

4.9.2.2 Removing the hollow shaft with parallel key

⚠ WARNING**Inadequately secured gearbox or geared motors can free themselves**

Before driving out the machine shaft, fasten a suitably dimensioned means of absorbing load to the gearbox.

Slightly pretension the pulling equipment so that the gearbox does not drop onto it when the insert shaft is released.

NOTICE**Subjecting stress to the hollow shaft causes bearing failure**

It is essential to prevent misalignment when removing the unit.

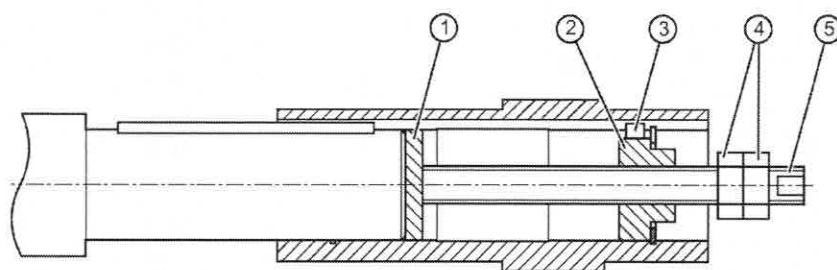
NOTICE**Excessive forces during removal**

Excessive forces can occur during removal of the hollow shaft via the housing.

Stresses in the hollow shaft can lead to bearing failure and damage to the gearbox housing.

Note

If frictional corrosion has occurred on the seat surfaces, use rust solvent to facilitate the removal of the gearbox. Allow an adequately long time for the rust solvent to take effect.



Items ① to ⑤ are not included in the scope of supply.

- | | |
|------------------|---------------|
| ① Disk | ④ Hexagon nut |
| ② Threaded block | ⑤ Leadscrew |
| ③ Parallel key | |

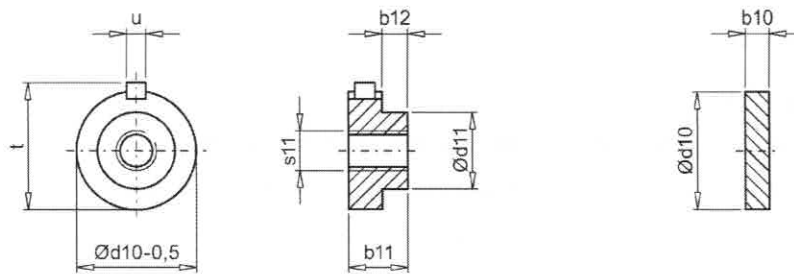
Figure 4-6 Removing the hollow shaft with parallel key

Procedure

1. Remove the axial locking element from the hollow shaft.
2. Drive out the machine shaft using the disk ①, threaded block ②, feather key ③, threaded spindle ⑤ and hexagon nuts ④.

You have now removed the hollow shaft with parallel key.

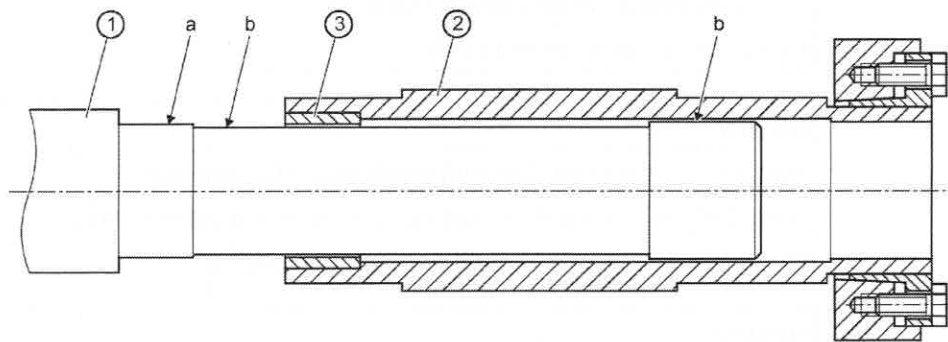
Design suggestion for threaded block and disk



Gearbox	Size	Hollow shaft Ø	b10	b11	b12	d10	d11	s11	t _{max}	u
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
B	19	20	3	15	10	19.9	10	M6	22.5	6
B, C	29	20	3	15	10	19.9	10	M6	22.5	6
B, F	29	25	3	15	10	24.9	16	M10	28	8
C	39	25	3	15	10	24.9	16	M10	28	8
B, K, F, C		30	6	15	10	29.9	18	M10	33	8
B		35	6	15	10	34.9	24	M12	38	10
B		40	6	15	10	39.9	28	M16	43	12
C	49	30	6	15	10	29.9	18	M10	33	8
K, F, C		35	6	15	10	34.9	24	M12	38	10
B		40	6	15	10	39.9	28	M16	43	12
K, F, C	69	40	6	20	9	39.9	28	M16	43	12
C		45	6	20	9	44.9	36	M16	48	14
K, F	79	40	6	20	9	39.9	28	M16	43	12
K, F, C	89	50	7	20	10	49.9	36	M16	53.5	14
C		60	7	20	10	59.9	45	M20	64	18
K, F	109	60	10	24	14	59.9	45	M20	64	18
K, F	129	70	10	24	14	69.9	54	M20	74.5	20
K, F	149	90	10	24	14	89.9	72	M20	95	25
K, F	169	100	10	30	15	99.9	80	M24	106	28
K, F	189	120	10	30	15	109.9	80	M24	127	32

4.9.3 Hollow shaft with shrink disk

4.9.3.1 Mounting the hollow shaft with shrink disk



- a Greased
b Absolutely grease-free
* Not included in scope of supply
① Machine shaft
② Hollow shaft
③ Bushing

Figure 4-7 Mounting the hollow shaft with shrink disk

Procedure

1. Using benzene or a solvent, remove the anti-corrosion protection from the shaft ends and flanges.
2. Check the seats or edges of the hollow and machine shafts for damage. Contact Technical Support if you notice any damage.
3. Mount the gearbox with the shrink disk shaft onto the machine shaft. Carefully ensure the correct position and that the shrink disk seat completely covers the machine shaft.

You have mounted the hollow shaft with shrink disk.

4.9.3.2 Mounting the shrink disk

 WARNING
Risk of injury due to freely rotating parts Fit a cover cap or protection cover.

NOTICE
Lubricants in the shrink disk seat impair torque transmission Keep the bore in the hollow shaft and the machine shaft completely grease-free. Do not use impure solvents and soiled cleaning cloths.

NOTICE
Plastic deformation of the hollow shaft caused by tightening the tightening bolts Plastic deformation of the hollow shaft when tightening the tightening bolts before fitting the machine shaft. First fit machine shaft. Then tighten the tightening bolts.

NOTICE
Avoid overloading the individual bolts Do not exceed the maximum tightening torque for the tightening bolt. Frame sizes 19 - 69: tighten clamping screws ⑥ Frame sizes 79 - 189: it is important that the face surfaces of the outer ring ④ and the inner ring ⑤ are flush with one another. If they are not flush with one another when tensioning, the tolerance of the insert shaft must be checked.

Note

The shrink disk, item ③, is delivered ready for installation.
Do not dismantle it before the initial fitting.

Note

The machine shaft material must comply with the following criteria in order to safely and reliably transfer the forces and torques.

- Yield point $Re \geq 360 \text{ N/mm}^2$
 - Modulus of elasticity: approx. 206 kN/mm^2
 - No face end thread in the machine shaft because it would reduce the transferred torque
-

Note

The shrink-fitted disc connection fastens the hollow shaft axially on the machine shaft.

Note

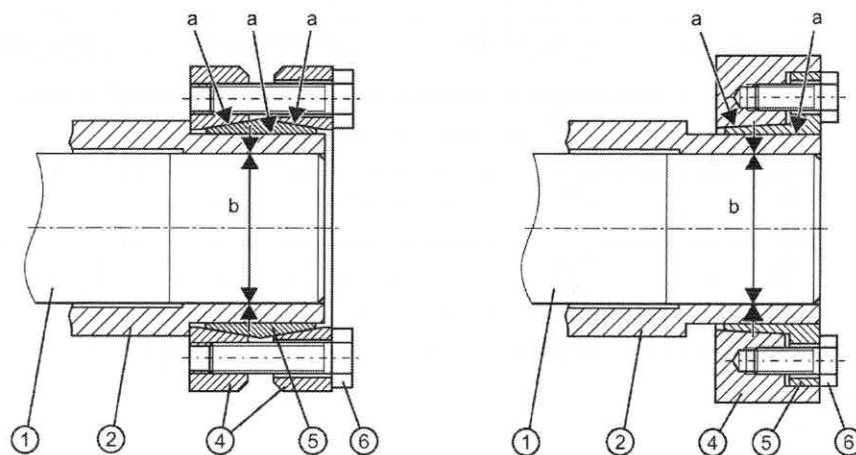
Apply a thin layer of grease to the shrink disk seat on the hollow shaft.

Note

Coat with a suitable lubricant to prevent frictional corrosion of the contact surface on the customer's machine shaft in the vicinity of the bush.

Sizes 19 - 69

Sizes 79 - 189



- a Greased
- b Absolutely grease-free
- ① Machine shaft
- ② Hollow shaft
- ③ Shrink disk comprising items ④ - ⑥
- ④ Outer ring
- ⑤ Inner ring
- ⑥ Tightening bolt

Figure 4-8 Mounting the shrink disk

Procedure

1. Push the shrink disk ③ onto the hollow shaft ②.
 - 3-part shrink disk until the limit for sizes 19 - 69.
 - 2-part shrink disk flush with the shaft end for sizes 79 - 189.
2. Tighten the clamping bolts ⑥, initially by hand. Align the shrink disk ③ so that the clamping flanges are plane-parallel with one other.
3. Use the torque wrench to turn each of the clamping screws ⑥ equally by 1/6 revolution (not crosswise); repeat this procedure several times. Observe the tightening torque.
4. Attach the rubber cover or protection cover included in the scope of supply, see Removing and installing the protection cover (Page 35).

You have now installed the shrink disk.

Table 4-7 Tightening torque for the tightening bolt

Gearbox size	Thread size	Strength class	Tightening torque
			[Nm]
19, 29	M5	10.9	5
39, 49, 69	M6	10.9	12
79, 89	M8	12.9	35
109	M10	12.9	70
129	M10	12.9	70
149	M12	12.9	121
169, 189	M14	12.9	193

4.9.3.3 Pulling off the shrink disk

Procedure

1. Successively release the tightening bolts ⑥ one after the other through a ¼ turn each time using a wrench. Do not completely remove the bolts.
2. Pull the shrink disk off the hollow shaft.

Sizes 79 - 189:

If the outer ring does not come away from the inner ring, remove some of the tightening bolts and insert them into neighboring forcing threads.

Pull the shrink disk off the hollow shaft.

4.9.3.4 Cleaning and lubricating shrink disks

Soiled shrink disks must be cleaned and regreased prior to fitting.

Shrink disks that have been released need not be disassembled and regreased before being retensioned.

Procedure

1. Only grease the inner friction surfaces of the shrink disks. To do this, use a solid lubricant with a friction coefficient of $\mu = 0.04$.
2. Use a paste containing MoS₂ to grease the bolts, applying the paste to the thread and underneath the head.


Clean the shrink disk.

Table 4- 8 Lubricants for shrink disks

Lubricant	Sold as	Manufacturer
Molykote 321 R (lubricant paint)	Spray	DOW Corning
Molykote spray (powder spray)		
Molykote G Rapid	Spray or paste	
Molykombin UMFT 1	Spray	Klüber Lubrication
Unimily P5	Powder	
Aemasol MO 19 P	Spray or paste	A. C. Matthes

4.9.4 SIMOLOC assembly system

4.9.4.1 General notes for the SIMOLOC assembly system

 WARNING
Risk of injury due to freely rotating parts Fit a cover cap or protection cover.

NOTICE
Damaged components impair the correct function of the gearbox If any components are damaged, the correct function of the gearbox will no longer be ensured. Do not install any damaged gearbox components.

NOTICE
Lubricant on the machine shaft ① impairs the torque transmission Keep the bore in the tapered bushing ⑨ and the machine shaft ① completely grease-free. Do not use impure solvents and soiled cleaning cloths.

NOTICE
Avoid overloading the individual bolts Do not exceed the maximum tightening torque for the tightening bolts ④ und ⑩.

Note

The SIMOLOC assembly system secures the hollow shaft axially on the machine shaft.

Note

In the hollow shaft ⑥, oil the locating hole for the tapered bushing ⑨ and bronze bushing ② lightly with the provided oil.

Oil type of the provided oil: CLP VG 68 DIN 51517-3

Note

The thrust collar ⑤ must be placed at the correct position as in the delivered state.

Note

Before installing the SIMOLOC, mount the torque arms ⑦ on the gearbox.

