

# Assembly and Maintenance Manual

Types AL/ ALP/ ALM/ AL..F2D2/ AL..F4D2/  
ALM..F2D2/ ALM..F4D2/ ALP..F7D7/  
ALMP..F7D7/ AL..KMSD2/  
ALM..KMSD2AL..KEED2



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Wartungsanleitungen\Original\_Worddatei\M1049E\_0\_AL\_ALP\_AL..F2D2\_AL..F4D2\_ALP..F7D7\_ALMP..F7D7\_AL..KMSD2\_AL..KEED2.docx



## General safety instructions






	<b>WARNING</b>	<p><b>Risk of injury due to moving components!</b> Rotating, driven components can cause severe injuries. Therefore, during operation:</p> <ul style="list-style-type: none"> <li>➤ It is strictly forbidden for persons to loiter in the hazard area or in its immediate vicinity.</li> <li>➤ Do not disable, render unusable, or circumvent safety equipment and/or safety functions.</li> </ul> <p>Prior to entering the hazard area:</p> <ul style="list-style-type: none"> <li>➤ Switch off the power supply and secure it against being switched on again.</li> <li>➤ Wait for still moving components to come to a standstill.</li> </ul>
	<b>DANGER!</b>	<p><b>Danger due to improper operation!</b></p> <ul style="list-style-type: none"> <li>➤ Modifications to the one-way clutch are not permitted and may impair safety.</li> <li>➤ All tasks may only be performed by personnel with the requisite training and expertise.</li> <li>➤ Repairs and maintenance tasks may only be performed when the machine is at a standstill. The machine is therefore to be secured against a restart.</li> </ul>
	<b>WARNING</b>	<p><b>Risk of injury due to the one-way clutch falling down or tipping over!</b> The weight of the one-way clutch can injure people and cause severe crushing. Therefore:</p> <ul style="list-style-type: none"> <li>➤ When lifting, use suitable lifting gear (slings, etc.) able to support the weight of the one-way clutch.</li> </ul>
	<b>WARNING</b>	<p><b>Risk of injury due to incorrect assembly!</b> Incorrect assembly and maintenance can cause severe property damage and personal injury. Assembly, maintenance, and repair work may only be performed by personnel with the requisite training and expertise.</p>
	<b>WARNING</b>	<p><b>Risk of injury for insufficiently qualified personnel!</b> Improper handling can cause significant personal injury and property damage. Therefore:</p> <ul style="list-style-type: none"> <li>➤ Only ever have tasks performed by those persons to whom the tasks have been assigned.</li> </ul>

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## 1 General

### 1.1 Information relating to the assembly and maintenance manual

This assembly and maintenance manual provides important information regarding the installation and commissioning of the one-way clutches of types AL/ ALP/ AL..F2D2/ AL..F4D2/ ALP..F7D7/ ALMP..F7D7/ AL..KMSD2/ AL..KEED2.






The prerequisite for safe operation is compliance with all of the stated safety and handling instructions.

Moreover, the relevant local accident protection guidelines and general safety provisions for the field of application of the one-way clutch are to be complied with.

Read the assembly and maintenance manual carefully prior to installation and commissioning. The manual is a product component and must be kept in the immediate vicinity of the installation site and be accessible to personnel at all times. Furthermore, all safety instructions stated in the assembly and maintenance manual are to be observed.

### 1.2 Explanation of symbols

Warnings are marked throughout this assembly and maintenance manual by symbols. These warnings are introduced by signal words that indicate the extent of the danger. Comply with the warnings under all circumstances and act with due care and attention to avoid accidents, personal injury, and property damage.

	<b>DANGER!</b>	...indicates an imminently dangerous situation that can be fatal or cause severe injuries if it is not averted.
	<b>WARNING</b>	...indicates a potentially dangerous situation that can be fatal or cause severe injuries if it is not averted.
	<b>ATTENTION</b>	...indicates a potentially dangerous situation that can cause minor or light injuries if it is not averted.
	<b>CAUTION</b>	...indicates a potentially dangerous situation that can cause property damage if it is not averted.
	<b>NOTICE</b>	... highlights helpful tips and recommendations as well as information for efficient and trouble-free operation.

### 1.3 Manufacturer

STIEBER GMBH, D-69126 Heidelberg, Hatschekstr. 36, Germany  
Phone +49 (0) 6221 3047-0, Fax -31

### 1.4 Labeling

External surface of the outer ring

- Manufacturer
- Type designation
- Date of manufacture (coded)

### 1.5 Environmental protection

Energy: The one-way clutch does not use any electrical energy.

