed or normally open contact; SPDT switch available on request

Switch hysteresis: approx. 5 %

Type	Switching point range ON	Switching point range OFF [l/min]	Maximum flow rate
DW-R-20	8.5 - 12.0	6.6 - 11.0	80



5.13 Visual flow indicator



57682AXX

Figure 73: Visual flow indicator

- [1] Oil flow direction
- [2] glass
- [3] Oil distribution block

Usage

The visual flow indicator is a simple method of checking the functioning of a pressure lubrication system by visually checking the oil flow. The visual flow indicator is a standard feature in all gear units with oil pump (as of 2006).

Gear units with oil pump and a flow rate above 8.5 l/min are equipped with an electrical flow switch and visual flow indicator (as of 2006).

Function

The oil flow can be seen behind the glass [2]. If no oil is flowing and/or if there are air bubbles in the oil, the function of the pump and suction pipes with connections must be checked.



It is easier to see the oil flow when the two glasses [2] are cleaned and bright light is used on the other side of the oil distribution block.



Mechanical Installation Options

Connecting the oil/water cooling system

5.14 Connecting the oil/water cooling system



Follow the instructions in the separate manufacturer's documentation when connecting the oil/water cooling system.

5.15 Connecting the oil/air cooling system

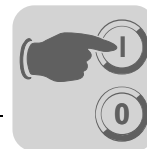


Follow the instructions in the separate manufacturer's documentation when connecting the oil/air cooling system.

5.16 Connecting the motor pump



Follow the instructions in the separate manufacturer's documentation when connecting the motor pump.



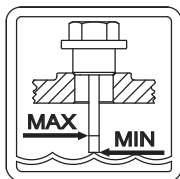
6 Startup

6.1 Startup of MC gear units



- It is essential to adhere to the safety notes in Sec. "Safety Notes."
- It is absolutely necessary to avoid open flames or sparking when working with the gear unit!
- Take preventive measures to protect people from the solvent vapors generated by the vapor phase inhibitor!
- Before startup, check for correct oil level! For lubricant fill quantities, refer to Sec. "Lubricants."
- For gear units with long-term protection: Replace the screw plug on the location indicated by the breather plug (Position → Sec. "Mounting Positions").
- If doing maintenance or/and oil-filling activities on the gear unit check the surface temperature in advance. Danger of burns (hot oil inside inside gear unit!!)

Before startup



- Remove dust and dirt completely from gear unit surface.
- For gear units with long-term protection: Remove the gear unit from the seaworthy protection box.
- Remove the corrosion protection agent from the gear unit parts. Make sure gaskets, sealing surfaces and sealing lips are not damaged by mechanical abrasion, etc.
- Before filling the gear unit with the correct oil grade and volume, drain the remaining amount of protection oil. To do so, unscrew the oil drain plug and drain the remaining protection oil. Thread the oil drain plug back in place.
- Remove the oil filling plug (Position → Sec. "Mounting Positions"). Use a funnel to fill the oil (filter mesh max. 25 µm). Fill the gear unit with the correct oil grade and volume (→ Sec. "Nameplate"). The oil volume specified on the nameplate of the gear unit is a reference value. **The mark on the dipstick is the decisive indicator of the correct oil level.** Check for correct oil level (= below the "max" mark on the dipstick) using the oil dipstick. After having filled the oil, replace the oil filling plug.
- For gear units with steel oil expansion tank (→ 6.3 Startup of MC gear units with steel expansion tank).



- For gear units with oil sight glass (option): Visually check for correct oil level (= oil is visible in the oil sight glass).
- Make sure that rotating shafts as well as couplings are equipped with suitable protective covers.
- If the gear unit has a motor pump, check for proper functioning of the pressure lubricating system. Make sure that monitoring devices are connected properly.
- After an extended period of storage (max. two years), have the gear unit operate without load with the correct oil fill (→ Sec. "Nameplate"). This way, the correct functioning of the lubricating system and particularly the oil pump is ensured.
- If the gear unit is equipped with a fan on the input shaft, check for free air intake within the specified angle (→ Sec. "Fan").



Startup

Startup of MC gear units with backstop

Running-in period

SEW-EURODRIVE recommends running-in the gear unit as first startup phase. Increase load and revolutions in two to three steps up to maximum level. The running-in phase takes about 10 hours.

Check the following points during the running-in phase:

- Verify the power values specified on the nameplate because their frequency may be a decisive factor for the service life of the gear unit.
- Does the gear unit run smoothly?
- Are there vibrations or unusual running noise?
- Are there signs of oil leakages on the gear unit?



For further information and troubleshooting, refer to Sec. "Malfunctions."

6.2 Startup of MC gear units with backstop

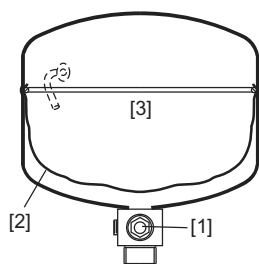


For gear units with backstop, make sure the direction of rotation of the motor is correct!

6.3 Startup of MC gear units with steel oil expansion tank

This chapter describes the procedure for filling oil into gear unit types MC.PV, MC.RV and MC.RE, which are delivered with steel oil expansion tank. Oil filling must be carried out with care to avoid that any air is left in the gear unit. Before filling the gear unit with oil, the membrane in the steel expansion tank must be in down position. During operation of the gear unit, the membrane moves up and down due to the thermal expansion of the oil.

Position of the membrane before startup:



52727AXX

- [1] Oil level
- [2] Membrane in down position
- [3] Air

If air gets under the membrane in the steel oil expansion tank, it can move the membrane upward thus causing pressure in the gear unit and possibly oil leakage.

The oil must have ambient temperature when filling the gear unit and the gear unit must be installed in its final mounting position. If the gear unit is filled before installation, the gear unit must not be tilted during installation to avoid that oil pushes the membrane upward.

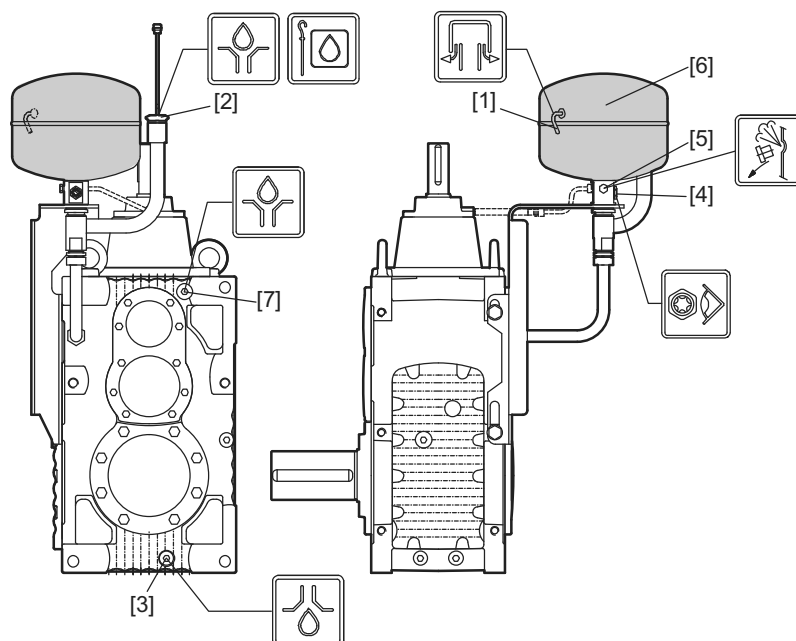


Figure 74: MC.PE../MC.RE.. industrial gear units with steel oil expansion tank 57695AXX

- | | |
|---|----------------------------------|
| [1] Breather plug | [5] Air outlet screw |
| [2] Oil dipstick and oil filling opening Number 2 | [6] Steel oil expansion tank |
| [3] Oil drain plug | [7] Oil filling opening Number 1 |
| [4] Oil sight glass | |

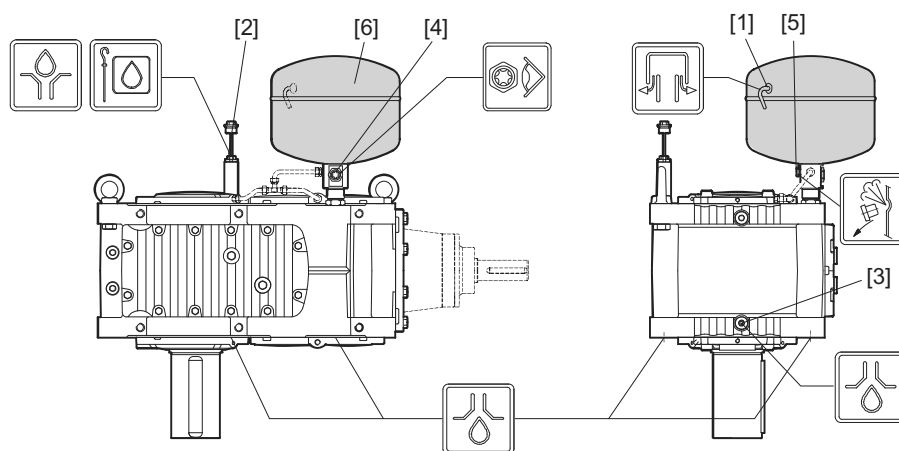


Figure 75: MC.PV../MC.RV.. industrial gear units with steel oil expansion tank 51588AXX

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



Startup

Startup of MC gear units with steel oil expansion tank



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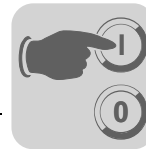


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1. Open the air outlet screw [5].
2. Open ALL upper screw plugs (usually three to four screw plugs) of the gear unit, such as breather plug, oil filling plug and oil dipstick.
3. Blow compressed air into the oil expansion tank through the breather plug [1]. The membrane goes down (sometimes you can hear a "plob").
4. Fill oil through the oil filling openings [2][7].
5. When the oil reaches the screw plug openings (except for oil dipstick), re-install the screw plugs on the housing. Start the closing process with that plug where the oil reaches the opening first, then close the second plug and so on. The closing process in this order helps to avoid air spots within the gear unit.
6. Fill the gear unit until oil comes out from the air outlet screw [5]. Close the air outlet screw.
7. Fill oil level to the oil sight glass [4].
8. Check the oil level via oil sight glass and oil dipstick to ensure that the oil level keeps stable. The correct oil level is reached, when the oil sight glass is covered half with oil. The marks on the oil sight glass are decisive for the oil level.
9. Screw in the oil dipstick [2].
10. Carry out a test run to ensure that the oil level does not fall below the oil sight glass.
11. Check the oil level only when the gear unit has cooled off to ambient temperature.



Before filling oil into the gear unit, the membrane in the oil expansion tank must be in down position to prevent pressure from building up in the gear unit. Strict observance of the procedure described is a prerequisite for the fulfillment of any warranty claims.



6.4 Taking MC gear units out of operation



Disconnect the drive from voltage supply and secure it to prevent unintentional restart!

If the gear unit is not operated for a longer period of time, you must activate it at regular intervals every two to three (2 to 3) weeks.

If the gear unit is not operated for a period **longer than six (6) months**, additional corrosion protection is required:

- **Corrosion protection for the inside of gear units with splash lubrication or bath lubrication:**

Fill the gear unit up to the breather plug with the oil grade specified on the nameplate.

- **Corrosion protection for the inside of gear units with oil pressure lubrication:**
Contact SEW-EURODRIVE in this case!

- **Surface corrosion protection:**

Apply a wax-based protective coating onto shaft ends and unpainted surfaces as corrosion protection. Grease the sealing lips of the oil seal to protect them from preservative agents.



For taking the gear unit back into operation, refer to Sec. "Startup".



7 Inspection and Maintenance

7.1 Inspection and maintenance intervals

Interval	What to do?
Daily	- Check the housing temperature: - with mineral oil: max 90°C - with synthetic oil: max. 100°C - Check gear unit noise - Check the gear unit for signs of leakage
After 500 - 800 hours of operation	First oil change after initial startup
After 500 hours of operation	Check the oil level, refill oil (→ Nameplate) if necessary
Every 3000 hours of operation, at least every 6 months	- Check the oil: If the gear unit is operated outdoors or in humid conditions, check the water content of the oil. The water content must not exceed 0.05 % (500 ppm). - Fill labyrinth seals with grease. Use about 30 g grease per grease nipple. - Clean the breather plug
Every 4000 hours of operation	For gear units with drywell: Regrease the lower bearings of the LSS
Depending on the operating conditions, at the latest every 12 months	- Change the mineral oil (→ Sec. "Inspection and maintenance of the gear unit") - Check whether retaining screws are tightly secured - Check contamination and condition of the oil/air cooling system - Check the condition of the oil/water cooling system - Clean oil filter, replace filter element if necessary
Every 8000 hours of operation, at the latest every 2 years	
Depending on the operating conditions, at the latest every 3 years	Change synthetic oil (→ Sec. "Inspection and maintenance of the gear unit")
Varying (depending on external factors)	- Repair or renew the surface/anticorrosion coating - Clean the gearcase surface and fan - Check the oil heater: - Are all connection cables and terminals tightened securely and free from corrosion? - Clean incrustrated elements (such as the heating element) and replace, if required (→ Sec. "Inspection and maintenance of the gear unit")

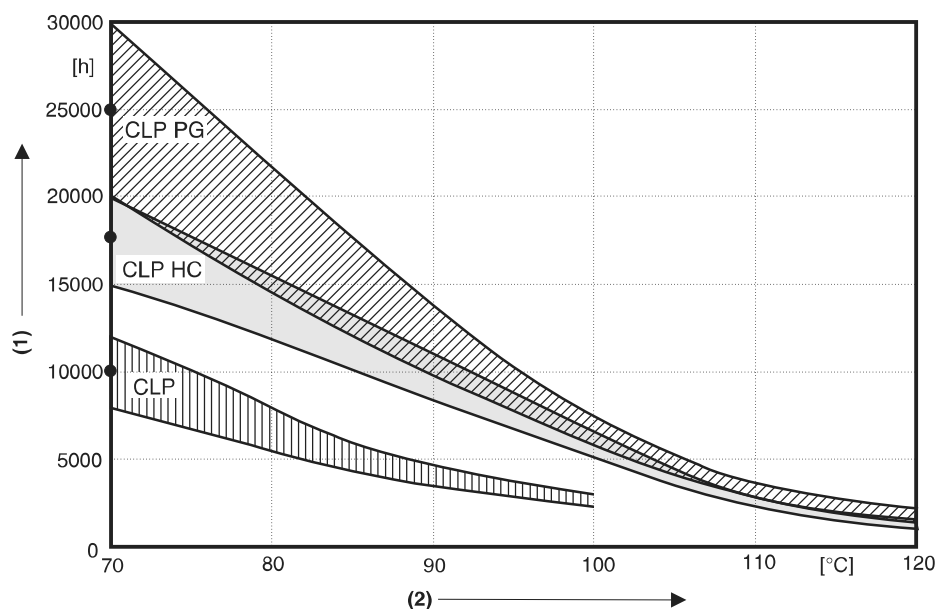


7.2 Lubricant change intervals

Change the oil more frequently when operating the industrial gear unit under more severe/aggressive environmental conditions!



Mineral CLP lubricants and synthetic polyalphaolefin-based (PAO) lubricants are used for lubrication. The synthetic lubricant CLP HC (according to DIN 51502) shown in the following figure corresponds to the PAO oils.



04640AXX

Figure 76: Lubricant change intervals for MC gear units under normal ambient conditions

- (1) Hours of operation
- (2) Sustained oil bath temperature
- Average value per oil type at 70°C

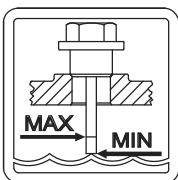


7.3 Inspection and maintenance of the gear unit



- Do not mix different synthetic lubricants and do not mix synthetic with mineral lubricants!
- For positions of the oil level plug, the drain plug, the breather plug and the oil sight glass, refer to Sec. "Mounting Positions."

Checking the oil level



1. Disconnect the motor from voltage supply and secure it to prevent unintentional restart!
Wait until the gear unit has cooled off – Danger of burns!
2. For gear units with oil dipstick:
 - Unscrew the oil dipstick and remove it. Clean the dipstick and re-insert it into the gear unit (do **not** screw in tightly!).
 - Remove dipstick again and check oil level. Correct if necessary: the oil level is correct when it is between the oil level mark (= maximum oil level) and the end of the dipstick (= minimum oil level)
3. For gear units with oil sight glass (option): Visually check correct oil level (= middle of oil sight glass)

Checking the oil



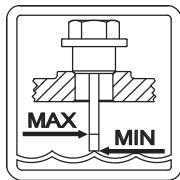
1. Disconnect the motor from voltage supply and secure it to prevent unintentional restart!
Wait until the gear unit has cooled off – Danger of burns!
2. Remove some oil from the oil drain plug
3. Check the oil consistency
 - Viscosity
 - If you can see that the oil is heavily contaminated, we recommend to change the oil disregarding the service intervals specified in Sec. "Service and maintenance intervals."

Changing the oil



When changing the oil, clean the gearcase thoroughly to remove oil residues and abrasion. Use the same oil grade as for the operation of the gear unit.

1. Disconnect the motor from voltage supply and secure it to prevent unintentional restart!
Wait until the gear unit has cooled off – Danger of burns! If your gear unit is equipped with an oil expansion tank, let the gear unit cool off until it reaches ambient temperature. The reason is that there might still be oil in the oil expansion tank which might leak through the oil filling hole!
Note: The gear unit must still be warm because the high viscosity of cold oil will make it more difficult to drain the oil correctly.
2. Place a container under the oil drain plug.
3. Remove oil filling plug, breather plug and oil drain plugs. When using a steel oil expansion tank, also remove the air outlet screw on the air expansion tank. To drain the oil completely, blow air through the breather into the oil expansion tank. As a result, the rubber membrane lowers and forces the remaining oil out. The lowering membrane compensates the pressure, which facilitates filling the new oil.
4. Drain the oil completely.
5. Reinstall the oil drain plugs.



6. Use a funnel to fill the oil (filter mesh max. 25 µm). Fill new oil of the same type as the old oil via the oil filling plug (if you want to change the oil type, contact our customer service first).
 - Fill the oil according to the volume specified on the nameplate (→ Sec. "Nameplate"). The oil volume specified on the nameplate is an approximate value. **The marks on the oil dipstick are decisive for the oil level.**
 - Check whether the oil level is correct using the oil dipstick.
7. Reinstall the oil filling plug. If your gear unit is equipped with a steel oil expansion tank, also screw in the air outlet screw.
8. Mount the breather plug.
9. Clean the oil filter, replace the filter element if necessary (when using an external oil/air or oil/water cooling system).

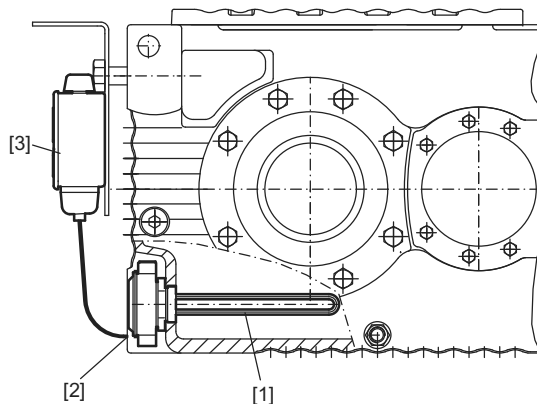


If you remove the housing cover, you must apply new sealing compound to the sealing surface. Else, the tightness of the gear unit is not guaranteed! Contact SEW-EURODRIVE in this case!

Cleaning the oil heater

Incrustation on the oil heater caused by oil must be removed. Remove the oil heater for this purpose.

Removing the oil heater



50530AXX

Figure 77: Oil heater for MC.. industrial gear units

- [1] Oil heater
- [2] Temperature sensor
- [3] Thermostat

- Remove the oil heater [1] and the gasket on the gear unit.
- Remove the base of the terminal box.
- Clean the tubular heating elements with solvent.



Be careful not to damage the heating elements through scratching or scraping!



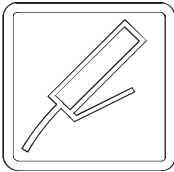
Inspection and Maintenance

Inspection and maintenance of the gear unit

Mounting the oil heater

- Reinstall the oil heater [1] and the gasket on the gear unit. The tubular heating elements must always be immersed in liquid.
- Mount the base of the terminal box onto the heating rod using a mounting ring.
- Make sure that the gasket is placed correctly between terminal box and upper end of the heating element.
- Insert the temperature sensor [2] into the oil sump of the gear unit. Set the required temperature on the thermostat [3].

Refilling grease



You can use any lithium-based bearing grease, (some examples see chapter 10.3) to grease the regreaseable dust protection covers or labyrinth seals ("Taconite") attached to input and output shafts as option (→ Sec. "Lubricants", "Sealing grease").

For the locations of regreasing points, refer to the order-specific dimension sheet. Use about 30 g grease per grease nipple disregarding the position of regreasing points and gear unit size.



Old grease comes out between shaft and bearing cover lip bringing dirt and sand with it. So the oil seal area can be kept clean. Wipe the bearing cover/shaft clean if there can be seen old grease. Do not use high pressure when filling new grease, press in gently. Do not use more than 30 gramm for one bearing cover.



Vertical gear units with drywell-sealing system on the output shaft

In the drywell version the lower bearings of the low speed shaft are lubricated by grease. Refer to the regreasing label on the gear unit for the amount of lubricating grease is required for the bearings. Use the correct type of grease per regrease nipple as indicated on the regreasing label and in the grease table → chapter 10

Only to be used for greasing the bearings.

If the gear unit is being stored for a long time, the bearing grease must be replaced before the gear unit is taken into operation.

The bearings must be regreased at regular intervals. Refer to the regreasing label on the gear unit for the required amount of bearing grease and regreasing intervals.

Two types of gear units with drywell are distinguished:

- with extended bearing distance (EBD) type E...G
- with standard bearing arrangement

With extended bearing distance (EBD)/E...G and drywell

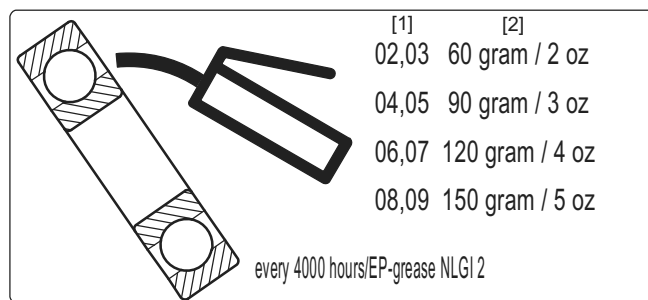


Figure 78: Regreasing amount with EBD and drywell (see nameplate MC.V../E..G)

57359AEN

[1] gear unit size (see nameplate)

[2] regreasing amount

Gear unit size MC.V... / E...G	Amount of grease [g]	Regreasing interval
02	60	every 4000 running hours or at least every 10 months
03	60	
04	90	
05	90	
06	120	
07	120	
08	150	
09	150	



Inspection and Maintenance

Inspection and maintenance of the gear unit

With standard
bearing arrange-
ment and drywell

every 4000 hours / EP-grease NLGI 2

^[1] 02,03 ^[2] 30 gram / 1 oz

04,05 50 gram / 2 oz

06,07 65 gram / 2.5oz

08,09 80 gram / 3 oz

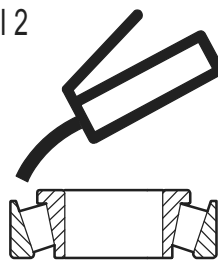


Figure 79: Regreasing amount standard bearing arrangement

57681AEN

[1] gear unit size (see nameplate)

[2] regreasing amount

Gear unit size MC.V...	Amount of grease [g]	regreasing interval
02	30	every 4000 running hours or at least every 10 month
03	30	
04	50	
05	50	
06	65	
07	65	
08	80	
09	80	



Proceed as follows to regrease the bearings:

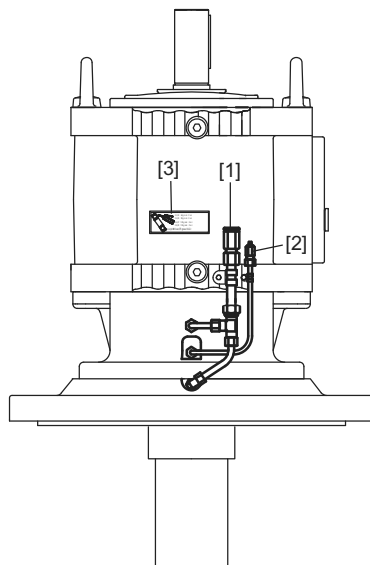


Figure 80: Regreasing drywell gear units (EBD version shown) ^{57378AXX}

- [1] Grease drain pipe
- [2] Grease nipple
- [3] Label with regreasing amount



- Fill in the grease while the gear unit is in operation
- See the label [3] for the amount of grease



Do not fill in the grease with high pressure!

High pressure causes the grease to come out between shaft seal lip and shaft. As a result, the lipseal might be damaged or move out of place, grease might enter the customer's process and the bearing housing might become corroded inside.

Fill in the grease while the gear unit is running by gently pressing the required amount of grease in.

Do not fill more than mentioned on label!

1. Open the pipe [1]. Old grease will leak out.
2. Fill the grease via the grease nipple [2].
3. Close the drain pipe [1].



8 Malfunctions

8.1 Gear unit malfunctions

Problem	Possible cause	Solution
Unusual, regular running noise	A Meshing/grinding noise: bearing damage B Knocking noise: irregularity in the gearing	A Check the oil (see →Sec. "Inspection and Maintenance"), replace bearings B Contact customer service
Unusual, irregular running noise	Foreign particles in the oil	- Check the oil (see Sec. "Inspection and Maintenance") - Stop the drive, contact customer service
Unusual noise in the area of the gear unit mounting	Gear unit mounting has loosened	- Tighten the retaining screws and nuts to the specified torque - Replace the damaged / defective retaining screws or nuts
Operating temperature too high	A Too much oil B Oil too old C Oil contaminated D Gear units with fan: air intake opening / gearcase contaminated E Shaft end pump defective F Malfunctions of oil/air or oil/water cooling system	A Check the oil level, correct if necessary (see Sec. "Inspection and Maintenance") B Check when the oil was changed last time; change oil if necessary (see Sec. "Inspection and Maintenance") C Change the oil (see Sec. "Inspection and Maintenance") D Check the air intake opening and clean if necessary, clean gear unit housing E Check the shaft end pump; replace if necessary F Observe the separate operating instructions of the oil/water and oil/air cooling system!
Bearing point temperatures too high	A Oil not enough B Oil too old C Shaft end pump defective D Bearing damaged	A Check the oil level, correct if necessary (see Sec. "Inspection and Maintenance") B Check when the oil was changed last time; change oil if necessary (see Sec. "Inspection and Maintenance") C Check the shaft end pump; replace if necessary D Check bearing and replace if necessary, contact customer service
Oil leaking ¹⁾ - from cover plate - from gearcase cover - from bearing cover - from mounting flange - from output/input end oil seal	A Gasket on cover plate (MC2P.) / gearcase cover / bearing cover / mounting flange leaking B Sealing lip of oil seal upside down C Oil seal damaged / worn	A Tighten the bolts on the respective cover plate and observe the gear unit. Oil still leaking: contact customer service B Vent the gear unit (see →Sec. "Mounting Positions") Observe the gear unit. Oil still leaking: contact customer service C Contact customer service
Oil leaking - from oil drain plug - from breather plug	A Too much oil B Drive operated in incorrect mounting position C Frequent cold starts (oil foams) and/or high oil level	A Correct the oil level (see Sec. "Inspection and Maintenance") B Mount the breather plug correctly (see Sec. "Mounting Positions") and correct the oil level (see Sec. "Lubricants")
Malfunctions of the oil/air or oil/water cooling system		Observe separate operating instructions of the oil/water and oil/air cooling system!
Operating temperature at backstop too high	Damaged / defective backstop	- Check the backstop; replace if necessary - Contact customer service

1) It is normal for small amounts of oil/grease to emerge from the oil seal during the running-in phase (24 hour running time, see also DIN 3761).