4.9.4.2 Installing SIMOLOC

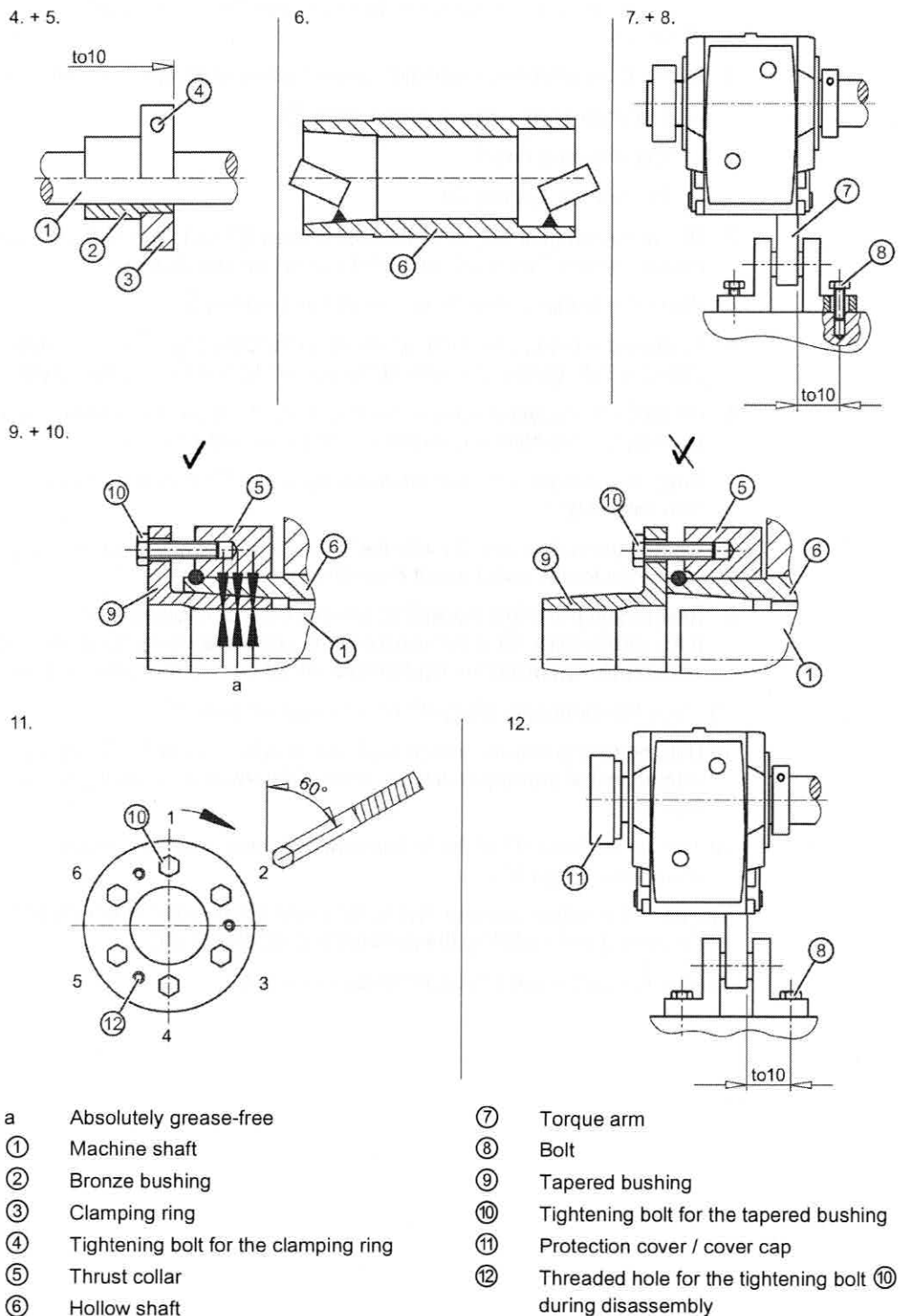


Figure 4-9 Installing SIMOLOC

Procedure

1. Attach the torque arm ⑦ to the gearbox, see Torque arms with shaft-mounted gearboxes (Page 51).
2. Remove the corrosion protection coating using white spirit or a solvent on:
 - The shaft ends of the machine shaft ①
 - The clamping ring ③
 - The bronze bushing ②.
3. Check the seats or edges of the hollow shaft ⑥ and the machine shaft ① for damage. Please contact Technical Support if you notice any damage.
4. Place the clamping ring ③ on the bronze bushing ②.
5. Position the bronze bushing ② with the clamping ring ③ on the machine shaft ①. Observe the tightening torque of the tightening bolt ④ and the tolerance dimension to10.
6. Oil lightly the locating holes in the hollow shaft ⑥ for the tapered bushing ⑨ and bronze bushing ②. Remove any excessive oil using a clean cloth.
7. Push the gearbox with the installed torque arm ⑦ on the machine shaft ① against the clamping ring ③.
8. Tighten the torque arm ⑦ with the bolts ⑧ only gently because the gearbox must have clearance for the subsequent mounting.
9. Ensure that the thrust collar ⑨ is placed at the correct position.
If the thrust collar ⑤ is not placed at the correct position, bring the ring ⑤ into the correct position by tightening the tightening bolts ⑩ with turned tapered bushing ⑨.
10. Place the tapered bushing ⑨ on the machine shaft ①.
11. Use the torque wrench to turn each of the tightening bolts ⑩ equally (not crosswise), repeating this procedure several times. Observe the tightening torque of the tightening bolt ⑩.
12. Tighten the bolts ⑧ of the torque-arm fastening, see Torque arms with shaft-mounted gearboxes (Page 51).
13. Attach the rubber cover or protection cover ⑪ included in the scope of delivery, see Removing and installing the protection cover (Page 35).

You have installed the SIMOLOC assembly system.

Table 4- 9 Tolerance dimension, tightening bolt ④ tightening torque

Gearbox type	Size	Tolerance dimension to10	Thread size ④	Tightening torque
		[mm]	Strength class 10.9	[Nm]
F, B, C	29	0.6 ... 2.1	M6	15
F, B, K, C	39	0.7 ... 2.2		
F, B, K, C	49	0.8 ... 2.6		
F, K, C	69	0.7 ... 2.5	M8	35
F, K	79	1.4 ... 3.2		
F, K, C	89	1.5 ... 3.4		

Table 4- 10 Tightening bolt ⑩ tightening torque

Gearbox type	Size	Thread size ⑩	Tightening torque
		Strength class 12.9	[Nm]
F, B, C	29	M5	10
F, B, K, C	39		
F, B, K, C	49	M6	16
F, K, C	69		
F, K	79	M8	38
F, K, C	89		

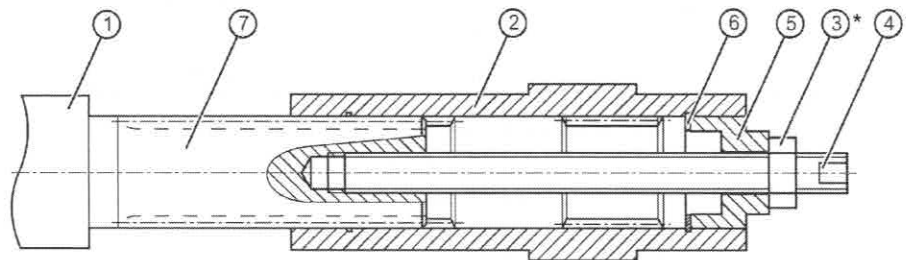
4.9.4.3 Removing SIMOLOC

Procedure

1. Remove all bolts ⑩ completely.
2. Screw the bolts ⑩ into the threaded holes ⑫.
3. Use the torque wrench to turn each of the bolts ⑩ equally (not crosswise), repeating this procedure several times. Observe the tightening torque of the bolt ⑩. Repeat the task until the tapered bushing ⑨ has been freed.
4. Unscrew the bolts ⑩ and remove the tapered bushing ⑨.
5. Lower the gearbox from the machine shaft ①.

You have removed the SIMOLOC assembly system.

4.9.5 Hollow shaft with splines



* Not included in scope of supply

- ① Machine shaft
- ② Hollow shaft
- ③ Hexagon nut
- ④ Threaded spindle
- ⑤ Disk
- ⑥ Locking ring
- ⑦ Mounting paste

Figure 4-10 Mounting the hollow shaft with splines

Instead of the nut and threaded spindle shown in the diagram, other types of equipment such as hydraulic lifting equipment may be used.

Procedure

1. Using benzine or a solvent, remove the anti-corrosion protection from the shaft ends and flanges.
2. Check the seats or edges of the hollow and machine shafts for damage. Please contact Technical Support if you notice any damage.
3. Apply the mounting paste ⑦ to the machine shaft ①. Apply the paste uniformly.
4. Fit the gearbox using the disk ⑤, threaded spindle ④ and nut ③. Support is provided by the hollow shaft ②.
5. Replace the nut ③ and the threaded spindle ④ with a screw. Tighten the bolts to the specified torque.

You have mounted the hollow shaft with splined shaft.

Table 4- 11 Tightening torque for the screw

Thread size	M5	M6	M8	M10	M12	M16	M20	M24	M30
Tightening torque [Nm]	5	8	8	14	24	60	120	200	400

4.9.6 Torque arms with shaft-mounted gearboxes

4.9.6.1 General information regarding torque arms

Torque arms can absorb the reaction torque and the weight force of the gearbox.



ATEX version gearboxes

Worn or irreparably damaged rubber elements will not function properly.

Impacts can cause sparks.

Damaged rubber elements must be replaced immediately.

NOTICE
Dangerous transient torques due to excess backlash
Take care to prevent the torque arm causing excessive constraining forces, e.g. due to the driven shaft running out-of-true.

NOTICE
Impermissible gearbox loading caused by incorrect mounting
Do not tension torque arms when mounting.

NOTICE
Damage to the rubber elements caused by solvent
Solvents, oils, greases, and fuels damage rubber elements.
Avoid contact at all times.

4.9.6.2 Mounting torque arms on parallel shaft gearboxes

We recommend using pretensioned, damping rubber elements.

Fixing accessories such as brackets, bolts, nuts, etc., are not included in the scope of supply.

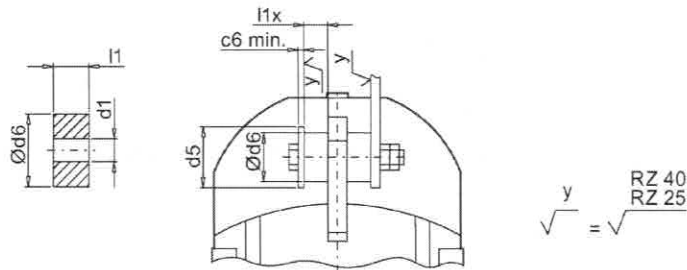


Figure 4-11 Installation suggestion for torque arms on F.29 - F.189

Size	Rubber buffer				Washer	
	Untensioned	Tensioned				
	l1	l1x	d6	d1	d5	c6 _{min}
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
29	15	14.0	30	10.5	40	4
39		13.5				
49	20	18.5	40	12.5	45	6
69		18.5			50	
79		17.5				
89	30	28	60	21	75	8
109		27.5				
129	40	37.5	80	25	100	10
149		36.5				
169	50	47.5	120	31	140	12
189		46.5				

Procedure

1. Use the washers according to the table above.
2. Use two nuts to secure the screw connection (lock nuts).
3. Tighten the bolts until the rubber buffers are pretensioned to the dimension l1x.

You have now installed the torque arm.

4.9.6.3 Mounting torque arms on bevel gearboxes and helical worm gearboxes

NOTICE

Impermissible loading caused by incorrect mounting

The torque arm bush must be supported by bearings on both sides.
After assembly, the sleeve must have some axial play.

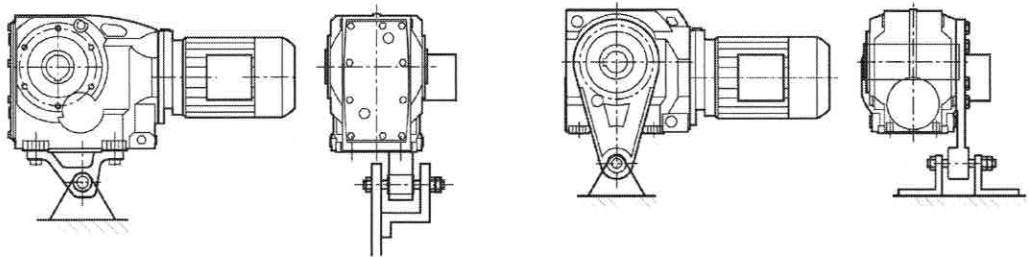


Figure 4-12 Mounting suggestion for torque arm on foot and flange

The torque arm can be fitted in various positions, depending on the hole circle pitch.

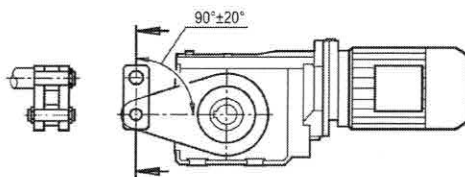


Figure 4-13 Toggle lever design

For a toggle lever design, derive the force in the range of $90^\circ \pm 20^\circ$.

Procedure

1. Clean the contact surfaces between the housing and the torque arm.
2. Tighten the bolts to the specified torque.

You have now mounted the torque arm.


Table 4- 12 Tightening torque for screws of strength class 8.8


Thread size	M8	M10	M12	M16	M20	M24	M36
Tightening torque [Nm]	25	50	90	210	450	750	2 600

Commissioning

5

5.1 General information for commissioning

 WARNING
Unintentional starting of the drive unit Secure the drive unit to prevent it from being started up unintentionally. Attach a warning notice to the start switch.

 WARNING
Risk of slipping on oil Remove any oil spillage immediately with an oil-binding agent in compliance with environmental requirements.

Checking the pressure breather valve

Check that the breather valve is activated.

If the breather valve has a transport fixture, it must be removed before commissioning.

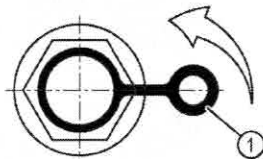


Figure 5-1 Pressure breather valve with securing clip

Remove the transport fixture by pulling the securing clip ① in the direction of the arrow.

5.2 Checking the oil level prior to commissioning

Check the oil level before commissioning. Correct the oil quantity when required.

Siemens AG recommends a complete oil change after a storage time longer than 24 months:

- For gearboxes with long-term preservation.
- For gearboxes supplied completely filled with oil.

Please observe Checking and changing lubricants (Page 71).

Gearbox in special mounting position

The gearbox is intended for a specific rotation angle and is delivered with the correct quantity of oil for this purpose.

It is not possible to check the oil level. You will find information regarding oil quantity and type of oil on the rating plate.

5.3 Mount the oil expansion unit

An oil expansion unit can be used depending on the power, drive speed, mounting position and transmission ratio. The oil expansion unit is used to equalize changes in the oil volume caused by temperature fluctuations in operation.

Before commissioning the gearbox, replace the screw plug with the oil expansion unit.

Oil expansion unit size 39 - 89

The unit is supplied as a mounting kit, and can be attached to the geared motor vertically or at an angle.

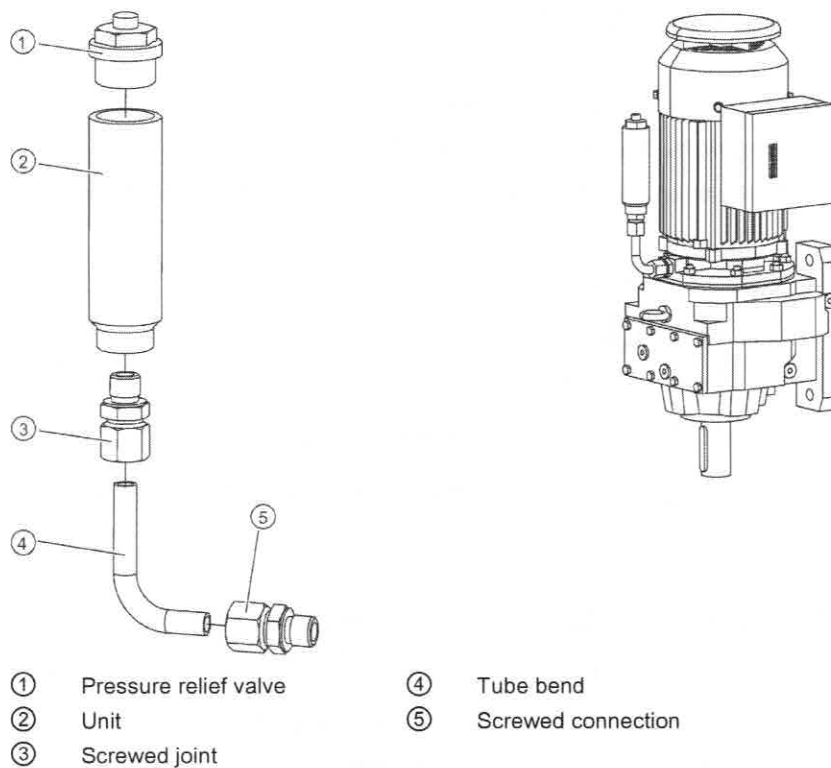


Figure 5-2 Installing oil expansion unit size 39 - 89

Procedure

1. Assemble the mounting kit ① - ⑤.
2. Screw on the unit with the screwed connection ⑤ at the uppermost drill hole of the gearbox housing or of the motor bearing shield.
3. Align the oil expansion unit so that it is vertical.

Oil expansion unit size 109 - 189

NOTICE

Hose with leaks

The hose of the oil expansion unit is subject to a natural aging process.

Check the hose for tears or leaks.

Never commission a leaky hose. Replace the hose, if necessary.

The hose of the oil expansion unit is not suitable for ambient temperatures below -25°C .

If the ambient temperatures differ, contact Technical Support.

The unit is supplied as a mounting kit. The installation is described in the supplied Compact Installation Instructions KA 2530-1.

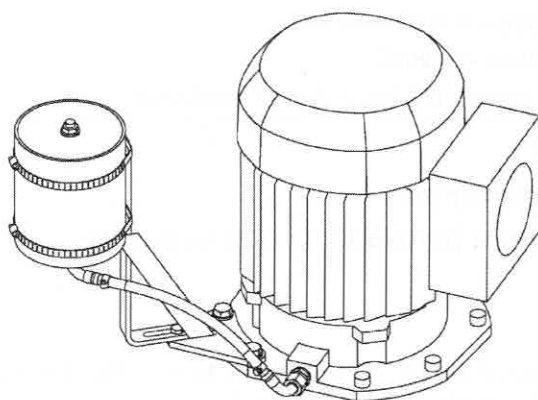


Figure 5-3 Example of an oil expansion unit size 109-189

5.4 Installing the oil temperature monitoring device

The PT100 resistance thermometer monitors the oil temperature. The resistance thermometer is deployed in the hazardous area and in the non-hazardous area.

The position of the resistance thermometer is defined by Siemens AG. The sensor pocket of the thermometer is installed in the gearbox and closed with a sealing cap.