Materials: Steel, brass

Recycling: Steel parts are up to 100% recyclable.

## 2 Safety

### 2.1 Intended use

One-way clutches of types AL/ ALP/ AL..F2D2/ AL..F4D2/ ALP..F7D7/ ALMP..F7D7/ AL..KMSD2/ AL..KEED2 are automatically switching clutches dependent on the direction of rotation. They are used as overrunning clutches, backstops, or switching clutches in machines and systems.

One-way clutches may only be operated within the limitations of use outlined in Section 2.5.

All of the specifications stated in the assembly and maintenance manual must be strictly adhered to.

Any claims due to damage arising from improper use are excluded. The operator bears sole liability for all damage arising from improper use.

#### Driving operation of an overrunning clutch:

When the driving machine elements are operated in the pulling direction, the driving machine element and the torque-supporting machine element are connected to each other in a force-locked manner by the overrunning clutch. In this operating state, output can be transmitted.

#### Overrun operation of an overrunning clutch:

The overrunning clutch automatically releases the force-locked connection of the driving machine element and the driven machine element if the torque of the driven machine element is higher than that of the driving machine element.

#### Lockout operation of a backstop:

When the machine shaft is operated in the reverse direction, the machine shaft and the torque-supporting machine element are connected to each other in a force-locked manner by the one-way clutch. In this operating state, a torque is transmitted.

#### Overrun operation of a backstop:

The one-way clutch automatically releases the force-locked connection between the machine shaft and the torque-supporting machine element, providing the machine shaft is operated in the overrun direction.

#### Driving operation of an indexing clutch:

When the machine shaft is operated in the pulling direction, the machine shaft and the torque-supporting machine element are connected to each other in a force-locked manner by the one-way clutch. In this operating state, an output is transmitted.

#### Idling operation of an indexing clutch:

The one-way clutch automatically releases the force-locked connection between the machine shaft and the torque-supporting machine element, providing the machine shaft is operated in the idling direction.

## **2.2 Responsibility of the operator**


The operator of the system in which the one-way clutch is installed is subject to the legal obligations concerning occupational safety.

The valid provisions for the site of operation as well as the safety and accident prevention regulations of the trade association are to be observed. In particular, this means that the operator:

- is aware of the valid occupational safety provisions
- implements at the site of operation the necessary behavioral requirements for operation of the system in which the one-way clutch is installed
- clearly defines responsibilities for installation, operation, maintenance, and cleaning of the system in which the one-way clutch is installed
- ensures that all staff members who work at or with the system in which the one-way clutch is installed have read and understood the operation manual. Moreover, the operator must, at regular intervals, provide training for personnel on how to handle the system in which the one-way clutch is installed, and inform them of the potential dangers. In addition, the operator is responsible for ensuring that the system in which the one-way clutch is installed:
  - is always in perfect technical condition

- is maintained in accordance with the specified maintenance intervals
- has all its safety equipment checked regularly for completeness and functionality

### 2.3 Assembly and maintenance personnel

	<b>WARNING</b>	<b>Risk of injury for insufficiently qualified personnel!</b> Improper handling can cause significant personal injury and property damage. Therefore: <ul style="list-style-type: none"><li>➤ Only ever have tasks performed by those persons to whom the tasks have been assigned.</li></ul>
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Qualified personnel are those persons who, owing to their training, experience, and instruction as well as their knowledge of relevant standards, provisions, accident prevention regulations and operating conditions, have been authorized by the person responsible for the safety of the system to perform the requisite tasks and are able to recognize and avoid potential dangers in doing so. Knowledge of first-aid measures and on-site emergency equipment is also required.

### 2.4 Personal protective equipment

In order to minimize health risks, it is necessary to wear personal protective equipment when handling the system in which the one-way clutch is installed.

Above all, the necessary protective equipment such as work shoes, gloves, safety goggles, etc. is to be put on prior to all tasks and kept on during the task.