Customer service

Please have the following information available when contacting our customer service:

- Complete nameplate data
- Nature and extent of the fault
- Time of occurrence and accompanying circumstances of the fault
- Presumed cause



9 Mounting Positions

9.1 Symbols used

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

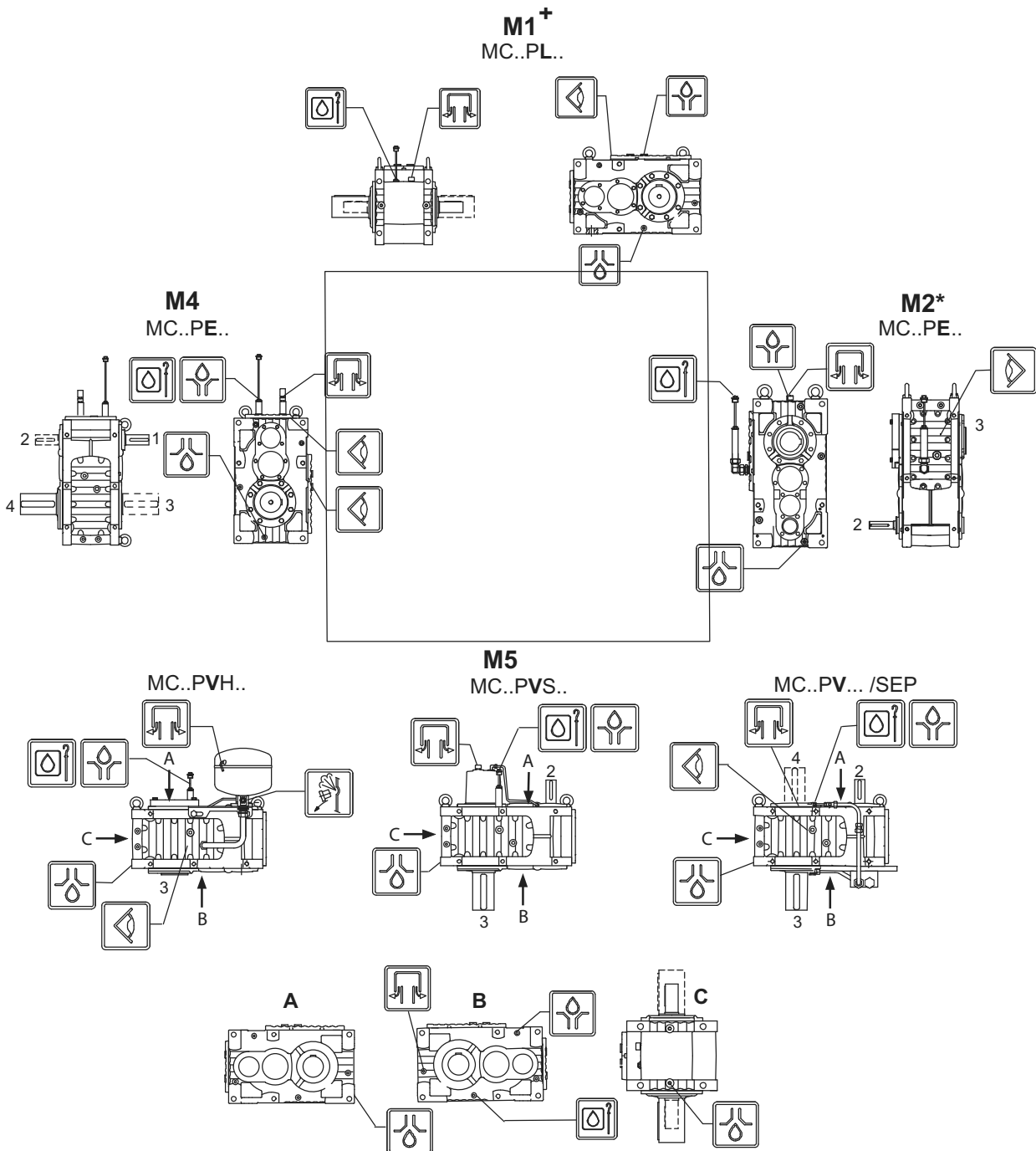
Symbol	Meaning
	Breather plug
	Air outlet screw
	Inspection opening
	Oil filling plug
	Oil drain plug
	Oil dipstick
	Oil sight glass



Mounting Positions

Mounting positions of MC.P.. gear units

9.2 Mounting positions of MC.P.. gear units



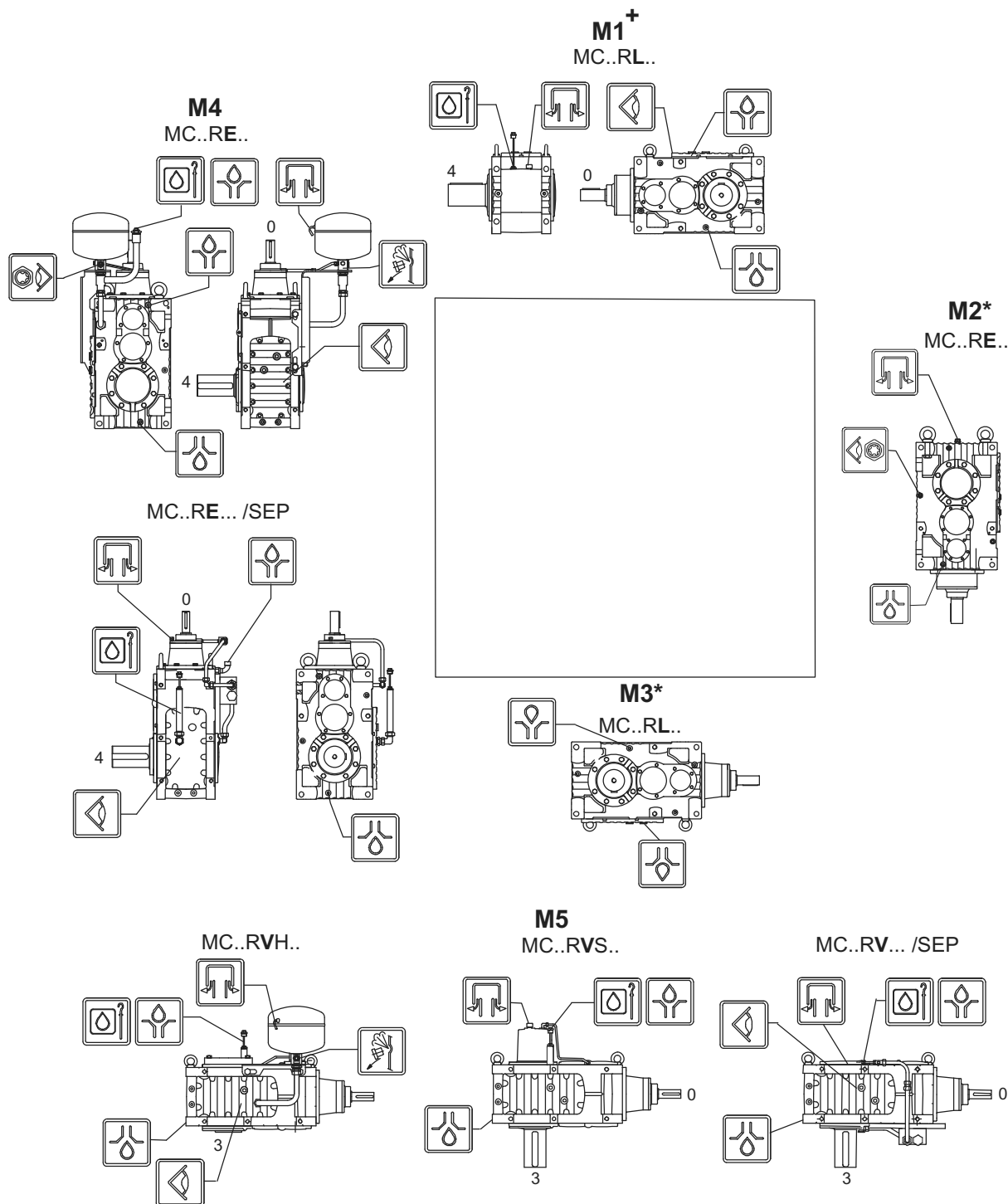
55477Axx

* = Non-standard mounting position / housing orientation. The positions of heater, dipstick, oil drain plug are only exemplary. Refer to the order-specific dimension drawing.

+ = In horizontal mounting position, the oil drain plug is always located on the opposite side of the output shaft.



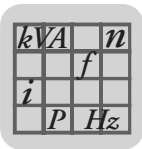
9.3 Mounting positions of MC.R.. gear units



55480AXX

* = Non-standard mounting position / housing orientation. The positions of heater, dipstick, oil drain plug are only exemplary. Refer to order-specific dimension drawing.

+ = In horizontal mounting position, the oil drain plug is always located on the opposite side of the output shaft.



10 Design and Operating Notes

10.1 Guideline for oil selection

General

Unless a special arrangement is made, SEW-EURODRIVE supplies the drives without oil fill.



It is therefore necessary to fill the gear unit with the correct type and quantity of oil before taking it into operation. The required information is indicated on the gear unit nameplate.

The required type and quantity of the gear unit oil depends on the following:

- gear unit size and type
- gear unit design (MC..L., MC...V., MC...E) and housing orientation (M1...M6)
- oil operating temperature, which depends on
 - transmitted power
 - ambient temperature
 - lubrication type (splash, bath or pressure lubrication)
 - additional cooling methods
- minimum temperature at cold start

In addition to the required viscosity, the oil must meet the following criteria:

- High viscosity index
- Must contain anti-wear, anti-rust, anti-oxidant and anti-foam additives
- Must also contain pressure-resistant additives (EP additives)

If synthetic oils are selected due to operating temperatures or oil change intervals, SEW-EURODRIVE recommends polyalphaolefin-based (PAO) oil.

Mineral oils

Standards

Lubricating oils are grouped in ISO VG viscosity classes according to the ISO 3448 and DIN 51519 standards.

ISO class	ISO 6743-6 designation	DIN 51517-3 designation	AGMA 9005-D94 designation
220	ISO-L-CKC 220	DIN 51517-CLP 220	AGMA 5 EP
460	ISO-L-CKC 460	DIN 51517-CLP 460	AGMA 7 EP

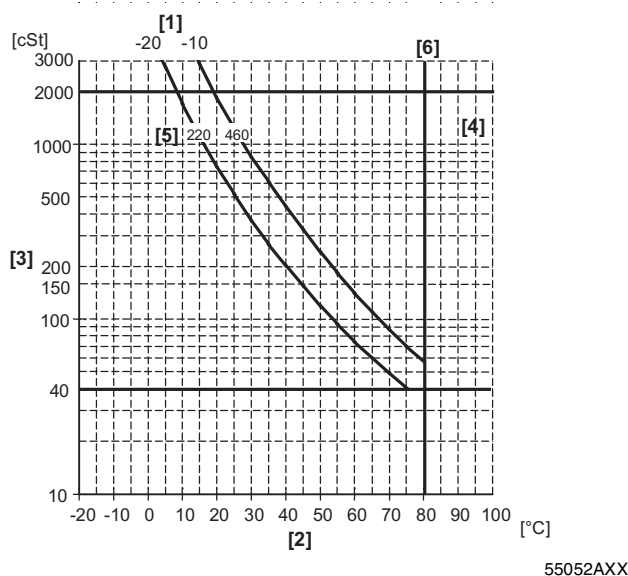
Selecting viscosity of mineral oils

Lubrication method	Ambient temperature	Mineral ISO VG
- Bath lubrication - Splash lubrication - Pressure lubrication with oil heater and cooler	-15...+20°C	220
- Bath lubrication - Splash lubrication - Pressure lubrication with oil heater and cooler	-5...+40°C	460
Pressure lubrication with cooler	+10...+20°C	220
Pressure lubrication without cooler	+20...+40°C	460



Pressure lubrication with or without cooler requires that the situation at cold start is checked! When using an oil pump (pressure lubrication), the starting viscosity must be below 2000 cSt (→ figure 55052AXX).

Use an oil heater (→ chapter 5.8) if necessary.



[1] Pour point [°C]

[4] Viscosity index VI = 90...100

[2] Gear unit's operating temperature of oil [°C]

[5] ISO VG

[3] Viscosity [cSt]

[6] Temperature limitation 80°C

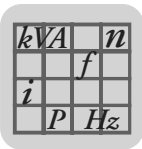


Max. running temperature of gear unit must be noticed. Max allowed running temperature, is 70 deg (long running temp) for ISO VG 220 and 80 deg for ISO VG 460. 90 deg can be used for short periods.

When needed, a cooling device must be used (fan, water/air cooling) or oil changing interval must be shortened (see chapter "Lubrication change interval" in the operating instructions).

Selecting oil type of mineral oils

Select the oil type according to the required viscosity from the table in chapter "10.2 Lubricants."



Synthetic oils

Standard

Lubricating oils are grouped in ISO VG viscosity classes according to the ISO 3448 and DIN 51519 standards.

ISO-L-CKT 460	ISO 6743-6 designation
220	ISO-L-CKT 220
320	ISO-L-CKT 320
460	ISO-L-CKT 460

Minimum requirements are the same as for mineral oils

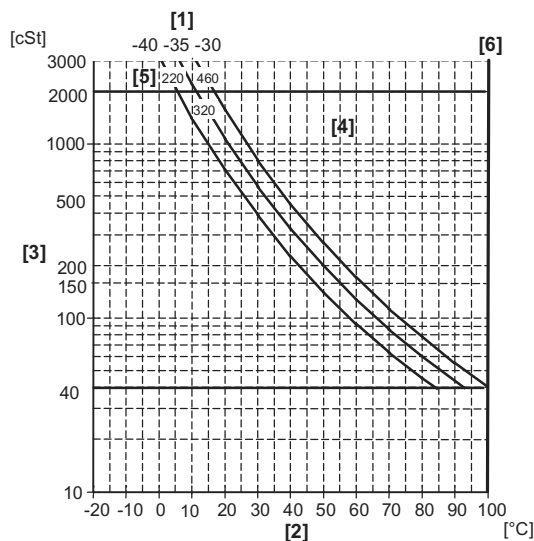
Selecting viscosity of synthetic oils

Lubrication method	Ambient temperature	Synthetic ISO VG
- Bath lubrication - Splash lubrication - Pressure lubrication with oil heater and cooler	−35...+30°C	220
- Bath lubrication - Splash lubrication - Pressure lubrication with oil heater and cooler	−30...+40°C	320
- Bath lubrication - Splash lubrication - Pressure lubrication with oil heater and without cooler	−25...+50°C	460
Pressure lubrication with cooler	+5...+30°C	220
Pressure lubrication with cooler	+10...+40°C	320
Pressure lubrication without cooler	+15...+50°C	460



Pressure lubrication with or without cooler requires that the situation at cold start is checked! When using an oil pump (pressure lubrication), the starting viscosity must be below 2000 cSt (→ 55051AXX).

Use an oil heater (→ chapter 5.8) if necessary.



55051AXX

- [1] Pour point [°C] [4] Viscosity index VI = 140...180
[2] Gear unit's operating temperature of oil [°C] [5] ISO VG
[3] Viscosity [cSt] [6] Temperature limitation 100°C



Max. running temperature of gear unit must be noticed.

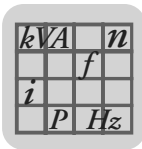
Viscosity class ISO VG	Max. allowed running temperatures [°C]
220	80
320	90
460	100 (105 for short periods)



When needed, a cooling device must be used (fan, water/air cooling) or oil changing interval must be shortened (see chapter "Lubrication change interval" in the operating instructions).

Selecting oil type of synthetic oils

Select the oil type according to the required viscosity from the table in chapter "10.2 Lubricants".



10.2 Lubricants for MC.. industrial gear units

Lubricant table The lubricant table on the following page shows the permitted lubricants for SEW-EURODRIVE gear units. Please note the following key to the lubricant table.

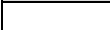
Key to the lubricant table

Abbreviations and meaning of shading and notes:

CLP = Mineral oil

CLP PAO = Synthetic polyalphaolefin

 = Synthetic lubricant (= synthetic anti-friction bearing grease)

 = Mineral lubricant (= mineral-based anti-friction bearing grease)

1) = Ambient temperature

 = please contact SEW-EURODRIVE



= Lubrication and cooling



= Splash lubrication



= Bath lubrication



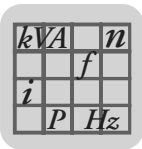
= Pressure lubrication with cooler and heater



= Pressure lubrication with cooler (without heater)

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10.3 Grease

The below mentioned greases can be used as

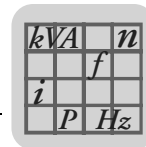
- Sealing grease
- Bearing grease for the lower LSS-bearings for gear units with drywell sealing system

SEW-EURODRIVE recommends the grease types listed in below table for operating temperatures from – 30°C to +100°C.

Lubricating grease properties:

- Contains EP additives
- Hardness class NLGI2

Company	Oil
Aral	Aralub HLP2
BP	Energrease LS-EPS
Castrol	Spheerol EPL2
Chevron	Dura-Lith EP2
Elf	Epexa EP2
Esso	Beacon EP2
Exxon	Beacon EP2
Gulf	Gulf crown Grease 2
Klüber	Centoplex EP2
Kuwait	Q8 Rembrandt EP2
Mobil	Mobilux EP2
Molub	Alloy BRB-572
Optimol	Olista Longtime 2
Shell	Alvania EP2
Texaco	Multifak EP2
Total	Multis EP2
Tribol	Tribol 3030-2



10.4 Lubricant fill quantities

The specified fill quantities are guide values. The precise values vary depending on the gear ratio.

MC.P.

Gear unit size	Lubrication type	Oil volume [l]					
		Two stages			Three stages		
		Mounting position					
		L	V	E	L	V	E
02	Splash Bath	9	-	-	11	-	-
		-	21	18	-	25	20
03	Splash Bath	14	-	-	15	-	-
		-	26	23	-	31	32
04	Splash Bath	18	-	-	20	-	-
		-	34	31	-	45	45
05	Splash Bath	24	-	-	27	-	-
		-	45	35	-	58	54
06	Splash Bath	28	-	-	36	-	-
		-	58	45	-	73	65
07	Splash Bath	33	-	-	47	-	-
		-	94	59	-	102	89
08	Splash Bath	55	-	-	68	-	-
		-	117	77	-	133	113
09	Splash Bath	79	-	-	90	-	-
		-	139	107	-	151	137

MC.R.

Gear unit size	Lubrication type	Oil volume [l]					
		Two stages			Three stages		
		Mounting position					
		L	V	E	L	V	E
02	Splash Bath	10 -	- 19	- 18	10 -	- 19	- 19
03	Splash Bath	14 -	- 27	- 29	13 -	- 27	- 28
04	Splash Bath	19 -	- 34	- 34	18 -	- 34	- 35
05	Splash Bath	22 -	- 47	- 47	24 -	- 47	- 47
06	Splash Bath	26 -	- 59	- 60	28 -	- 59	- 61
07	Splash Bath	32 -	- 89	- 91	33 -	- 88	- 89
08	Splash Bath	58 -	- 111	- 119	56 -	- 111	- 116
09	Splash Bath	84 -	- 137	- 133	79 -	- 137	- 137



When using pressure lubrication, it is essential to observe the specifications on the nameplate and in the order-specific documentation!



11 Change Index

11.1 Changes to the previous edition

The following section lists the changes made to the individual sections from edition 07/2003, publication number 10560009.

Safety notes

- The subsection "Corrosion and surface correction" has been revised.

Unit design

- The nameplates for "Industrial gear units MC.., SEW-EURODRIVE" have been revised in the subsection "Unit designations, nameplates."
- The subsections
 - "Mounting positions"
 - "Mounting surface"
 - "Housing orientation"
 - "Shaft positions"have been added.

Mechanical installation

- In the subsection "Gear unit foundation", the "Tightening torques" table has been revised.
- In the subsection "Gear unit foundation", the "Connecting flange" and "EBD connecting flange" have been added.
- The subsection "Mounting/removing hollow shaft gear units with shrink disc" has been completely revised.

Mechanical installation options

- In the subsection "Mounting couplings", the "Flexible jaw couplings type MT, MS-MTN" has been included.
- The subsection "Shaft end pump SHP" has been included.
- The subsection "Mounting of V-belt drive" has been changed.
- The subsection "Oil heater" was been revised.
- The subsection "Flow switch" has been included.
- The subsection "Visual flow indicator" has been included.



Startup

- The subsection "Startup of MC gear units with steel oil expansion tank" has been included.

Inspection and maintenance

- In the subsection "Inspection / maintenance of the gear unit", the "Vertical gear unit with Drywell sealing system on the LSS" has been included.

Mounting positions

- The section "Mounting positions" has been completely revised.

Design and operating notes

- The section "Design and operating notes" has been completely revised.



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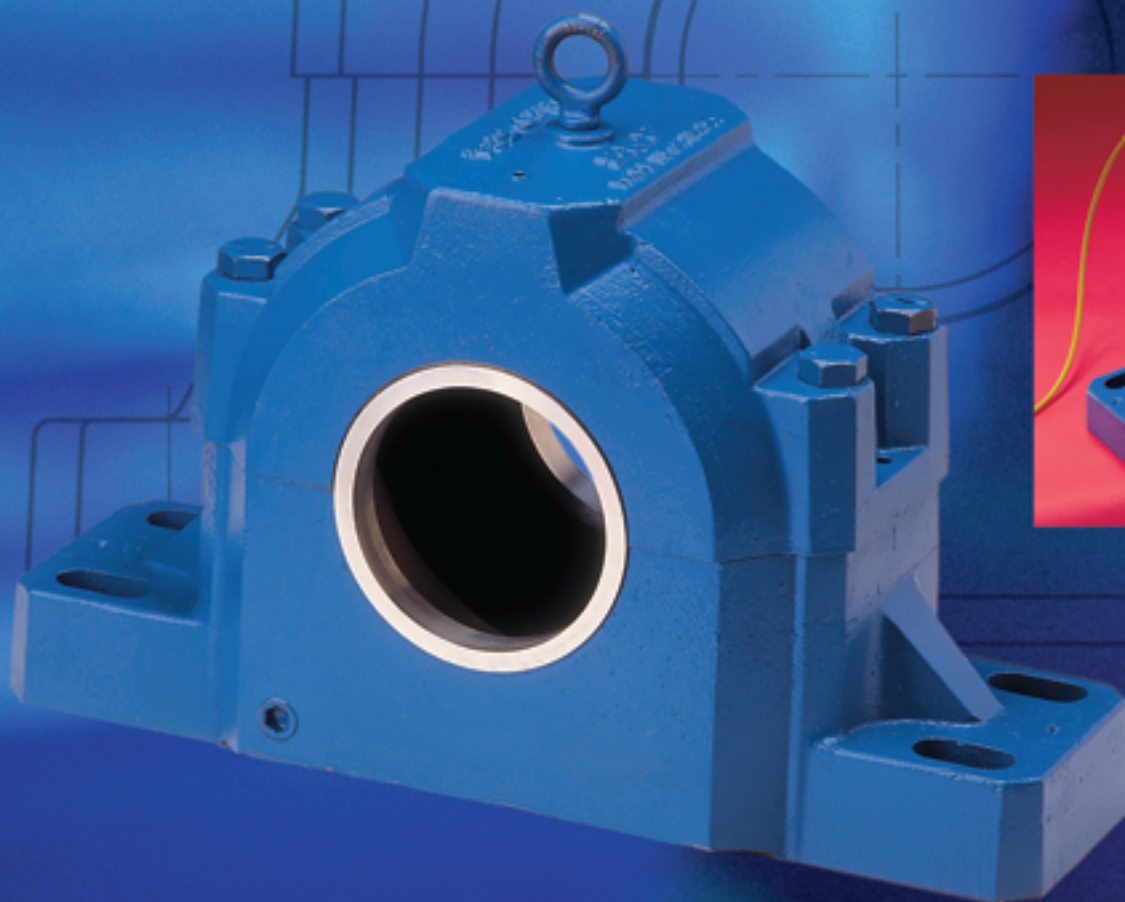


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7.2 SKF Maintenance Handbook

Heavy Duty Pillow Block Maintenance Handbook

Catalogue No. CDN995



SKF Canada Limited

AN ISO 9001 REGISTERED COMPANY

Proud recipient of The Canada Awards for Excellence Certificate of Merit

Correct names for Pillow Block parts:

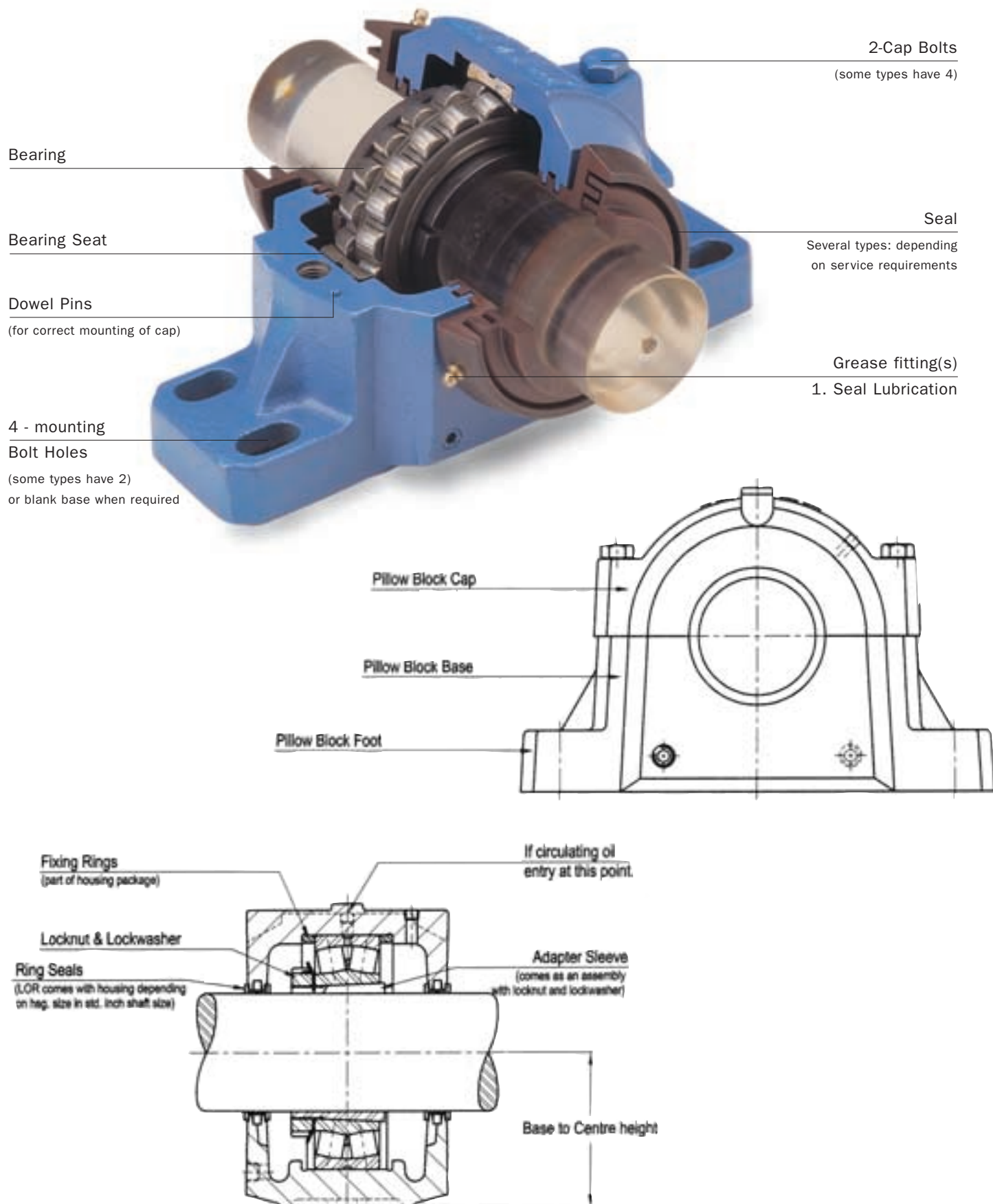


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Fixing Ring Location in Pillow Block Assemblies	11
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Mounting Procedures for Pillow Block Assemblies Pillow Block Series	
Pillow Block Series	Seal
SNL, SSNHD	G 13-14
SNL, SSNHD	V-Ring (A) 13 + 15
SNL, SSNHD	Triple Seal S 13 + 24
SNL, SSNHD	Feltseal C 13 + 16
SNL, SSNHD	D and E 13 + 25-26
SAFD	LOR, LORC, A9508/LER 17 + 20
SAFD	TER-C 17 + 21
SAFD	TER-CV 17 + 22
SAF, SAFS, SDAF	LOR, A9508/LER 19 + 20
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SNL



The new SNL pillow block housings enable the full service life potential of the incorporated bearing to be exploited with less need for maintenance. Among other enhancements, the housings have increased stiffness making them even more insensitive to uncontrolled and excessive tightening of the attachment bolts.

SAF FSAF SAFS



Standard SAF pillow blocks are made of cast iron with either self-aligning double row ball bearings for normal loads or self-aligning spherical roller bearings for heavy loads. Standard with triple ring seal. Alternative sealing arrangements such as taconite or contact seals are available.

SAFS: Same features, cast in steel.

SNH (Replaced by SNL)



SNH pillow blocks of cast iron with either self-aligning double roll ball bearing for normal loads or self-aligning spherical roller bearing for heavy loads. A variety of different sealing arrangements are available.

SSNHD



SSNHD pillow blocks feature the same sealing arrangements as SNH pillow blocks but the base is kept blank so mounting holes in the base can be drilled and machined for two or four bolt mounting. For added strength SSNHD housings are cast in ductile iron.

SAFD



Interchangeable with SAF and SNCD series blocks made by SKF and their competition. Supplied in ductile iron as standard and stronger than the old designs. These new housings will accommodate the old designs. The new housings will accommodate the standard LER triple ring seals and in addition, a new taconite service seal can be used with the same housing. Increased load capacity can be provided by specifying the 232 series bearing for which the new block has been designed as well as the 222 series. This block utilizes the same components, specifically adapter sleeves and fixing rings, as our popular SNL/ SNH series blocks.

SNCD



Canadian designed pillow blocks made of ductile iron. A variety of sealing arrangements are available but the D and E type seal are considered the standard. Excellent for extreme abrasive materials for instance taconite dust. These pillow blocks can also be supplied in steel. Consult SKF for availability.

SD



Standard SD pillow blocks are made of cast iron and designed for use with larger spherical roller bearings, shaft size 150mm (6") and up. The standard sealing arrangement is the triple ring seal.

SDAF



The SDAF pillow block is designed for applications where the loads require a housing of extra sturdy construction. SDAF pillow blocks can also be supplied in cast steel. Consult SKF for availability.