The sensor is supplied as a mounting kit. The installation is described in the Compact Installation Instructions KA 2530-2.



ATEX version gearboxes

The PT100 resistance thermometer operates with a disconnecter.

The disconnecter must be approved for the ATEX version.

The disconnecter is installed outside the hazardous area.

Observe the operating instructions of the disconnecter.



Functional restriction of the sensor

Note the following:

- The sensor must be free of any dirt and residues.
- Do not damage the cables or the insulation.
- Lay the supply line with strain relief.
- Avoid strong bending loads, buckling and point mechanical loads.

Technical specifications of the sensor

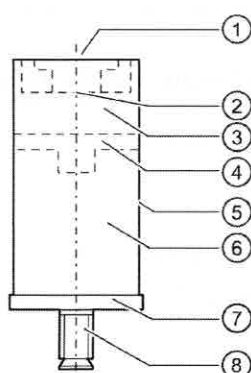
- Explosion protection type: II 2G Ex ia IIC Gb, II 2D Ex ia IIC Db
- Protection class IP68
- 3-wire input
- Supply line of the sensor: S3x22/7-PTFE/PTFE, 0.36 mm², 2000 mm long, WH (RD/RD/WH), external diameter 3.8 mm, free ends
- Sensor ambient temperature: -40° C to +180° C
- Sensor pocket ambient temperature: -40° C to +125° C

5.5 Options of the VLplus heavy-duty bearing system

5.5.1 Automatic regreasing device

Gearboxes with the VLplus heavy-duty bearing system can be optionally supplied with an automatic regreasing device.

The automatic regreasing device can be installed in any position and can be used underwater.



- | | |
|-------------------------------|-------------------------|
| ① Lubrication time controller | ⑤ Transparent housing |
| ② Pressure generator | ⑥ Roller bearing grease |
| ③ H ₂ gas | ⑦ Unit floor |
| ④ Pressure piston | ⑧ Connection thread |

Figure 5-4 Automatic regreasing device

Table 5- 1 Technical data

Grease fill quantity	125 ml
Adjustable lubrication time	0 ... 12 months
Permissible ambient temperature	-20° C ... +55° C
Maximum operating pressure	3 bar
Pressure generator	Hydrogen gas generating cell
Recommended storage temperature	+20° C
Usage period	Within 2 years of filling date
Weight including grease fill	approx. 190 g

⚠ CAUTION
Closed lubricator bursts
Overpressure will result if the lubricator is not opened and the grease channels are contaminated. At an overpressure of approximately 5 bar, the lubricator will burst at the preset breaking point between the housing and the funnel.
Open the lubricator before commissioning.
Press fresh grease into blocked channels with a grease gun.

Note

Fill the lubricant channels and bearings with grease before installing the lubricator.

Procedure

1. Clean the area around the connection thread of the greasing point.
2. Use a knife to cut off the seal at the lubricator outlet. Or remove the screw plug.

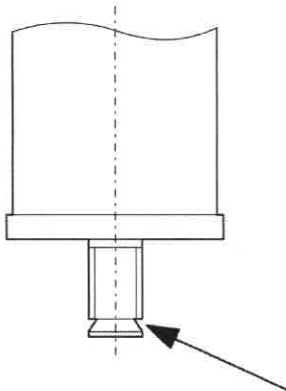


Figure 5-5 Sealing the lubricator

3. Screw the lubricator into the connection thread.

Setting the lubrication time

CAUTION

Setting the wrong lubrication time

The lubrication time is heavily influenced by the resistance in the lubricant channels and the ambient temperature.

Check the actual lubrication time during operation.

The actual lubrication time is the time it takes for the lubricator to be completely emptied. The lubrication time is influenced by the resistance in the lubricant channels and the ambient temperature.

At an ambient temperature of -10°C , the actual lubrication time is twice that for the set temperature.

At an ambient temperature of $+40^{\circ}\text{C}$, the actual lubrication time drops to approximately half that for the set temperature.

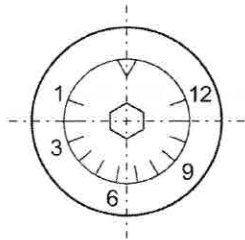


Figure 5-6 Lubrication time controller

Procedure

1. Set the lubrication time with a 3 mm Allen key.
2. Note the date of commissioning and the lubrication time on the lubricator.

The times in months listed in the table are guide values.

Table 5-2 Timing in months on the lubrication time controller

Size	89	109	129	149	169
Months	12	12	12	12	11

5.5.2 Dry-well version with oil sensor

Please refer to the separate operating instructions for the oil level sensor.

The oil sensor can also be deployed for ATEX version gearboxes.



ATEX version gearboxes

The oil sensor operates with a disconnecter.

The disconnecter must be approved for the ATEX version.

The disconnecter is installed outside the hazardous area.

Observe the operating instructions of the disconnecter.



Functional restriction of the sensor

Note the following:

- The sensor must be free of any dirt and residues.
- Do not damage the cables or the insulation.
- Lay the supply line with strain relief.
- Avoid strong bending loads, buckling and point mechanical loads.




ATEX version gearboxes

The difference between the temperature of the housing and the ambient temperature of max. +40° C must not exceed 70 K.

Using a suitable temperature sensor, measure the temperature at the lowest point of the housing (oil sump) or at the mounting surface in the case of output units. We recommend that you monitor the gearbox temperature indirectly by monitoring the motor current.

Changes are an indication of possible incipient damage.

 CAUTION
Malfunctions can cause injuries or gearbox damage
In the event of changes during operation, the drive unit must be switched off immediately.
Determine the cause of the fault using the fault table (Page 65). Remedy faults or have faults remedied.

Check the gearbox during operation for:

- Excessive operating temperature
- Changes in gear noise
- Possible oil leakage at the housing and shaft seals

Preconditions for smooth, vibration-free operation

During operation, observe the maximally permissible vibration values specified in DIN ISO 10816-3. Avoid inadmissible vibration levels caused by imbalance, for example (drive output element), external vibration or any resonance over the complete speed range.

Faults, causes and remedies

Note

Faults and malfunctions that occur during the warranty period and requiring repair work on the gearbox must be remedied only by Technical Support. If faults occur without a clearly identifiable cause, Siemens AG recommends the services of the Technical Support even after the warranty period has elapsed.

If you need the help from the Technical Support, please have the following information ready:

- Rating plate data
- Nature and extent of the fault
- Suspected cause

Table 7- 1 Faults, causes and remedies

Faults	Causes	Remedy
Unusual noise on the gearbox.	Oil level too low.	Check the oil level (Page 71).
	Foreign bodies in the oil (irregular noise).	Checking the oil quality (Page 78). Cleaning the gearbox (Page 94). Change the oil (Page 71).
	Excessive bearing play and / or bearing defective.	Check the bearing and replace if necessary.
	Defective gearing.	Check the gearing and replace if necessary.
	Fastening bolts loose.	Checking tightness of fastening bolts (Page 95).
	Excessive external load on the drive input and output.	Check the load against rated data (you might need to correct the belt tension, for example).
	Transport damage.	Check the gearbox for damage in transit.
	Damage due to blockage during commissioning.	Call Technical Support.
Unusual noise from the drive unit.	Drive unit bearing not lubricated (motor size 160 and higher).	Regrease bearing (Page 83).
	Excessive bearing play and / or bearing defective.	Check the bearing and replace if necessary.
	Fastening bolts loose.	Checking tightness of fastening bolts (Page 95).

Faults	Causes	Remedy
Unusual motor noise.	Excessive bearing play and / or bearing defective.	Check the bearing and replace if necessary.
	Motor brake is rubbing.	Check air gap and adjust if necessary.
	Inverter parameterization.	Correct the parameterization.
Oil escapes.	Incorrect oil level for the mounting position being used.	Check the mounting position (Page 110) and the oil level (Page 71).
	Gearbox leaks.	Checking the gearbox for leaks (Page 93).
	Overpressure due to lack of venting.	Mount the venting as appropriate for the mounting position (Page 110).
	Overpressure due to soiled venting.	Clean the venting (Page 94).
	Shaft sealing rings defective.	Replace the shaft sealing rings.
	Cover / flange bolts loose.	Checking tightness of fastening bolts (Page 95). Continue to monitor the gearbox.
	Surface sealing defective (e.g. on cover, flange).	Reseal.
	Damage in transit (e.g. hairline cracks).	Check the gearbox for damage in transit.
Oil leak at the gearbox vent	Incorrect oil level for the mounting position used and / or incorrect venting position.	Check the venting position, the mounting position (Page 110) and the oil level (Page 71).
	Frequent cold starts during which the oil foams up.	Call Technical Support.
Gearbox overheats.	Motor fan cover and / or gearbox very dirty.	Clean the fan cover and surface of the geared motor (Page 94).
	Incorrect oil level for the mounting position being used.	Check the mounting position (Page 110) and the oil level (Page 71).
	Incorrect oil being used (e.g. incorrect viscosity).	Checking the oil quality (Page 78).
	Oil is too old.	Check the date of last oil change. If required, change the oil (Page 71).
	Excessive bearing play and / or bearing defective.	Check the bearing and replace if necessary.
	Coolant temperature outside the permissible range.	Adjust the cooling air to the right temperature

Faults	Causes	Remedy
Output shaft does not turn when the motor is running.	Force flow interrupted by breakage in gearbox.	Call Technical Support.
Geared motor only starts with difficulty or not at all.	Incorrect oil level for the mounting position being used.	Check the mounting position (Page 110) and the oil level (Page 71).
	Incorrect oil being used (e.g. incorrect viscosity).	Checking the oil quality (Page 78).
	Excessive external load on the drive input and output.	Check the load against rated data (you might need to correct the belt tension, for example).
	Motor brake is not released.	Check circuit / connection of brake. Check brake for wear and readjust if necessary.
Excessive play at drive input and output.	Geared motor runs against backstop.	Change the direction of motor or backstop rotation.
	Flexible elements worn (e.g. on couplings).	Replace flexible elements.
Speed and torque drop.	Positive connection disrupted by overload.	Call Technical Support.
	Belt tension too low (for belt drive).	Check the belt tension and replace belt if necessary.

Service and maintenance

8

8.1 General notes about maintenance work



ATEX version gearboxes

All measures, checks, and their results must be documented by the operator and records kept in a safe place for 10 years.

WARNING
Unintentional starting of the drive unit
Secure the drive unit to prevent it from being started up unintentionally.
Attach a warning notice to the start switch.

NOTICE
Improper maintenance
Only authorized qualified personnel may perform the maintenance and servicing. Only original parts supplied by Siemens AG may be installed.

Only qualified personnel may perform the inspection, maintenance and servicing work. Please observe the General information and safety notes (Page 7).

Table 8- 1 Maintenance measures

Remedy	Interval	Description of work
Monitor and check the geared motor for unusual noise, vibrations, and changes.	Daily; if possible, more frequently during operation.	Operation (Page 63)
Check the housing temperature.	After 3 hours, on the first day, thereafter monthly.	
Check the oil level.	After the first day, and then every 3,000 operating hours, or at the latest after 6 months.	Checking and changing lubricants (Page 71)
Check the oil level sensor	Regularly and after oil changes.	Checking the oil level sensor (optional) (Page 94)
Check the oil quality.	Every 6 months.	Checking the oil quality (Page 78)


8.1 General notes about maintenance work


Remedy	Interval	Description of work
First oil change after commissioning.	After approximately 10,000 operating hours or at the latest after 2 years.	Checking and changing lubricants (Page 71)
Subsequent oil changes.	Every 2 years or 10,000 operating hours ¹⁾ .	
Visual inspection of the gearbox and shaft sealing ring for leaks.	After the first day, thereafter monthly.	Checking the gearbox for leaks (Page 93)
When required, replace the breather valve.	Once a year.	Replacing the vent valve (Page 94)
Clean the gearbox.	Depending on degree of soiling, at least every 6 months.	Cleaning the gearbox (Page 94)
Carry out a complete inspection of the geared motor.	Every 12 months.	Inspecting the gearbox (Page 95)
Check the friction clutch and adjust if necessary.	After 500 hours, thereafter once a year and after every blockage.	Observe the BA 2039 Operating Instructions.
Check the coupling.	For the first time after 3 months.	Please refer to the separate operating instructions.
Check that fastening bolts on gearboxes and add-on elements are securely tightened. Check that covers and plugs are securely fastened.	After 3 hours, and then every 2 years.	Checking tightness of fastening bolts (Page 95)
Change the roller bearing grease.	When the oil is changed.	Change the roller bearing grease (Page 83)
Replace the bearing.	-	Replace bearings (Page 92)
Check the rubber buffer of the torque arms.	Every 6 months.	Torque arms with shaft-mounted gearboxes (Page 51)
Check the hose of the oil expansion unit.	Check regularly; renew every 4 years at the latest.	Replacing the hose of the oil expansion unit (Page 96)
Lubricate the XLplus and VLplus heavy-duty bearing systems.	-	Lubrication of the XLplus and VLplus heavy-duty bearing systems (Page 90)

¹⁾ When using synthetic oils, the intervals can be doubled. The data specified is valid for an oil temperature of +80° C. See the figure titled "Guide values for oil change intervals" for the intervals for other temperatures.

8.2 Checking and changing lubricants

8.2.1 General safety notes

 WARNING
Danger of scalding from the hot oil emerging from the unit Before starting any work wait until the oil has cooled down to below +30 °C.

 WARNING
Risk of slipping on oil Remove any oil spillage immediately with an oil-binding agent in compliance with environmental requirements.

NOTICE
Damage to the gearbox caused by incorrect oil quantities The oil quantity and the position of the sealing elements are determined by the mounting position. After removing the oil level screw, the oil level may not be below the specified fill level.

NOTICE
Damage to the gearbox due to open oil holes Dirt and damaging atmosphere can penetrate through open oil holes. Close the gearbox immediately after checking the oil level or changing the oil.

Note

Information about oil

Refer to the rating plate for the type of oil, oil viscosity and quantity of oil required.

For oil compatibility, see Recommended lubricants (Page 86).

Note

Gearbox sizes 19 and 29

Gearbox sizes 19 and 29 are lubricated for life. There is no opening to check the oil level. An oil change is not required.

In mounting positions M2 and M4 the gearboxes are equipped with a breather valve.

C29 has a breather valve in all mounting positions.

Note

Tandem gearbox - intermediate helical gearbox

- In a horizontal operating position the bulging part of the housing of the intermediate helical gearbox generally faces vertically downwards.
 - The oil quantity is specified for every individual gearbox and is valid for the standard mounting position.
 - Perform the following work for each individual gearbox:
 - Check the oil level.
On the main gearbox D/Z, it is not possible to check the oil level in mounting position M4. The oil level is above the oil level bore so that the bearings above it are lubricated.
 - Check the oil quality.
 - Change the oil.
 - Fill in oil and top it up.
-

Note

Gearbox in special mounting position

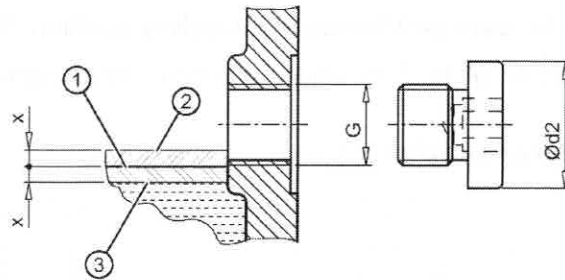
The gearbox is intended for a specific rotation angle and is delivered with the correct quantity of oil for this purpose.

It is not possible to check the oil level. You will find information regarding oil quantity and type of oil on the rating plate.

When draining the oil a higher residual quantity of oil may remain in the gearbox. When you carry out an oil change remove any residual oil.

8.2.2 Checking the oil level

NOTICE
The gearbox oil volume changes depending on the temperature
If the temperature rises, the volume increases. Where temperature differences and filling quantities are significant, the volume difference can amount to several liters.
The oil level must therefore be checked while still slightly warm, approximately 30 minutes after switching off the drive unit.