## 2.5 Limitations of use

- Maximum permissible overrun rotation speeds and maximum permissible torques (oil quantities):

Type	Dimensions* Hole Ø H7	Max. torque [Nm]	Max. overrun rotation speed Inner race [rpm]	Max. overrun rotation speed Outer race [rpm]
AL ALP	12	110	4,000	7,200
	15	250	3,600	6,500
	20	362	2,700	5,600
	25	576	2,100	4,500
	30	1,000	1,700	4,100
	35	1,450	1,550	3,800
	40	2,050	1,150	3,400
	45	2,250	1,000	3,200
	50	4,250	800	2,800
	55	5,250	750	2,650
	60	7,000	650	2,450
	70	11,500	550	2,150
	80	17,000	500	1,900
	90	29,000	450	1,700
	100	40,000	350	1,450
	120	62,500	250	1,250
	150	140,000	200	980
200	350,000	150	750	
250	575,000	120	620	
ALM	25	776	2,100	2,800
	30	1,176	1,700	2,500
	35	1,676	1,550	2,400

\* Special hole and reinforced spring design AL(..)VV upon request

Table 1a Specification for oil-lubricated one-way clutches

	<b>NOTICE</b>	If the hole diameter is smaller than the maximum, the maximum torque to be transmitted depends on the fitting key connection.
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Type	Dimensions* Hole Ø [mm] H7	Max. torque [Nm]	Max. overrun rotation speed Inner race [rpm]	Max. overrun rotation speed Outer race [rpm]	Oil quantity in ml
AL..F2D2 AL..F4D2 ALP..F7D7	12	110	2,500	7,200	4
	15	250	1,900	6,500	6
	20	362	1,600	5,600	8
	25	576	1,400	4,500	13
	30	1,000	1,300	4,100	16
	35	1,450	1,100	3,800	26
	40	2,050	950	3,400	30
	45	2,250	900	3,200	36
	50	4,250	850	2,800	45
	55	5,250	720	2,650	58
	60	7,000	680	2,450	62
	70	11,500	580	2,150	105
	80	17,000	480	1,900	110
	90	29,000	380	1,700	190
	100	40,000	350	1,450	240
	120	62,500	250	1,250	500
	150	140,000	180	980	880
200	350,000	120	750	1,600	
250	575,000	100	620	2,500	
ALM..F2D2 ALM..F4D2 ALMP..F7D7	25	776	1,100	2,800	13
	30	1,176	1,000	2,500	16
	35	1,676	900	2,400	26

(Values apply for horizontal installation; vertical installation upon request)

\* Special hole and reinforced spring design AL(..)VV upon request

Table 1b Specification for oil-lubricated one-way clutches

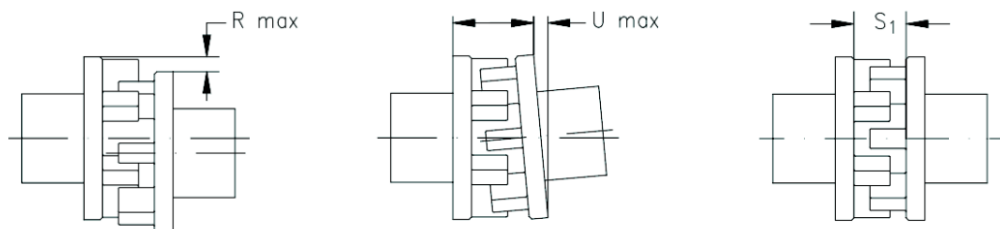
Type	Dimensions* Hole Ø [mm] H7	Clutch size KMS	Max. torque [Nm]	Max. overrun rotation speed Inner race [rpm]	Max. overrun rota- tion speed Outer race [rpm]	Oil quanti- ty in ml
AL..KMSD2	12	4	100	2,500	6,000	4
	15	6.3	158	1,900	6,000	6
	20	10	250	1,600	5,600	8
	25	10	250	1,400	4,500	13
	30	16	400	1,300	4,100	16
	35	25	626	1,100	3,800	26
	40	40	1,000	950	3,400	30
	45	63	1,576	900	3,200	36
	50	100	2,500	850	2,800	45
	55	100	2,500	720	2,650	58
	60	160	4,000	680	2,450	62
	70	250	6,250	580	2,150	105
	80	400	10,000	480	1,900	110
	90	630	15,750	380	1,700	190
	100	1,000	25,000	350	1,450	240
	120	1,600	40,000	250	1,250	500
	150	6,300	140,000	180	980	880
200	1,600	350,000	120	750	1,600	
250	25,000	575,000	100	620	2,500	
ALM..KMSD2	25	16	400	1,100	2,800	13
	30	25	626	1,000	2,500	16
	35	40	1,000	900	2,400	26