SDCD

SDCD/MC14



Canadian designed heavy duty pillow block is made of ductile iron to complement the well proven SD design. Sealing features are the same as the SD pillow block. For extreme operating conditions D and E type labyrinth seals are standard. Excellent for abrasive materials i.e. taconite dust. These pillow blocks can also be supplied in cast steel. Consult SKF for availability.

General Information and Housing Material

Some Words About SKF Pillow Blocks (Split Housing)

SKF's complete line of ball and roller bearings and pillow block housings are adaptable to every industrial purpose and offers these outstanding performance advantages:

Low Friction Characteristics
 Inherent Self-Alignment
 Ease of Assembly
 No Adjustment
 Infrequent Lubrication
 Prevents Drip or Leak
 No Intrusion of Abrasive and Corrosive Matter
 Economical, Trouble-Free Operation

SKF bearing housings are made of grey cast iron, ductile iron and cast steel. The bearing seating of the housings is machined to tolerances such that a loose fit of the bearing outer ring is assured and in most cases the seating width is such that the bearing has axial freedom. Dimensional inaccuracies, slight positioning errors in mounting, and thermal elongation of the shaft can be accommodated in the pillow block housing itself.

Axial location of the bearings is achieved by inserting the fixing rings specified in the housing tables. If only one ring

is to be used with a bearing having an adapter sleeve, the fixing ring should be positioned on the same side of the bearing as the locknut. The bearing is then displaced from its centre position in the housing by the distance equal to half the fixing rings and their designation should be stated.

Pillow block housings shown in the housing tables are horizontally split and are designated for use with self-aligning ball bearings and spherical roller bearings with either a tapered bore and mounted on an adapter sleeve or with a cylindrical bore. The elongated (slotted) bolt holes in the housing base permit slight adjustments to be made to the position of the pillow block. The housings are fitted with dowel pins, or the mating surfaces may be stepped to ensure correct location of the associated caps and bases, which are **NOT interchangeable**.

To ensure reliable function and long operational life of the bearing in the pillow block, the mating surface of the supporting component should be machined to a surface roughness of $R_a=1.6$ mm (63 RMS). For the flatness IT7 is recommended. When the demand is lower, IT8 can be used.

Comparison of Physical Properties of Typical Pillow Block Housing Material

SKF pillow blocks are usually made of cast iron and are mainly intended for grease lubricated ball or roller bearings. For extra heavy duty applications, ductile iron or cast steel pillow blocks are available.

MATERIAL	SPECIFICATION	ULTIMATE TENSILE STRENGTH		YIELD STRENGTH		MINIMUM ELONGATION %
		psi	Mpa	psi	Mpa	
Cast Iron	ASTM A48 Grade 35	35000	240	-	-	-
Cast Steel	ASTM A27 Grade 65-35	65000	450	34000	240	24
Ductile Iron	ASTM A536 Grade 65-45-12	65000	450	45000	310	12

The method of bearing and housing selection we recommend must only be used for general or standard applications. Where conditions such as high thrust loads, shock loads, extreme temperatures and speeds prevail, consult SKF for detailed recommendations.

SKF Pillow Block Identification

Bold = Prefix

SNL

Pillow block a split design inch and metric variety of sealing options. See page 2.

SNA

Discontinued design replaced by SNL.

SNH

Discontinued design, replaced by SNL.

SSN

Discontinued design, replaced by SSNHD which is ductile iron.

SSNHD

Same as SNL but with blank base, Materials: spheroidal cast iron (ductile iron).

SAF

Pillow block split design inch overall dimensions (North American standard) used for inch shafting. Variety of sealing arrangements available, see Page 8.

Material : Grey cast iron ASTMA 48 grade 35

SAFD

Pillow block split design inch overall dimensions (Canadian Standard) used for inch shafting. Variety of sealing arrangements available see Page 8.

Current standard product

Material: Ductile iron ASTMA 536 grade 65-45-12

Recommended for low temperatures -40°C (-40°F)

SAFS

Same as SAF dimensionally but material cast steel ASTMA 27 grade 65-35

SDAF

Pillow block split design inch overall dimensions (North American standard) heavier design than SAF. Used for inch shafting variety of sealing arrangements available, see Page 8. Current standard product.

Material: Grey cast iron ASTMA 48 grade 35

SD

Pillow block split design metric overall dimensions can be used for metric or inch shafting (European standard) Current standard product

Available with triple ring seals only

Material: Grey cast iron GG 25 (ISO/DIS 185 grade 250)

SDD

Same as SD dimensionally but material spheroidal cast iron GGG 40 (ISO 1083-1976, 500-7)

SDCD

Pillow block split design metric overall dimensions can be used for metric or inch shafting (Canadian standard)

Current standard product

Available with triple seal rings only

Material: Ductile iron

ASTMA 536 grade 65-45-12

Recommended for low temperatures -40°C (-40°F)

SDCD/MC14

Same as SDCD dimensionally but modified to accept extreme service seals (Taconite), see Page 9

SDJC

Pillow block split design, metric overall dimensions (European standard), metric shafting. For reference only. Consult SKF for availability and technical specifications.

SNCD

Discontinued Canadian designed pillow block, dimensionally interchangeable with SAFD. Pillow block split design inch overall dimension can be used for metric or inch shafting. Available with variety of sealing arrangements see Page 9.

Material: ductile iron ASTMA 536 grade 65-45-12

SNCT

Same as SNCD dimensionally but material cast steel ASTMA 27 grade 65-35

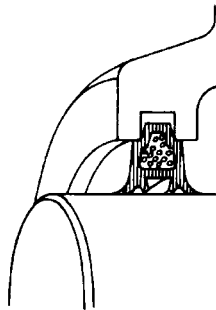
SKF Sealing Arrangements

Seals

There are many different types of seal designs for use in SKF Pillow Blocks. The many alternative choices available ensure that a correct or most suitable solution will be found to meet the condition surrounding a particular application.

If a contact (rubbing seal) is selected, care must be taken with regard to the surface finish of the shaft. It is recommended that the shaft surface roughness does not exceed 125 RMS ($t_a: 3.2 \mu\text{m}$ ISO N8).

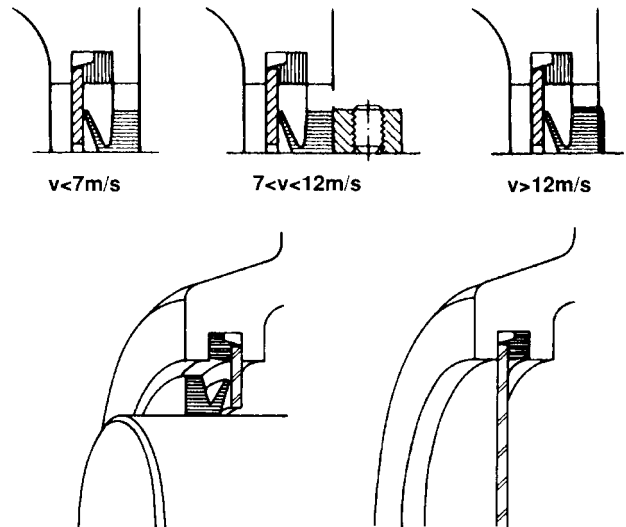
Double lip seal, Type G



The G-seal is made of polyurethane, a wear resistant material with excellent resilience. The split design simplifies mounting. This seal can be used with grease lubrication at peripheral speeds up to 8 m/s (1600 ft/min). The maximum permissible misalignment of the shaft is approximately 1° up to shaft diameters of 100 mm (3.15/16") and 0.5° for larger sizes.

These seals can be used at temperatures between -40° and $+100^\circ\text{C}$ (-40° and $+212^\circ\text{F}$). Double-lip seals are designated TSN followed by the housing number and suffix G, (ie. TNS 511 G).

V-Ring seals, Type A

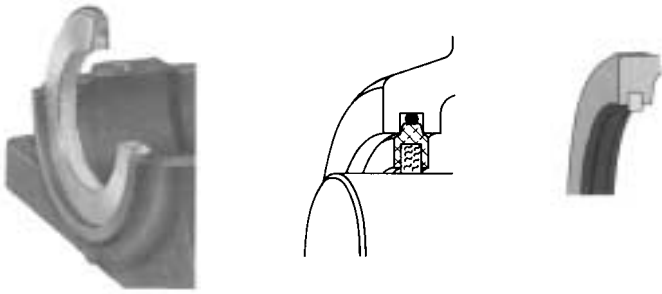


The V-Ring, of Nitrile rubber, has a thin sealing lip which functions in an axial direction. The ring also acts as a flinger as it rotates with the shaft. This type of seal can be used for both grease and oil lubrication and is extremely effective under most operating conditions including high speeds and shafts with rough sealing surfaces. V rings are normally suitable for peripheral speeds up to 7m/sec (1400 ft/min) and if axially clamped tolerate speeds up to 12m/sec (2400 ft/min). The maximum permissible misalignment of the shaft is approximately 1.5° . For a shaft diameter of 50mm, and approximately 1° for shaft diameter of 150mm.

For SNL pillow block housings, the V-rings seal against sheet metal washers which are coated with a rust inhibitor. Each washer has a rubber lip, bonded around its periphery which locates and seals in the housing groove. These seals can be used at temperatures between -40°C and $+100^\circ\text{C}$ (-40°F and $+212^\circ\text{F}$). V-ring seals are designated TSN followed by the housing number and suffix A, for example TSN 511A.

Pillow Block Seal Arrangements

Felt Seals, Type C



The felt seal is a simple and adequate seal which can be used with grease lubrication at peripheral speeds up to 4m/s (800 ft/min). Pillow block housings of series SNL 5 and SNL 6 are available with split felt seals consisting of oiled felt incorporated in halves of a light alloy ring, the seal halves are fitted into the housing grooves, the O-section cords provide an effective seal between the housing hub bore and the outside diameter of the seal inserts. Misalignment exceeding 0.5° would impair efficiency.

Felt seals are designated TSN followed by the housing number and suffix C, for example TSN 511 C.

Triple Ring Seals Types LOR, LORC, TS, S and A9508/LER

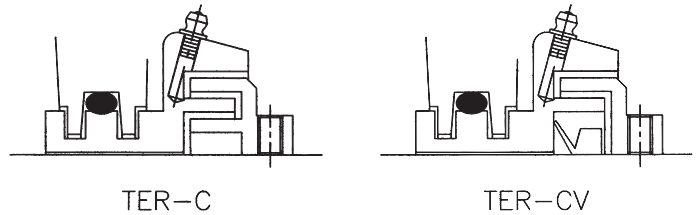
A labyrinth created between the rotating seal ring and its matching hub grooves results in an efficient seal, particularly if the labyrinth is filled with grease. The sliding fit of the rotating seal ring on the shaft ensures that it will automatically find its own proper location relative to the stationary hub grooves. For larger shaft diameters an O-sectioned cord is inserted between the seal ring and the shaft to ensure ring rotation and avoid possible lubricant leakage.

The maximum permissible misalignment between shaft and housing must be restricted to 0.25° .

Labyrinth Seal (Taconite Service Seal)

Type TER5-C and TER5-CV

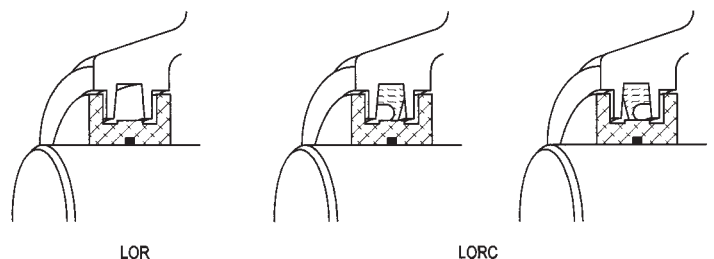
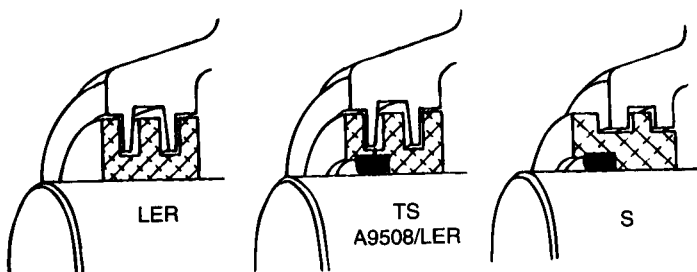
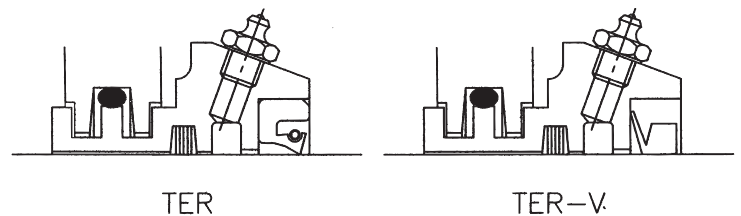
Optional Seal for SAF, SAFD, FSAF, FSAFD



Taconite Service Seal

Type TER, and TER-V

These Taconite seals were developed as an alternative for the SAFD, SAF, SAFS and SDAF blocks without modifications having to be made. The TER and TER V with felt strip or garter spring seal are interchangeable with the TER-C and TER-CV..

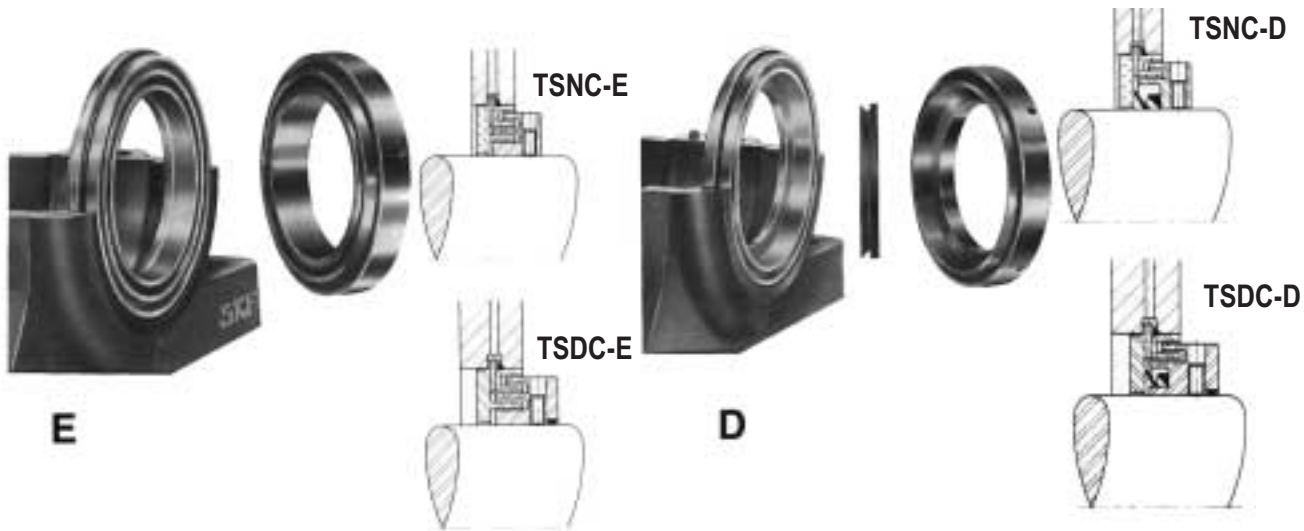


Labyrinth Seals Type D and E

Extreme service seals of D and E types were initially developed for the mining industry, where fine abrasive dusts were prevalent (e.g. taconite), but have since found usage in the pulp, paper, forest and other industries where water and water laden debris prevail. They are most commonly used in the SDCD and SNL series of housing which have additional grease fitting allowing the seals to be periodically purged. Their design offers the distinct advantage that housing caps may be removed for maintenance inspection of bearings with the seals remaining undisturbed.

NOTE: Pillow Blocks SNL and SSNHD must be modified to suffix MC 106 when using TSNC-D, TSNC-E and MC14 seals.

SAFD and FSAFD must be modified to MC 14 when using TSNC-D and TSNC-E. These seals available on special order only.



Seal Options Available for SKF Pillow Blocks						
SEAL DESIGN	SNL SSNHD	SAFD FSAFD	SAF SAFS SDAF	SNCD SNCT	SD	SDCD SDCT SDHD
G Double lip contact type	X	—	—	X	—	—
A V-ring seal contact type	X	—	—	X		
C Felt seal contact type	X	—	—	X		
E Labryinth type	X	X	—	X	—	X
D Labrynth with additional V-ring	X	X	—	X	—	X
TS, & LOR & LORC, S Triple seal Labryinth	S	LER, LOR, LORC A9508LER		LER	TS	TS
TER contact type	—	X	X		—	—
TER V contact type with V-ring	—	X	X		—	—
TER C	—	X	X		—	—
TER CV	—	X	X		—	—

For reference only (discontinued series)

Preparation before Mounting

Check shipment and make certain all assemblies are complete, and no short shipping has occurred on components.

The bearings should be left in their original packages until immediately before mounting so that they do not become dirty. Generally the preservative with which new bearings are coated before leaving the factory need only be removed from the outside cylindrical surface and bore of the bearing.

An exception is if the bearing is to be grease lubricated and used at very high or very low temperatures. In such cases the bearings should be washed and dried to prevent any detrimental effect on the lubricating properties of the greases. Bearings which have become contaminated because of improper handling (damaged package etc.) should be washed and dried before mounting.

Bearings which, when taken from their original package, have a relatively thick greasy layer of preservative, have been hot dipped and should also be washed and dried. Hot dipping is still used, principally on large-size bearings.

Clean shaft and housing*; remove all burrs and sharp edges. Check that the shaft diameter is to recommended tolerance.

Read and become familiar with the bearing mounting procedure and the installation instructions to be used for this assembly.

* NOTE: Caps and bases of housings are not interchangeable. Do not mix.

Adapter Sleeve Mounting – Spherical Roller Bearings

All spherical roller bearings with taper bore, to be mounted on adapter sleeves, have to be driven up the taper sufficiently to achieve the proper reduction of clearance.

The unmounted clearance of each bearing must be measured and recorded. Stand the bearing on the bench and insert progressively thicker feelers the full length of the roller between the unloaded roller and the outer ring at the top location. Never roll the rollers over the feelers as the wrong value will be obtained.

Position the adapter sleeve (less locknut and lockwasher) on the shaft in the correct position for the proposed bearing mounted center line. A light smear of spindle oil applied to the sleeve outside diameter, results in easier mounting/removal of bearing.

Mount bearing on adapter with the large bore side of the inner ring to match the taper on the outside diameter of the adapter. With bearing hand tight on the adapter, locate the bearing and adapter to the proper axial location on the shaft. Do not apply lockwasher. Drive up procedure could damage it. To avoid damage to the bearing it is most important during this and subsequent operations, that the shaft be blocked up so the bearing is unloaded.

Lubricate the chamfered face of the locknut and the threads (use Molykote for larger sizes), then apply locknut with chamfered face to bearing, tighten nut until sleeve is snug on the shaft. Wrenches are available for bearing drive up. For larger bearings, hydraulic mounting nuts are recommended to obtain required internal clearance reduction. Ref. page 42.

Never tighten the locknut with a hammer and drift. The locknut will be damaged and chips can enter the bearing. Continue tightening locknut and measure the internal clearance with feelers until the internal clearance is less than the recorded unmounted clearance figure by the amount shown in table on page 42. Remove locknut and install the washer with the inner prong located in the slot provided in the adapter and have the tabs facing away from the bearing. Re-apply the locknut and tighten until firmly seated against the lockwasher. If necessary tighten the locknut to a point where one of the tabs on the lock washer lines up with a slot in the locknut then bend this tab into that slot.

For a large size adapter sleeves (size 44 and up) the use of the oil injection mounting method is standard practice. For these adapter sizes the lockwasher is replaced with a lockplate. In these cases with the locknut tightened to achieve the proper reduction of internal clearance in the bearing, take lockplate and place its prong in the slot of the adapter sleeve. Note how much the locknut will have to be tightened for the holes in the locknut to align with the holes in the lockplate. Reverse the lockplate and observe how much the locknut will have to be tightened for the hole in the locknut to align with the holes in the lockplate. The lockplate is to be placed in the position requiring the least tightening to align the two sets of holes. When the locknut has been tightened to achieve this, then insert and tighten cap screws. Lock cap screws with lockwire through holes in heads. Do a final check on the mounted internal clearance of the bearing.

Adapter Sleeve Mounting Self-Aligning Ball Bearing

Position adapter sleeve (less locknut and lockwasher) on the shaft in the correct position for the proposed bearing mounted center line. A light smear of clean spindle oil applied to the sleeve outside diameter, results in easier mounting and removal of bearing.

Mount bearing on adapter with the large bore side of the inner ring to match the taper on the outside diameter of the adapter. With bearing hand tight on the adapter, relocate if necessary, the bearing and the adapter to the proper axial location on the shaft. Do not apply lockwasher. Drive up procedure could damage it. To avoid damage to the bearing it is most important during this subsequent operation that the shaft is blocked up so the bearing is not loaded.

Apply the locknut with the chamfered face toward the bearing after lubricating the face of the locknut next to the bearing. Hand tighten the nut with the spanner wrench until the adapter sleeve can neither be moved axially, nor rotated on the shaft. Then with the hammer hit the hook wrench until the locknut has been turned 90° or 1/4 turn on the adapter sleeve (varies with size).

Caution: A loose adapter sleeve can lead to the inner ring turning on the adapter sleeve and/or the adapter sleeve turning on the shaft. To insure that the nut is not excessively tight, make certain the outer ring of the bearing rotates freely.

When mounting a normal fit bearing, swiveling the outer ring will result in a slight drag. If the bearing is a C3 fit, the outer ring will swivel freely. Remove locknut and mount lockwasher with inner prong located in the slot provided in the adapter and the tabs on washer O.D. leaning away from the bearing. Re-apply locknut and tighten until firmly seated against lockwasher. Find lockwasher tab nearest one of the slots in the locknut. If slot is past tab, do not loosen nut, but tighten until a tab can be bent into a slot.

Cylindrical Bore Mounting Self-aligning Ball or Spherical Roller Bearings

Small bearings up to bore size 50mm (2in.)

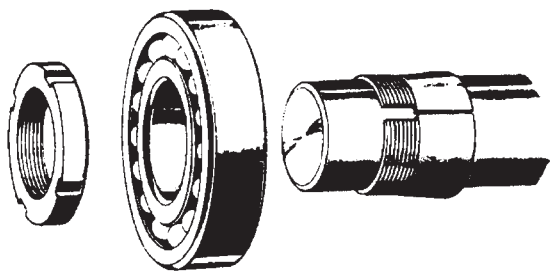
Apply a coat of light oil to the shaft and bearing bore. Fit a clean tube with one end squared and bore slightly larger than the bearing bore, against the bearing inner ring. With the bearing square on the shaft, apply pressure using a press. The bearing must be seated firmly against the shaft shoulder.

Mount lockwasher with inner prong located in the key slot provided in the shaft and tabs on washer O.D. leaning away from the bearing. Apply locknut with face lubricated, tighten with appropriate wrench until all components are locked up solid to shaft shoulder. It may be necessary to further tighten the nut to engage a washer tab with a slot in the nut. A very small movement of the nut will usually align a tab with a slot.

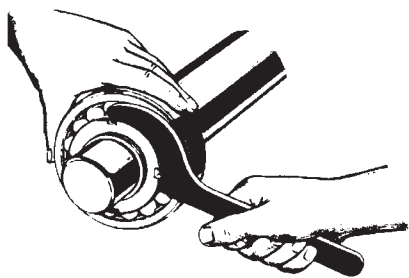
Large Bearings-Bore Size 50mm (2in) and larger

These bearings are not easily pressed on a shaft, and should therefore be heated using an induction heater, hot plate or temperature controlled oven. On very large bearings it may be necessary to use an "oil bath" using a 10%-15% mixture of soluble oil in water to approximately 100°C maximum. The bearing must be on supports to isolate it from direct contact with bottom of the tank, thereby preventing the possibility of localized overheating which could result in bearing damage. Never use an open flame to heat the bearing. Mount the bearing on the shaft firmly against the shoulder, immediately applying the locknut and tighten to prevent the bearing shrinking away from its proper position against the shoulder. When the bearing has cooled, remove the locknut and mount the lockwasher with inner prong located in the key slot provided in the shaft and the prongs on the O/D facing away from the bearing. Apply the locknut with the face lubricated and tighten with appropriate wrench until all components are locked up solid to shaft shoulder. It may be necessary to further tighten the nut to engage a washer tab with a slot in the nut, enabling the tab to be bent down into the slot in the nut. A very small movement of the nut will usually align these.

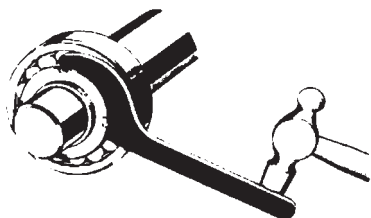
Recommended Method for Mounting Bearings



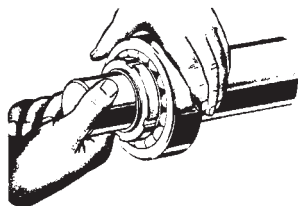
Place the bearing on the sleeve and screw on the nut with the nut chamfer toward the bearing. Tighten the nut just enough to ensure that the bearing and shaft make contact with the sleeve, but do not tighten to drive the bearing further up the sleeve.



Turn the nut with a hook spanner according to the illustration.



To achieve the right fit, turn the nut through the angle α . Then reposition the spanner 180° and tighten a few more degrees by rapping on the spanner with a hammer. SKF has a set of lock nut spanners which are clearly marked with the correct tightening gauge.



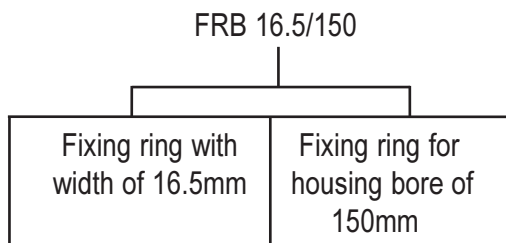
For a self-aligning bearing with normal clearance, the drive-up is correct when the outer ring easily rotates but resists swiveling. If the nut is placed inboard of the bearing, the locking washer must be mounted together with the nut. Lubricate the surfaces that slide against each other during tightening.

Special Note on Location of Bearings in Pillow Blocks

If the bearing is to be held (located), fixing rings are inserted between the side faces of the outer ring and the housing shoulders. If an adapter sleeve is used to secure the bearing to the shaft and only one fixing ring is required, it should be placed on the same side of the bearing as the locknut. The bearing is then displaced from its central position in the housing by a distance equal to half the fixing ring width.

- 1 ring - on the **same side as the sleeve nut**
- 2 rings - one on each side of the bearing
- 3 rings - two on the **same side as the sleeve nut**
- 4 rings - two on each side of the bearing

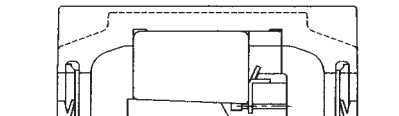
Example:



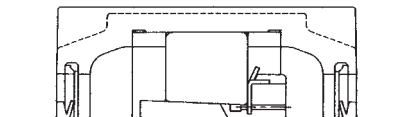
Note:

As opposed to a held bearing - a free bearing is mounted without fixing rings. The bearing positioned in the centre of the bearing seat in the pillow block housing will ensure proper lubrication as well as shaft expansion and contraction.