- ① Specified oil level
- ② Maximum oil level
- ③ Minimum oil level

Figure 8-1 Oil level in the gearbox housing

Table 8-2 Minimum and maximum fill levels x

Oil level hole	Ød2	Fill level x	Tightening torque
	[mm]		
G 1/8"	14	2.5	10
G 1/4"	18	3	10
G 3/8"	22	4	25
G 3/4"	32	7	50

Procedure

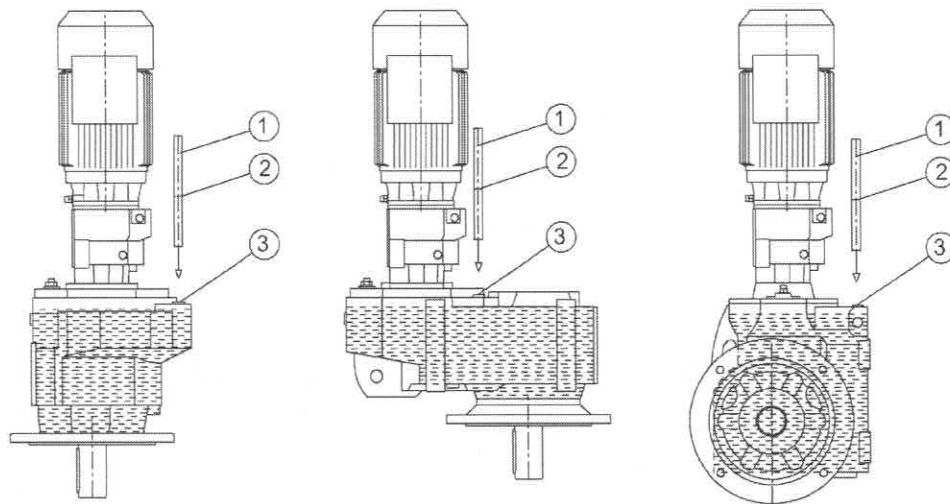
1. Switch off the power supply to the drive unit.
2. Unscrew the oil level screw, see Mounting positions (Page 110). Oil escapes if the maximum fill level is above the plug hole.
3. Check the oil level. Observe the fill level x.
4. Top up the oil level if necessary and check it again.
5. Check the state of the sealing ring on the sealing element. If the sealing ring is damaged, replace the sealing element with a new one.
6. After checking, seal the gearbox immediately using the sealing element.

You have now checked the oil level in the gearbox housing.

8.2.3 Check the oil level for tandem gearboxes in mounting position M4

The main gearboxes "a" DF, ZF, F., K. for tandem gearboxes do not have any check hole as shown in Figure 8-1.

The oil level can be checked as described below:



- ① Dipstick / measuring instruments
- ② Marking
- ③ Screw plug

Figure 8-2 Oil level check for tandem gearbox mounting position M4

Procedure

1. Switch off the power supply to the drive unit.
2. Remove the screw plug ③.
3. Make a mark ② on a suitable dipstick ①.
4. Insert the dipstick ① vertically into the opening until the mark ② is level with the screw plug seating ③.
5. Pull the dipstick ① out vertically.
6. Measure the distance "x" on the dipstick ①.
7. Compare the value "x" with the value for distance "x" as shown in the table.
8. Top up the oil level if necessary and check it again.
9. Check the condition of the sealing ring on the screw plug ③ and replace the sealing ring if necessary.
10. Seal the gearbox using the screw plug ③.

You have checked the oil level of the tandem gearbox.

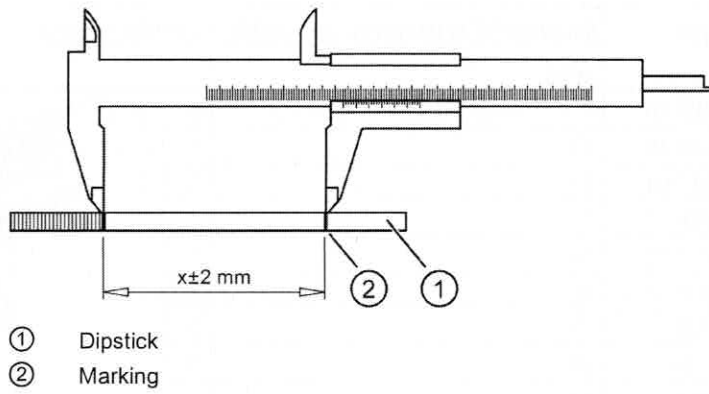
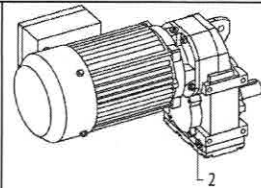
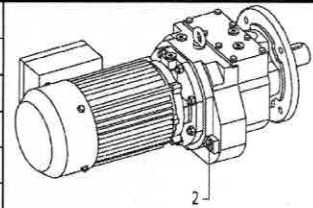
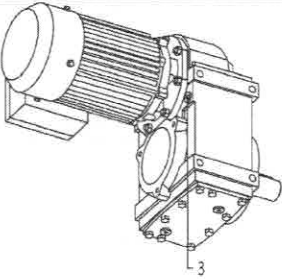
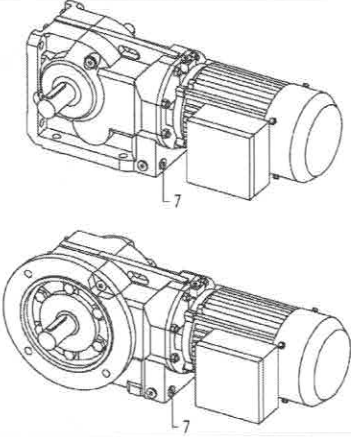


Figure 8-3 Distance "x"

Table 8- 3 Values for distance "x"

Gearbox type	Distance "x" in mounting position M4	Oil hole position
	[mm]	
DZF 49	15	2
DZF 59	15	2
DZF 69	15	2
DZF 79	17	2
DZF 89	20	2
DF 109	26	2
DF 129	29	2
DF 149	32	2
DF 169	26	2
DF 189	49	2
FD/Z / FD/ZF 29	12	2



Gearbox type	Distance "x" in mounting position M4	Oil hole position
	[mm]	
FD/Z / FD/ZF 39	7	3
FD/Z / FD/ZF 49	13	3
FD/Z / FD/ZF 69	21	3
FD/Z / FD/ZF 79	20	3
FD/Z / FD/ZF 89	12	3
FD/Z / FD/ZF 109	25	3
FD / FDF 129	12	3
FD / FDF 149	20	3
FD / FDF 169	13	3
FD / FDF 189	34	3
		
K / K.Z / KF 39	39	7
K / K.Z / KF 49	12	7
K / K.Z / KF 69	12	7
K / K.Z / KF 79	12	7
K / K.Z / KF 89	12	7
K / K.Z / KF 109	12	7
K / K.Z / KF 129	12	7
K / K.Z / KF 149	16	7
K / K.Z / KF 169	16	7
K / K.Z / KF 189	16	7
		

8.2.4 Checking the oil level using the oil sight glass (optional)

If there is an oil sight glass to check the oil level ①, the oil must be visible in the center of the sight glass when the oil is cool. When the oil is hot, the oil level ① is above the center of the sight glass. The oil level ① of cold oil is below the center of the sight glass.

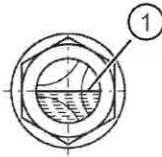


Figure 8-4 Oil level in the oil sight glass

Top up the oil level ① if necessary, and check it again.

8.2.5 Checking the oil level using the oil dipstick (optional)

In the M4 mounting position for ZF/EF helical gearboxes, the oil level can be checked with an oil dipstick.

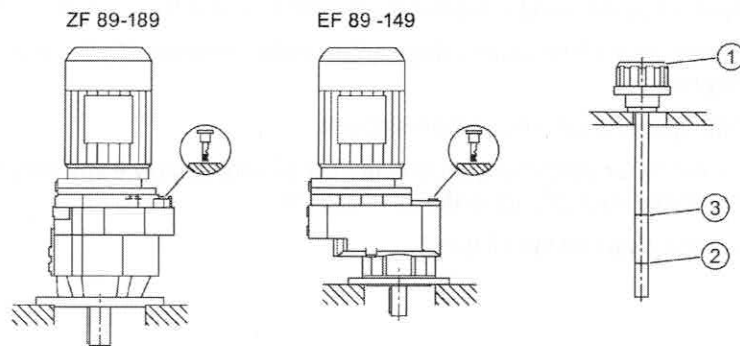


Figure 8-5 Checking the oil level using the oil dipstick

To check the oil level, push the oil dipstick ① into the hole but do not screw it in.

The oil level must be between the lower ② and upper ③ marks on the oil dipstick ①.

After checking, screw the oil dipstick ① in again hand-tight. The oil dipstick ① can remain screwed in during operation.

Rectify the oil level if necessary and check it again.

8.2.6 Checking the oil quality

Visible signs show effects on the oil. Fresh oil is clear to the eye, and has a typical smell and a specific product color. Clouding or a flocculent appearance indicates water and / or contamination. A dark or black color indicates residue, serious thermal decomposition or contamination.

Observe the symbols in the diagrams of the Mounting positions (Page 110):



Venting



Oil level

Procedure

1. Allow the geared motor to run for a short time. Wear and contaminant particles are visible in the oil shortly after shutting down.
2. Switch off the power supply to the drive unit.
3. Unscrew the sealing element at one of the points marked with the symbols listed above.
4. Remove some oil, using a suction pump and a flexible hose, for example.
5. Check the state of the sealing ring on the sealing element. When required, replace the sealing ring.
6. Seal the gearbox with the sealing element.
7. Check the oil for abnormalities. Change the oil immediately if you determine any abnormalities, see Changing the oil (Page 79).

You have now checked the oil quality.

8.2.7 Changing the oil

8.2.7.1 General safety notes for changing the oil

NOTICE**Impermissible mixing of oils leads to damage**

Impermissible mixing of oils leads to:

- Darkening
- Sediment
- Foam formation
- Change of the viscosity or reduced corrosion protection
- Wear protection.

When changing oil of the same type, the residual volume of oil in the gearbox should be kept as low as possible. Generally speaking, a small residual volume will cause no particular problems.

Gear oils of different types and by different manufacturers must not be mixed. Have the manufacturer confirm that the new oil is compatible with the remaining volume of used oil.

If very different types of oil or oils with very different additives are changed, always flush out the gearbox with the new oil. When changing from mineral oil to polyglycol oil (PG) or vice versa, it is vital to flush the gearbox twice. All traces of old oil must be completely removed from the gearbox.

NOTICE**Contaminations of the oil impair the lubricity**

Do not mix the gearbox oil with other substances.

Do not flush with paraffin or other solvents, as traces of these substances will always remain inside the gearbox.

Note

The oil must be warm because insufficient viscosity caused by oil that is too cold impairs correct emptying.

If necessary, run the gearbox for 15 to 30 minutes to become warm.

8.2.7.2 Draining the oil

Observe the symbols in the diagrams of the Mounting positions (Page 110):



Venting



Oil level



Oil drain

Procedure

1. Switch off the power supply to the drive unit.
2. Unscrew the vent plug.
3. Place a suitable and sufficiently large receptacle underneath the oil drain plug.
4. Remove the oil drain plug. Drain all the oil into the receptacle.
5. Check the state of the sealing ring on the sealing element. If the sealing ring is damaged, replace the sealing element with a new one.
6. After draining the oil, seal the gearbox immediately using the sealing element.

You have now drained the oil from the gearbox.

8.2.7.3 Flushing the gearbox when changing between incompatible oils

 **WARNING**

Impermissible mixing of oils leads to damage

Residual quantities of original oil can impair the specific properties of the new oil.

A flushing process is required with biodegradable and physiologically safe oils.

The residual corrosion protection oil must amount to no more than 1% of the operating oil volume.

Note

Polyglycol oil has a higher density than mineral oil. Therefore, it sinks down towards the oil drain and the mineral oil floats on top.

This makes the required complete draining of mineral oil from the gearbox extremely difficult.

Note

After the second flush, we recommend that an appropriate analysis institute checks the quality of the flushed fluid.

Observe the symbols in the diagrams of the Mounting positions (Page 110):



Venting



Oil drain

Procedure

1. After the oil has been drained, wipe the gearbox clean of any remaining mineral oil using a cloth.
2. Unscrew the vent plug.
3. Fill the gearbox with a flushing oil, using a filter (filter mesh max. 25 µm). For the flushing oil, use either the new oil or one that is compatible with the new oil and is less expensive.
4. Operate the gearbox for 15 to 30 minutes under a low load.
5. Place a suitable and sufficiently large receptacle underneath the oil drain plug.
6. Remove the oil drain plug. Drain all the oil into the receptacle.
7. After flushing, immediately seal the gearbox using the sealing element.
8. Repeat this step for the second flushing.

You have now flushed the gearbox twice and can pour in the new oil.

8.2.7.4 Filling in oil

NOTICE
Mixing of different oils impairs the lubricity
When adding oil, use the same oil type and viscosity. If changing mutually incompatible oils, see Flushing the gearbox (Page 80).

Observe the symbols in the diagrams of the Mounting positions (Page 110):



Venting

Procedure

1. Unscrew the vent plug.
2. Fill the gearbox with fresh oil. Use a filler filter with mesh of max. 25 µm.
3. Check the oil level.
4. Top up the oil level if necessary and check it again.
5. Check the state of the sealing ring on the sealing element. If the sealing ring is damaged, replace the sealing element with a new one.
6. After filling with oil, seal the gearbox immediately using the sealing element.

You have now filled up the gearbox with oil.

8.2.8 Topping up with oil

If the mounting position of the gearbox is changed or oil lost because of leakage, check the oil level. If you notice oil escaping, locate the leak, and seal the affected area. Top up and check the oil level.

At the time of going to print, the following types of oil are being used when the gearbox is filled for the first time:

CLP ISO VG220: Fuchs Renolin CLP220

CLP ISO PG VG220: Fuchs Renolin PG220

CLP ISO PG VG460: Fuchs Renolin PG460

CLP ISO PAO VG68: Fuchs Renolin Unisyn CLP68

CLP ISO PAO VG220: Fuchs Renolin Unisyn XT220

CLP ISO PAO VG460: Fuchs Renolin Unisyn CLP460

CLP ISO E VG220: Fuchs Plantogear S220

CLP ISO H1 VG100: Klüber Klübersynth UH1 6 100

CLP ISO H1 VG460: Castrol Optileb GT 1800/460

If, following agreement, the gearbox is filled at the factory with special lubricant for the special applications referred to above, the lubricant must be shown on the rating plate.

8.2.9 Change the roller bearing grease

The roller bearings are lubricated in the factory with the greases listed in the table.

Renew the grease quantify for grease-lubricated bearings with each oil change.

Clean the bearing before filling it with fresh lubricant.

In the case of bearings on the output shaft or intermediate shafts, the grease quantity must fill 2/3, and in the case of bearings on the input side, 1/3 of the space between the rolling elements.

Table 8- 4 Roller-bearing and shaft-sealing-ring grease

Fields of application	Ambient temperature	Manufacturer	Type
Standard	-40 °C to +80 °C	Klüber Fuchs	Petamo GHY 133 N Renolit CX-Tom 15 ¹⁾
Foodstuff-compatible for the food industry	-30 °C to +60 °C	Castrol	Optileb GR UF 1 NSF H1
Biologically degradable, for agriculture, forestry and water industries	-35 °C to +60 °C	Fuchs	Plantogel 2 S
¹⁾ Rolling-bearing grease based on a semi-synthetic base oil.			

8.2.10 Service life of the lubricants

Note

In case of ambient conditions deviating from normal conditions, e.g. high ambient temperatures, high relative humidity, aggressive ambient media, the intervals between changes should be shorter. In such cases, contact Technical Support for assistance in determining the individual lubricant change interval.