(Values apply for horizontal installation; vertical installation upon request)

\* Special hole and reinforced spring design AL(..)VV upon request

Table 2a Specification for oil-lubricated one-way clutches with KMS clutch and cover D2

#### Permissible KMS clutch displacement



Radial alignment

Angular alignment

Axial alignment

Figure 1 Alignment tolerances of KMS clutches

Size	4	6.3	10	16	25	40	63	100	160	250	400	630	1,000	1,600	2,500
R <sub>max</sub> [mm]	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.7	0.8	0.8
U <sub>max</sub> [mm]	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.2
S <sub>1max</sub> [mm]	18±1	20±1	17±1	19±1	22±1	26±1	30±1	35±1	41 <sup>+1.2</sup> <sub>-1</sub>	47 <sup>+1.5</sup> <sub>-1</sub>	56 <sup>+1.5</sup> <sub>-1</sub>	64 <sup>+1.5</sup> <sub>-1</sub>	75 <sup>+1.5</sup> <sub>-1</sub>	85 <sup>+2</sup> <sub>-1</sub>	110 <sup>+2</sup> <sub>-1</sub>

Table 2b Alignment tolerances of KMS clutches

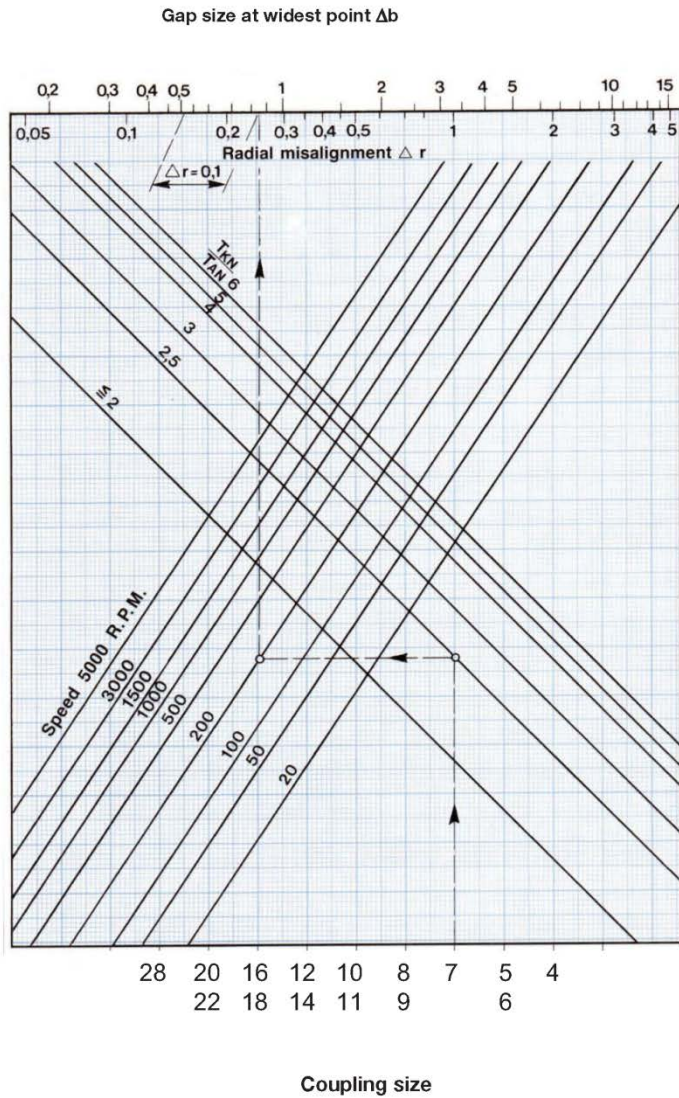
Type	Dimensions* Hole Ø [mm] H7	Clutch size KEE	Max. torque [Nm]	Max. overrun rota- tion speed Inner race [rpm]	Max. overrun rota- tion speed Outer race [rpm]	Oil quantity in ml
AL...KEED2	12	2	110	2,500	6,000	4
	15	3	244	1,900	6,000	6
	20	3	244	1,600	5,600	8
	25	4	576	1,400	4,500	13
	30	5	1,000	1,300	4,100	16
	35	6	1,450	1,100	3,800	26
	40	6	2,050	950	3,400	30
	45	6	2,050	900	3,200	36
	50	7	3,500	850	2,800	45
	55	8	5,250	720	2,650	58
	60	8	5,500	680	2,450	62
	70	10	11,500	580	2,150	105
	80	11	17,000	480	1,900	110
	90	12	27,500	380	1,700	190
	100	14	40,000	350	1,450	240
	120	16	60,000	250	1,250	500
	150	18	87,500	180	980	880
200	22	195,000	120	750	1,600	
250	28	500,000	100	620	2,500	
ALM...KEED2	25	4	400	1,100	2,800	13
	30	5	626	1,000	2,500	16
	35	6	1,000	900	2,400	26