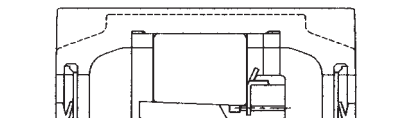
1 RING



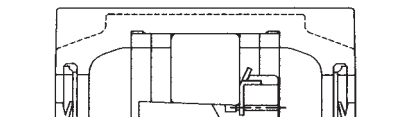
2 RINGS
STANDARD



3 RINGS

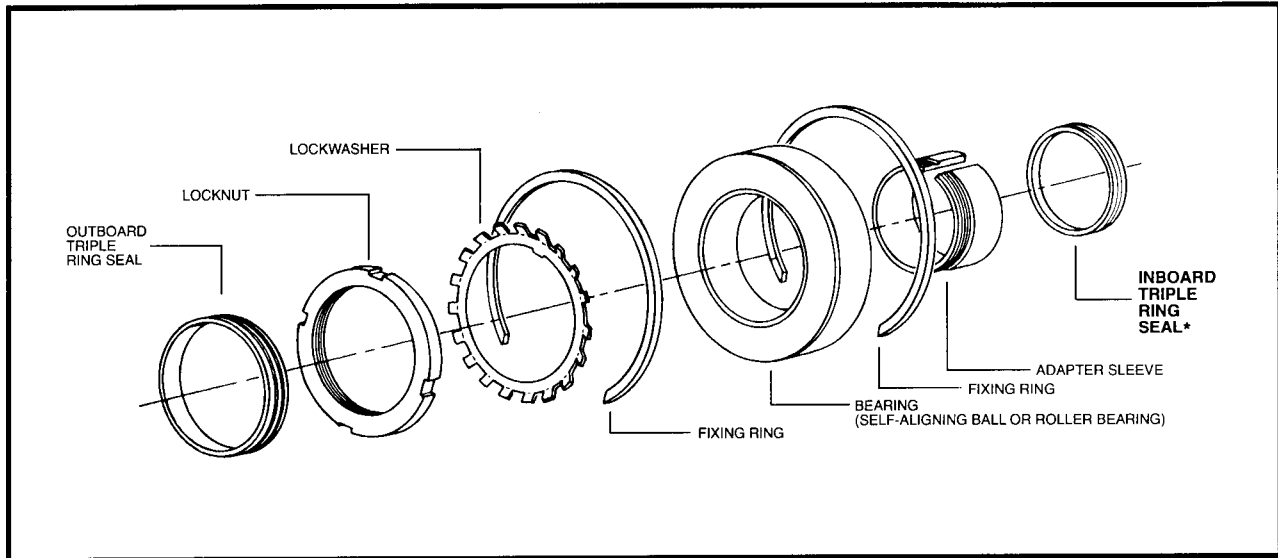


4 RINGS

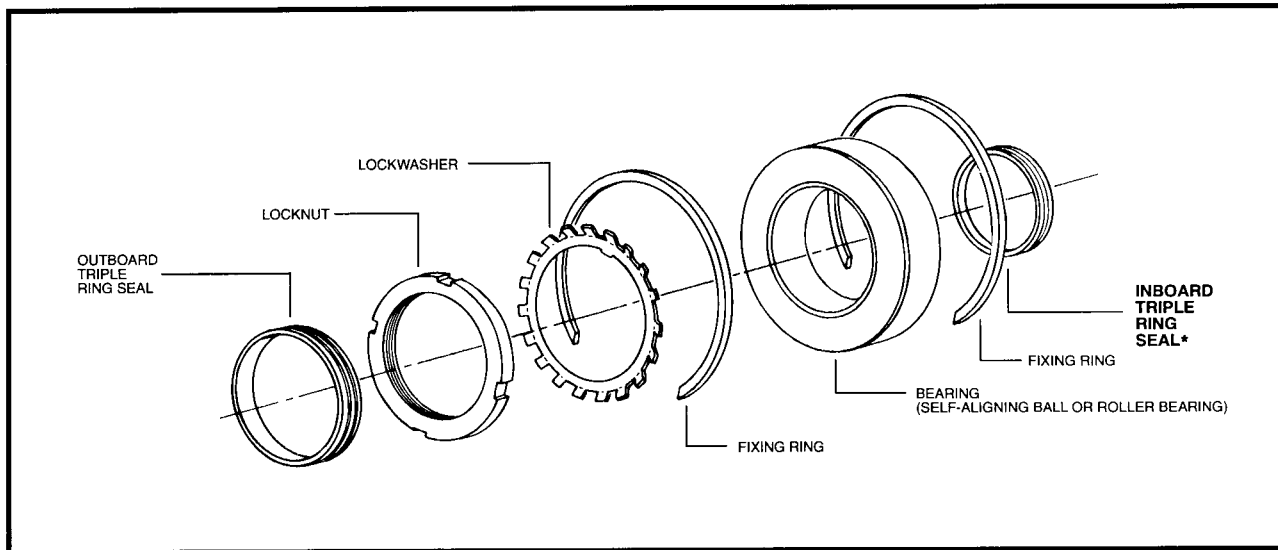


Basic Procedures For Mounting Bearings

Adapter Sleeve Mounting



Cylindrical Bore Mounting

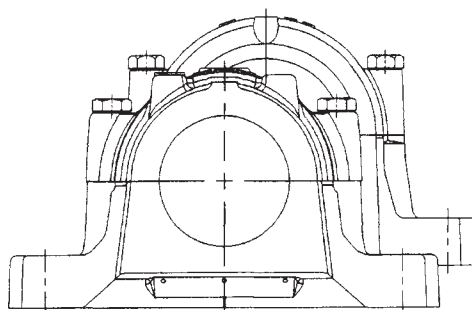


* Note: Do not forget to mount this seal ring first!



PILLOW BLOCK HOUSINGS

SNL, SSNHD



MATERIAL

SNL: cast iron GG20 (ISO/DIS 185 grade 200) SSNHD: Ductile iron

BEARING SERIES
USED

12K, 12EK, 13K, 22K, 22EK, 23K, 222CCK, 222EK, 223CCK, 223EK
C 22K, C 23K, C 32K

SHAFT SIZE RANGE

3/4" to 5-1/2"

20mm to 140mm

PILLOW BLOCK SIZE

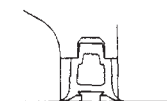
505 - 532 (adapter mounting)

PILLOW BLOCK
LUBRICATION

Grease (for oil lubrication consult SKF)

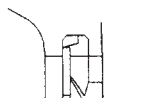
STANDARD SEALS

TSN-G

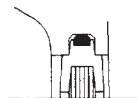


OPTIONAL SEALS

TSN-A



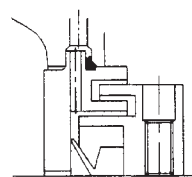
TSN-C



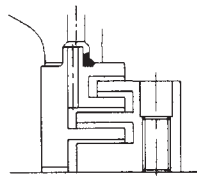
TSN-S



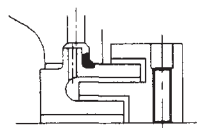
TSNC-D



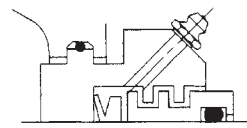
TSNC-E



TSNC/MC17



Taconite TSN-ND

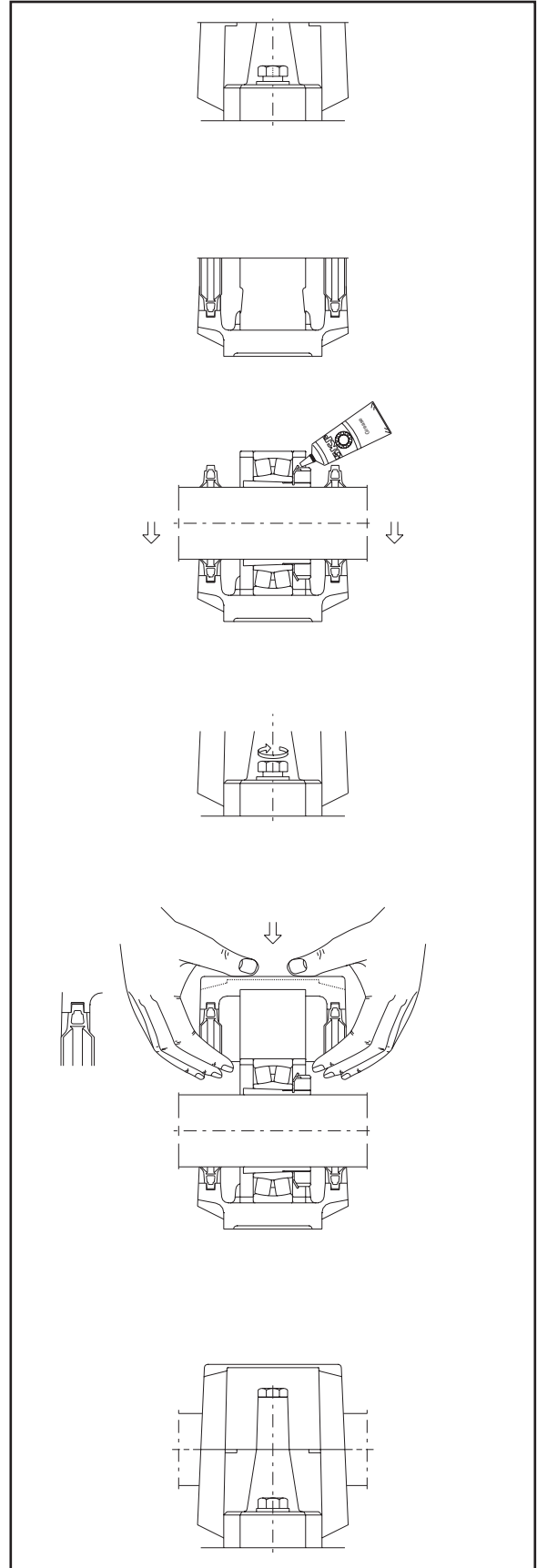


Note : Pillow Block SNL & SSNHD must be modified to MC106 when using TSNC-D & E for sizes 520 through 532 and TSNC/MC17 for sizes 515 through 518.

Seal assembly and Mounting Procedure

G-Type Seal

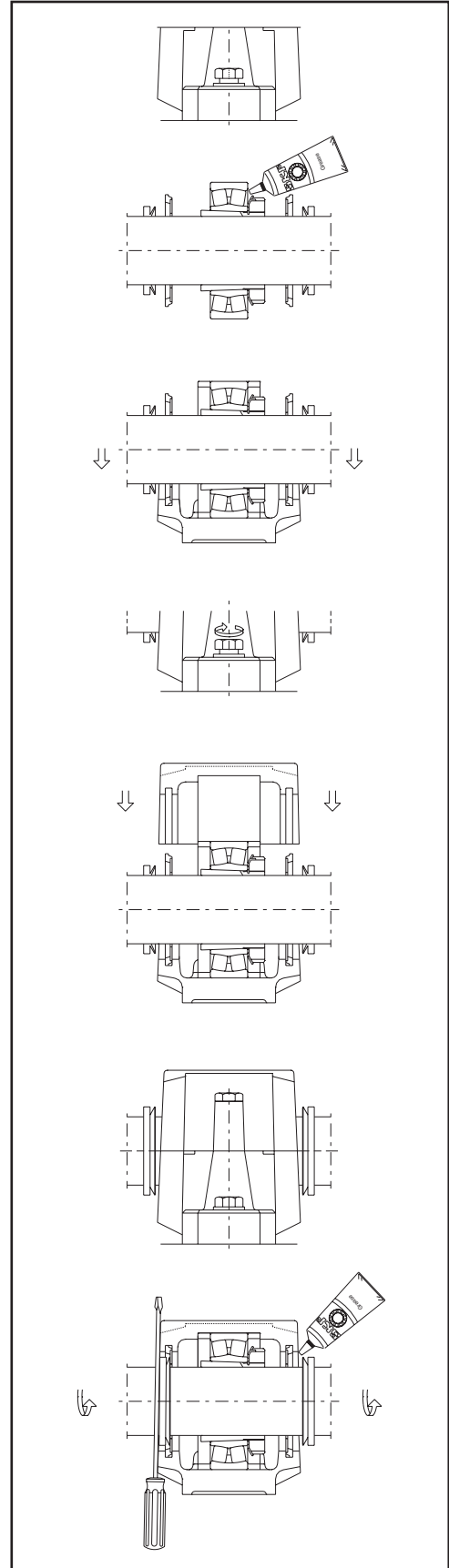
1. The housing base is placed in position and the mounting bolts loosely fitted.
2. The halves of the seals are inserted in the housing grooves and the spaces between the lips of the seals are filled with grease.
3. The bearing is mounted on the shaft (directly or on an adapter sleeve) and filled with grease.
4. The shaft, complete with bearing assembly, is placed in the lower half of the housing.
5. For held unit, fixing rings are placed in position. For free unit, bearing must be located in center of bearing seat of housing for proper lubrication.
6. The housing base is checked for alignment, ensuring that it is within acceptable limits, and the mounting bolts are then slightly tightened.
7. The other halves of the seals are inserted in the cap and the space between the lips of the seals filled with grease. For sizes 528-532 and 616-620 the seal halves must be turned so that the spigots fit in the holes of the connecting seal halves.
8. At the first charge of grease, the bearing **MUST** be filled with grease (do not wash out the protective coating) and the housing will be filled one-third full. For greasing quantities, refer to Page 40.
9. The housing cap is fitted and the cap bolts tightened to the recommended torque, see table on Pages 26 through 37. Note that the cap **must not be interchanged** with that of other housings.
10. Finally the housing mounting bolts are tightened to the support.



Seal Assembly and Mounting Procedure

V-Ring Seal Type “A”

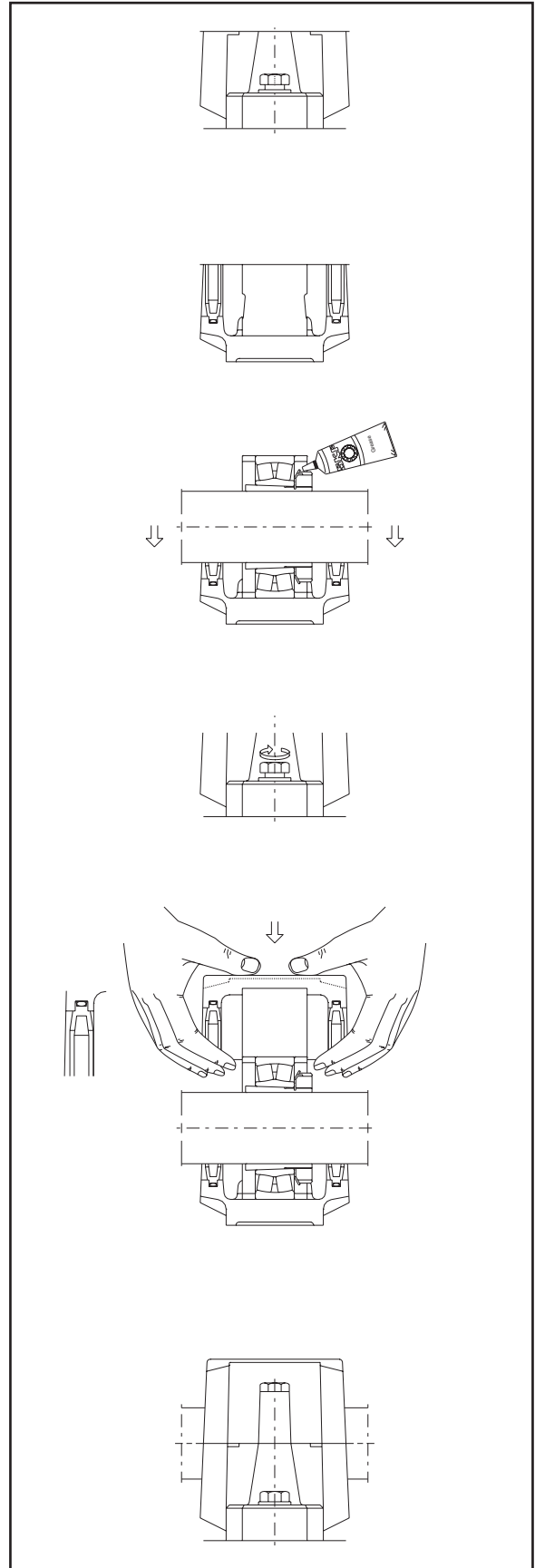
1. The housing base is placed in position and the mounting bolts loosely fitted.
2. One V-ring and one sheet metal washer are placed on the shaft. Care should be taken to position these correctly in relation to the housing. Do not allow the V-ring seal lip to pass through the sheet metal washer.
3. The bearing is mounted on the shaft (directly or on an adapter sleeve) and filled with grease.
4. The second V-ring and sealing washer are placed on the shaft.
5. The shaft, complete with bearing assembly and sealing components, is placed in the lower half of the housing.
6. For held unit, fixing rings are placed in position. For free unit, bearing must be located in center of bearing seat of housing for proper lubrication.
7. The housing base is checked for alignment, ensuring that it is within acceptable limits, and the mounting bolts are then slightly tightened.
8. At the first charge of grease, the bearing must be filled with grease (do not wash out the protective coating) and the housing will be filled one-third full. For greasing quantities, refer to Page 40.
9. The housing cap is fitted and the cap bolts tightened to the recommended torque, see table on Pages 26 through 37. Note that the cap **must not be interchanged** with that of another housing.
10. The mounting bolts are tightened to the support.
11. The outer surfaces of the sealing washers are smeared with grease.
12. Finally the V-rings are pushed axially along the shaft until their sealing lips are aligned and in the correct working position relative to the sealing washer. The simplest way to move the V-rings is to use a screwdriver blade while rotating the shaft by hand. V-ring seals may be used for oil lubrication. The assembly shown at the right is for grease. When V-rings are used for oil, the seals are doubled up. Consult SKF for more detail.



Seal Assembly and Mounting Procedure

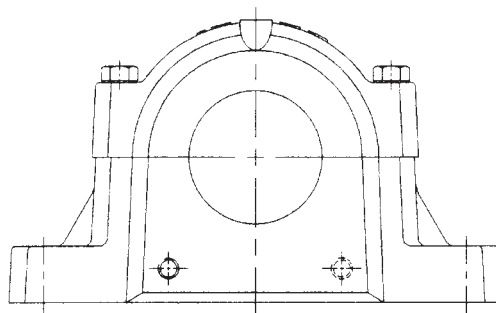
Felt Seal Type “C”

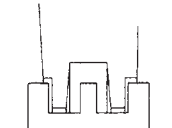
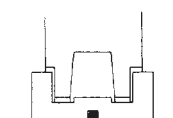
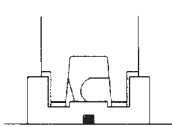
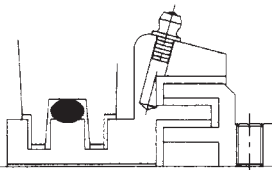
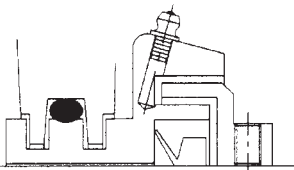
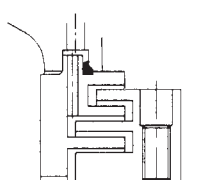
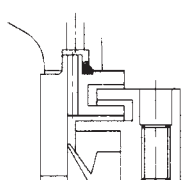
1. The housing base is placed in position and the attachment bolts loosely fitted.
2. The rubber O-section cords are placed in the grooves in the housing base.
3. The halves of the alloy ring with felt seals are mounted on the O-section cords in the grooves of the housing base.
4. The bearing is mounted on the shaft (directly or on an adapter sleeve) and filled with grease.
5. The shaft, complete with bearing assembly, is placed in the lower half of the housing.
6. For held unit, fixing rings are placed in position. For free unit, bearing must be located in center of bearing seat of housing for proper lubrication.
7. The housing base is checked for alignment, ensuring that the housing is within acceptable limits, and the mounting bolts are then slightly tightened.
8. The rubber O-section cords are placed in the grooves in the housing cap.
9. The felt seals with the light alloy rings are mounted on the O-section cords in the grooves of the housing cap.
10. At the first charge of grease, the bearing **MUST** be filled with grease (do not wash out the protective coating) and the housing will be filled one-third full. For greasing quantities, refer to Page 40.
11. The housing cap is fitted and the cap bolts tightened to the recommended torque, see table on Pages 26 through 37. The seals in the housing cap are held in position while the cap is fitted on the housing base. Note that the cap **must not be interchanged** with that of another housing.
12. Finally, the mounting bolts are tightened to the support.



PILLOW BLOCK HOUSINGS

SAFD, FSAFD



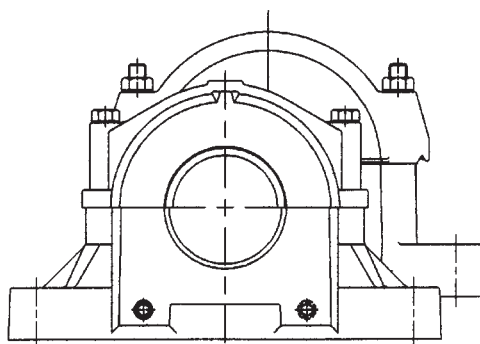
MATERIAL	Ductile Iron ASTM A536 grade 65-45-12		
BEARING SERIES USED	12K, 12EK, 22K, 22EK, 222CCK, 222EK, 232CCK		
SHAFT SIZE RANGE	1-3/16" to 8"	30mm to 203mm	
PILLOW BLOCK SIZE	507 - 544 (adapter mounting)		
PILLOW BLOCK LUBRICATION	Grease or Oil		
STANDARD SEALS	LER 		LOR 
	LORC 	TER-C 	TER-CV 
OPTIONAL SEALS	A-9508/LER 	TSNC-E 	TSNC-D 

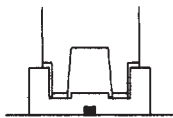
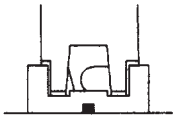
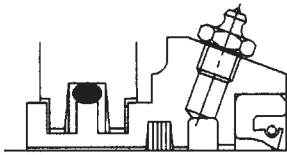
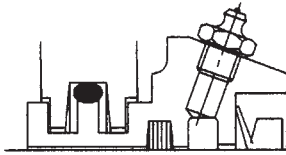
Note : Pillow Block SAFD & FSAFD must be modified to MC14 when using TSNC-D & E type seals sizes 520 through 532. Metric LOR & LORC seals are not available.



PILLOW BLOCK HOUSINGS

SAF, FSAF, SAFS, FSAFS

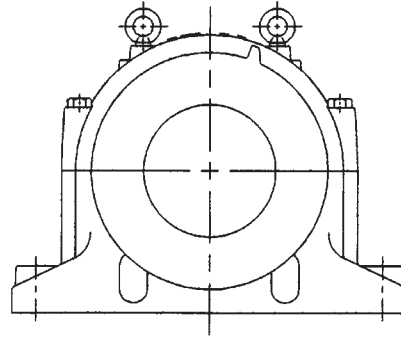


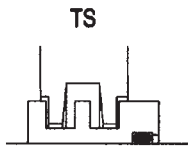
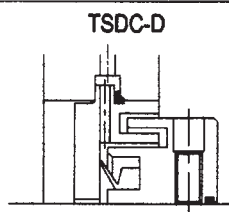
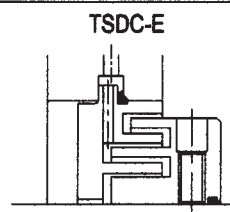
MATERIAL	SAF cast iron ASTM A48 grade 35 SAFS cast steel ASTM A27 grade 65-35		
BEARING SERIES USED	12K, 12EK, 13K, 13EK, 222CCK, 222EK, 223CCK, 230CCK, 230CAK		
SHAFT SIZE RANGE	1-3/8" to 10-1/2"		
PILLOW BLOCK SIZE	024 - 056 (adapter mounting) 507 - 544 (adapter mounting) 609 - 640 (adapter mounting)		
PILLOW BLOCK LUBRICATION	Grease or Oil		
STANDARD SEALS	LOR 		
OPTIONAL SEALS	LORC 	TER 	TER-V 



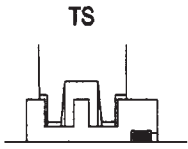
PILLOW BLOCK HOUSINGS

SD, SDCD, SDCD/MC14



MATERIAL	Ductile Iron ASTM A536 grade 65-45-12	
BEARING SERIES USED	230CCK, 231CCK, 232CCK	
SHAFT SIZE RANGE	5-15/16" to 16.142"	150mm to 410mm
PILLOW BLOCK SIZE	3036 - 3088 (adapter mounting) 3134 - 3188 (adapter mounting) 3234 - 3280 (adapter mounting)	
PILLOW BLOCK LUBRICATION	Grease or Oil	
STANDARD SEALS		
OPTIONAL SEALS		

Note : Pillow Block SDCD must be modified to MC14 when using TSDC-D & E type seals.

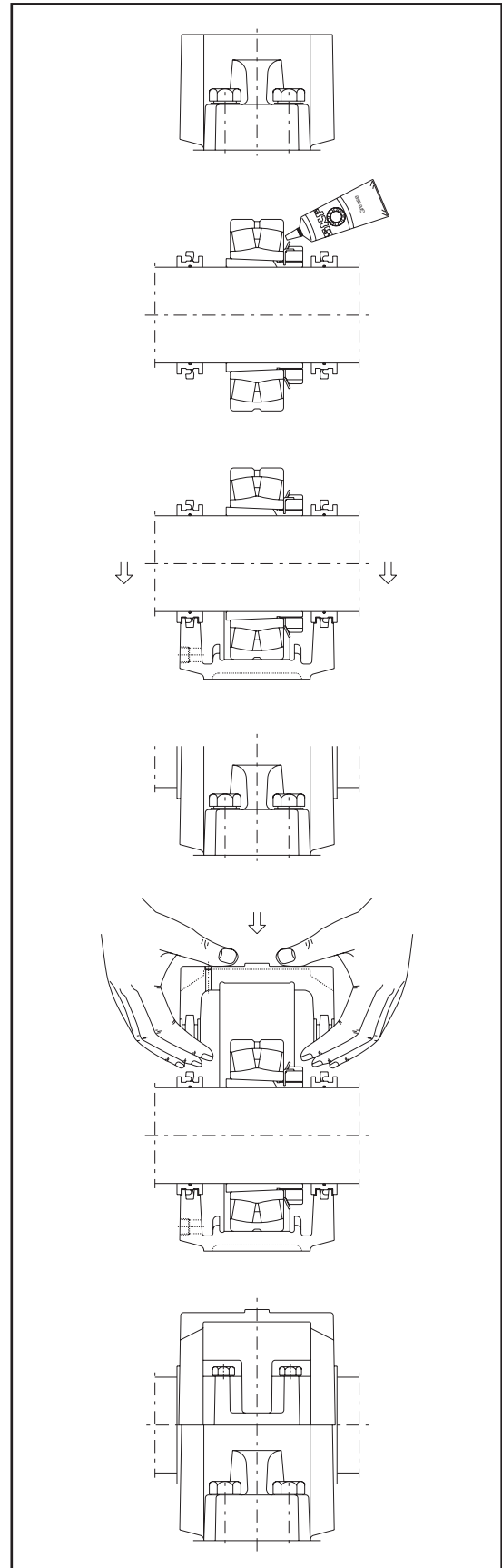
MATERIAL	Grey cast iron GG 25 (ISO/DIS 185 grade 250)	
BEARING SERIES USED	231CCK,	
SHAFT SIZE RANGE	5-15/16" TO 11.811"	150mm TO 300mm
PILLOW BLOCK SIZE	3134 - 3164 (adapter mounting)	
PILLOW BLOCK LUBRICATION	Grease or Oil	
STANDARD SEAL		

Seal Assembly And Mounting Procedure

Triple Ring Seal “LOR, LORC and A 9508/LER”

1. The housing base is placed in position and the mounting bolts loosely fitted.
2. One labyrinth seal is placed on the shaft.
3. The bearing is mounted on the shaft (directly or on an adapter sleeve) and filled with grease.
4. The second labyrinth seal is placed on the shaft.
5. The shaft, complete with bearing assembly and labyrinth seals, is placed in the lower half of the housing.
6. For held unit, fixing rings are placed in position. For free unit, bearing must be located in center of bearing seat of housing for proper lubrication.
7. The housing base is checked for alignment, ensuring that it is within acceptable limits, and the mounting bolts are then slightly tightened.
8. At the first charge of grease, the bearing **MUST** be filled with grease (do not wash out the protective coating) and the housing will be filled one-third full. For greasing quantities, refer to Page 40.
9. The housing cap is fitted and the cap bolts tightened to the recommended torque, see table on Pages 26 through 37. Note that the cap **must not be interchanged** with that of another housing.
10. The mounting bolts are tightened to the support.
11. Finally the silicon O-ring is placed in the grooves of the labyrinth seals. The simplest way to mount the O-ring is to use a screwdriver blade while rotating the shaft by hand.
12. For the LORC seal insert the inboard LOR seal with the added sealing component assuring that the rubber sealing component is facing in the correct orientation to make it either purgeable or non-purgeable.

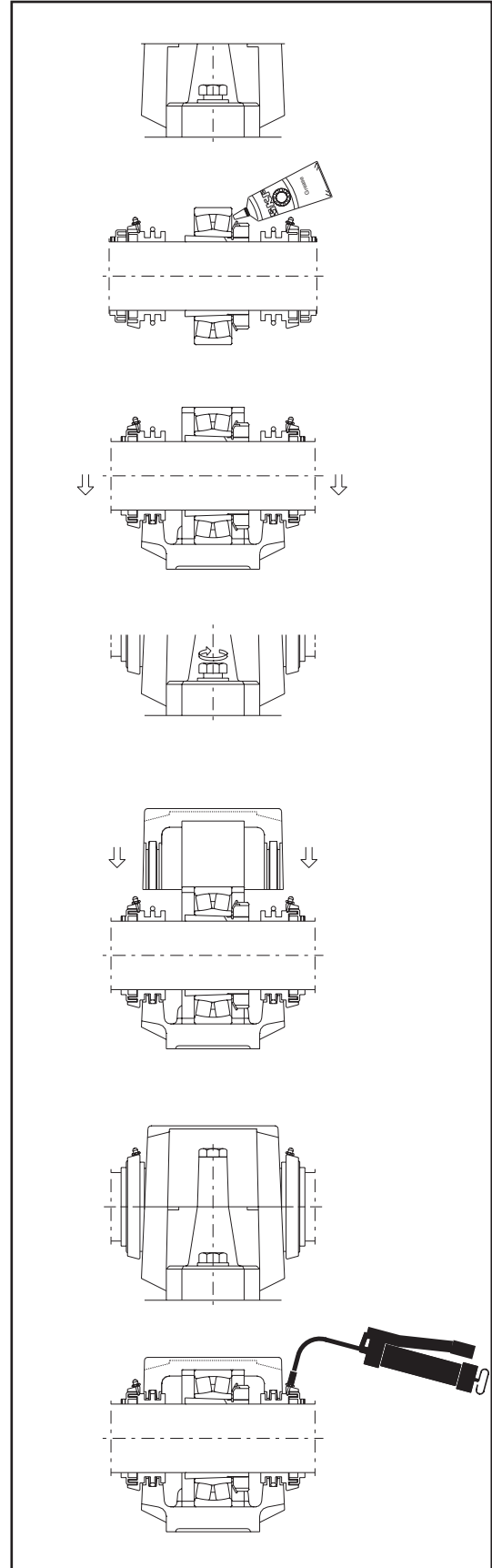
NOTE: Instruction 11 is only required for A9508/LER Labyrinth Seal.