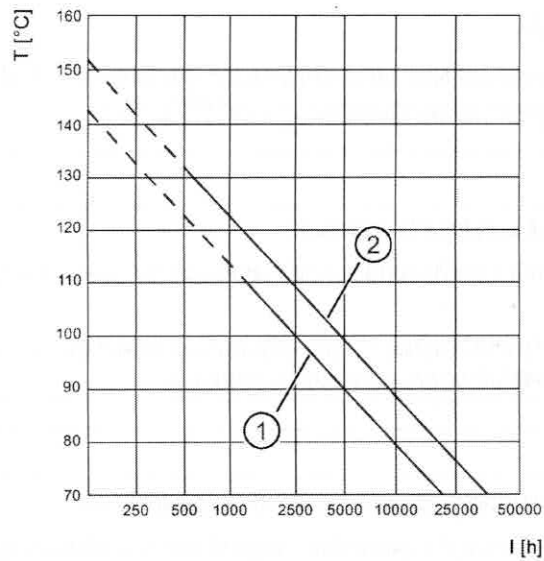
Note

Oil sump temperatures above +80 °C can reduce service life. A temperature increase by 10 K halves the service life by the amount as shown in the figure titled "Guide values for oil change intervals".

For a +80 °C oil sump temperature, the following service life can be expected when observing the properties specified by Siemens AG:

Table 8- 5 Service life of the oils

Type of oil	Service life
Mineral oil	10 000 operating hours or 2 years
Biodegradable oil	
Physiologically safe oil according to USDA-H1/-H2	
Synthetic oil	20 000 operating hours or 4 years



- ① Mineral oil
- ② Synthetic oil
- T Oil-bath steady-state temperature [°C]
- I Oil change interval in operating hours [h]

Figure 8-6 Guide values for oil change intervals

Grease service life of roller bearing greases

Roller bearings and the clearance in front are filled with sufficient grease.

Under approved operating conditions and ambient temperatures, no regreasing is required.

We recommend that the grease in the bearings is also renewed when the oil or shaft sealing rings are replaced.

8.2.11 Recommended lubricants

The released and recommended lubricants are listed in the table NT 7300 (<https://support.industry.siemens.com/cs/ww/en/view/109753864>).



Used lubricants only have conditional approval

The used lubricants are not or only conditionally approved for use in the foodstuff or pharmaceutical industry.

Use only lubricants with USDA (United States Department of Agriculture) H1 / H2 approval for deployment in the foodstuff or pharmaceutical industry.

NOTICE

Incorrect operating temperatures impair lubricity of the gearbox oil

Operating temperatures outside the permitted range impair the lubricating property of the gearbox oil.

For this, observe the permissible oil sump temperatures listed in the lubricant table.

The oil used must be approved for use in the ambient temperature range given on the rating plate.

When changing the oil, please observe the operating temperature range of the new oil as specified by the oil manufacturer.

Note

As standard, the lubricants and shaft seals are harmonized and coordinated with one another corresponding to the prevailing operating conditions.

Contact Technical Support for:

- Change of the operating conditions
- Change in oil grade
- Deployment of new shaft seals.

Note

The lubricants used are not at all or only conditionally biodegradable. If biologically degradable lubricants are required, use only gearbox lubricants with the appropriate classification listed in the NT 7300 table.

Note

We recommend the use of CLP ISO PG oils for gearboxes of frame sizes 169 and 189 with a service factor $f_B < 1.2$.

Note

These recommendations are not a guarantee of the lubricant quality provided by your supplier. All lubricant manufacturers are responsible for the quality of their own products.

The oil viscosity is decisive for the oil selection (ISO VG class). The viscosity is specified on the rating plate of the gearbox. The viscosity class indicated applies for the contractually agreed operating conditions.

In the case of different operating conditions, contact Technical Support.

If, following agreement, the gearbox is filled at the factory with special lubricant for the special applications referred to above, the lubricant is shown on the rating plate.

The oil quality must meet the gearbox lubricant requirements specified in the NT 7300 table. The Siemens warranty is otherwise null and void. We recommend the use of one of these gearbox lubricants. These gearbox oils are subject to constant testing and meet the specified requirements. It is possible that the recommended oils are removed or replaced by oils that have been further developed at a later point in time. We recommend that you regularly check as to whether the selected lubricating oil is still recommended by Siemens. Otherwise change the product.

8.2 Checking and changing lubricants

Table 8- 6 Lubricant table

Operating range	Oil grade designation according to DIN 51502	Permissible oil sump temperature range during operation [°C]	Ambient temperature [°C]				
			-15 ...+40	-20 ...+40	-25 ...+40	-30 ...+40	-40 ...+40
Helical gearbox E / Z / D, parallel shaft gearbox F and bevel gearbox K			-15 ...+40	-20 ...+40	-25 ...+40	-30 ...+40	-40 ...+40
Standard	CLP ISO VG220	-15 ... +80	✓	-	-	-	-
	CLP ISO PAO VG220	-30 ... +100	✓	✓	✓	✓	✓1)
	CLP ISO PAO VG68	-40 ... +60	-	-	✓	✓	✓
	CLP ISO PG VG460	-25 ... +110	✓	✓	✓	-	-
	CLP ISO PG VG220	-25 ... +110	✓	✓	✓	-	-
Food sector (USDA) NSF-H1	CLP ISO H1 VG460	-25 ... +100	✓	✓	✓	-	-
	CLP ISO H1 VG100	-30 ... +90	✓	✓	✓	✓	-
Biodegradable oil	CLP ISO E VG220	-20 ... +100	✓	✓	-	-	-
Helical gearbox E / Z / D, parallel shaft gearbox F and bevel gearbox K			-20 ...+45	-20 ...+50	-20 ...+60		
Standard	CLP ISO VG220	-15 ... +80	-	-	-		
	CLP ISO PAO VG220	-30 ... +100	✓	✓	✓		
	CLP ISO PAO VG68	-40 ... +60	-	-	-		
	CLP ISO PG VG460	-25 ... +110	✓	✓	✓		
	CLP ISO PG VG220	-25 ... +110	✓	✓	✓		
Food sector (USDA) NSF-H1	CLP ISO H1 VG460	-25 ... +100	✓	✓	✓		
	CLP ISO H1 VG100	-30 ... +90	✓	✓	✓		
Biodegradable oil	CLP ISO E VG220	-20 ... +100	✓	✓	✓		

Operating range	Oil grade designation according to DIN 51502	Permissible oil sump temperature range during operation [°C]	Ambient temperature [°C]			
			-20 ...+40	-25 ...+40	-30 ...+40	-40 ...+40
Helical worm gearbox C, bevel gearbox B			-20 ...+40	-25 ...+40	-30 ...+40	-40 ...+40
Standard	CLP ISO PG VG220	-25 ... +110	✓	✓	-	-
	CLP ISO PAO VG460	-25 ... +110	✓	✓	-	-
	CLP ISO PAO VG220	-30 ... +100	✓	✓	✓	✓1)
	CLP ISO PAO VG68	-40 ... +60	-	✓	✓	✓
	CLP ISO PG VG460	-25 ... +110	✓	✓	-	-
Food sector (USDA) NSF-H1	CLP ISO H1 VG460	-25 ... +100	✓	✓	-	-
	CLP ISO H1 VG100	-30 ... +90	✓	✓	-	-
Helical worm gearbox C, bevel gearbox B			-20 ...+45	-20 ...+50	-20 ...+60	
Standard	CLP ISO PG VG220	-25 ... +110	✓	✓	✓	
	CLP ISO PAO VG460	-25 ... +110	✓	✓	✓	
	CLP ISO PAO VG220	-30 ... +100	✓	✓	✓	
	CLP ISO PAO VG68	-40 ... +60	-	-	-	
	CLP ISO PG VG460	-25 ... +110	✓	✓	✓	
Food sector (USDA) NSF-H1	CLP ISO H1 VG460	-25 ... +100	✓	✓	✓	
	CLP ISO H1 VG100	-30 ... +90	✓	✓	✓	

1) To ensure optimum lubricating properties, we recommend that the drive is preheated to an operating temperature of at least -30 °C.

CLP = mineral oil

CLP PG = polyglycol oil

E = ester oil, organic oil (bio oil / risk of water pollution, class WGK1)

PAO = poly-alpha-olefin oil

CLP H1 = physiologically safe oil (USDA-H1 approval)

8.3 Lubrication of the XLplus and VLplus heavy-duty bearing systems

The output-side bearing is greased depending on the frame size. Initial greasing has already been carried out.

In normal operating conditions and with low loads, the lubrication is sufficient for approximately 25,000 to 30,000 operating hours.

For higher loads due to speed and / or temperature, schedule regreasing at shorter intervals.

Regreasing intervals

Note

The relubrication interval of the bearing depends on the temperature and the load

For temperatures above +70° C, the regreasing interval must be reduced by half for each temperature increase of 15 K.

For moderate shock loading and vibration, the regreasing interval must be reduced by 20%.

For heavy loading, the regreasing interval must be reduced by half.

The regreasing interval is valid for a temperature of +70° C, measured on the surface of the housing in the vicinity of the bearing.

Regrease the bearing after the following number of operating hours.

Table 8- 7 Regreasing interval in operating hours [h]

Output speed n ₂	Operating hours for size				
	89	109	129	149	169
[rpm]	[h]				
≤ 30	29000	29000	29000	29000	18000
31 ... 50	29000	18000	18000	14000	14000
51 ... 100	14000	12000	12000	10000	9000
101 ... 150	10000	10000	9000	9000	7000
151 ... 250	9000	7000	7000	5000	5000
251 ... 400	7000	5000	5000	4000	4000

Rolling bearing grease**NOTICE****Impermissible mixing of rolling bearing greases results in damage**

Residual quantities of original oil can impair the specific properties of the new oil.

When regreasing, do not mix greases with a different soap base.

Use the recommended rolling bearing grease when relubricating the bearings.

Using a grease gun, inject the grease into the bearing point via the lubricating nipples provided.

The grease quantities listed in the table are guide values.

Table 8- 8 Grease quantity [g] for relubrication

Regreasing interval	Grease quantity for size				
	89	109	129	149	169
	[g]				
After 6 months	10	10	20	20	30
After several years without operation	28	33	46	68	95

Maintenance of the output-side bearing**Note**

Change the grease filling of the rolling bearing when you change the gear oil.

Use the recommended rolling bearing grease when filling the bearings with new grease.

Procedure

1. Dismantle the output-side bearing unit.
2. Clean the bearing.
3. Fill the bearing with the new grease up to approximately 30% of the free bearing chamber.
4. Reassemble the bearing unit.

Maintenance interval after regreasing

After regreasing, the maintenance interval can be increased to the following number of operating hours.

Table 8-9 Maintenance interval in operating hours [h] for relubrication

Output speed n ₂	Operating hours for size				
	89	109	129	149	169
[rpm]	[h]				
≤ 30	80000	80000	80000	80000	50000
31 ... 50	80000	50000	50000	40000	40000
51 ... 100	40000	32000	32000	28000	25000
101 ... 150	28000	28000	25000	25000	20000
151 ... 250	25000	20000	20000	15000	15000
251 ... 400	20000	15000	15000	10000	10000

8.4 Replace bearings

The bearing service life depends greatly on the operating conditions and so cannot be calculated reliably. In the operating conditions specified by the operator, bearing life can be calculated and indicated on the rating plate. If no information is given, changes in vibration and noise pattern can serve as an indicator that an immediate bearing replacement is necessary.

8.5 Checking the gearbox for leaks



ATEX version gearboxes

Shaft sealing rings are subject to natural wear. The service life depends on the operating conditions.

Include the shaft sealing rings in periodic maintenance and servicing work on the system.

Note

From the inherent principle of operation, oil mist can escape from the vent valve or a labyrinth seal.

Oil or grease escaping in small quantities from the shaft sealing ring should be regarded as normal during the running-in phase of 24 hours operating time.

If the quantities escaping are significant or leaking continues after the running-in phase, the shaft sealing ring must be replaced to prevent consequential damage.

Table 8- 10 Description and measures

Status	Description	Measures	Notes
Film of moisture on the shaft sealing ring	Film of moisture as a result of the inherent principle of operation (apparent leakage)	Remove using a clean cloth and continue to observe.	This does not represent a fault; frequently, in the course of operation, the sealing ring dries off.
Leakage at the shaft sealing ring	Identifiable small trickle, formation of drops, also after the running-in phase	Replace the sealing ring, determine the possible cause of the sealing ring failure and rectify.	During the run-in period, the shaft sealing ring beds into the shaft. A visible track can be seen on the shaft. Optimum preconditions for a perfect seal are obtained after the run-in period.

8.6 Replacing the vent valve

To ensure correct functioning, renew the breather valve yearly.

When replacing, prevent dirt and damaging atmospheres from entering the gearbox.

If too much oil is contained in the gearbox, oil will escape from the breather valve. Correct the oil quantity and replace the breather valve.

8.7 Checking the oil level sensor (optional)

The oil level sensor indicates the oil level only when the gearbox is shut down.

Lower the oil level and fill it up again until the oil level sensor gives a switching signal.

Please refer to the separate operating instructions for the oil level sensor.

8.8 Cleaning the gearbox

NOTICE
Dust deposits cause higher housing temperatures
Dust deposits prevent heat radiation.
Keep the geared motor free from dirt and dust.

NOTICE
Cleaning with a high-pressure cleaning appliance
Water can penetrate into the geared motor. Seals can become damaged.
Do not use a high-pressure cleaning appliance to clean the geared motor.
Do not use tools with sharp edges.

Switch off the power supply to the drive unit before cleaning it.

8.9 Checking tightness of fastening bolts



ATEX version gearboxes

Loose parts can cause sparks through impact.

Entry of foreign bodies can cause sparks.

Note

Replace damaged headless bolts with new bolts of the same type and strength class.

Switch off the power supply to the drive unit. Check all fastening bolts for tightness using a torque wrench.

The general tolerance for the tightening torque is 10 %. The tightening torque is based on a friction coefficient of $\mu = 0.14$.

Table 8- 11 Tightening torques for fastening bolts

Thread size	Tightening torque for strength class		
	8.8	10.9	12.9
	[Nm]	[Nm]	[Nm]
M4	3	4	5
M5	6	9	10
M6	10	15	18
M8	25	35	41
M10	50	70	85
M12	90	120	145
M16	210	295	355
M20	450	580	690
M24	750	1 000	1 200
M30	1 500	2 000	2 400
M36	2 500	3 600	4 200

8.10 Inspecting the gearbox

Carry out a scheduled inspection of the gearbox once a year in accordance with the possible criteria listed in General notes about maintenance work (Page 69).

Check the gearbox in accordance with the criteria set out in General information and safety notes (Page 7).

Touch up damaged paintwork carefully.

8.11 Replacing the hose of the oil expansion unit

NOTICE
Hose with leaks
The hose of the oil expansion unit is subject to natural wear. The service life depends on the operating conditions.
Check the hose regularly for tears or leaks.
Renew the hose every 4 years at the latest.


Disposal

9



Recycling and disposal of SIMOGEAR geared motors

For environmentally friendly recycling and disposal of your old device, please contact a company certified for the disposal of old electrical and/or electronic devices and dispose of the device in accordance with the regulations in your country.

 WARNING
Incorrect disposal of used oil
Incorrect disposal of used oil is a threat to the environment and health.
After use, oil must be taken to a used oil collection point. The addition of foreign substances such as solvents, brake and cooling fluid is prohibited.
Avoid prolonged contact with the skin.

Empty the used oil from the gearbox. The used oil must be collected, stored, transported and disposed of in accordance with regulations. Do not mix polyglycols with mineral oil. Dispose of polyglycols separately.

Please observe country-specific laws. Under German law, to allow optimal treatment of the oil (§4 VI Used Oil), oils with different disposal codes must not be mixed with one another.

Collect and dispose of used oil in accordance with regulations.