(Values apply for horizontal installation; vertical installation upon request)

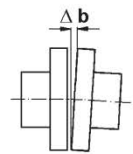
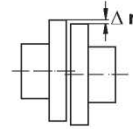
\* Special hole and reinforced spring design AL(..)VV upon request

Table 3 Specification for oil-lubricated one-way clutches with KEE clutch and cover D2

## Permissible Misalignment KEE-Coupling



The permissible angular misalignment  $\Delta \alpha$  is given as a measurable linear dimension  $\Delta b$ .



Design with intermediate disc



Design without intermediate disc



KEE-Size	Permissible axial displacement	
	without [mm]	with intermediate disc [mm]
4	6	—
5	4	16
6	4	16
7	5	20
8	6	20
9	6	20
10	6	25
11	6	25
12	7	25
14	7	25
16	8	30
18	8	30
20	9	30
22	9	—
28	10	—

**Example:**

KEE Coupling size 214 with  $T_{KN} / T_{AN} = 2,5$  and speed  $n = 200$  R.P.M.

1. permissible radial misalignment  
 $\Delta r = 0,25$  mm or

2. permissible angular misalignment  
 $\Delta \alpha$  corresponding to  $\Delta b = 0,85$  mm or

3. permissible radial and angular misalignment:  
e.g. if there is already a  $\Delta b$  of 0,5 then  
 $\Delta r$  can be 0,25 minus 0,15 = 0,1 mm.

Figure 2 Permissible displacements of KEE clutches

**NOTICE**

If the hole diameter is smaller than the maximum, the maximum torque to be transmitted depends on the fitting key connection.

- Limits for ambient temperature: -40°C to +50°C
- Max. operating temperature: 90°C (194°F)
- Machine shaft tolerance: d = h6 or j6
- Oil lubrication: approved oils as per Stieber product catalog / WN900
- Grease lubrication: approved greases as per Stieber product catalog / WN900  
With grease lubrication, only use the reinforced design AL(..)VV

**NOTICE**

With grease lubrication, the maximum overrun rotation speeds of the outer and inner race decrease by 50%.

	Ambient temperature				Grease
	-40°C to -15°C	-15°C to +15°C	+15°C to +30°C	+30°C to +50°C	
	Operating temperature				
	-20°C to +25°C	+10°C to +50°C	+40°C to +70°C	+50°C to +85°C	
	Oil				
<b>ISO - VG DIN 51519</b>	10	22	46	100	
<b>ARAL</b>	SUMUROL CM 10	SUMUROL CM 22	SUMUROL CM 46 MOTANOL HE 46	DEGOL CL 100T MOTANOL HE 100	ARALUB HL2
<b>BP</b>	ENERGOL CS 10	ENERGOL CS 22	ENERGOL CS 46 ENERGOL RC R 46	ENERGOL CS 100 ENERGOL RC 100	ENERGREASE LS2
<b>CASTROL</b>	–	–	AIRCOL PD 46	AIRCOL PD 100	SPHEEROL MP2
<b>ESSO</b>	SPINESSO 10	SPINESSO 22	TERESSTIC T46	NUTO 100	UNIREX N2
<b>FUCHS</b>	RENOLIN MR3	RENOLIN DTA 22	RENOLIN DTA 46	RENOLIN MR30	RENOLIT LZR 2
<b>KLÜBER</b>	ISOFLEX PDP 38	ISOFLEX PDP 48	LAMORA HLP 46	LAMORA 100	POLYLUB WH2 KLÜBERSYNTH BM 44-42
<b>MOBIL</b>	VELOCITE No. 6	VELOCITE No. 10	MOBIL DTE 798	MOBIL DTE OIL HEAVY	POLYREX EM
<b>SHELL</b>	MORLINA S2 BL 10	MORLINA S2 BL 22	MORLINA 46	MORLINA 100	ALVANIARL2
<b>TOTAL</b>	AZZOLA ZS 10	AZZOLA ZS 22	AZZOLA ZS 46	AZZOLA ZS 100	MULTIS 2

\* At operating temperatures from 0°C to +80°C, SAE 10W-40 multipurpose oils are preferred.