Seal Assembly and Mounting Procedure

Labyrinth Seals Type “TER-C”

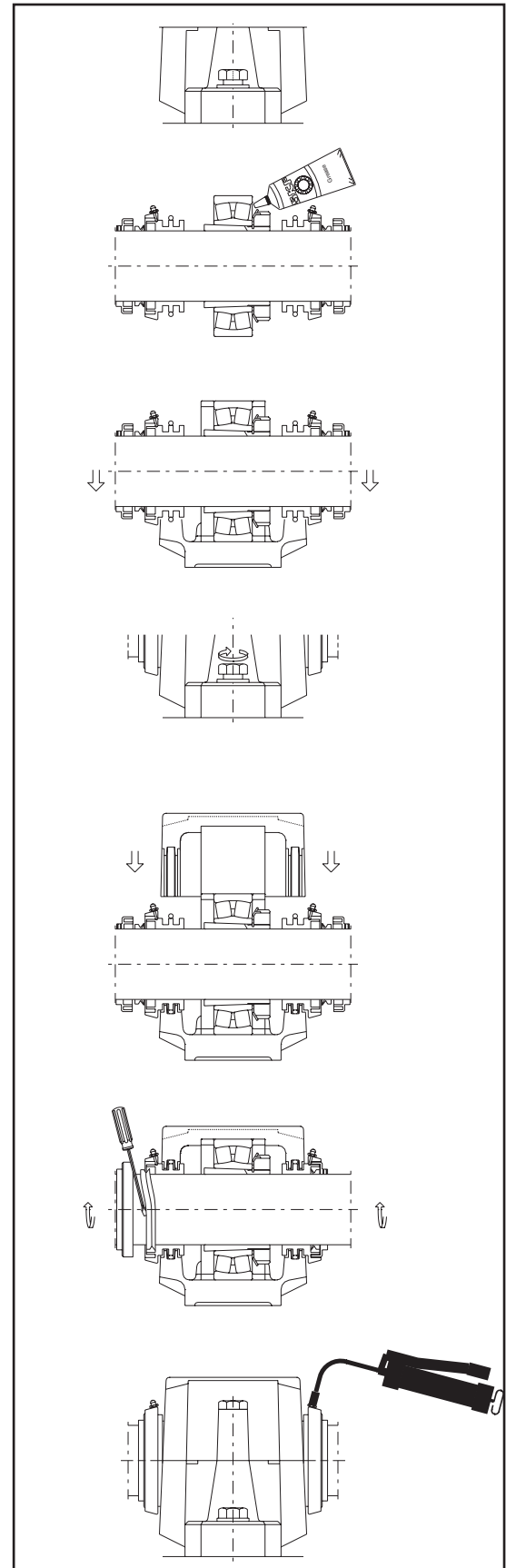
1. The housing base is placed in position and the mounting bolts loosely fitted.
2. Slide one labyrinth seal, consisting of labyrinth flinger, with prongs pointed towards bearing location and labyrinth insert with O-ring installed on its O.D., in this order, on the shaft.
3. The bearing is mounted on the shaft (directly or on an adapter) and filled with grease.
4. The second labyrinth seal is placed on the shaft following instruction as described above under 2 except reverse sequence.
5. The shaft, complete with bearing assembly and labyrinth seal assemblies, is placed in the lower half of the housing.
6. For held unit, fixing rings are placed in position. For free unit, bearing must be located in center of bearing seat of housing for proper lubrication.
7. The housing base is checked for alignment, ensuring that is within acceptable limits, and the mounting bolts are then slightly tightened.
8. The housing must be filled 1/3 full with grease, by packing the free space on both sides of the bearing. See page 40. (Do not wash out the protective coating).
9. The housing cap is fitted, being careful not to damage the O-rings on the O.D. of the seal rings, and the cap bolts tightened to the recommended torque, see Tables on Pages 26 through 37. Note that the cap **must not be interchanged** with that of another housing. Also if shimming is required, only shims giving full mounting support must be used.
10. The mounting bolts are tightened to the support.
11. Fill seal labyrinth on insert and flinger with grease.
12. To adjust labyrinth seal flingers, move the flingers axially toward housing till they contact insert. Back flinger off 1/16" (1.6 mm) on “HELD” assembly. For “FREE” assembly back off the amount of the expected shaft expansion plus 1/32" (0.8 mm). Tighten the setscrews.



Seal Assembly and Mounting Procedure

Labyrinth Seals Type “TER-CV”

1. The housing base is placed in position and the mounting bolts loosely fitted.
2. Slide one labyrinth seal, consisting of labyrinth flinger and a V-ring. Note: Make sure seal lip of V-ring is away from flinger. Point prongs of flinger and V-ring towards bearing location. Slide labyrinth insert with O-ring installed on its O.D., in this order, on the shaft.
3. The bearing is mounted on the shaft (directly or on an adapter) and filled with grease.
4. The second labyrinth seal is placed on the shaft following instruction as described above under 2, except reverse sequence.
5. The shaft, complete with bearing assembly and labyrinth seal assemblies, is placed in the lower half of the housing.
6. For held unit, fixing rings are placed in position. For free unit, bearing must be located in center of bearing seat of housing for proper lubrication.
7. The housing base is checked for alignment, ensuring that it is within acceptable limits, and the mounting bolts are then slightly tightened.
8. The housing must be filled 1/3 full with grease, by packing the free space on both sides of the bearing. See page 40. (Do not wash out the protective coating).
9. The housing cap is fitted, being careful not to damage the O-rings on the O.D. of the seal inserts, and the cap bolts tightened to the recommended torque, see Table on Pages 26 through 37. Note that the cap **must not be interchanged** with that of another housing.
10. The mounting bolts are tightened to the support.
11. Fill seal labyrinth on insert and flinger with grease.
12. To adjust labyrinth seal flingers, move the flingers axially toward housing till they contact insert. Back flinger off 1/16" (1.6 mm) on "HELD" assembly. For "FREE" assembly back off the amount of the expected shaft expansion plus 1/32" (0.8 mm). Tighten the set screws.



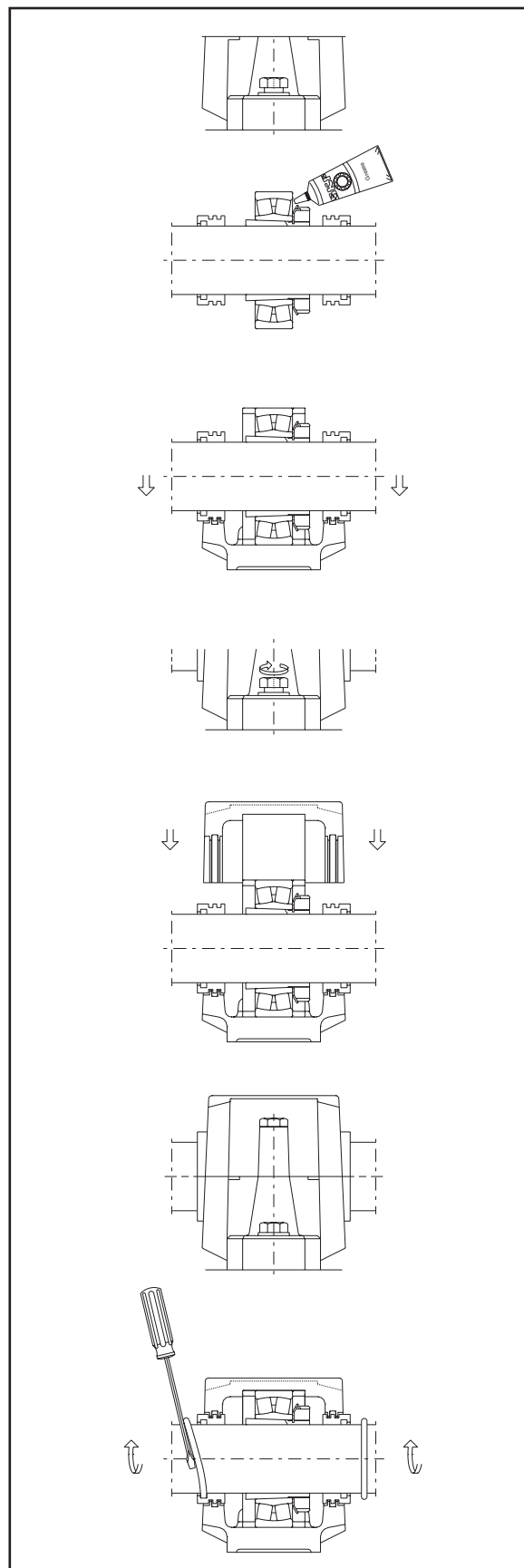
Seal Assembly and Mounting Procedure

Labyrinth Seal Type “S” and “TS”

1. The housing base is placed in position and the Mounting bolts loosely fitted.
2. One labyrinth seal is placed on the shaft.
3. The bearing is mounted on the shaft (directly or on an adapter sleeve) and filled with grease.
4. The second labyrinth seal is placed on the shaft.
5. The shaft, complete with bearing assembly and labyrinth seals, is placed in the lower half of the housing.
6. For held unit, fixing rings are placed in position. For free unit, bearing must be located in center of bearing seat of housing for proper lubrication.
7. The housing base is checked for alignment, ensuring that it is within acceptable limits, and the mounting bolts are then slightly tightened.
8. At the first charge of grease, the bearing **MUST** be filled with grease (do not wash out the protective coating) and the housing will be filled one-third full.
* For greasing quantities, refer to Page 40.
9. The housing cap is filled and the cap bolts tightened to the recommended torque, see Table on Pages 26 through 37. Note that the cap **must not be interchanged** with that of another housing.
10. The mounting bolts are tightened to the support.
11. Finally the silicon O-section cords are placed in the grooves of the labyrinth seals. The simplest way to mount the cords is to use a screwdriver blade while rotating the shaft by hand.

NOTE: Type S is used with SNH and SSNHD.
Type TS is used with SD, SDGD, SDCT and SDHD.

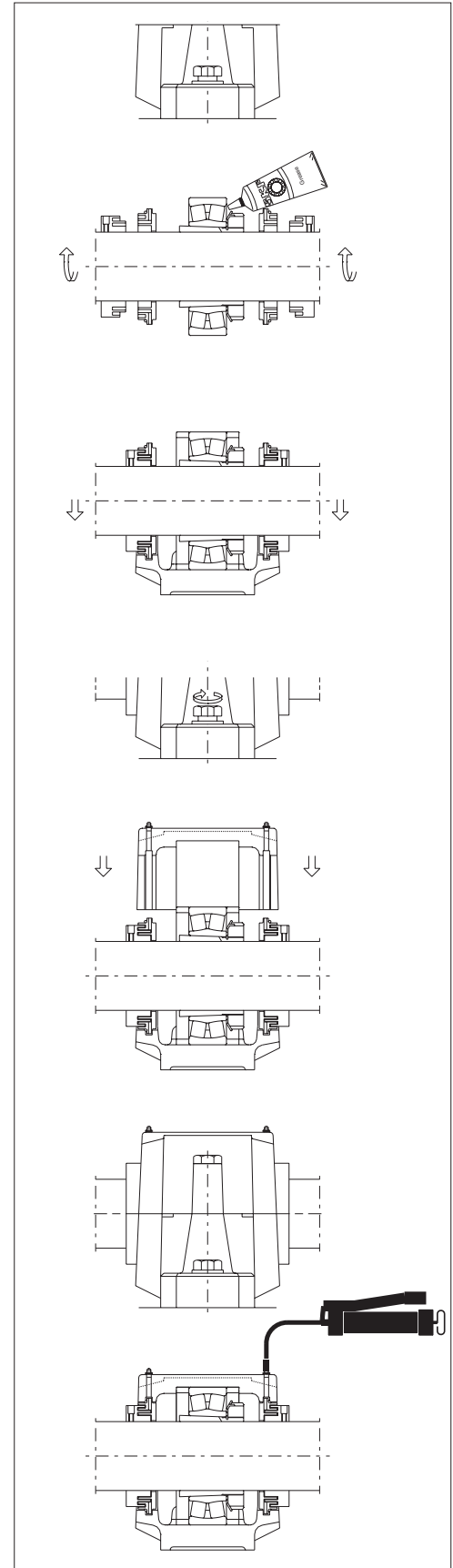
*The initial charge can be increased to half-full for slow to moderate speeds. For slower applications less than 10 rpm consult SKF Engineering Dept.



Seal Assembly and Mounting Procedure

Labyrinth Seals Type “E”

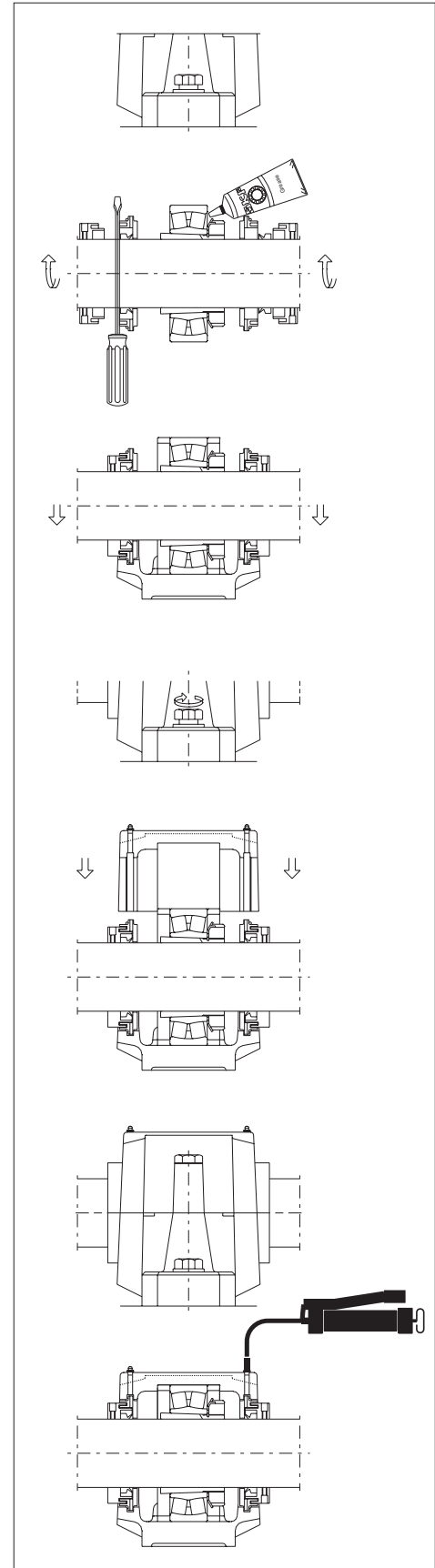
1. The housing base is placed in position and the mounting bolts loosely fitted.
2. Slide one labyrinth seal, consisting of labyrinth flinger, with prongs towards bearing location and labyrinth insert with O-ring installed on its O.D., in this order, on the shaft.
3. The bearing is mounted on the shaft (directly or on an adapter) and filled with grease.
4. The second labyrinth seal is placed on the shaft following instruction as described above under 2.
5. The shaft, complete with bearing assembly and labyrinth seal assemblies, is placed in the lower half of the housing.
6. For held unit, fixing rings are placed in position. For free unit, bearing must be located in center of bearing seat of housing for proper lubrication.
7. The housing base is checked for alignment, ensuring that it is within acceptable limits, and the mounting bolts are then slightly tightened.
8. At the first charge of grease, the bearing **MUST** be filled with grease. See page 40. (do not wash out the protective coating) the housing will be filled one-third full.
9. The housing cap is fitted, being careful not to damage the O-rings on the O.D. of the seal inserts, and the cap bolts tightened to the recommended torque, see Table on Pages 26 through 37. Note that the cap **must not be interchanged** with that of another housing.
10. The mounting bolts are tightened to the support.
11. To adjust labyrinth seal flingers, move the flingers axially toward housing until they contact insert. Back flinger off $1/16"$ (1.6 mm) on “HELD” assembly. For “FREE” assembly back off the amount of the expected shaft expansion plus $1/32"$ (0.8mm). Tighten the setscrews which secure the flingers on the shaft. To complete the assembly in the case of SDCD housings with these labyrinth seal assemblies, take one half of the 4 mm rubber cord supplied and insert it in the counter bore of each flinger bore adjacent to the outer face.
12. At the initial startup, with shaft rotating, lubricate seals through grease fitting until a bead of grease appears around the periphery of the flingers. NOTE: Use same grease as for lubrication of bearing.



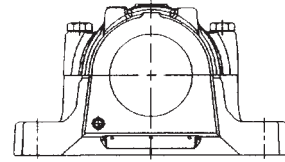
Seal Assembly and Mounting Procedure

Labyrinth Seals Type “D”

1. The housing base is placed in position and the mounting bolts loosely fitted.
2. Slide one labyrinth seal, consisting of labyrinth flinger and a V-ring.
Note: Make sure seal lip of V-ring is away from flinger. Point prongs of flinger and V-ring towards bearing location. Slide labyrinth insert with O-ring installed on its O.D., in this order, on the shaft.
3. The bearing is mounted on the shaft (directly or on an adapter) and filled with grease.
4. The second labyrinth seal is placed on the shaft following instruction as described above under 2.
5. The shaft, complete with bearing assembly and labyrinth seal assemblies is placed in the lower half of the housing.
6. For held unit, fixing rings are placed in position. For free unit, bearing must be located in center of bearing seat of housing for proper lubrication.
7. The housing base is checked for alignment, ensuring that is within acceptable limits, and the mounting bolts are then slightly tightened.
8. At the first charge of grease, the bearing **MUST** be filled with grease. See page 40. (do not wash out the protective coating) the housing will be filled one-third full.
9. The housing cap is fitted, being careful not to damage the O-rings on the O.D. of the seal inserts, and the cap bolts tightened to the recommended torque, see Pages 26 through 37. Note that the cap **must not be interchanged** with that of another housing.
10. The mounting bolts are tightened to the support.
11. To adjust labyrinth seal flingers, move the flingers axially toward housing till they contact insert. Back flinger off $1/16"$ (1.6 mm) on “HELD” assembly. For “FREE” assembly back off the amount of the expected shaft expansion plus $1/32"$ (0.8 mm). Tighten the set screws which secure the flingers on the shaft. To complete the assembly in the case of SDCD housings with these labyrinth seal assemblies, take one half of the 4 mm rubber cord supplied and insert it in the counter bore of each flinger bore adjacent to the outer face.
12. At the initial start up, with shaft rotating, lubricate seals through grease fitting until a bead of grease appears around the periphery of the flingers. NOTE: Use same grease as for lubrication of bearing.

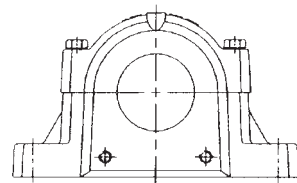


Series: SNL 500 - 600, SNL 200 - 300
SSNHD 500 - 600, SSNHD 200 - 300



Suffix -VU Housing Size	Cap Bolt Information				Lubrication Fitting Hole Detail		Base or Attachment bolts Qty (2) or (4) inch/metric
	Size Qty. (2)	Recommended Tightening Torque		Grade			
	Metric	Ft/Lbs.	Nm	Metric ISO	Cap In	Base Out	
505 205	M10	37	50	8.8	$\frac{1}{8}$ -27 NPSF M10 x 1 R $\frac{1}{8}$ May also be used in the same hole	$\frac{1}{8}$ NPT	(2) $\frac{1}{2}$ "/12 mm (4) $\frac{3}{8}$ "/10 mm
506 - 605 206							
507 - 606 207							
508 - 607 208							
509 209							
510 - 608 210							
511 - 609 211							
512 - 610 212	M12	60	80	8.8		$\frac{1}{8}$ NPT	(2) $\frac{5}{8}$ "/16 mm (4) $\frac{1}{2}$ "/12 mm
513 - 611 213							
515 - 612 215							
516 - 613 216 517 217	M12	60	80	8.8	$\frac{1}{8}$ NPT	(2) $\frac{3}{4}$ "/20 mm (4) $\frac{5}{8}$ "/16 mm	
518 - 615 218 519 - 616	M16	110	150	8.8	$\frac{1}{8}$ NPT	(2) $\frac{3}{4}$ "/20 mm (4) $\frac{5}{8}$ "/16 mm	
520 - 617 522 - 619 524 - 620	M20	150	200	8.8	$\frac{1}{4}$ NPT	(2) $\frac{7}{8}$ "/24 mm (4) $\frac{5}{8}$ "/16 mm	
526	M24	260	350	8.8	$\frac{3}{8}$ NPT	(2) 1"/24 mm (4) $\frac{3}{4}$ "/20 mm	
528 530 532	M24	260	350	8.8	$\frac{3}{8}$ NPT	(2) 1 $\frac{1}{4}$ "/30 mm (4) $\frac{7}{8}$ "/24 mm	

Series: **SAFD 500**
 SAFD 200



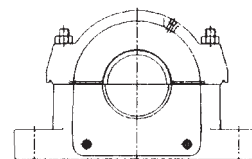
Housing Size	Cap Bolt Information				Lubrication Fitting Hole Detail		Base or Attachment bolts Qty (2) or (4) inch/metric
	Size Qty. (2) or (4)	Recommended Tightening Torque		Grade			
	Inch	Ft/Lbs.	Nm	SAE	Cap In	Base Out	
507	(2) $\frac{3}{8}$ - 16	40	55	8	$\frac{1}{8}$ NPT	$\frac{1}{4}$ NPT	(2) $\frac{1}{2}$ "/12 mm
509	(2) $\frac{7}{16}$ - 14	80	110	8	$\frac{1}{8}$ NPT	$\frac{1}{4}$ NPT	(2) $\frac{1}{2}$ "/12 mm
510	(2) $\frac{7}{16}$ - 14	80	110	8	$\frac{1}{8}$ NPT	$\frac{1}{4}$ NPT	(2) $\frac{1}{2}$ "/12 mm
511	(2) $\frac{1}{2}$ - 13	110	150	8	$\frac{1}{8}$ NPT	$\frac{1}{4}$ NPT	(2) $\frac{5}{8}$ "/16 mm
513	(2) $\frac{1}{2}$ - 13	110	150	8	$\frac{1}{8}$ NPT	$\frac{1}{4}$ NPT	(2) $\frac{5}{8}$ "/16 mm (4) $\frac{1}{2}$ "/12 mm
515 215	(2) $\frac{1}{2}$ - 13	110	150	8	$\frac{1}{8}$ NPT	$\frac{1}{4}$ NPT	(2) $\frac{5}{8}$ "/16 mm (4) $\frac{1}{2}$ "/12 mm
516 216	(2) $\frac{5}{8}$ - 11	220	300	8	$\frac{1}{8}$ NPT	$\frac{1}{4}$ NPT	(2) $\frac{3}{4}$ "/20 mm (4) $\frac{5}{8}$ "/16 mm
517 217	(2) $\frac{5}{8}$ - 11	220	300	8	$\frac{1}{8}$ NPT	$\frac{1}{4}$ NPT	(2) $\frac{3}{4}$ "/20 mm (4) $\frac{5}{8}$ "/16 mm
518 218	(4) $\frac{5}{8}$ - 11	220	300	8	$\frac{1}{8}$ NPT	$\frac{1}{4}$ NPT	(2) $\frac{3}{4}$ "/20 mm (4) $\frac{5}{8}$ "/16 mm
520 220	(4) $\frac{5}{8}$ - 11	220	300	8	$\frac{1}{4}$ NPT	$\frac{1}{2}$ NPT	(2) $\frac{7}{8}$ "/24 mm (4) $\frac{3}{4}$ "/20 mm
522 222	(4) $\frac{5}{8}$ - 11	220	300	8	$\frac{1}{4}$ NPT	$\frac{1}{2}$ NPT	(4) $\frac{3}{4}$ "/20 mm
524 224	(4) $\frac{5}{8}$ - 11	220	300	8	$\frac{1}{4}$ NPT	$\frac{1}{2}$ NPT	(4) $\frac{3}{4}$ "/20 mm
526 226	(4) $\frac{3}{4}$ - 10	380	520	8	$\frac{1}{4}$ NPT	$\frac{1}{2}$ NPT	(4) $\frac{7}{8}$ "/24 mm
528 228	(4) $\frac{7}{8}$ - 9	600	820	8	$\frac{1}{4}$ NPT	$\frac{1}{2}$ NPT	(4) $\frac{3}{4}$ "/20 mm
*530 230	(4) $\frac{7}{8}$ - 9	600	820	8	$\frac{1}{4}$ NPT	$\frac{1}{2}$ NPT	(4) 1"/24 mm
532 232	(4) $\frac{7}{8}$ - 9	600	820	8	$\frac{1}{4}$ NPT	$\frac{1}{2}$ NPT	(4) 1"/24 mm
534 234	(4) $\frac{7}{8}$ - 9	600	820	8	$\frac{1}{4}$ NPT	$\frac{3}{4}$ NPT	(4) 1"/24 mm
536 236	(4) $\frac{7}{8}$ - 9	600	820	8	$\frac{1}{4}$ NPT	$\frac{3}{4}$ NPT	(4) 1"/24 mm
538 238	(4) 1 - 8	900	1230	8	$\frac{1}{4}$ NPT	$\frac{3}{4}$ NPT	(4) 1 $\frac{1}{4}$ "/30 mm
540 240	(4) 1 - 8	900	1230	8	$\frac{1}{4}$ NPT	1NPT	(4) 1 $\frac{1}{4}$ "/30 mm
544 244	(4) 1 - 8	900	1230	8	$\frac{1}{4}$ NPT	1NPT	(4) 1 $\frac{1}{2}$ "/36 mm

Series: SAF 500

SAF 200

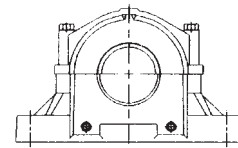
SAF 0

N-Design 4 Hex. head cap bolts.



N-Design Housing Size	Cap Bolt Information				Lubrication Fitting Hole Detail		Base or Attachment bolts Qty (2) or (4) inch/metric
	Size Qty. (4)	Recommended Tightening Torque		Grade			
	Inch	Ft/Lbs.	Nm	SAE	Cap In	Base Out	
518 218	1/2 - 13	50	70	2	1/8NPT	3/8NPT	(2) 3/4"/20 mm (2) 5/8"/16 mm
520 220 024	5/8 - 11	100	140	2	1/4NPT	3/8NPT	(2) 7/8"/24 mm (4) 3/4"/20 mm
522 222 026	5/8 - 11	100	140	2	1/4NPT	3/8NPT	(4) 3/4"/20 mm
524 224 028	5/8 - 11	100	140	2	1/4NPT	1/2NPT	(4) 3/4"/20 mm
526 226 030 032	3/4 - 10	175	240	2	1/4NPT	1/2NPT	(4) 7/8"/24 mm
528 228	7/8 - 9	165	220	2	1/4NPT	3/4NPT	(4) 1"/24 mm
530 230	7/8 - 9	165	220	2	1/4NPT	3/4NPT	(4) 1"/24 mm
532 232 036 038	7/8 - 9	165	220	2	1/4NPT	3/4NPT	(4) 1"/24 mm
534 234 040	1 - 8	250	340	2	1/4NPT	3/4NPT	(4) 1"/24 mm
536 236	1 - 8	250	340	2	1/4NPT	3/4NPT	(4) 1"/24 mm
538 238 044	1 1/8 - 7	350	480	2	1/4NPT	1NPT	(4) 1 1/4"/30 mm
540 240 048	1 1/4 - 7	500	680	2	1/4NPT	1NPT	(4) 1 1/4"/30 mm
544 244 052	1 3/8 - 6	660	900	2	1/4NPT	1NPT	(4) 1 1/2"/36 mm

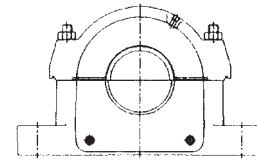
Series: SAF 500
SAF 200
A-Design



Note: To recognize A-design, cap of block is held down with 2 hex. Head bolts, except 532 which uses 4 bolts.