Remove oil spillages immediately with an oil-binding agent in compliance with environmental requirements.

Dispose of the housing parts, gears, shafts, and roller bearings of the geared motor as scrap metal.

Dispose of packaging material in accordance with regulations.

Table 9- 1 Disposal codes for gear oils

Type of oil	Designation	Disposal code
Mineral oil	CLP ISO VG220	13 02 05
Polyglycols	CLP ISO PG VG220, CLP ISO PG VG460, CLP ISO H1 VG100, CLP ISO H1 VG460	13 02 08
Poly-Alpha-Olefines	CLP ISO PAO VG68, CLP ISO PAO VG220, CLP ISO PAO VG460	13 02 06
Biologically degradable oils	CLP ISO E VG220	13 02 07

Technical data

10.1 Type designation

Table 10- 1 Example of the type designation structure

	Main gearbox				Intermediate helical gearbox		Input unit	
	F	D	F	89	- Z	39	- K4	(100)
Example:								
Gearbox type	F							
Stage		D						
Type			F					
Size				89				
Stage					Z			
Size						39		
Input unit							K4	
(for motor size)								(100)

Table 10- 2 Type designation code

Gearbox type	
(-)	Helical gearbox
F	Parallel shaft gearbox
B	Bevel gearbox, two-stage
K	Bevel gearbox, three-stage
C	Helical worm gearbox
Stage	
(-)	
E	Single-stage
Z	Two-stage
D	Three-stage

Technical data

10.1 Type designation

Type	
Shaft	
(-)	Solid shaft
A	Hollow shaft
Fixing	
(-)	Foot-mounted design
B	Foot / flange-mounted version
F	Flange-mounted design (A type)
Z	Housing flange (C type)
D	Torque arm
G	Flange (A type) opposite output shaft
Connection	
(-)	Parallel key
S	Shrink disk
T	Hollow shaft with splines
R	SIMOLOC assembly system
Special features	
W	Reduced-backlash version
Intermediate helical gearbox - transmission stage	
Z	Two-stage
D	Three-stage
Input unit	
KS	Coupling adapter only for mounting a SIEMENS SIMOTICS S-1FK7/-1FT7, SIMOTICS M-1PH8, SIMOTICS S-1FK2, SIMOTICS S-1FL6 servomotor
K2	Coupling adapter with flexible coupling for fitting an IEC motor
K3	Coupling adapter with flexible coupling for fitting a NEMA motor
K4	Short adapter with plug-in connection for fitting an IEC motor
K5	Short adapter with plug-in connection for fitting a NEMA motor
KQ(S)	Coupling adapter for mounting a SIMOTICS S-1FK7/-1FT7 servomotor
K8	Coupling adapter for mounting a SIMOTICS M-1PH8 servomotor
A	Adapter with free input shaft

10.2 Rating plate data

10.2.1 General technical data

The most important technical data appears on the rating plate of the gearboxes and geared motors.

This data, together with the contractual agreements for the geared motors, determines the limits of intended use.

In the case of geared motors, a rating plate attached to the motor usually indicates the data for the entire drive.

In certain cases separate rating plates are attached to the gearbox and the motor.

10.2.2 SIMOGEAR gearbox rating plate

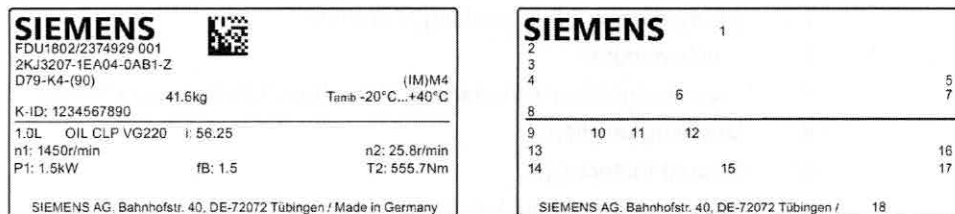


Figure 10-1 Example of a SIMOGEAR rating plate for gearboxes

- 1 Data matrix code
- 2 Serial number
- 3 Article number
- 4 Type designation
- 5 Mounting position
- 6 Weight m [kg]
- 7 Ambient temperature
- 8 Customer ID
- 9 Oil quantity [l] main gearbox / intermediate gearbox
- 10 Oil grade
- 11 Oil viscosity ISO VG class according to DIN 51519 / ISO 3448
- 12 Total transmission ratio i
- 13 Gearbox input speed n₁ [rpm]
- 14 Rated power
- 15 Service factor f_B
- 16 Gearbox output speed n₂ [rpm]
- 17 Geared motor output torque T₂ [Nm]
- 18 Manufacturer's address and country of origin

10.2.3 Rating plate SIMOGEAR geared motors without a UL/CSA design

SIEMENS FDU0412/8999999 nnn 2KJ3105-1EM22-2AV1-Z ZF59-LE90SG4E-L32/14N-IN S104 2KJ3 1AV2090B IP55 30kg Tamb -15...+40°C K-ID: 1234567890		INV. DUTY IEC60034 CE (IM)M1	SIEMENS	1	2	3
1.5L OIL CLP VG220 i: 28 50Hz n2: 49.3r/min 60Hz n2: 59.7r/min T2: 213Nm fB: 2.1 T2: 203Nm fB: 2.2		14 15 16 17 19 22 23 20 21 24 25		10	11	12
3-Mot. THCL 155(F) TP-PTC 14Nm 230V ±10% AC 50Hz 230/400V ±10% D/Y 60Hz 460V ±10% Y 4.33/2.5A cosφ 0.78 2.2 A cosφ 0.78 1.1kW S1 IE2-81.4% 1425r/min 1.27kW S1 IE2-81.4% 1725r/min Mot. 1LE1001-0EB0 -□□□- 230 V SIEMENS AG, Bahnhofstr. 40, DE-72072 Tuebingen / Made in Germany		26 27 28 29 30 31 32 33 34 41 42 43 35 36 44 45 37 38 39 40 46 47 48 49 50 51		SIEMENS AG, Bahnhofstr. 40, DE-72072 Tuebingen / 52		

Figure 10-2 Example of a SIMOGEAR rating plate for non-UL/CSA geared motors

- 1 Data matrix code
- 2 INV. DUTY - suitable for inverter operation
- 3 Underlying standard
- 4 Serial number
- 5 CE marking or other marking, if required
- 6 Article number
- 7 Type designation with marking of the (functionally safe) encoder
- 8 Mounting position
- 9 Geared motors type
- 10 Degree of protection acc. to IEC 60034-5
- 11 Weight m [kg]
- 12 Ambient temperature
- 13 Customer ID
- 14 Oil quantity [l] main gearbox / intermediate gearbox
- 15 Oil grade
- 16 Oil viscosity ISO VG class according to DIN 51519 / ISO 3448
- 17 Overall transmission ratio i
- Frequency 1
- 18 Rated frequency f [Hz]
- 19 Gearbox output speed n₂ [rpm]
- 20 Geared motor output torque T₂ [Nm]
- 21 Service factor f_B
- Frequency 2
- 22 Rated frequency f [Hz]
- 23 Gearbox output speed n₂ [rpm]
- 24 Geared motor output torque T₂ [Nm]
- 25 Service factor f_B

Motor and brake data

- 26 Number of phases and motor current type
- 27 Temperature class Th. Cl.
- 28 Thermal motor protection
- 29 Symbols (IEC 60617-2): \triangle = brake
- 30 Rated braking torque T_{Br} [Nm]
- 31 Brake supply voltage U [V]

Frequency 1

- 32 Rated frequency f [Hz]
- 33 Rated voltage / range U [V]
- 34 Circuit, circuit symbols according to DIN EN 60617 Part 6 / IEC 60617-6
- 35 Rated current I_N [A]
- 36 Power factor $\cos \varphi$
- 37 Rated power P_N [kW]
- 38 Operating mode for motor and brake (if \neq S1)
- 39 Efficiency class marking according to IEC 60034-30
- 40 Rated speed n_N [rpm]


Frequency 2

- 41 Rated frequency f [Hz]
- 42 Rated voltage / range U [V]
- 43 Circuit, circuit symbols according to DIN EN 60617 Part 6 / IEC 60617-6
- 44 Rated current I_N [A]
- 45 Power factor $\cos \varphi$
- 46 Rated power P_N [kW]
- 47 Operating mode for motor and brake (if \neq S1)
- 48 Efficiency class marking according to IEC 60034-30
- 49 Rated speed n_N [rpm]
- 50 Motor designation
- 51 Anti-condensation heating
- 52 Manufacturer's address and country of origin

10.2.4 Rating plate SIMOGEAR geared motors with a UL/CSA design

SIEMENS FDU1806/8999999 nnn 2KJ3401-SDF23-2FA1-Z FDAF29-LE80ZMQ4P-IN S104 2KJ3 1AV3083B IP55 TEFC 16kg (IM)M1 K-ID: 1234567890 AMB. 40°C		INV. DUTY IEC60034 CE		
0.6L OIL CLP VG220 i: 57.79 60Hz n ₂ : 30.1r/min T ₂ : 273Nm f _B : 0.55		14Nm 230V ±10% AC 3-G-Mot. Th.CL155(F) TP-PTC 460V Y DES.B CODE M 1.68A PF0.75 NEMA NOM.EFF.85.5% 0.86kW IE3-85.5% 1750r/min 1.15HP CONT. SF1.0 Mot. 1LE1023-0DB3 230 V SIEMENS AG, Bahnhofstr. 40, DE-72072 Tuebingen / Made in Germany		
SIEMENS		1	2	3
4 6 7 9 14		10	11	12
15 19 21		16	17	18
23 29 32 34 43		24	25	26
20 22 30 31 37 33 39 36 40 41		27	28	29
SIEMENS AG, Bahnhofstr. 40, DE-72072 Tuebingen /		45		

Figure 10-3 Example of a SIMOGEAR rating plate for UL/CSA geared motors

- 1 Data matrix code
- 2 INV. DUTY - suitable for inverter operation
- 3 Underlying standard
- 4 Serial number
- 5 CE marking or other marking, if required
- 6 Article number
- 7 Type designation with marking of the (functionally safe) encoder
- 8 Mounting position
- 9 Geared motors type
- 10 Degree of protection acc. to IEC 60034-5
- 11 Ventilation type
- 12 Weight m [kg]
- 13 Ambient temperature
- 14 Customer ID
- 15 Oil quantity [l] main gearbox / intermediate gearbox
- 16 Oil grade
- 17 Oil viscosity ISO VG class according to DIN 51519 / ISO 3448
- 18 Overall transmission ratio i
- Frequency 1
- 19 Rated frequency f [Hz]
- 20 Gearbox output speed n₂ [rpm]
- 21 Geared motor output torque T₂ [Nm]
- 22 Service factor f_B
- Motor and brake data
- 23 Number of phases and motor current type
- 24 Temperature class Th. Cl.
- 25 Thermal motor protection
- 26 Symbols (IEC 60617-2):  = brake

- 27 Rated braking torque T_{Br} [Nm]
- 28 Brake supply voltage U [V]
- Frequency 1
- 29 Rated frequency f [Hz]
- 30 Rated voltage / range U [V]
- 31 Circuit, circuit symbols according to DIN EN 60617 Part 6 / IEC 60617-6
- 32 Rated current I_N [A]
- 33 Performance factor
- 34 Rated power P_N [kW]
- 35 Efficiency class marking according to IEC 60034-30
- 36 Rated speed n_N [rpm]
- 37 Design letter
- 38 Code letter
- 39 NEMA energy efficiency
- 40 Rated power P_N [HP]
- 41 NEMA operating mode
- 42 Service factor
- 43 Motor designation
- 44 Anti-condensation heating
- 45 Manufacturer's address and country of origin

10.2.5 Rating plate SIMOGEAR geared motors for converter operation

The most important technical data for converter operation at 87 Hz and 104 Hz is stamped on the rating plate of the geared motor.

SIEMENS				SIEMENS					
FDU1707/8999999 nnn		CODE: 60021		1				2	
87Hz	n2: 40.9r/min	104Hz	n2: 46.6r/min	3	4 7			8	
T2: 115Nm	fB: 0.96	T2: 94.7Nm	fB: 1.2	5	6 9			10	
87Hz	400V ±10% D	104Hz	460V ±10% D	11	12	13	19	20	21
4.8A	cosφ 0.78	4.25A	cosφ 0.69	14	15 22			23	
1.90kW	2610r/min	1.90kW	3118r/min	16	17 24			25	
EFF 89.0%		EFF 89.0%		18	26				

Figure 10-4 Example of an additional SIMOGEAR rating plate for geared motors for converter operation at 87 Hz and 104 Hz

- 1 Serial number
- 2 Motor code
- Frequency 1
- 3 Rated frequency f [Hz]
- 4 Gearbox output speed n_2 [rpm]
- 5 Geared motor output torque T_2 [Nm]
- 6 Service factor f_B

10.2 Rating plate data

Frequency 2

- 7 Rated frequency f [Hz]
- 8 Gearbox output speed n_2 [rpm]
- 9 Geared motor output torque T_2 [Nm]
- 10 Service factor f_B

Motor and brake data



Frequency 1

- 11 Rated frequency f [Hz]
- 12 Rated voltage / range U [V]
- 13 Circuit, circuit symbols according to DIN EN 60617 Part 6 / IEC 60617-6
- 14 Rated current I_N [A]
- 15 Power factor $\cos \varphi$
- 16 Rated output P_N [kW]
- 17 Rated speed n_N [rpm]
- 18 Energy efficiency

Frequency 2

- 19 Rated frequency f [Hz]
- 20 Rated voltage / range U [V]
- 21 Circuit, circuit symbols according to DIN EN 60617 Part 6 / IEC 60617-6
- 22 Rated current I_N [A]
- 23 Power factor $\cos \varphi$
- 24 Rated output P_N [kW]
- 25 Rated speed n_N [rpm]
- 26 Energy efficiency

10.2.6 Rating plate, SIMOGEAR geared motors with synchronous-reluctance motor and SINAMICS G110M

SIEMENS FDU1810/B999999 nnn 2KJ3502-1EN27-9AR1-Z B39-LE90ZLT4SVM				 IEC60034 CE (IM)M1-A	
K-ID: 1234567890		2KJ3 1RV4094B A		Tamb -15...+40°C	
INV.DUTY ONLY					
T2: 239Nm		n2: 24-60.0r/min		n1: 600-1500.0r/min	
0.5L OIL CLP PG VG 220		i: 25		35kg	
T2: 239Nm		fB: 1.0 50Hz		n2: 60.0r/min	
3-G-Mot. Th.CL.155(F) TP-PT1000		14Nm		230V ±10% AC	
cosφ 0.69 PF0.69		3.75A		NEMA NOM.EFF.88.2% EFF.88.2%	
1.5kW 380V Y / 50Hz 1500r/min		2.0HP		TEFC IP55	
Mot. 1FP1014-0EB4		CODE: 60022			
SIEMENS AG, Bahnhofstr. 40, DE-72072 Tuebingen / Made in Germany					

SIEMENS		1		2	
3					4
5					7
6					10
8		9			14
11					19
12			13		23
15	16	17	18	21 22	29
20					34
24	25	26		27	34
30	31		32 33	41	42
35	36	37	38	39 40	44
43					45
SIEMENS AG, Bahnhofstr. 40, DE-72072 Tuebingen /					

Figure 10-5 Example of a SIMOGEAR rating plate for geared motors with synchronous-reluctance motors and SINAMICS G110M