Table 4 Recommended lubricants

**NOTICE**

With grease lubrication, fill approx. 30 to 40% of the free space in the one-way clutch with grease. Too much grease can impair the function of the one-way clutch.

### 3 Structure and function

#### 3.1 Structure

Item 1	Outer race	Item 17	Oil filling plug
Item 2	Inner race	Item 19	Dynamic seal
Item 3	Cylindrical roller	Item 30	Locking ring
Item 6	Spring-loading	Item 31	KEE clutch hub
Item 7	Washer	Item 32	AL-KEE flange
Item 9	Shim	Item 33	Threaded pin
Item 10	Grooved ball bearing	Item 35	Profile sleeve
Item 11	Paper seal	Item 36	Bolt
Item 12	Cover D2	Item 38	Nut
Item 13	Flange F2	Item 39	Washer
Item 14	Centering flange F4	Item 41	KMS clutch hub
Item 15	Cover F6	Item 42	AL-KMS flange
Item 16	Cover F7	Item 43	Threaded pin
		Item 45	Annular gear/saddle element
		Item 46	Retaining cap

Table 5 Parts list

Item 11 is always delivered separately.

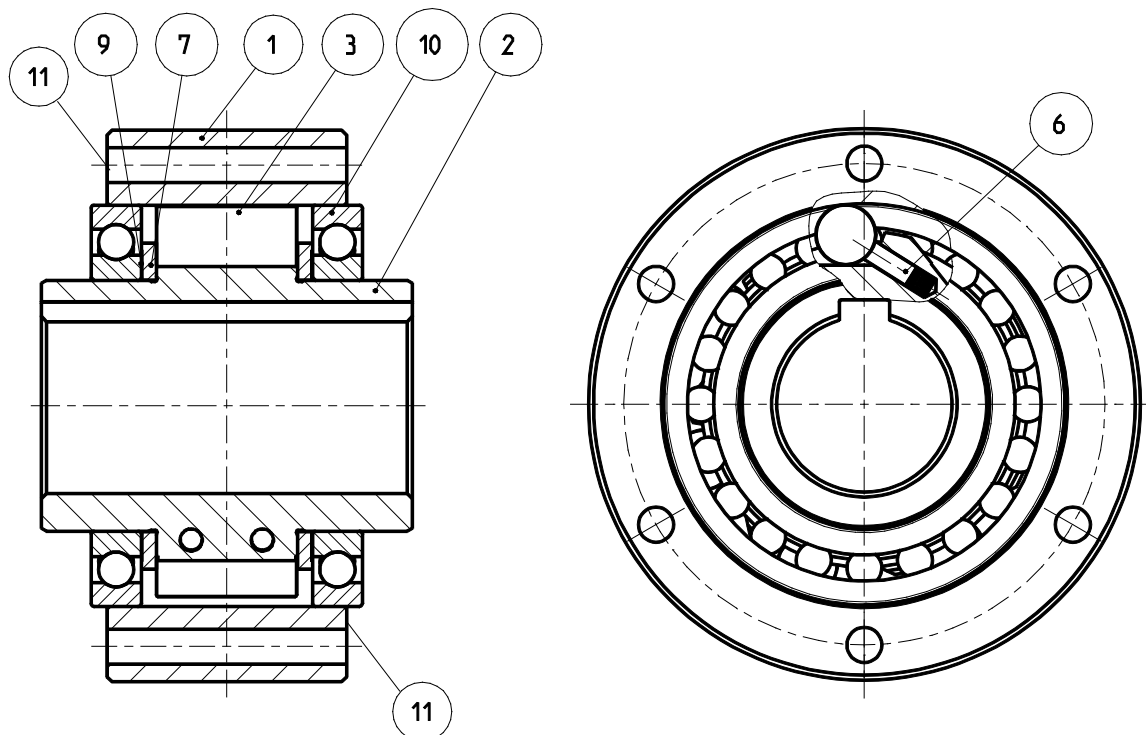


Figure 3a Structure of AL

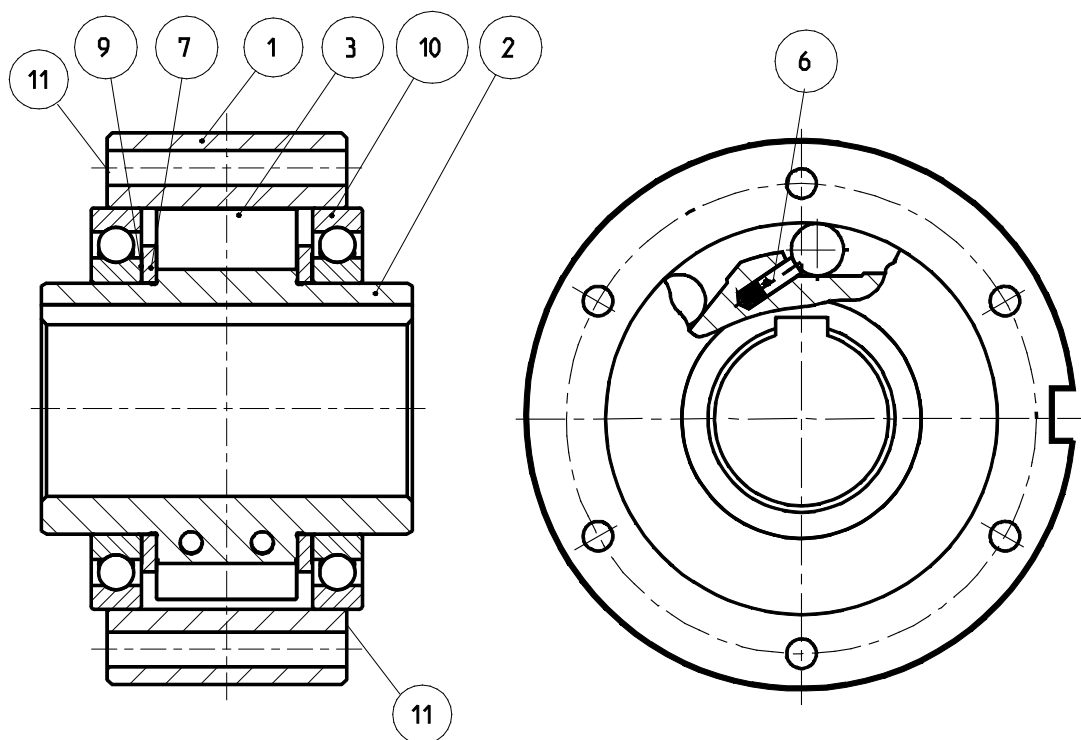


Figure 3b Structure of ALP base unit



Item 11 is always delivered separately.