A-Design Housing Size	Cap Bolt Information				Lubrication Fitting Hole Detail		Base or Attachment bolts Qty (2) or (4) inch/metric
	Size Qty. (4) or (4)	Recommended Tightening Torque		Grade			
	Inch	Ft/Lbs.	Nm	SAE	Cap In	Base Out*	
507	³ / ₈ - 16	40	55	8	¹ / ₈ NPT	¹ / ₈ NPT	(2) ³ / ₈ "/10 mm
509	⁷ / ₁₆ - 14	80	110	8	¹ / ₈ NPT	¹ / ₈ NPT	(2) ¹ / ₂ "/12 mm
510	⁷ / ₁₆ - 14	80	110	8	¹ / ₈ NPT	¹ / ₈ NPT	(2) ¹ / ₂ "/12 mm
511 211	¹ / ₂ - 13	105	150	8	¹ / ₈ NPT	¹ / ₄ NPT	(2) ⁵ / ₈ "/16 mm
513 213	¹ / ₂ - 13	105	150	8	¹ / ₈ NPT	¹ / ₈ NPT	(2) ⁵ / ₈ "/16 mm
515 215	¹ / ₂ - 13	105	150	8	¹ / ₈ NPT	¹ / ₄ NPT	(2) ⁵ / ₈ "/16 mm (4) ¹ / ₂ "/12 mm
516 216	⁵ / ₈ - 11	210	300	8	¹ / ₈ NPT	³ / ₈ NPT	(2) ³ / ₄ "/20 mm (4) ⁵ / ₈ "/16 mm
517 217	⁵ / ₈ - 11	210	300	8	¹ / ₈ NPT	³ / ₈ NPT	(2) ³ / ₄ "/20 mm (4) ⁵ / ₈ "/16 mm
518 218	⁵ / ₈ - 11	210	300	8	¹ / ₈ NPT	³ / ₈ NPT	(2) ³ / ₄ "/20 mm (4) ⁵ / ₈ "/16 mm
520 220	³ / ₄ - 10	280	520	8	¹ / ₄ NPT	³ / ₈ NPT	(2) ⁷ / ₈ "/24 mm (4) ³ / ₄ "/20 mm
522 222	³ / ₄ - 10	280	520	8	¹ / ₄ NPT	³ / ₈ NPT	(4) ³ / ₄ "/20 mm
524 224	1 - 8	900	1200	8	¹ / ₄ NPT	¹ / ₂ NPT	(4) ³ / ₄ "/20 mm
526 226	1 - 8	900	1200	8	¹ / ₄ NPT	¹ / ₂ NPT	(4) ⁷ / ₈ "/24 mm
528 228	1 - 8	900	1200	8	¹ / ₄ NPT	³ / ₄ NPT	(4) 1"/24 mm
532 232	³ / ₄ - 10	380	520	8	¹ / ₄ NPT	³ / ₄ NPT	(4) 1"/24 mm
534 234	(4) ³ / ₄ -10	380	520	8	¹ / ₄ NPT	³ / ₄ NPT	(4) 1"/24 mm
536 236	(4) ³ / ₄ -10	380	520	8	¹ / ₄ NPT	³ / ₄ NPT	(4) 1"/24 mm
538 238	(4) ⁷ / ₈ -9	600	820	8	¹ / ₄ NPT	³ / ₄ NPT	(4) 1 ¹ / ₄ "/30 mm
540 240	(4) ⁷ / ₈ -9	600	820	8	¹ / ₄ NPT	1NPT	(4) 1 ¹ / ₄ "/30 mm
544 244	(4) 1-8	900	1230	8	¹ / ₄ NPT	1NPT	(4) 1 ¹ / ₂ "/36 mm

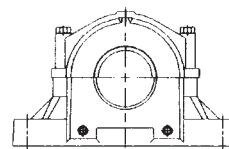
Series: **SAF 600**
SAF 300
SAF O KA
N-Design



Note: To recognize N-design, the block has 4 hex. Head nuts to hold down cap

N-Design Housing Size	Cap Bolt Information				Lubrication Fitting Hole Detail		Base or Attachment bolts Qty (2) or (4) inch/metric
	Size Qty. (4)	Recommended Tightening Torque		Grade			
	Inch	Ft/Lbs.	Nm	SAE	Cap In	Base Out*	
615 315	1/2 - 13	50	70	2	1/8NPT	3/8NPT	(2) 3/4"/20 mm (4) 5/8"/16 mm
616 316	1/2 - 13	50	70	2	1/8NPT	3/8NPT	(2) 3/4"/20 mm (4) 5/8"/16 mm
617 317	5/8 - 11	100	140	2	1/4NPT	3/8NPT	(2) 7/8"/24 mm (4) 3/4"/20 mm
618 318	5/8 - 11	100	140	2	1/4NPT	3/8NPT	(4) 3/4"/20 mm
620 320	5/8 - 11	100	140	2	1/4NPT	1/2NPT	(4) 3/4"/20 mm
622 322	3/4 - 10	175	240	2	1/4NPT	1/2NPT	(4) 7/8"/24 mm
624 324	7/8 - 9	165	220	2	1/4NPT	3/4NPT	(4) 1"/24 mm
626 326	7/8 - 9	165	220	2	1/4NPT	3/4NPT	(4) 1"/24 mm
628 328	1 - 8	250	340	2	1/4NPT	3/4NPT	(4) 1"/24 mm
630 330	1 - 8	250	340	2	1/4NPT	3/4NPT	(4) 1"/24 mm
632 332	1 1/8 - 7	350	480	2	1/4NPT	1NPT	(4) 1 1/4"/30 mm
634 334	1 1/4 - 7	500	680	2	1/4NPT	1NPT	(4) 1 1/4"/30 mm
638 338	1 3/8 - 6	660	900	2	1/4NPT	1NPT	(4) 1 1/2"/36 mm

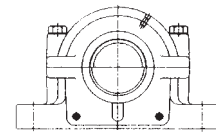
Series: SAF 600
SAF 300
SAF O KA
A-Design



Note: To recognize A-design, cap of block is held down with 2 hex. Head bolts

A-Design Housing Size	Cap Bolt Information				Lubrication Fitting Hole Detail		Base or Attachment bolts Qty (2) or (4) inch/metric
	Size Qty. (2)	Recommended Tightening Torque		Grade			
	Inch	Ft/Lbs.	Nm	SAE	Cap In	Base Out*	
613 313	⁵ / ₈ - 11	220	300	8	¹ / ₈ NPT	³ / ₈ NPT	(2) ³ / ₄ "/20 mm (4) ⁵ / ₈ "/16 mm
615 315	⁵ / ₈ - 11	290	300	8	¹ / ₈ NPT	³ / ₈ NPT	(2) ³ / ₄ "/20 mm (4) ⁵ / ₈ "/16 mm
620 320	1 - 8	900	1200	8	¹ / ₄ NPT	¹ / ₂ NPT	(4) ³ / ₄ "/20 mm
622 322	1 - 8	900	1200	8	¹ / ₄ NPT	¹ / ₂ NPT	(4) ⁷ / ₈ "/24 mm
024 KA	³ / ₄ - 10	380	520	8	¹ / ₄ NPT	³ / ₈ NPT	(2) ⁷ / ₈ "/24 mm (4) ³ / ₄ "/20 mm
026 KS	³ / ₄ - 10	380	520	8	¹ / ₄ NPT	³ / ₈ NPT	(4) ³ / ₄ "/20 mm
028 KA	1 - 8	900	1200	8	¹ / ₄ NPT	¹ / ₂ NPT	(4) ³ / ₄ "/20 mm
030 KA	1 - 8	900	1200	8	¹ / ₄ NPT	¹ / ₂ NPT	(4) ⁷ / ₈ "/24 mm
032 KA	1 - 8	900	1200	8	¹ / ₄ NPT	¹ / ₂ NPT	(4) ⁷ / ₈ "/24 mm
034 KA	1 - 8	900	1200	8	¹ / ₄ NPT	³ / ₄ NPT	(4) ⁷ / ₈ "/24 mm

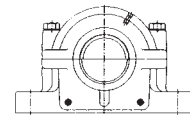
Series: SAF 500
SAF 200
L-Design



Note: To recognize L-design, which is the original design and still used for blocks made of steel, cap is held down with 2 hex. head bolts

L-Design Housing Size	Cap Bolt Information				Lubrication Fitting Hole Detail		Base or Attachment bolts Qty (2) or (4) inch/metric
	Size Qty. (2)	Recommended Tightening Torque		Grade			
	Inch	Ft/Lbs.	Nm	SAE	Cap In	Base Out	
507	³ / ₈ - 16	20	27	2	¹ / ₈ NPT	¹ / ₈ NPT	(2) ³ / ₈ "/10 mm
509	⁷ / ₁₆ - 14	30	40	2	¹ / ₈ NPT	¹ / ₈ NPT	(2) ¹ / ₂ "/12 mm
510	⁷ / ₁₆ - 14	30	40	2	¹ / ₈ NPT	¹ / ₈ NPT	(2) ¹ / ₂ "/12 mm
511	¹ / ₂ - 13	50	70	2	¹ / ₈ NPT	¹ / ₄ NPT	(4) ⁵ / ₈ "/16 mm
513	¹ / ₂ - 13	50	70	2	¹ / ₈ NPT	¹ / ₈ NPT	(2) ⁵ / ₈ "/16 mm (4) ¹ / ₂ "/12 mm
515	¹ / ₂ - 13	50	70	2	¹ / ₈ NPT	¹ / ₄ NPT	(2) ⁵ / ₈ "/16 mm (4) ¹ / ₂ "/12 mm
516 216	¹ / ₂ - 13	50	70	2	¹ / ₈ NPT	³ / ₈ NPT	(2) ³ / ₄ "/20 mm (4) ⁵ / ₈ "/16 mm
517 217	⁵ / ₈ - 11	100	140	2	¹ / ₈ NPT	³ / ₈ NPT	(2) ³ / ₄ "/20 mm (4) ⁵ / ₈ "/16 mm

Series: SAF 600
SAF 300
L-Design



Note: To recognize L-design, which is the original design and still used for blocks made of steel, cap is held down with 2 hex. head bolts

L-Design Housing Size	Cap Bolt Information				Lubrication Fitting Hole Detail		Base or Attachment bolts Qty (2) or (4) inch/metric
	Size Qty. (2)	Recommended Tightening Torque		Grade			
	Inch	Ft/Lbs.	Nm	SAE	Cap In	Base Out	
308	$\frac{7}{16}$ - 14	30	40	2	$\frac{1}{8}$ NPT	$\frac{1}{8}$ NPT	(2) $\frac{1}{2}$ "/12 mm
609 309	$\frac{1}{2}$ - 13	50	70	2	$\frac{1}{8}$ NPT	$\frac{1}{8}$ NPT	(2) $\frac{5}{8}$ "/16 mm
610 310	$\frac{1}{2}$ - 13	50	70	2	$\frac{1}{8}$ NPT	$\frac{1}{8}$ NPT	(2) $\frac{5}{8}$ "/16 mm
611 311	$\frac{1}{2}$ - 13	50	70	2	$\frac{1}{8}$ NPT	$\frac{1}{4}$ NPT	(2) $\frac{5}{8}$ "/16 mm (4) $\frac{1}{2}$ "/12 mm
613 313	$\frac{5}{8}$ - 11	100	140	2	$\frac{1}{8}$ NPT	$\frac{3}{8}$ NPT	(2) $\frac{3}{4}$ "/20 mm (4) $\frac{5}{8}$ "/16 mm

Series: **SAFS 500, SAFS 200, SAFS O**

Note: To recognize A-design, cap of block is held down with 2 hex. Head bolts

Housing Size	Cap Bolt Information				Lubrication Fitting Hole Detail		Base or Attachment bolts Qty (2) or (4) inch/metric
	Size Qty. (2) or (4)	Recommended Tightening Torque		Grade			
	Inch	Ft/Lbs.	Nm	SAE	Cap In	Base Out*	
509 510	(2) ⁷ / ₁₆ - 14	70	110	8	¹ / ₈ NPT	¹ / ₈ NPT	(2) ⁷ / ₁₆ "/12 mm
511	(2) ¹ / ₂ - 13	110	150	8	¹ / ₄ NPT	¹ / ₄ NPT	(2) ⁵ / ₈ "/16 mm
513 515	(2) ¹ / ₂ - 13	110	150	8	¹ / ₄ NPT	¹ / ₄ NPT	(2) ⁵ / ₈ "/16 mm (4) ¹ / ₂ "/12 mm
516 216	(2) ¹ / ₂ - 13	110	150	8	³ / ₈ NPT	³ / ₈ NPT	(2) ⁵ / ₈ "/16 mm (4) ⁵ / ₈ "/16 mm
517 217	(2) ⁵ / ₈ - 11	220	300	8	³ / ₈ NPT	³ / ₈ NPT	(2) ³ / ₄ "/20 mm (4) ⁵ / ₈ "/16 mm
518 218	(4) ¹ / ₂ - 13	110	150	8	³ / ₈ NPT	³ / ₈ NPT	(2) ³ / ₄ "/20 mm (4) ⁵ / ₈ "/16 mm
520 220 024	(4) ⁵ / ₈ - 11	220	300	8	³ / ₈ NPT	³ / ₈ NPT	(2) ⁷ / ₈ "/24 mm (4) ³ / ₄ "/20 mm
522 222 026	(4) ⁵ / ₈ - 11	220	300	8	³ / ₈ NPT	³ / ₈ NPT	(4) ³ / ₄ "/20 mm
524 224 028	(4) ⁵ / ₈ - 11	220	300	8	¹ / ₂ NPT	¹ / ₂ NPT	(4) ³ / ₄ "/20 mm
526 226 030 032	(4) ³ / ₄ - 10	380	520	8	¹ / ₂ NPT	¹ / ₂ NPT	(4) ⁷ / ₈ "/24 mm
528 228 034	(4) ⁷ / ₈ - 9	600	820	8	³ / ₄ NPT	³ / ₄ NPT	(4) 1"/24 mm
530 230	(4) ⁷ / ₈ - 9 mm	600	820	8	³ / ₄ NPT	³ / ₄ NPT	(4) 1"/24 mm
532 232 036 038	(4) ⁷ / ₈ - 9 mm	600	820	8	³ / ₄ NPT	³ / ₄ NPT	(4) 1"/24 mm
534 234 040	(4) 1 - 8	900	1200	8	³ / ₄ NPT	³ / ₄ NPT	(4) 1"/24 mm
536 236	(2) 1 ³ / ₈ - 6	2380	3250	8	³ / ₄ NPT	³ / ₄ NPT	(4) 1"/24 mm
538 238 044	(4) 1 ¹ / ₈ - 7	1280	1750	8	1NPT	1NPT	(4) 1 ¹ / ₄ "/30 mm
540 240 048	(4) 1 ¹ / ₄ - 7	1820	2450	8	1NPT	1NPT	(4) 1 ¹ / ₄ "/30 mm
544 244 052	(2) 1 ³ / ₈ - 6	2380	3250	8	1NPT	1NPT	(4) 1 ¹ / ₂ "/36 mm

Series: SD 31							
Housing Size	Cap Bolt Information				Lubrication Fitting Hole Detail		Base or Attachment bolts Qty (2) or (4) inch/metric
	Size Qty. (4)	Recommended Tightening Torque		Grade			
	Inch	Ft/Lbs.	Nm	SAE	Cap In	Base Out	
34	M24	260	350	8.8	*	*	(4) 1"/24 mm
36	M24	260	350	8.8	*	*	(4) 1"/24 mm
38	M24	260	350	8.8	*	*	(4) 1"/24 mm
40	M24	260	350	8.8	*	*	(4) 1 ¹ / ₄ "/30 mm
44	M24	260	350	8.8	*	*	(4) 1 ¹ / ₄ "/30 mm
48	M30	300	400	8.8	*	*	(4) 1 ¹ / ₄ "/30 mm
52	M30	300	400	8.8	*	*	(4) 1 ¹ / ₂ "/36 mm
56	M30	300	400	8.8	*	*	(4) 1 ¹ / ₂ "/36 mm
60	M30	300	400	8.8	*	*	(4) 1 ¹ / ₂ "/36 mm
64	M30	300	400	8.8	*	*	(4) 1 ¹ / ₂ "/36 mm

Series: SD CD 30, SD CD 30 / MC14
SD CD 0, SD CD 0 / MC14

Housing Size	Cap Bolt Information				Lubrication Fitting Hole Detail		Base or Attachment bolts Qty (2) or (4) inch/metric
	Size Qty. (4)	Recommended Tightening Torque		Grade			
	Inch	Ft/Lbs.	Nm	SAE	Cap In	Base Out	
36	⁷ / ₈ - 9	400	550	5	¹ / ₄ NPT	*	1"/24 mm
38	⁷ / ₈ - 9	400	550	5	¹ / ₄ NPT	*	1"/24 mm
40	1 - 8	600	820	5	¹ / ₄ NPT	*	1"/24 mm
44	1 - 8	600	820	5	¹ / ₄ NPT	*	1 ¹ / ₄ "/30 mm
48	1 - 8	600	820	5	¹ / ₄ NPT	*	1 ¹ / ₄ "/30 mm
52	1 ¹ / ₄ - 7	1100	1500	5	¹ / ₄ NPT	*	1 ¹ / ₄ "/30 mm
56	1 ¹ / ₄ - 7	1100	1500	5	¹ / ₄ NPT	*	1 ¹ / ₄ "/30 mm
60	1 ¹ / ₄ - 7	1100	1500	5	¹ / ₄ NPT	*	1 ¹ / ₂ "/36 mm
64	1 ¹ / ₄ - 7	1100	1500	5	¹ / ₄ NPT	*	1 ¹ / ₂ "/36 mm
68	1 ¹ / ₄ - 7	1100	1500	5	¹ / ₄ NPT	*	1 ¹ / ₂ "/36 mm
72	1 ¹ / ₄ - 7	1100	1500	5	¹ / ₂ NPT	*	1 ¹ / ₂ "/36 mm
76	1 ¹ / ₄ - 7	1100	1500	5	¹ / ₂ NPT	*	1 ¹ / ₂ "/36 mm
80	1 ¹ / ₂ - 6	*	*	5	¹ / ₂ NPT	*	1 ³ / ₄ "/45 mm
84	1 ³ / ₄ - 5	*	*	5	¹ / ₂ NPT	*	2"/50 mm
88	1 ³ / ₄ - 5	*	*	5	¹ / ₂ NPT	*	2"/50 mm

Series: SDCD 31, SDCD 31 / MC14 SDHD (sizes 34 and 72 only)
SDCD 1, SDCD1 / MC14

Housing Size	Cap Bolt Information				Lubrication Fitting Hole Detail		Base or Attachment bolts Qty (2) or (4) inch/metric
	Size Qty. (4)	Recommended Tightening Torque		Grade			
	Inch	Ft/Lbs.	Nm	SAE	Cap In	Base Out	
34	$\frac{7}{8}$ - 9	600	820	8	$\frac{1}{4}$ NPT	*	1"/24 mm
36	$\frac{7}{8}$ - 9	400	550	5	$\frac{1}{4}$ NPT	*	1"/24 mm
38	1 - 8	600	820	5	$\frac{1}{4}$ NPT	*	1"/24 mm
40	1 - 8	600	820	5	$\frac{1}{4}$ NPT	*	1 $\frac{1}{4}$ "/30 mm
44	1 - 8	600	820	5	$\frac{1}{4}$ NPT	*	1 $\frac{1}{4}$ "/30 mm
48	1 $\frac{1}{4}$ - 7	1100	1500	5	$\frac{1}{4}$ NPT	*	1 $\frac{1}{4}$ "/30 mm
52	1 $\frac{1}{4}$ - 7	1100	1500	5	$\frac{1}{4}$ NPT	*	1 $\frac{1}{2}$ "/36 mm
56	1 $\frac{1}{4}$ - 7	1100	1500	5	$\frac{1}{4}$ NPT	*	1 $\frac{1}{2}$ "/36 mm
60	1 $\frac{1}{4}$ - 7	1100	1500	5	$\frac{1}{4}$ NPT	*	1 $\frac{1}{2}$ "/36 mm
64	1 $\frac{1}{4}$ - 7	1100	1500	5	$\frac{1}{2}$ NPT	*	1 $\frac{1}{2}$ "/36 mm
68	1 $\frac{1}{2}$ - 6	*	*	5	$\frac{1}{2}$ NPT	*	1 $\frac{3}{4}$ "/45 mm
72	1 $\frac{1}{2}$ - 6	*	*	8	$\frac{1}{2}$ NPT	*	1 $\frac{3}{4}$ "/45 mm
76	1 $\frac{3}{4}$ - 5	*	*	5	$\frac{1}{2}$ NPT	*	2"/50 mm
80	1 $\frac{3}{4}$ - 5	*	*	5	$\frac{1}{2}$ NPT	*	2"/50 mm
84	1 $\frac{3}{4}$ - 5	*	*	5	$\frac{1}{2}$ NPT	*	2"/50 mm
88	1 $\frac{3}{4}$ - 5	*	*	5	$\frac{1}{2}$ NPT	*	2"/50 mm

Series: SDCD 32, SDCD 32 / MC14
SDCD 2, SDCD2 / MC14

Housing Size	Cap Bolt Information				Lubrication Fitting Hole Detail		Base or Attachment bolts Qty (2) or (4) inch/metric
	Size Qty. (4)	Recommended Tightening Torque		Grade			
	Inch	Ft/Lbs.	Nm	SAE	Cap In	Base Out	
34	1 - 8	600	820	5	$\frac{1}{4}$ NPT	*	1"/24 mm
36	1 - 8	600	820	5	$\frac{1}{4}$ NPT	*	1"/24 mm
38	1 - 8	600	820	5	$\frac{1}{4}$ NPT	*	1 $\frac{1}{4}$ "/30 mm
40	1 $\frac{1}{4}$ - 7	600	820	5	$\frac{1}{4}$ NPT	*	1 $\frac{1}{4}$ "/30 mm
44	1 $\frac{1}{4}$ - 7	1100	1500	5	$\frac{1}{4}$ NPT	*	1 $\frac{1}{4}$ "/30 mm
48	1 $\frac{1}{4}$ - 7	1100	1500	5	$\frac{1}{4}$ NPT	*	1 $\frac{1}{2}$ "/36 mm
52	1 $\frac{1}{4}$ - 7	1100	1500	5	$\frac{1}{4}$ NPT	*	1 $\frac{1}{2}$ "/36 mm
56	1 $\frac{1}{4}$ - 7	1100	1500	5	$\frac{1}{4}$ NPT	*	1 $\frac{1}{2}$ "/36 mm
60	1 $\frac{1}{4}$ - 7	1100	1500	5	$\frac{1}{2}$ NPT	*	1 $\frac{1}{2}$ "/36 mm
64	1 $\frac{1}{2}$ - 6	*	*	5	$\frac{1}{2}$ NPT	*	1 $\frac{3}{4}$ "/45 mm
68	1 $\frac{3}{4}$ - 5	*	*	5	$\frac{1}{2}$ NPT	*	2"/50 mm

Series: SDAF 500
SDAF 200

Housing Size	Cap Bolt Information				Lubrication Fitting Hole Detail		Base or Attachment bolts Qty (2) or (4) inch/metric
	Size Qty. (4)	Recommended Tightening Torque		Grade			
	Inch	Ft/Lbs.	Nm	SAE	Cap In	Base Out	
520 220	$\frac{3}{4}$ - 10	175	240	2	$\frac{1}{4}$ NPT	$\frac{1}{4}$ NPT	(4) $\frac{3}{4}$ "/20 mm
522 222	$\frac{7}{8}$ - 9	165	220	2	$\frac{1}{4}$ NPT	$\frac{1}{4}$ NPT	(4) $\frac{7}{8}$ "/24 mm
524 224	$\frac{7}{8}$ - 9	165	220	2	$\frac{1}{4}$ NPT	$\frac{1}{4}$ NPT	(4) $\frac{7}{8}$ "/24 mm
526 226	$\frac{7}{8}$ - 9	165	220	2	$\frac{1}{4}$ NPT	$\frac{3}{8}$ NPT	(4) 1"/24 mm
530 230	$1\frac{1}{8}$ - 7	350	480	2	$\frac{1}{4}$ NPT	$\frac{3}{8}$ NPT	(4) $1\frac{1}{8}$ "/27 mm
532 232	$1\frac{1}{8}$ - 7	350	480	2	$\frac{1}{4}$ NPT	$\frac{1}{2}$ NPT	(4) $1\frac{1}{8}$ "/27 mm
536 236	$1\frac{1}{4}$ - 7	500	680	2	$\frac{1}{4}$ NPT	$\frac{3}{4}$ NPT	(4) $1\frac{1}{4}$ "/30 mm
538 238	$1\frac{1}{4}$ - 7	500	680	2	$\frac{1}{4}$ NPT	$\frac{3}{4}$ NPT	(4) $1\frac{3}{8}$ "/36 mm
540 240	$1\frac{1}{4}$ - 7	500	680	2	$\frac{1}{4}$ NPT	$\frac{3}{4}$ NPT	(4) $1\frac{3}{8}$ "/36 mm
544 244	$1\frac{3}{8}$ - 6	660	900	2	$\frac{1}{4}$ NPT	$\frac{3}{4}$ NPT	(4) $1\frac{1}{2}$ "/36 mm

Series: SDAF 600
SDAF 300
SDAF 0

Housing Size	Cap Bolt Information				Lubrication Fitting Hole Detail		Base or Attachment bolts Qty (2) or (4) inch/metric
	Size Qty. (4)	Recommended Tightening Torque		Grade			
	Inch	Ft/Lbs.	Nm	SAE	Cap In	Base Out	
617 317	³ / ₄ - 10	175	240	2	¹ / ₄ NPT	¹ / ₄ NPT	(4) ³ / ₄ "/20 mm
618 318	³ / ₄ - 10	175	240	2	¹ / ₄ NPT	¹ / ₄ NPT	(4) ³ / ₄ "/20 mm
620 320	⁷ / ₈ - 9	165	220	2	¹ / ₄ NPT	¹ / ₄ NPT	(4) ⁷ / ₈ "/24 mm
622 322	⁷ / ₈ - 9	165	220	2	¹ / ₄ NPT	³ / ₈ NPT	(4) 1"/24 mm
624 324	1 ¹ / ₈ - 7	350	480	2	¹ / ₄ NPT	³ / ₈ NPT	(4)1 ¹ / ₈ "/27 mm
626 326	1 ¹ / ₈ - 7	350	480	2	¹ / ₄ NPT	¹ / ₂ NPT	(4)1 ¹ / ₈ "/27 mm
628 328	1 ¹ / ₈ - 7	350	480	2	¹ / ₄ NPT	¹ / ₂ NPT	(4)1 ¹ / ₄ "/30 mm
630 330	1 ¹ / ₄ - 7	500	680	2	¹ / ₄ NPT	³ / ₄ NPT	(4)1 ¹ / ₄ "/30 mm
632 332	1 ¹ / ₄ - 7	500	680	2	¹ / ₄ NPT	³ / ₄ NPT	(4)1 ³ / ₈ "/36 mm
634 334	1 ¹ / ₄ - 7	500	680	2	¹ / ₄ NPT	³ / ₄ NPT	(4)1 ³ / ₈ "/36 mm
636 336	1 ³ / ₈ - 6	660	900	2	¹ / ₄ NPT	³ / ₄ NPT	(4)1 ¹ / ₂ "/36 mm
638 338	1 ³ / ₈ - 6	660	900	2	¹ / ₄ NPT	³ / ₄ NPT	(4)1 ¹ / ₂ "/36 mm
640 340	1 ³ / ₈ - 6	660	900	2	¹ / ₄ NPT	³ / ₄ NPT	(4)1 ⁵ / ₈ "/39 mm
060	1 ³ / ₈ - 6	660	900	2	*	*	(4)1 ⁵ / ₈ "/39 mm
064	1 ³ / ₈ - 6	660	900	2	*	*	(4)1 ⁵ / ₈ "/39 mm
068	1 ³ / ₄ - 5	1250	1700	2	*	*	(4)1 ⁷ / ₈ "/48 mm
072	1 ³ / ₄ - 5	1250	1700	2	*	*	(4)1 ⁷ / ₈ "/48 mm
076	1 ³ / ₄ - 5	1250	1700	2	*	*	(4)1 ⁷ / ₈ "/48 mm
080	1 ³ / ₄ - 5	1250	1700	2	*	*	(4) 2"/50 mm
084	1 ³ / ₄ - 5	1250	1700	2	*	*	(4) 2"/50 mm

LUBRICATION

General

It is necessary to lubricate rolling bearings to prevent metallic contact between rolling elements, raceways and cage.

The most favourable running (operating) conditions for a rolling bearing is obtained when the minimum quantity of lubricant necessary to ensure reliable operation is used.

However, the quantity used also depends on additional functions required of the lubricant, i.e. sealing and cooling.

Lubricating properties deteriorate as a result of aging and mechanical churning. When using labyrinth and taconite seals in severely contaminated environments, it is suggested to shorten the lubrication interval. Also certain operating conditions i.e. high speeds, high temperatures or heavy loads require more frequent lubrication.

The choice of lubricants depends primarily on the temperature range, operating speed and magnitude of the load.

Either oil or grease of proper quality can be considered for lubricating bearings. At low and medium speeds, grease usually permits a simpler method of obtaining reliable and durable lubrication. It requires a simpler sealing system and has an additional advantage of affording excellent protection to bearings against rust and intrusion of contaminants. With high speeds, it becomes necessary to add fresh grease and remove old grease more frequently to obtain safe operation. At some limiting speed, grease must be replaced so often that it becomes impractical. Then oil should be used.

When oil is used, it is advisable to employ an oil reservoir or an adequate supply of oil and effective housing seals so that the oil does not leak out. The level of oil should be about the center of the lowest ball or roller when the bearing is stationary.

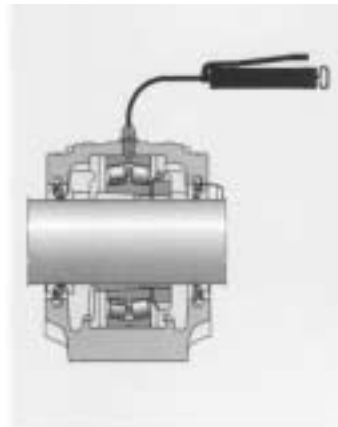
Too high an oil level or too large a quantity of grease, usually results in a high operating temperature due to churning of the lubricant.

Grease Lubrication

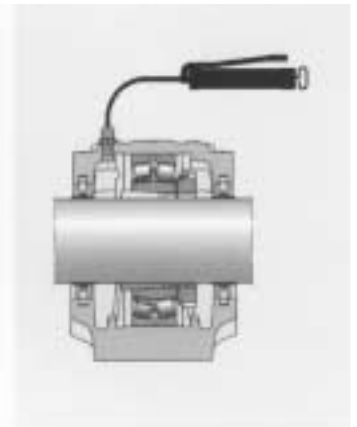
SKF pillow block housings are primarily intended for grease lubrication. In the majority of cases it is sufficient to charge the housings with grease on mounting and to replace this grease periodically, either at specified time interval or when performing inspections.