- 1 Data matrix code
- 2 Underlying standard
- 3 Serial number
- 4 CE marking or other marking, if required
- 5 Article number
- 6 Type designation
- 7 Mounting position
- 8 Customer ID
- 9 Geared motors type
- 10 Ambient temperature
- 11 INV. DUTY - suitable for inverter operation
- 12 Geared motor output torque T_2 [Nm]
- 13 Output speed range n_2 for output torque T_2 (pos.10) [rpm]
- 14 Input speed range n_1 for output torque T_2 (pos.10) [rpm]
- 15 Oil quantity [l] main gearbox / intermediate gearbox
- 16 Oil grade
- 17 Oil viscosity ISO VG class according to DIN 51519 / ISO 3448
- 18 Overall transmission ratio i
- 19 Weight m [kg]
- Frequency 1
- 20 Geared motor output torque T_2 [Nm]
- 21 Service factor f_B
- 22 Rated frequency f [Hz]
- 23 Gearbox output speed n_2 [rpm]
- Motor and brake data
- 24 Number of phases and motor current type
- 25 Temperature class T_h . Cl.
- 26 Motor protection
- 27 Symbols (IEC 60617-2): \square = brake
- 28 Rated braking torque T_{Br} [Nm]
- 29 Brake supply voltage U [V]
- 30 Power factor $\cos \phi$
- 31 Performance factor
- 32 Rated current I_N [A]
- 33 NEMA energy efficiency
- 34 Energy efficiency
- 35 Rated power P_N [kW]
- 36 Rated voltage range U [V]
- 37 Circuit, circuit symbols according to DIN EN 60617 Part 6 / IEC 60617-6
- 38 Rated frequency f [Hz]

10.3 Rating plate for ATEX version gearboxes

- 39 Rated speed n_N [rpm]
- 40 Rated power P_N [HP]
- 41 NEMA operating mode
- 42 Degree of protection acc. to IEC 60034-5
- 43 Motor designation
- 44 Motor code
- 45 Manufacturer's address and country of origin

10.3 Rating plate for ATEX version gearboxes



Figure 10-6 ATEX rating plate fitted

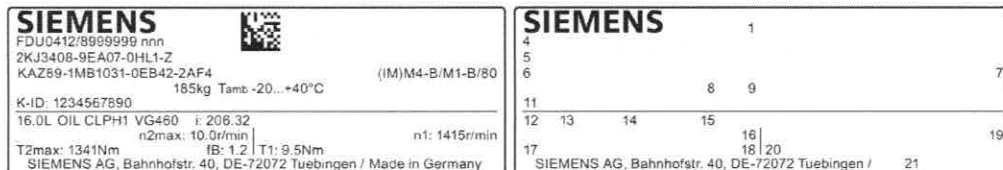



Figure 10-7 ATEX rating plate, supplied separately packed

- 1 Data matrix code
- 2  marking
- 3 CE marking
- 4 Serial number
- 5 Article number
- 6 Type designation
- 7 Mounting position
- 8 Weight m [kg]
- 9 Ambient temperature
- 10.1 Gas explosion protection type
- 10.2 Dust explosion protection type
- 11 Customer ID
- 12 Oil quantity [l] main gearbox / intermediate gearbox
- 13 Oil grade
- 14 Oil viscosity ISO VG class according to DIN 51519 / ISO 3448
- 15 Total transmission ratio i

- 16 Gearbox output speed n_{2max} [rpm]
- 17 Geared motor output torque T_{2max} [Nm]
- 18 Service factor f_B
- 19 Gearbox input speed n_1 [rpm]
- 20 Geared motor input torque T_1 [Nm]
- 21 Manufacturer's address and country of origin

10.4 Weight

The weight of the entire geared motor is given in the shipping papers.

The weight is stated on the rating plate of the motor, gearbox or geared motor.

The weight specification refers only to the product in the delivery state.

10.5 Sound energy level

SIMOGEAR geared motors have noise levels below the permissible noise levels defined for gearboxes in VDI guideline 2159 and for motors in IEC 60034-9. In conjunction with gearboxes, the motor noise values L_{pFA} or L_{WA} increase on average by 3 dB (A).

The circumferential velocity of the motor pinion has a significant influence on the additional gearbox noise. As a consequence, higher speeds or lower ratios result in higher noise.

External noise

Noise not generated by the gearbox but emitted from it are not taken into consideration.

Noise emitted by the drive and driven machines or the base are also not taken into consideration. Even when the noise from the gearbox have been transferred there.

10.6 Mounting positions

10.6.1 General notes on mounting positions

Only operate the gearbox in the mounting position specified on the rating plate. This ensures that the correct quantity of lubricant is provided. The symbols are shown for the standard mounting position.

Note

Gearbox sizes 19 and 29

Gearbox sizes 19 and 29 are lubricated for life. There is no opening to check the oil level.

In mounting positions M2 and M4 the gearboxes are equipped with a breather valve.

C29 has a breather valve in all mounting positions.

Description of the symbols:



Venting



Oil level



Oil drain

A, B Position of insert shaft / solid shaft

* On opposite side

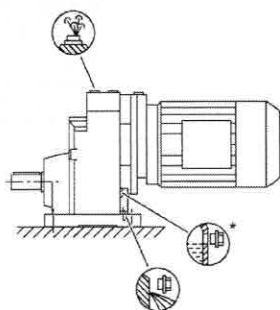
① Oil level check not possible for tandem gearbox (main gearbox a)

② Two-stage gearbox

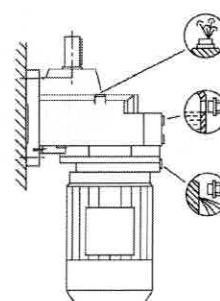
③ Three-stage gearbox

10.6.2 Single-stage helical gearboxes

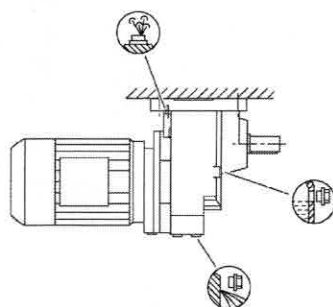
M1



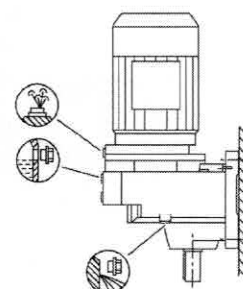
M2



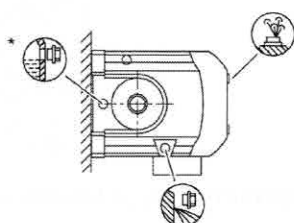
M3



M4



M5



M6

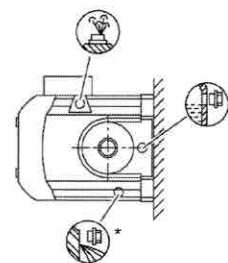


Figure 10-8 Mounting positions for helical gearbox E, foot-mounted design, sizes 39 - 149

10.6 Mounting positions

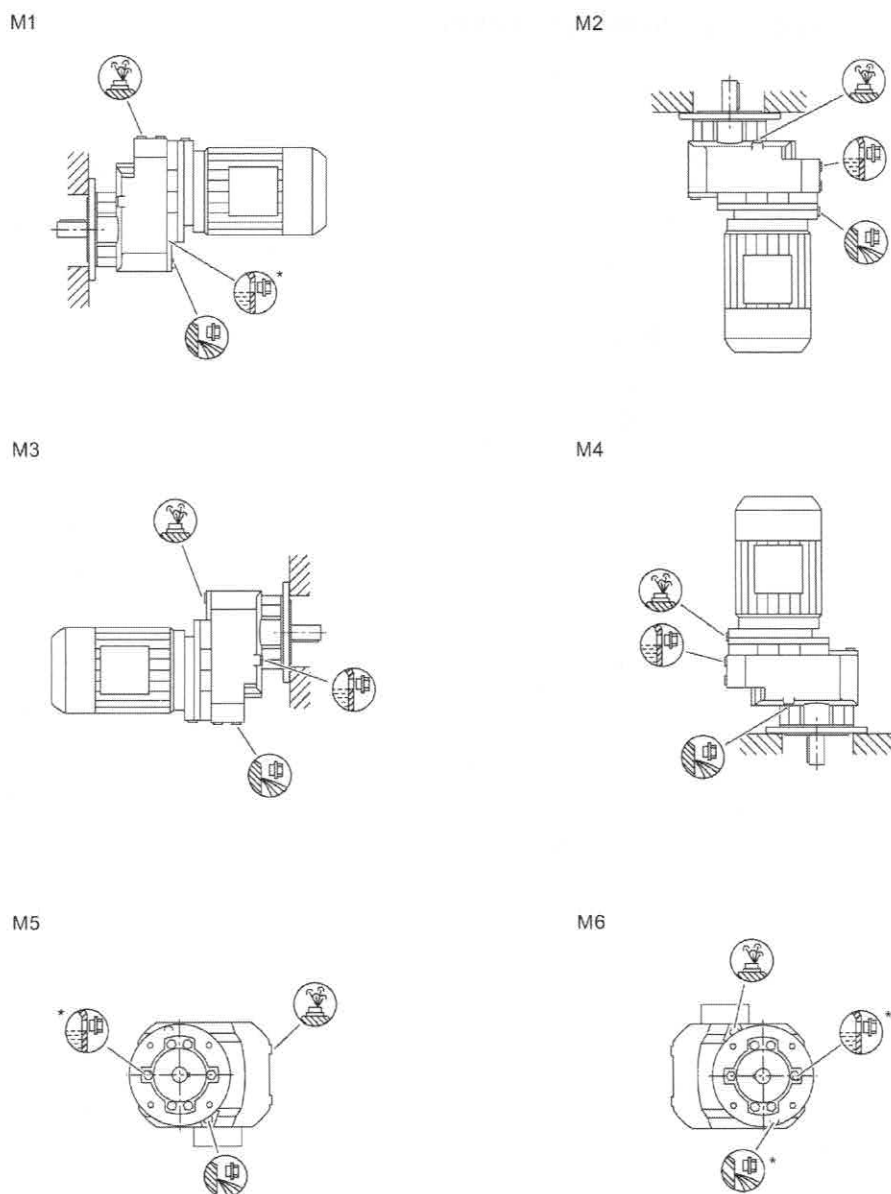
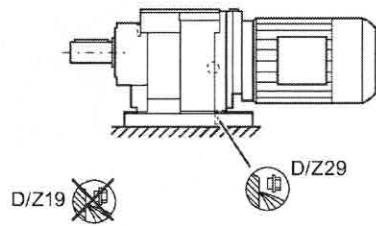


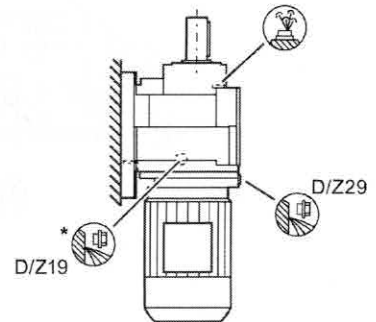
Figure 10-9 Mounting positions for helical gearbox EF/EZ, flange-mounted design, sizes 39 - 149

10.6.3 Two- and three-stage helical gearbox

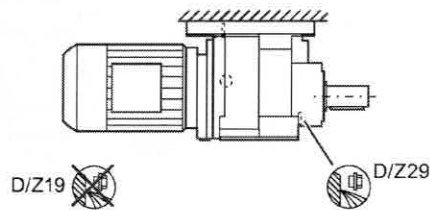
M1



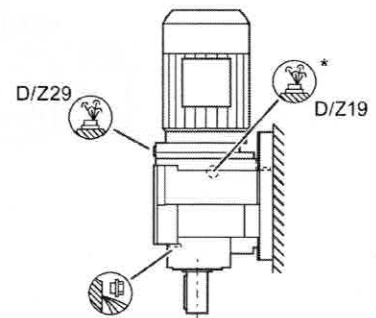
M2



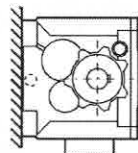
M3



M4



M5



M6

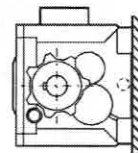


Figure 10-10 Mounting positions for helical gearbox D/Z foot-mounted design, sizes 19 - 29

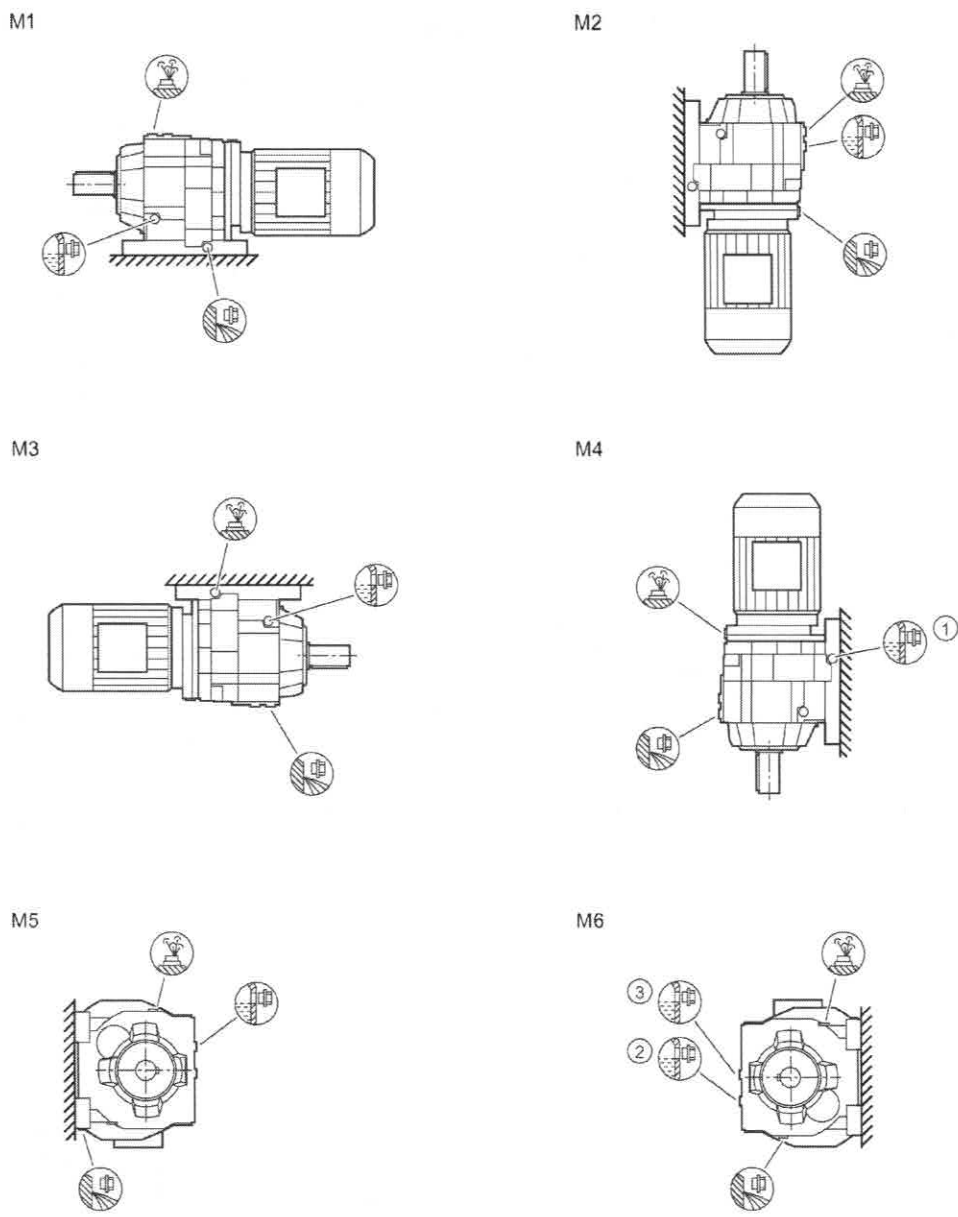
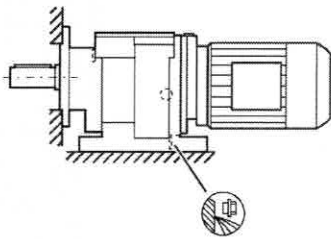
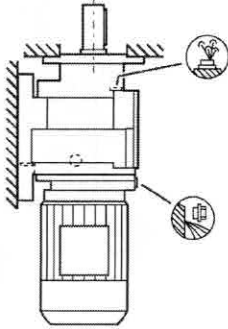


Figure 10-11 Mounting positions for helical gearbox D/Z foot-mounted design, sizes 39 - 189

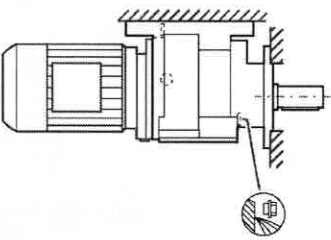
M1



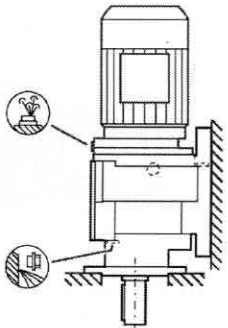
M2



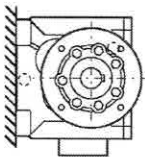
M3



M4



M5



M6

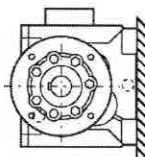
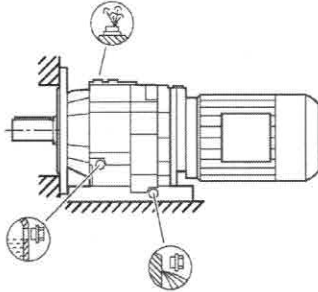
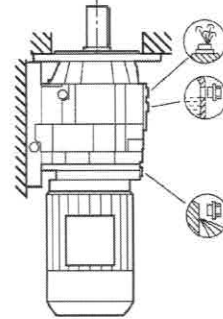


Figure 10-12 Mounting positions for helical gearbox DB/ZB foot / flange-mounted design, size 29

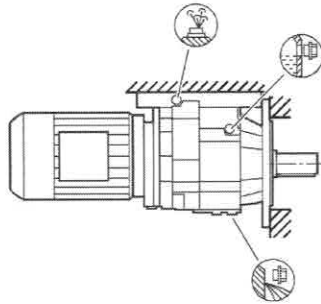
M1



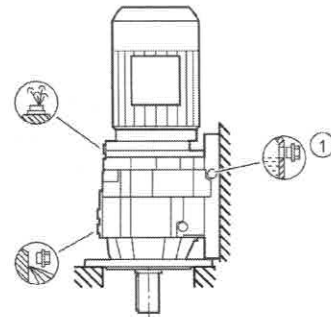
M2



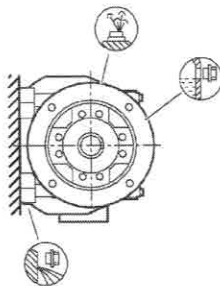
M3



M4



M5



M6

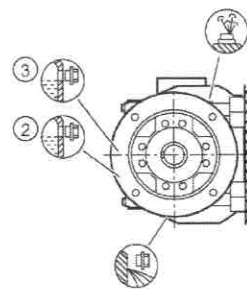
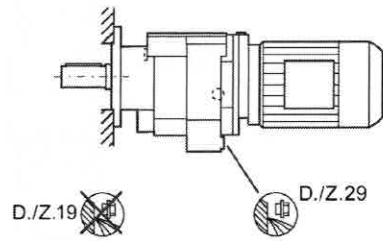
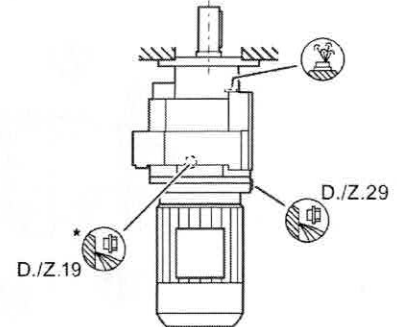


Figure 10-13 Mounting positions for helical gearbox DB/ZB foot / flange-mounted design, sizes 39 - 89

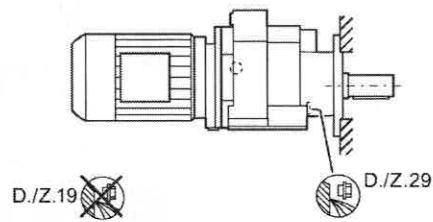
M1



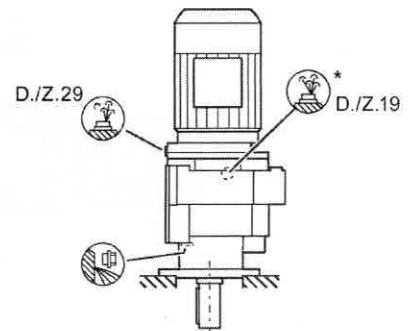
M2



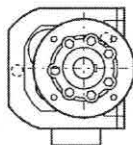
M3



M4



M5



M6

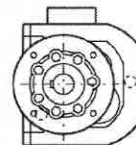
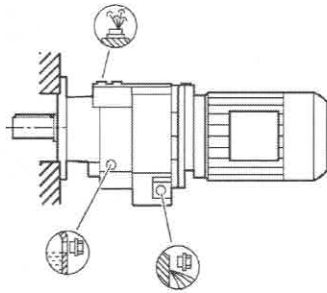
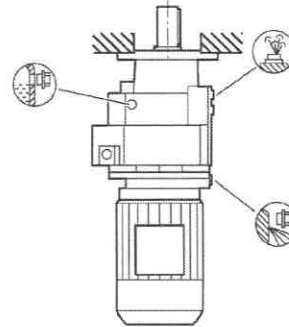


Figure 10-14 Mounting positions for helical gearbox DF/ZF flange-mounted design and DZ/ZZ with housing flange, sizes 19 - 29

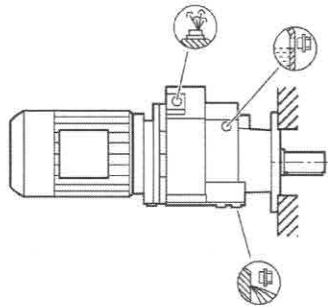
M1



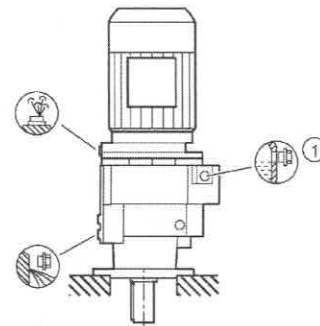
M2



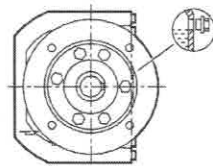
M3



M4



M5



M6

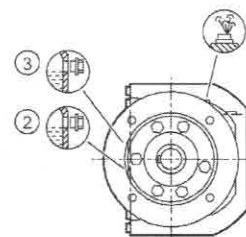


Figure 10-15 Mounting positions for helical gearbox DF/ZF flange-mounted design and DZ/ZZ with housing flange, size 39

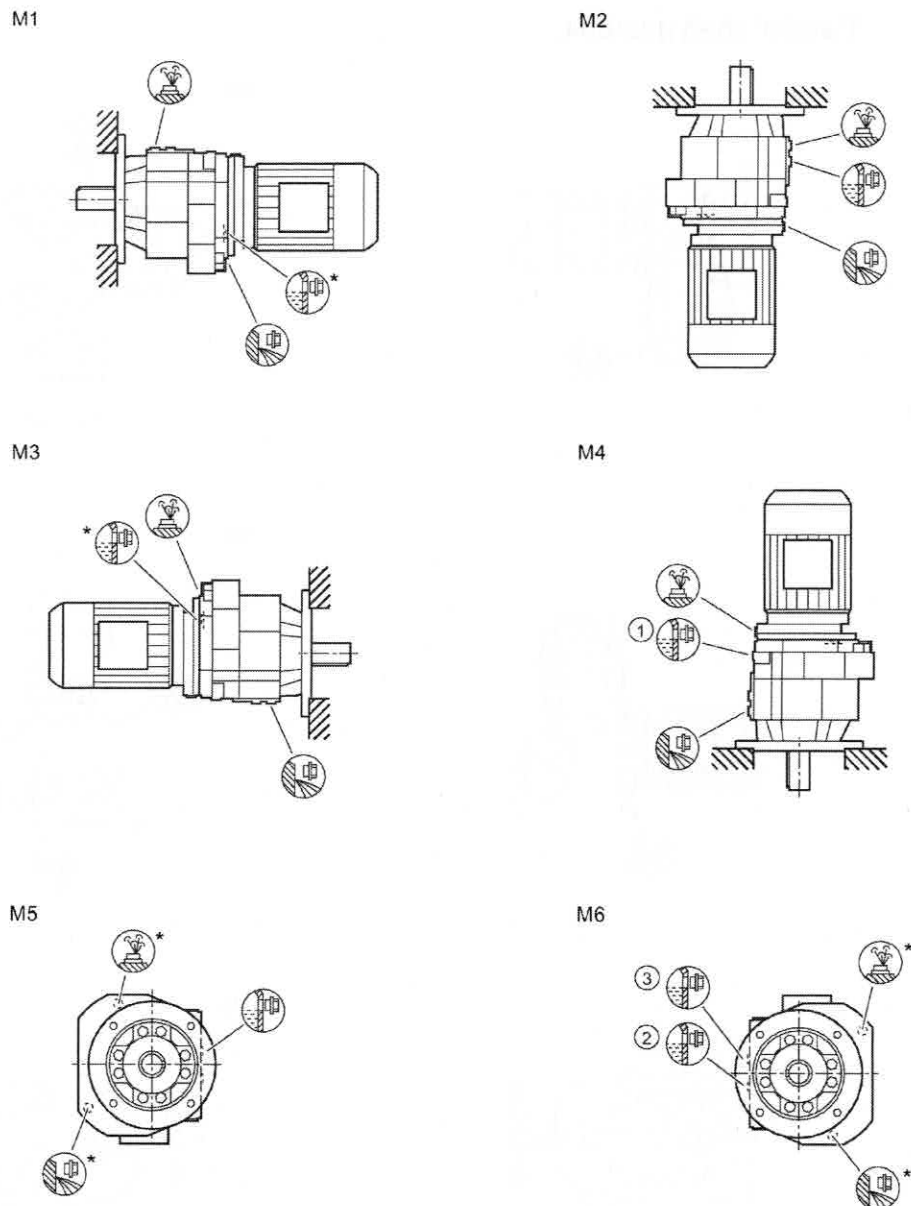
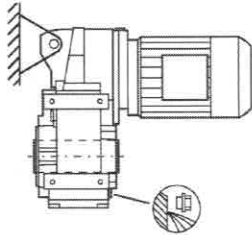


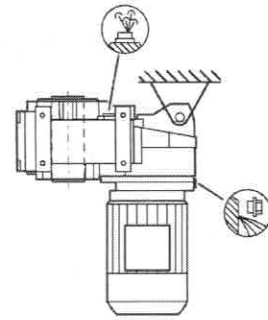
Figure 10-16 Mounting positions for helical gearbox DF/ZF flange-mounted design, sizes 49 - 189 and DZ/ZZ with housing flange, sizes 49 - 129

10.6.4 Parallel shaft gearbox

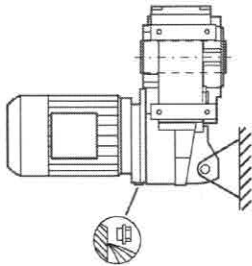
M1



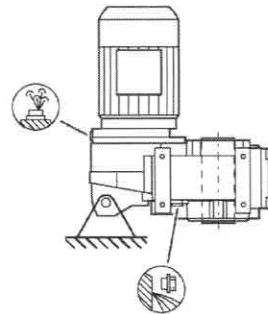
M2



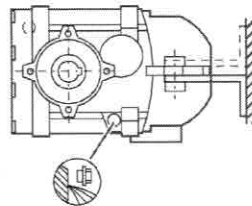
M3



M4



M5



M6

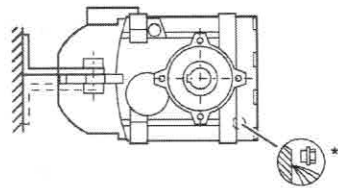
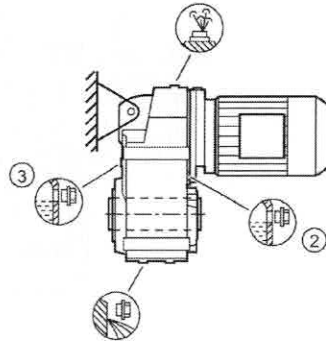
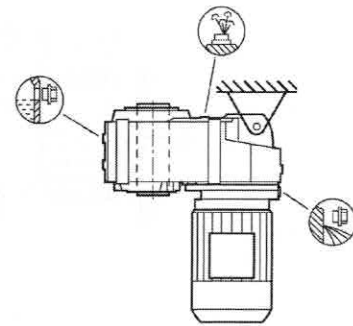


Figure 10-17 Mounting positions for parallel shaft gearbox F.AD shaft-mounted design, size 29

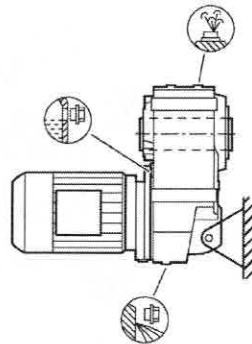
M1



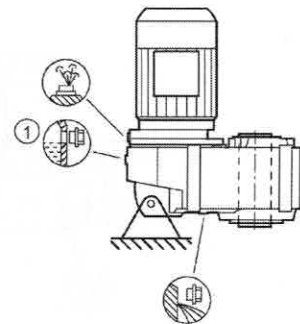
M2



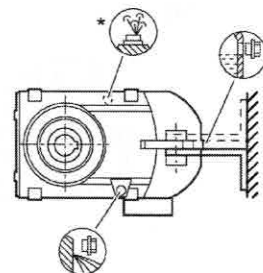
M3



M4



M5



M6

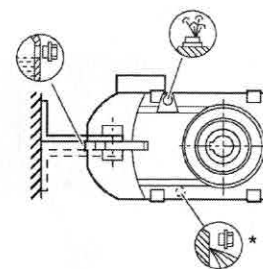
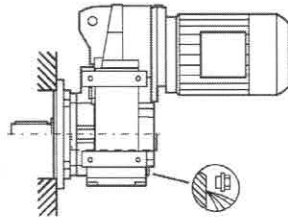
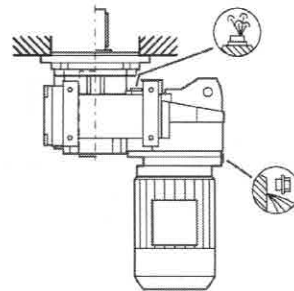


Figure 10-18 Mounting positions for parallel shaft gearbox F.AD shaft-mounted design, sizes 39 - 189

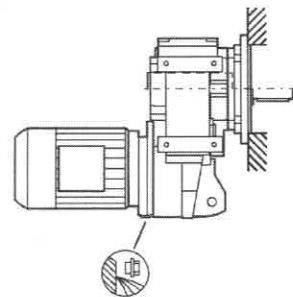
M1



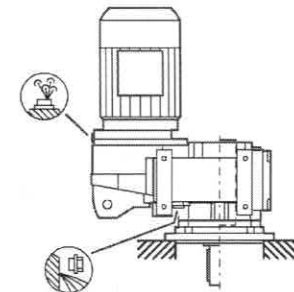
M2



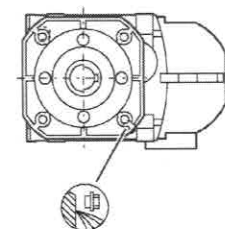
M3



M4



M5



M6

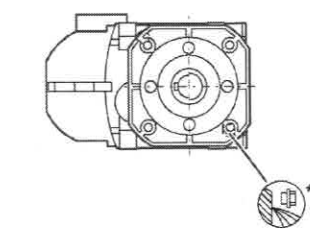


Figure 10-19 Mounting positions for parallel shaft gearbox F.F flange-mounted design and F.Z with housing flange, size 29