Pillow block housings caps can be equipped with grease fittings. For spherical roller bearings with W33 or E suffix (groove in outer ring and three lubricating holes spaced at 120°) the center lubricating fitting must be used. For bearing without the E or W33 feature, either of the two side lubrication fitting are used to supply grease. Generally the side opposite the lock nut.

Lubrication through
center fitting for W33



Non W33



If grease is used as a lubricant, at installation of bearing the lubricant must be worked in between the rolling elements. The housing should be packed 1/3 full. As a precaution, never mix greases with unlike base oils or incompatible thickeners. It should also be noted that bearings are generally lubricated after mounting. This ensures an accurate clearance measurement, avoids the mess in trying to handle a greasy bearing, and decreases the possibility of additional contamination being introduced into the bearing.

Only where, after mounting, an even distribution of grease in the bearing is not possible should one consider greasing prior to mounting.

Relubrication and Relubrication Intervals

Relubrication Intervals

The period during which a grease lubricated bearing will function satisfactorily without relubrication is dependent on the bearing type, size, operating conditions (load, speed, temperature, environment) and the grease used. The relubrication intervals (hours of operation) obtained from Diagram A are valid for bearings in stationary machines where loading conditions are normal. The diagram is based on the use of an age resistant, quality grease and is valid for bearing temperatures of +70°C. At temperatures over 70°C, the lubricating intervals should be halved for each 15°C rise, but the maximum permissible operating temperature for the grease should obviously not be exceeded. Conversely, if operating temperatures are lower than 70°C, the intervals can be lengthened to about twice the 70°C values for operating temperatures of 50°C and below. It should be noted however that, relubrication intervals may vary significantly even where apparently similar greases are used.

Contaminated grease results in failures such as premature fatigue, polishing wear, etc. Where there is a risk of the grease becoming contaminated, the relubrication intervals should be reduced. This reduction also applies to applications where the grease is required to seal against moisture (e.g. bearings in paper making machines, where water runs over the bearing housings, relubrication should be done once a week).

The amount of grease

The amount of grease needed for relubrication can be estimated using the following formula:

$$G = 0,005 D B$$

where

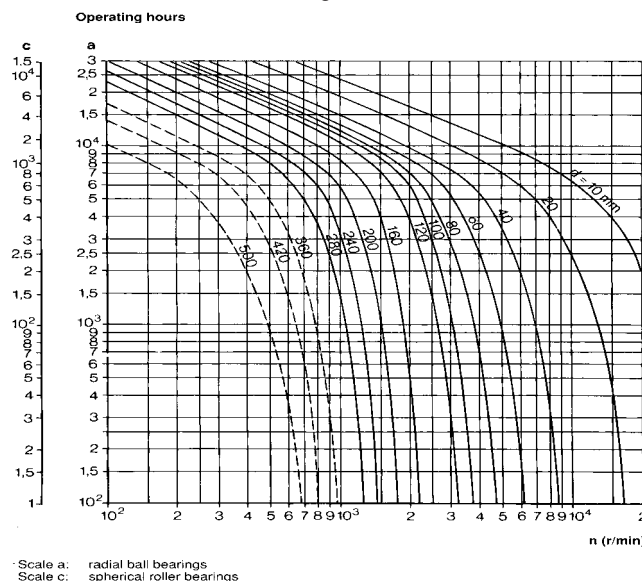
G = grease quantity, g (for ozs, x 0.0353)

D = bearing outside diameter, mm

B = total bearing width, mm

If the relubrication interval is not specified we suggest at regular plant maintenance shutdown to remove and replace the lubricant. The cap of split housings and the cover of one-piece housing can usually be taken off to expose the bearing. After removing the used grease, fresh grease should be packed between the rolling elements.

If frequent relubrication is required a grease nipple should be fitted to the housing. A grease gun can then be used to ensure that fresh grease actually reaches the bearing and replaces the old grease. After a number of such relubrications, the housing should be opened and the used grease removed before fresh grease is added.



Initial grease charges for split pillow blocks

The approximate initial grease charge (mass) for split pillow blocks is given in these tables. The recommended initial grease charge is one-third to one-half the volume of the free space in the pillow block, and the empty space between rolling elements and cage filled with grease (buttered). This recommendation is for moderate speeds and normal or light bearing loads ($C/P > 8.3$).

Housing size and Series	Grease quantity		Housing size and Series	Grease quantity		Housing size and Series	Grease quantity		Housing size and Series	Grease quantity				
SNL, SSNHD			SAF, SAFS, SAFD			SAF			SD 31, SDCD 30, SDCD 31					
	g.	oz.		g.	oz.		g.	oz.		g.	oz.			
505	25	0.9	507	70	2.5	308	127	4.5	34	1800	64			
205			509	85	3.0	609, 309	142	5.0	36	2200	78			
506 - 605	40	1.4	510	113	4.0	610, 310	184	6.5	38	2900	103			
206			511	142	5.0	611, 311	227	8.0	40	3800	134			
507 - 606	50	1.8	513	213	7.5	312	283	10.0	44	4400	155			
207			515	255	9.0	613, 313	369	13.0	48	5500	194			
508 - 607	60	2.1	516, 216	369	13.0	314	397	14.0	52	7000	247			
208			517, 217	369	13.0	615, 315	397	14.0	56	7400	260			
509	65	2.3	518, 218	397	14.0	616, 316	453	16.0	60	10500	370			
510 - 608	75	2.6	520, 220	595	21.0	617, 317	567	20.0	64	13000	460			
210			522, 222	794	28.0	618, 318	624	22.0	68	17500	620			
511 - 609	100	3.5	524, 224	1134	40.0	620, 320	1134	40.0	72	18400	650			
211			526, 226	1475	52.0	622, 322	1475	52.0	76	19200	680			
512 - 610	150	5.3	528, 228	1475	52.0	624, 324	1700	60.0	80	22200	790			
212			530, 230	1700	60.0	626, 326	1930	68.0	84	29300	1050			
513 - 611	180	6.4	532, 232	1930	68.0	628, 328	2400	84.0	88	30000	1070			
213			534, 234	2381	84.0	630, 330	2722	96.0	SDCD 32					
515 - 612	230	8.1	536, 236	2722	96.0	632, 332	3290	116				34	2200	78
215			538, 238	3290	116.0	634, 334	3860	136				36	2900	103
516 - 613	280	9.9	540, 240	3860	136.0	638, 338	5200	184				38	3800	134
216			544, 244	5200	184.0	SAF-K			40	4400	155			
517	330	12	SDAF						024 KA	595	21.0	44	5500	194
217						520	571	20	026 KA	794	28.0	48	7000	247
518 - 615	430	15	522	771	27	028 KA	1134	40.0	52	7400	260			
218			524	914	32	030 KA	1475	52.0	56	10500	370			
519 - 616	480	17	526	1257	44	032 KA	1475	52.0	60	13000	460			
520 - 617	630	22	530	1371	48	034 KA	1475	52.0	64	17500	620			
522 - 619	850	30	532	1714	60	036 KA	1930	68.0	68	18400	650			
524 - 620	1000	35	534	2171	76	038 KA	1930	68.0	72	19200	680			
526	1100	39	536	2514	88	040 KA	2381	84.0	76	22200	790			
528	1400	49	538	2971	104	044 KA	3290	116.0	80	29300	1050			
530	1700	60	540	3657	128	048 KA	3860	136.0	84	30000	1070			
532	2000	70	544	4800	168	052 KA	5200	184.0	88	37000	1300			
						056 KA	7000	248.0						

SKF Grease - Technical Specifications

Designation	Properties								
	Temperature range				Consistency acc. to NLGI	Thickener	Base oil	Base oil viscosity	
	from		to					at	
	°C	°F	°C	°F				40°C	100°C
-	°C	°F	°C	°F	-	-	-	mm²/s	mm²/s
LGMT2	-30	-22	+120	+250	2	Lithium soap	Mineral oil	110	11
LGMT3	-30	-22	+120	+250	3	Lithium soap	Mineral oil	120	12
LGEP2	-30	-22	+110	+230	2	Lithium soap	Mineral oil	190	15
LGEM2	-20	-4	+120	+250	2	Lithium soap	Mineral oil	510	32
LGLT2	-55	-65	+110	+230	2	Lithium soap	Di-ester oil	15	3.7
LGHT3	-30	-22	+150	+300	3	Lithium complex	Mineral oil	110	13
LGWM1	-30	-22	+110	+230	1	Lithium soap	Mineral oil	200	16

With the help of the Table, the right grease can be selected with due consideration to the operating conditions. For more detailed information on other SKF greases not listed and their recommended application, consult SKF.

Operating requirements	Designation						
	LGMT2	LGMT3	LGEP2	LGEM2	LGLT2	LGHT3	LGWM1
High temperature	xx	xx	xx	x	xx	xxx	
Low temperature	xx	xx	xx		xxx	xx	xxx
High speed	xx	xx	x		xxx	xx	
Low speed and/or vibrations	x	x	xx	xxx		x	xx
Low friction	xx	xx	x		xxx	xx	xx
Heavy load	xx	xx	xxx	xxx		x	xxx
Vibrations	xxx	xxx	xxx	xxx	x	xxx	
Resistance to water	xxx	xxx	xxx	xx	xxx	xxx	xxx
Rust protection	xx	xx	xxx	xx	x	xx	xxx

no cross = not suitable

x = suitable for normal requirements

xx = suitable for extreme requirements

xxx = very suitable for extreme requirements

Mounting of Spherical Roller Bearings (with tapered bore)

Metric Measurement

Bearing bore diameter		Radial internal clearance (unmounted)						Reduction in radial internal clearance		Axial drive-up* Taper 1:12 on diameter		Minimum Permissible residual clearance after mounting bearings with initial clearance		
d		Normal		C3		C4								
over	incl.	min	max	min	max	min	max	min	max	min	max	Normal	C3	C4
mm		mm												
30	40	0.035	0.050	0.050	0.065	0.065	0.085	0.020	0.025	0.35	0.40	0.015	0.025	0.040
41	50	0.045	0.060	0.060	0.080	0.080	0.100	0.025	0.030	0.40	0.45	0.020	0.030	0.050
51	65	0.055	0.075	0.075	0.095	0.095	0.120	0.030	0.040	0.45	0.60	0.025	0.035	0.055
66	80	0.070	0.095	0.095	0.120	0.120	0.150	0.040	0.050	0.60	0.75	0.025	0.040	0.070
81	100	0.080	0.110	0.110	0.140	0.140	0.180	0.045	0.060	0.70	0.90	0.035	0.050	0.080
101	120	0.100	0.135	0.135	0.170	0.170	0.220	0.050	0.070	0.75	1.10	0.050	0.065	0.100
121	140	0.120	0.160	0.160	0.200	0.200	0.260	0.065	0.090	1.10	1.40	0.055	0.080	0.110
141	160	0.130	0.180	0.180	0.230	0.230	0.300	0.075	0.100	1.20	1.60	0.055	0.090	0.130
161	180	0.140	0.200	0.200	0.260	0.260	0.340	0.080	0.110	1.30	1.70	0.060	0.100	0.150
181	200	0.160	0.220	0.220	0.290	0.290	0.370	0.090	0.130	1.40	2.00	0.070	0.100	0.160
201	225	0.180	0.250	0.250	0.320	0.320	0.410	0.100	0.140	1.60	2.20	0.080	0.120	0.180
226	250	0.200	0.270	0.270	0.350	0.350	0.450	0.110	0.150	1.70	2.40	0.090	0.130	0.200
251	280	0.220	0.300	0.300	0.390	0.390	0.490	0.120	0.170	1.90	2.70	0.100	0.140	0.220
281	315	0.240	0.330	0.330	0.430	0.430	0.540	0.130	0.190	2.00	3.00	0.110	0.150	0.240
316	355	0.270	0.360	0.360	0.470	0.470	0.590	0.150	0.210	2.40	3.30	0.120	0.170	0.260
356	400	0.300	0.400	0.400	0.520	0.520	0.650	0.170	0.230	2.60	3.60	0.130	0.190	0.290
401	450	0.330	0.440	0.440	0.570	0.570	0.720	0.200	0.260	3.10	4.00	0.130	0.200	0.310
451	500	0.370	0.490	0.490	0.630	0.630	0.790	0.210	0.280	3.30	4.40	0.160	0.230	0.350
501	560	0.410	0.540	0.540	0.680	0.680	0.870	0.240	0.320	3.70	5.00	0.170	0.250	0.360
561	630	0.460	0.600	0.600	0.760	0.760	0.980	0.260	0.350	4.00	5.40	0.200	0.290	0.410
631	710	0.510	0.670	0.670	0.850	0.850	1.090	0.300	0.400	4.60	6.20	0.210	0.310	0.450
711	800	0.570	0.750	0.750	0.960	0.960	1.220	0.340	0.450	5.30	7.00	0.230	0.350	0.510
801	900	0.640	0.840	0.840	1.070	1.070	1.370	0.370	0.500	5.70	7.80	0.270	0.390	0.570
901	1000	0.710	0.930	0.930	1.190	1.190	1.520	0.410	0.550	6.30	8.50	0.300	0.430	0.640

Inch Measurement

Bearing bore diameter		Radial internal clearance (unmounted)						Reduction in radial internal clearance		Axial drive-up* Taper 1:12 on diameter		Minimum Permissible residual clearance after mounting bearings with initial clearance		
d		Normal		C3		C4								
over	incl.	min	max	min	max	min	max	min	max	min	max	Normal	C3	C4
mm		inches												
30	40	0.0014	0.0020	0.0020	0.0026	0.0026	0.0033	0.0008	0.0010	0.014	0.016	0.0006	0.0010	0.0016
41	50	0.0018	0.0024	0.0024	0.0031	0.0031	0.0039	0.0010	0.0012	0.016	0.018	0.0008	0.0012	0.0020
51	65	0.0022	0.0030	0.0030	0.0037	0.0037	0.0047	0.0012	0.0016	0.018	0.024	0.0010	0.0014	0.0022
66	80	0.0028	0.0037	0.0037	0.0047	0.0047	0.0059	0.0016	0.0020	0.024	0.030	0.0010	0.0016	0.0028
81	100	0.0031	0.0043	0.0043	0.0055	0.0055	0.0071	0.0018	0.0024	0.028	0.035	0.0014	0.0020	0.0031
101	120	0.0039	0.0053	0.0053	0.0067	0.0067	0.0087	0.0020	0.0028	0.030	0.043	0.0020	0.0026	0.0039
121	140	0.0047	0.0063	0.0063	0.0079	0.0079	0.0102	0.0026	0.0035	0.043	0.055	0.0022	0.0031	0.0043
141	160	0.0051	0.0071	0.0071	0.0091	0.0091	0.0118	0.0030	0.0039	0.047	0.063	0.0022	0.0035	0.0051
161	180	0.0055	0.0079	0.0079	0.0102	0.0102	0.0134	0.0031	0.0043	0.051	0.067	0.0024	0.0039	0.0059
181	200	0.0063	0.0087	0.0087	0.0114	0.0114	0.0146	0.0035	0.0051	0.055	0.079	0.0028	0.0039	0.0063
201	225	0.0071	0.0098	0.0098	0.0126	0.0126	0.0161	0.0039	0.0055	0.063	0.087	0.0031	0.0047	0.0071
226	250	0.0079	0.0106	0.0106	0.0138	0.0138	0.0177	0.0043	0.0059	0.067	0.094	0.0035	0.0051	0.0079
251	280	0.0087	0.0118	0.0118	0.0154	0.0154	0.0193	0.0047	0.0067	0.075	0.106	0.0039	0.0055	0.0087
281	315	0.0094	0.0130	0.0130	0.0169	0.0169	0.0213	0.0051	0.0075	0.079	0.118	0.0043	0.0059	0.0094
316	355	0.0106	0.0142	0.0142	0.0185	0.0185	0.0232	0.0059	0.0083	0.094	0.130	0.0047	0.0067	0.0102
356	400	0.0118	0.0157	0.0157	0.0205	0.0205	0.0256	0.0067	0.0091	0.102	0.142	0.0051	0.0075	0.0114
401	450	0.0130	0.0173	0.0173	0.0224	0.0224	0.0283	0.0079	0.0102	0.122	0.157	0.0051	0.0079	0.0122
451	500	0.0146	0.0193	0.0193	0.0248	0.0248	0.0311	0.0083	0.0110	0.130	0.173	0.0063	0.0091	0.0138
501	560	0.0161	0.0213	0.0213	0.0268	0.0268	0.0343	0.0094	0.0126	0.146	0.197	0.0067	0.0098	0.0142
561	630	0.0181	0.0236	0.0236	0.0299	0.0299	0.0386	0.0102	0.0138	0.157	0.213	0.0079	0.0114	0.0161
631	710	0.0201	0.0264	0.0264	0.0335	0.0335	0.0429	0.0118	0.0157	0.181	0.244	0.0083	0.0122	0.0177
711	800	0.0224	0.0295	0.0295	0.0378	0.0378	0.0480	0.0134	0.0177	0.209	0.276	0.0091	0.0138	0.0201
801	900	0.0252	0.0331	0.0331	0.0421	0.0421	0.0539	0.0146	0.0197	0.224	0.307	0.0106	0.0154	0.0224
901	1000	0.0280	0.0366	0.0366	0.0469	0.0469	0.0598	0.0161	0.0217	0.248	0.335	0.0118	0.0169	0.0252

1. * Valid for solid steel shafts only.

Shaft tolerances and fits

Shaft tolerance limites for adapter mounting

Nominal Shaft diameter		Diameter tolerances		Max permissible taper and ovality on radius
over	incl.	max	min	
in.				
0.3940	0.7090	+0.000	-.0017	.00015
0.7090	1.1810	+0.000	-.0020	.00020
1.1810	1.9690	+0.000	-.0024	.00020
1.9690	3.1500	+0.000	-.0029	.00025
3.1500	4.7240	+0.000	-.0034	.00030
4.7240	7.0870	+0.000	-.0039	.00035
7.0870	9.8430	+0.000	-.0045	.00040
9.8430	12.402	+0.000	-.0051	.00045
12.402	15.748	+0.000	-.0055	.00050
15.748	19.685	+0.000	-.0061	.00055

Nominal Shaft diameter		Diameter tolerances		Max. permissible taper and ovality
over	incl.	max	min	
mm		µm (.001 mm)		
10	18	+0	-43	4.0
18	30	+0	-52	4.5
30	50	+0	-62	5.5
50	80	+0	-74	6.5
80	120	+0	-87	7.5
120	180	+0	-100	9.0
180	250	+0	-115	10.0
250	315	+0	-130	11.5
315	400	+0	-140	12.5
400	500	+0	-155	13.5

Shaft tolerances for spherical roller bearings with cylindrical bore

Brg. Size	Inches		ISO Fit	Millimeters	
	Max.	Min.		Max.	Min
07	1.3785	1.3780	l5	35.013	35.002
08	1.5753	1.5749	lk5	40.013	40.002
09	1.7724	1.7720	k6	45.020	45.009
10	1.9693	1.9689	m5	50.020	50.009
11	2.1663	2.1658	m5	55.024	55.011
12	2.3631	2.3626	m5	60.024	60.011
13	2.5600	2.5595	m5	65.024	65.011
14	2.7571	2.7563	m6	70.030	70.011
15	2.9539	2.9532	m6	75.030	75.011
16	3.1508	3.1500	m6	80.030	80.011
17	3.3478	3.3470	m6	85.035	85.013
18	3.5447	3.5438	m6	90.035	90.013
19	3.7415	3.7407	m6	95.035	95.013
20	3.9384	3.9375	m6	100.035	100.013
22	4.3325	4.3316	n6	110.045	110.023
24	4.7262	4.7253	n6	120.045	120.023
26	5.1201	5.1192	n6	130.052	130.027
28	5.5138	5.5129	n6	140.052	140.027
30	5.9082	5.9072	p6	150.068	150.043
32	6.3019	6.3009	p6	160.068	160.043
34	6.6956	6.6946	p6	170.068	170.043
36	7.0893	7.0883	p6	180.068	180.043
38	7.4834	7.4823	p6	190.079	190.050
40	7.8771	7.8760	p6	200.079	200.050
44	8.6645	8.6634	p6	220.079	220.050
48	9.4519	9.4508	p6	240.079	240.050
52	10.2397	10.2384	p6	260.088	260.056
56	11.0271	11.0258	p6	280.088	280.056
60	11.8161	11.8149	r6	300.130	300.098
64	12.6041	12.6027	r6	320.144	320.108
68	13.3915	13.3901	r6	340.144	340.108
72	14.1791	14.1777	r6	360.150	360.114
76	14.9665	14.9651	r6	380.150	380.114
80	15.7539	15.7525	r6	400.150	400.114
84	16.5419	16.5404	r6	420.166	420.126
88	17.3293	17.3278	r6	440.166	440.126

Shaft tolerances for self aligning ball bearings with cylindrical bore

Brg. Size	Inches		ISO Fit	Millimeters	
	Max.	Min.		Max.	Min
05	0.9847	.9843	k5	25.011	25.002
06	1.1815	1.1812	k5	30.011	30.002
07	1.3785	1.3780	k5	35.013	35.002
08	1.5753	1.5749	k5	40.013	40.002
09	1.7722	1.7717	k5	45.013	45.002
10	1.9690	1.9686	k5	50.013	50.002
11	2.1659	2.1654	k5	55.015	55.002
12	2.3628	2.3623	k5	60.015	60.002
13	2.5596	2.5591	k5	65.015	65.002
14	2.7565	2.7560	k5	70.015	70.002
15	2.9533	2.9528	-	75.015	75.002
16	3.1502	3.1497	k5	80.015	80.002
17	3.3472	3.3466	k5	85.018	85.003
18	3.5440	3.5434	k5	90.018	90.003
19	3.7409	3.7403	k5	95.018	95.003
20	3.9377	3.9371	k5	100.018	100.003
22	4.3318	4.3312	m5	110.028	110.013

AUTOMATIC LUBRICATION, WHERE YOU WANT IT, 24 HOURS A DAY, 7 DAYS A WEEK.

Any bearing deprived of correct lubrication will fail well within its predicted lifespan. With that fundamental engineering principle in mind, SKF, the world's largest bearing manufacturer, has introduced SKF SYSTEM 24, a new generation of automatic lubricators that bridge the conflicting interests of commercial need and environmental pressures.

Mounted in seconds, SKF SYSTEM 24 provides constant lubrication at a predetermined rate to minimize downtime and reduce the costs of expensive manual maintenance procedures.

A range of advanced lubrication products is available such as LAGD 125/WA2, a grease for general purposes, wide temperature applications (has EP additives); LAGD 125/LG202 grease and LAGD 125/HFP 120 oil, both non-toxic, non-staining, food compatible products.

Practical benefits

SKF SYSTEM 24 sets new standards in lubrication management and efficiency:

- **Reliability** - allowing fit and forget procedures until predetermined replacement time.
- **Transparent container** to check lubricant levels
- **High capacity, compact size** permits installation in restricted areas.
- **Dispense rate setting** is a simple part of the installation process.
- **Can be temporarily deactivated**
- **Reduced inventory cost** as one lubricator covers all time settings.
- **Hermetic sealing** prevents ingress of dirt or foreign matter.
- **No harmful chemicals** to generate the drive gas.
- **Lubricator time set dial** allows easy and accurate adjustment of lubrication flow
- **Transparent container** allows visual checking of dispense rate
- **Cartridge neck** screws into lubrication point or accessories
- **Special piston shape** ensures optimum emptying of lubricator



TECHNICAL DATA

Grease capacity	125 ml, (4.25fl oz. US)
Nominal emptying time	Adjustable; 1 - 12 months
Ambient temperature range	-20° to +55°C (-5° to +130°F)
Maximum operating pressure	4 bar (60 psi)
Drive mechanism	Gas cell producing hydrogen gas (H ₂)
Connection thread	1/4" BSP
Recommended storage temperature	+20°C (+70°F)
Storage life of lubricator	2 years
Gas cell life	3 year
Weight	Approx 190g (6.7 oz) lubricant included

For additional Maintenance Products Tooling, Heaters and Lubricants contact you local SKF sales office or www.skf.ca

SKF Shaft Alignment Tool TMEA 1

Simplified alignment of rotating machinery

Approximately 50% of breakdowns in rotating machinery are caused by misalignment of the shafts. Poor machine alignment generates additional loads and vibration, causing premature damage to bearings, seals and couplings. It also significantly increases the energy consumption.

Using only four buttons and the well proven laser alignment techniques, the SKF Shaft Alignment Tool TMEA 1, makes accurate machine alignment operation simpler and quicker than with traditional methods and equipment. The TMEA 1 is supplied in a sturdy portable carrying case equipped with all the necessary accessories.

High accuracy but simple to operate

The TMEA 1 alignment tool uses two measuring units, both provided with a laser diode and a positioning detector. After attaching the measuring units to the shafts the on-screen instructions guide you simply through the alignment procedure. The machine can then be correctly positioned according to the calculated live values provided on the display.

SKF precut machinery shims are a timesaving accessory to any rotating machine alignment job.

Good alignment means:

- Reduced maintenance costs
- Longer bearing, seal and coupling life
- Less vibration and noise
- Less energy consumption
- Fewer unplanned stops

User-friendly tool:

- Only four buttons to operate
- Spirit levels integrated in the unit
- On-screen instructions
- Displays live results
- Easy attachment of measuring units
- Basic set of shims included
- Weight only 4,5 kg
- Sturdy portable carrying case



For additional Maintenance Products Tooling, Heaters and Lubricants contact you local SKF sales office or www.skf.ca

SKF's Belt Alignment Tool TMEB1

Laser technology combines precise accuracy with simple operation

Accurate pulley alignment ensuring well-aligned belts is the key to Trouble-Free Operation of your belt driven equipment. BeltAlign, SKF's belt alignment tool, is the most precise alignment tool for V-belt pulleys available. Its advanced lightweight design coupled with cutting-edge technology makes it an ideal solution to enhance performance and reduce down time of your machinery. With only two components, BeltAlign is fast and easy to attach, and requires no training to operate.

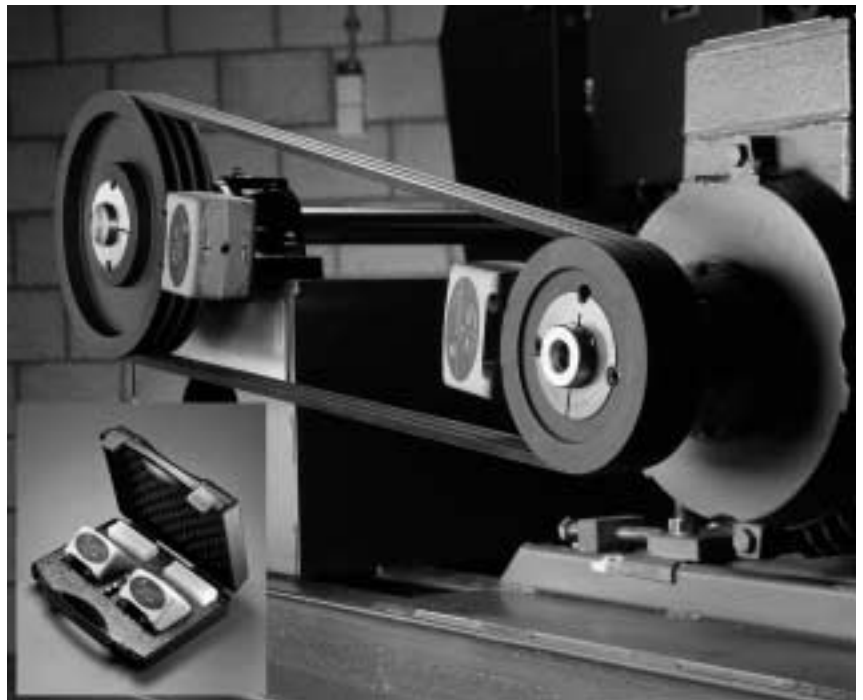
SKF BeltAlign attaches simply and securely to the pulley; two V-guides grip the groove while bar magnets hold the unit firmly in place.

Accurate alignment means:

- Less wear on belt and pulley
- Less friction and therefore lower energy consumption
- Less vibration and noise
- Increased safety-prevents belt turnover in the pulley
- Increased up time
- Lower costs

Advantages:

- User-friendly tool
- Fast and easy to attach, easy to use
- Aligns grooves of the pulley rather than its face, allowing for alignment of pulleys of unequal width or with dissimilar faces even fits applications where pulley face cannot be used as a reference
- No trial and error. The laser position indicates the nature of misalignment allowing easy, accurate adjustment
- Facilitates simultaneous adjustment of tension and alignment
- V-guides allow for alignment of a wide range of V-belt pulleys
- The unique dual laser eliminates need for mirrors or reflectors, minimising diffusion of the beam over longer distances.
- Long (6 m) operating distance
- Only two components
- Lightweight



For additional Maintenance Products Tooling,
Heaters and Lubricants contact your local SKF sales office or www.skf.ca

TIH 015 Heater

**Quality heater from SKF that does what heaters should do.
And at a very competitive price!**

SKF Bearing heaters are powerful, safe and have excellent long-term reliability.

SKF induction heater TIH 015 is made for heating bearings and other annular metal components up to approximately 40 lbs (20 kg), reaching a maximum temperature of approximately 600°F (300°C), depending on weight, geometry and material of the workpiece.

Induction heating

An induction heater is similar to a transformer, using the principle of a primary coil with a large number of windings and a secondary coil with a few windings on a mutual iron core. When heated by an SKF induction heater, the bearing becomes the short circuited, single turn secondary coil through which a high current flows at a low voltage, generating heat. The heater itself, as well as the yoke, remain at ambient temperature.

The SKF TIH 015 heater

The induction heater has a glass-fiber, reinforced housing in which a coil on a U-shaped iron core is mounted together with the START/STOP button. The heater is supplied with two top yokes suitable for bore diameters from 0.8 inch (20 mm) and 1.6 inch (40 mm). Every TIH 015 heater is provided with a 2 meter cable and a standard plug with a round grounding pin. Please note that the SKF TIH 015 is not equipped with automatic demagnetization, which instead must be done manually.

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Equipped with spring operated arms and safety pin, SKF's new patent-pending EasyPull is one of the most user-friendly and safe tools on the market today. Ergonomically designed, the spring-operated arms enable the user to position the puller behind the component with just one movement of the hand. Costs resulting from exchange of expensive spare parts are avoided with the EasyPull's unique safety pin which breaks instead of the pull itself, should excessive force be used. Additionally, hazardous slipping of the puller claws is avoided due to the special locking mechanism which ensures a tighter grip of the components as the pulling force increases.

EasyPull dismounts the most difficult bearings

Dismounting a bearing can be a demanding task for both user and puller. The new EasyPull, with its uniquely designed opening mechanism and safety pin, makes dismounting easy. Simply open the arms of the EasyPull by pressing the red rings together, place the EasyPull behind the component with one movement of your hand and pull either manually or with one of SKF's hydraulic tools. It's as easy as that.

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 - Extremely user-friendly due to spring operated and self-locking arms, gripping behind the component with just one movement of the hand
 - Ergonomic red-rings
 - Available in three sizes with a maximum withdrawal force of 3, 5 or 8 tonnes (30, 50 or 80kN), enabling easy selection
 - Hydraulic force generators available for the 8 tonne (80kN) EasyPull
 - Light-weight
- **Safe:**
 - Safety pin minimises any injury to the user and prevents damage to puller arms, rings and spindle
 - Self-locking: Arms prevent risk of slipping of puller under load
- **Cost-saving:**
 - No need to buy expensive spare-parts; a unique safety pin breaks should excessive force be used
 - Service life of puller extended by safety pin
 - Self-centering avoids damage to shaft
 - Efficient use of time due to quick dismounting



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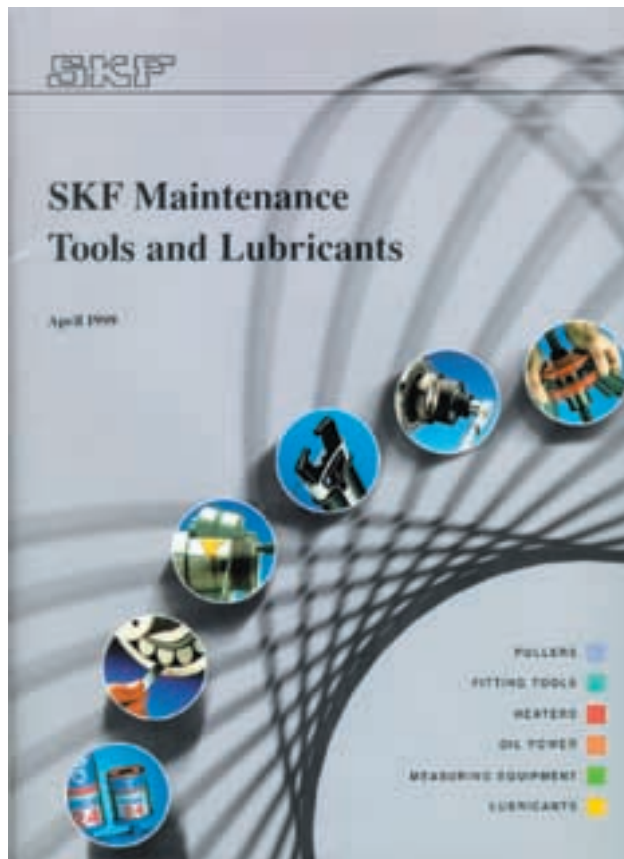
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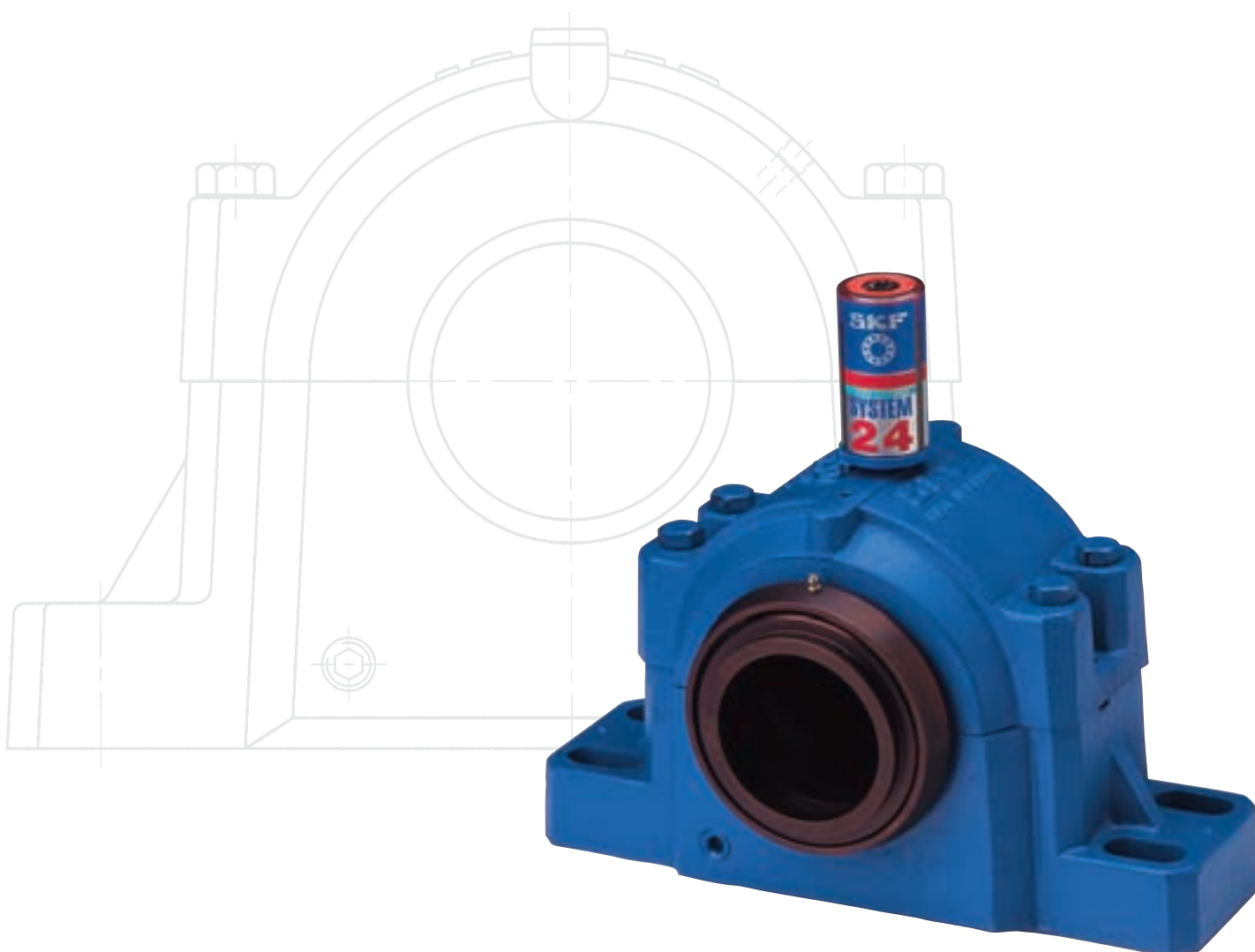
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7.3 Goodyear Conveyor Belt Maintenance Manual

7.3 Goodyear Conveyor Belt Maintenance Manual



INSTALLATION, MAINTENANCE & TROUBLESHOOTING GUIDE



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STORAGE

The methods of storing and handling conveyor belting and the procedures for tensioning it before making the final splice are just as important as actually making the splice. Protect your conveyor belt investment with proper storage. Belts should always be stored upright in the factory package until used in a cool, dry building and in an area free from sunlight. Store the belt roll suspended on a tube, bar or support stand. Under no conditions should rolls of belt, especially raw edge or used, be laid flat on its side. Storing the belt flat on the ground, where moisture can penetrate exposed fabric, or storing the belt roll with weight on one edge, may stretch the belt. This can cause belt camber or a bowing in the belt, resulting in serious belt mistracking.

During extended storage, the belt roll should be covered with a tarp or dark plastic. Exposure to sunlight, rain and ozone can have detrimental effects on the rubber covers. The cover should remain in place for the entire storage time. Ideally, the belt should be rotated 90 degrees approximately every 90 days. Rotation should be performed in the same direction used to wind up the belt. Rotating in the opposite direction could cause the roll to loosen or telescope.

It is important to make sure the belt is not exposed to extreme temperatures during storage. Ideal temperature for storing a belt is between 50° F and 70° F. Temperatures outside of this range for an extended period of time can have detrimental effects on the rubber compounds.

As the length of time stored increases, and as the size of the roll of belting increases, so does the importance of the following correct storage procedures. Following these procedures will increase the life of the belt once it is installed on the system.

HANDLING THE ROLL

Conveyor belting is customarily packaged in cylindrical reels, or rolls on a core with the carrying cover side facing out. If rolling is necessary, it should occur in a direction such that the end of the roll on the outside wrap travels in the direction from which it is wound up. Rolling in the opposite direction tends to loosen and telescope the belt.

Reels or rolls should never be dropped from a freight car, truck, or other means of conveyance, since their weight will break the packaging and may damage the belt. Reels or rolls should always be rolled, or provision should be made for hoisting them. For hoisting, a square lifting bar of the correct size should be placed through the hole in the center of the core. A spreader bar should be utilized to prevent the chains or slings from damaging the edges of the conveyor belt. Slings or chains of the correct size for the weight of the roll should be used (Fig. 1).

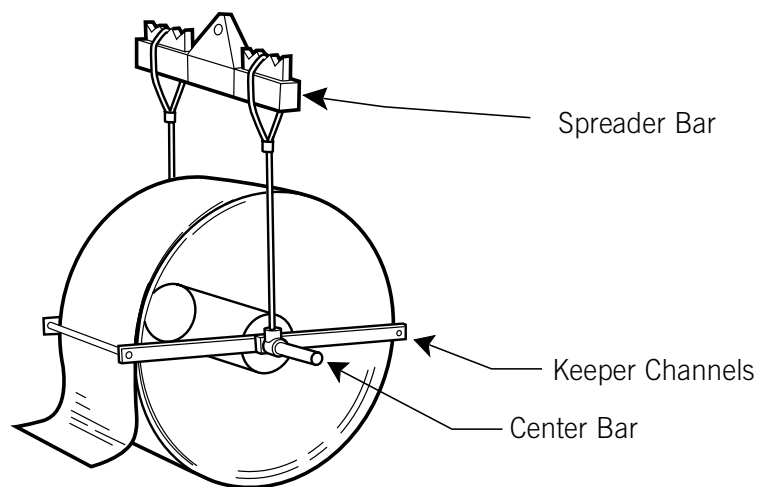


Fig. 1

INSTALLATION

The relative position of the top and bottom covers or surfaces of the belt should be considered when positioning the roll for threading. Once the roll of belting has been transported to the point of installation, it should be mounted on a suitable shaft for unrolling and threading onto the conveyor. Conveyor belting is normally rolled at the factory with the carrying side out. Consequently, in mounting the roll, the belt must lead off the top of the roll if it is being pulled onto the troughing or carrying idlers, but off the bottom of the roll if it is being pulled onto the return idlers. When pulling the belt onto the conveyor, the roll will turn opposite the direction indicated by the arrows on the crate. Fig. 2 illustrates a suitable method of mounting, as well as leading off the top of the roll for pulling onto the troughing idlers.

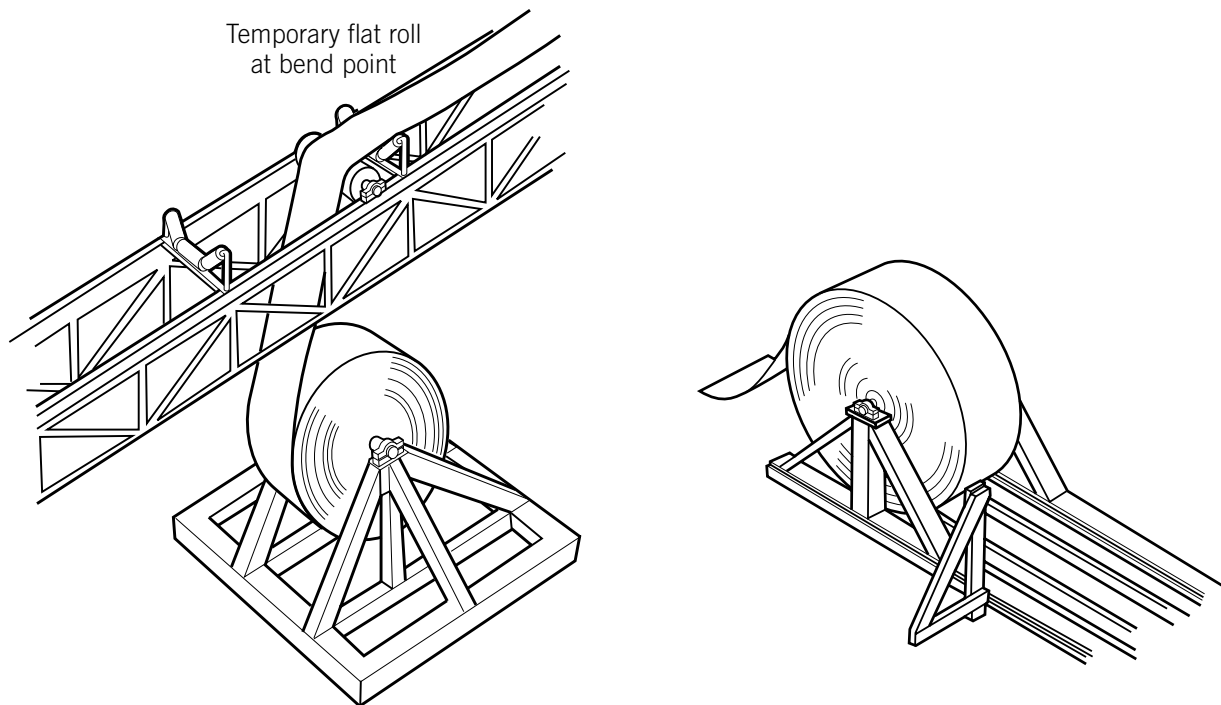


Fig. 2

Note: Temporary flat roll at bend point, as roll is pulled onto troughing idlers.

INSTALLATION, MAINTENANCE & TROUBLESHOOTING GUIDE

INSTALLATION

In some cases, such as in mines where headroom does not permit maneuvering a roll, the belt may have to be pulled off the roll and reefed (Fig. 3). Extreme care should be exercised to see that the loops have large bends to avoid kinking or placing undue strain on the belt, and no weight should ever be placed on the belt when it is in this position. Ideally, supports should be placed at each end where the bends occur.

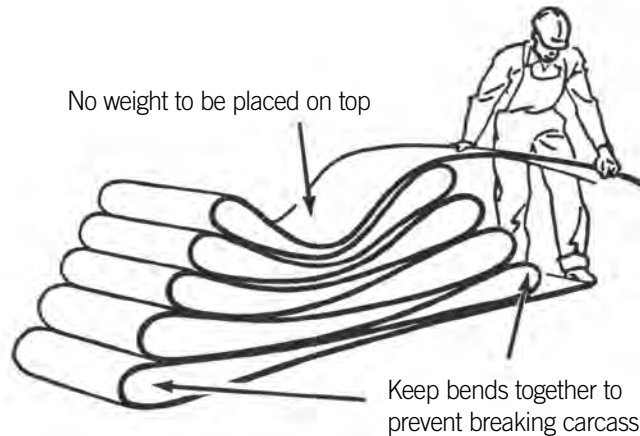


Fig. 3
Reefing the Belt

A third method of handling the roll, where headroom for mounting on a horizontal shaft is lacking, is mounting on a turntable with a vertical spindle. The belt must make a 90-degree twist as it comes off the turntable. This method is sometimes used underground, with the turntable mounted on wheels or skids for transporting the roll of belt as it lies on its side, as well as for unrolling it at the final location.

If the belt is for replacement, the new roll can be set up as previously indicated. The old belt is clamped off and cut, and the new belt is spliced to the leading end of the old belt by using approximately one-half the usual number of plate-type fasteners. The trailing end of the old belt is hooked to a truck, tractor, mine locomotive, or other means of providing traction. The conveyor drive motor is used to pull on the new belt while the towing device drags the old belt away and at the same time provides sufficient slack side tension for the conveyor drive pulley. In all cases, care should be exercised to ensure the carrying side of the conveyor is placed upward if pulling onto the top run, or downward if pulling onto the return run.

For a new conveyor installation having little or no slope, a rope or cable should be attached to a clamp at the belt end. In clamping to the end of the belt for pulling it on the conveyor, it is not sufficient to cut a hole through the belt or ears into its corners for tying on a rope. A clamp should be made to distribute the pull applied to the end across its full width. Since the clamp must pass through places of low clearance, it usually is made of two pieces of 1/4-inch to 1/2-inch plate approximately equal to the belt width and 4 inches long. One piece is placed against each surface of the belt at the end, and bolts are placed through both plates at about 6-inch intervals and 2 inches back from the belt end. The rope is then attached to this clamp with a shackle or by welding an eye to one of the plates. The belt roll has been handled as previously described. The rope or cable is then threaded over the conveyor and attached to a towing device to pull the belt onto the conveyor.

INSTALLATION, MAINTENANCE & TROUBLESHOOTING GUIDE

INSTALLATION

For installations with a relatively high degree of slope (12 degrees or more), the method of handling is slightly different. The roll of belt is set up as previously described. It is often found most convenient to place it at or near the head pulley, since this generally is the most accessible. Assuming the conveyor is sufficiently long to require more than one splice, the conveyor side and the return sides are threaded on separately. Care must be taken to see that conveyor side or heavier cover is up on the carrying side and down on the return run.

As the belt is fed on, the tension at the roll tends to build up due to the weight of the belt on the slope. For this reason, some method of braking is required. Customary practice is to use a belt clamp, mounted on the conveyor structure, through which the belt is threaded. Where the slope is very long, additional clamps should be spaced approximately 1000 feet apart. Where more than one clamp is used, workers are stationed at each clamp to loosen and tighten the clamps as the belt is fed onto the conveyor. Care must be exercised that the belt does not run away. As a roll runs out, another is spliced on and then fed onto the conveyor.

If the conveyor side and the return side have been fed on separately, the final splice is best made at the bottom of the slope where the ends of the belt meet, since a much lower splicing tension will serve at this point. Making the final splice at the top of the slope is entirely possible but requires proper splicing tension.

When pulling the belt onto the system, station personnel at key points along the conveyor to help avoid the belt from hanging up on the structure resulting in belt damage. Pull the belt ends until they overlap the required splicing length.

To prevent the belt roll from over-running at the let-off, a braking device is often needed (Fig. 4).

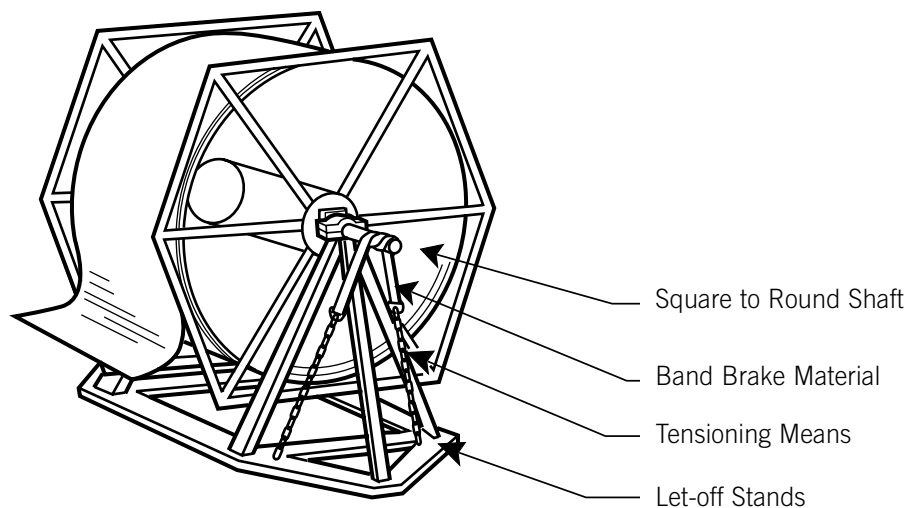


Fig. 4

STRINGING THE BELT

Textile belts such as Pylon Plus®, Pylon®, Raider®, Pathfinder®, etc. that have been slit from a full-width slab at the factory should be spliced with the factory-cut edges on the same side of the conveyor (Goodyear Engineered Products identifies these edges with white paint applied at the factory after slitting). The factory-edge side of slit belts will be identified by painting "Factory Edge" on that side and a solid white 3" strip will be painted across the full diameter of the same edge.

To minimize side travel on steel cord belt rolls, it is recommended that rolls be strung onto the conveyor in the exact sequence they were manufactured.

TENSIONING

Once the belt has been pulled onto the conveyor system, it must be tensioned prior to splicing to facilitate correct positioning of the take-up and to eliminate sag. The tensioning operation takes place at the location where the last splice will be made. After final tensioning, clamps are placed on each end of the belt. These are made of steel and have a clamping surface as indicated in Figure 5.

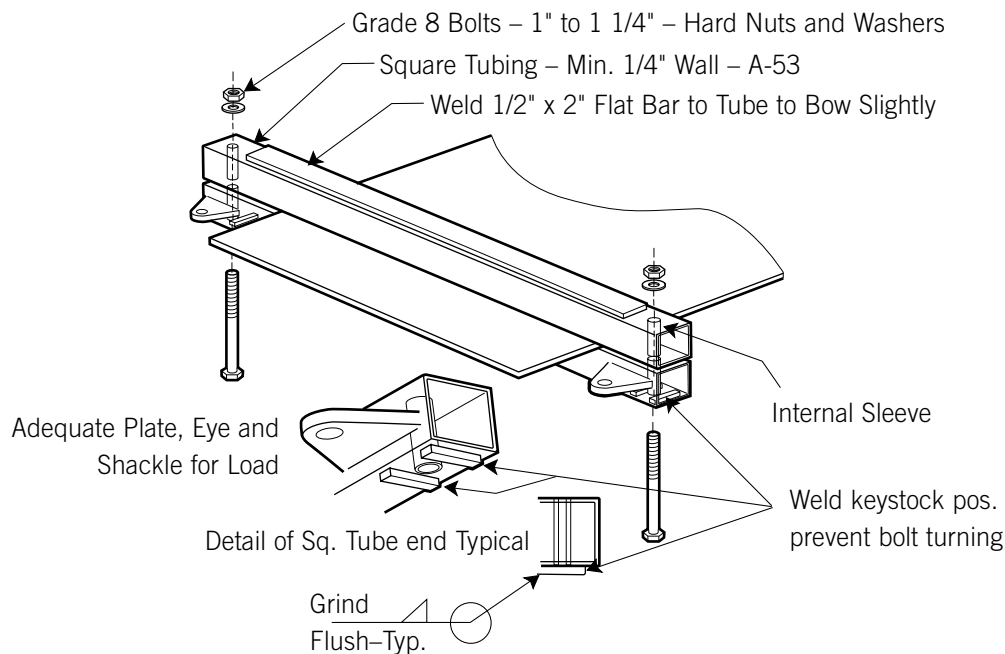


Fig. 5

Tension Clamp for Splicing

Tension is applied by means of a power device, which is used to pretension the belt before "clamping off."

When tension measuring load cells or scales are used, they are rigged to measure the pull on the take-up pulley. The belt is pulled until the load cells or scales register a tension equal to or slightly greater than the recommended take-up force. Make allowance for an amount of belt necessary to correctly position the counterweight from this point.

INSTALLATION, MAINTENANCE & TROUBLESHOOTING GUIDE

I N S T A L L A T I O N

Certain basic statements and recommendations can be made about tensioning for splicing:

- Belts which are tensioned by pulling in only one direction require more splicing tension than those pulled in both directions.
- Slope belts spliced at the top of the slope require more splicing tension than those spliced at the bottom.
- Slope belts with an anti-rollback device that cannot be released must be tensioned by pulling only in the direction of belt travel.
- Check the belt frequently during tensioning to ensure that the belt is free and not binding at any place.
- During the final tensioning pull, be sure the ends of the belt are lined up properly.

Conveyor installations having limited take-up travel should be spliced to a tension based on the loaded running tension. This tension should be specified by Goodyear Engineered Products and measured by suitable load cells or dynamometers. Where it is practical, fabric belts should be run for several weeks with mechanical fasteners before making the final vulcanized splice.

Obtaining the required tension depends heavily on the experience of the individual making the splice. It is possible for a gravity type take-up to severely damage the conveyor structure if it is positioned too close to the forward or upward stop. Too much tension applied to a relatively short belt may thus have a harmful effect on the pulley shafts and bearings as well as the belt.

The belt may be tensioned with a suitable take-up device as follows:

When the counterweight is on: Tie the take-up off 6" to 8" (150mm to 200mm) above the desired running position (Consideration may have to be made for excessive sag). Next, pull the belt until the take-up starts to lift and the tie-off ropes become slack. Make the final splice, allowing a minimum of belt slack.

When the counterweight is not on: Splicing without the counterweight installed is undesirable; however, the following procedure should be employed if necessary: Use suitable belt clamps to hold the take-up pulley 6" to 8" (150mm to 200mm) above the desired running position (Consideration may have to be made for excessive sag). Pull the belt to its running tension, which can only be estimated in this situation. Judgment in estimating this tension will improve with the experience of the splicer.

Tables 1-1 and 1-2 show the recommended take-up travel and initial take-up position respectively.

TABLE 1-1
RECOMMENDED MINIMUM TAKE-UP TRAVEL
IN PERCENT OF CENTER DISTANCE*

TYPE OF TAKE-UP AND CARCASS MATERIAL [WARP]	PERCENT OF RATED TENSION		
	100%	75%	50% or LESS
MANUAL TAKE-UP**			
NYLON	4.00%	3.00%	2.00%
POLYESTER	2.50%	2.00%	1.50%
ARAMID	2.00%	1.50%	1.00%
FIBERGLASS	1.00%	0.75%	0.50%
AUTOMATIC TAKE-UP			
NYLON	3.00%	2.50%	1.50%
POLYESTER	1.70%	1.25%	0.75%
ARAMID	1.50%	1.00%	0.75%
FIBERGLASS	0.50%	0.40%	0.25%
STEEL	0.30%	1.23%	0.15%

*For [1] belts installed at average empty running tension [2] take-up position per Table 1-2, and [3] Drive location at or near the high tension end of the conveyor.

**Only short endless feeder belts and the like would normally be vulcanized on conveyors with a manual take-up.

TABLE 1-2
RECOMMENDED INITIAL TAKE-UP POSITION+

CARCASS MATERIAL [WARP]	PERCENT AVAILABLE FOR LENGTH INCREASE	PERCENT AVAILABLE FOR LENGTH DECREASE
STEEL	25%	75%
NYLON, POLYESTER, ARAMID, FIBERGLASS	90%	10%

+Take-up conditions and travel amounts as shown in Table 1-1.

TRAINING THE BELT

Training the belt is a process of adjusting idlers, pulleys, and loading conditions in a manner that will correct any tendency of the belt to run other than centrally. The following causes of common belt performance are considered axiomatic.

When all portions of a belt run off through a part of the conveyor length, the cause is probably in the alignment or leveling of the conveyor structures, idlers, or pulleys in that region. If one or more portions of the belt run off at all points along the conveyor, the cause is more likely in the belt itself, in the joints of the belt, or in the loading of the belt. When the belt is loaded off-center, the center of gravity of the load tends to find the center of the troughing idlers, thus leading the belt off on its lightly loaded edge (Fig. 6).

These basic rules can be used to diagnose belt running ills. Combinations of these rules sometimes produce cases that do not appear clear-cut as to cause, but if there are a sufficient number of belt revolutions, the running pattern will become clear and the cause disclosed. The usual cases when a running pattern does not emerge are those of erratic running, which may be found with an unloaded belt that does not trough well, or a loaded belt that is not receiving its load uniformly centered.

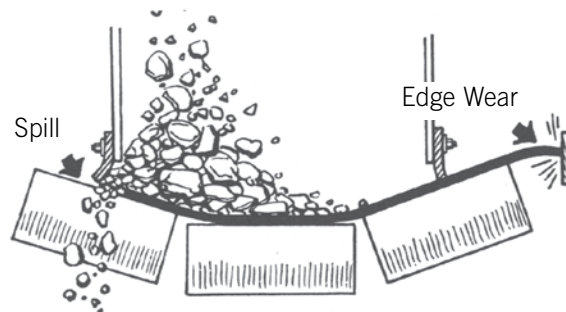


Fig. 6
Effects of Off-Center Loading