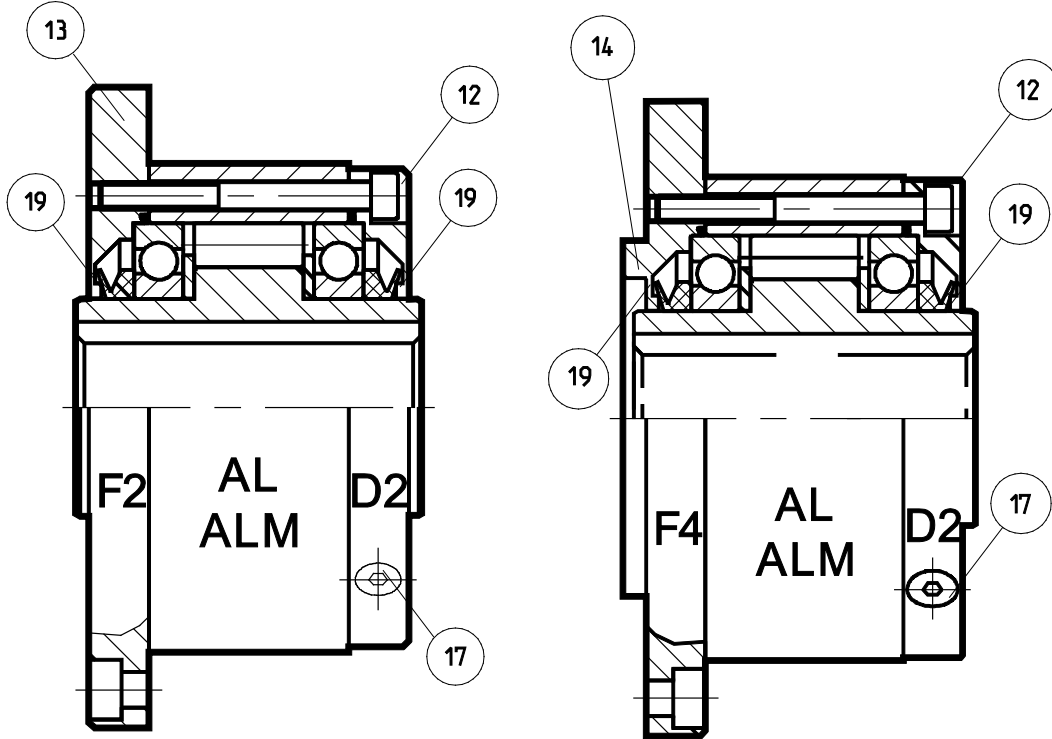
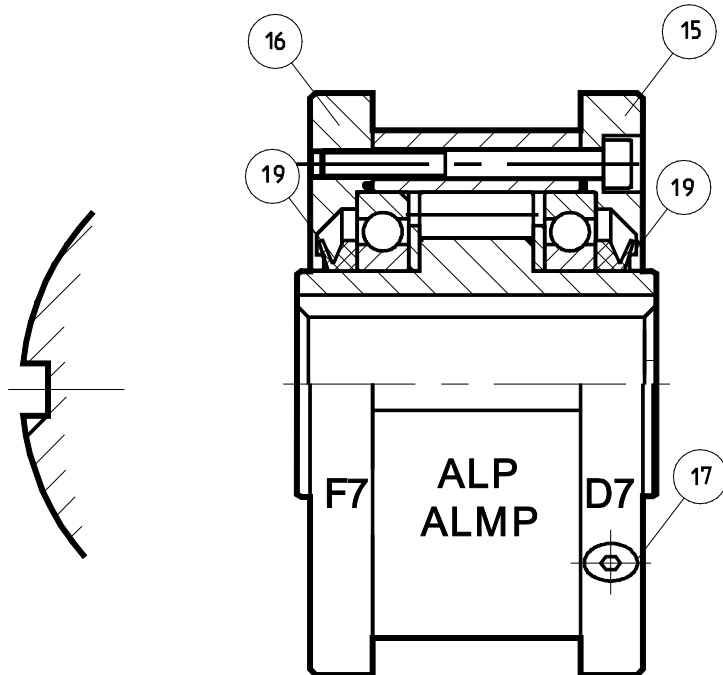


Figure 3c Structure of AL/ALM...F2FD2

Figure 3d Structure of AL/ALM..F4D2



+

Figure 3e Structure of ALP/ALMP..F7D7

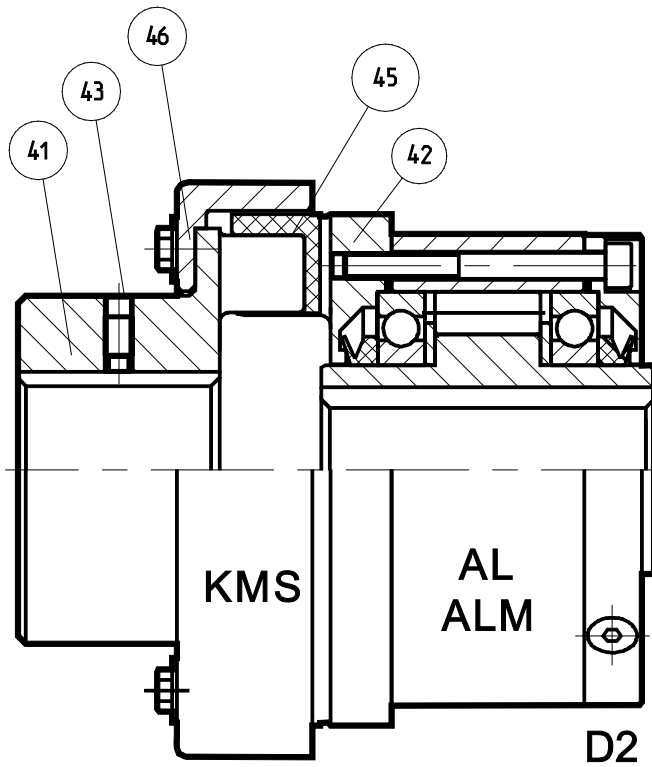


Figure 3f Structure of AL/ALM...KMSD2

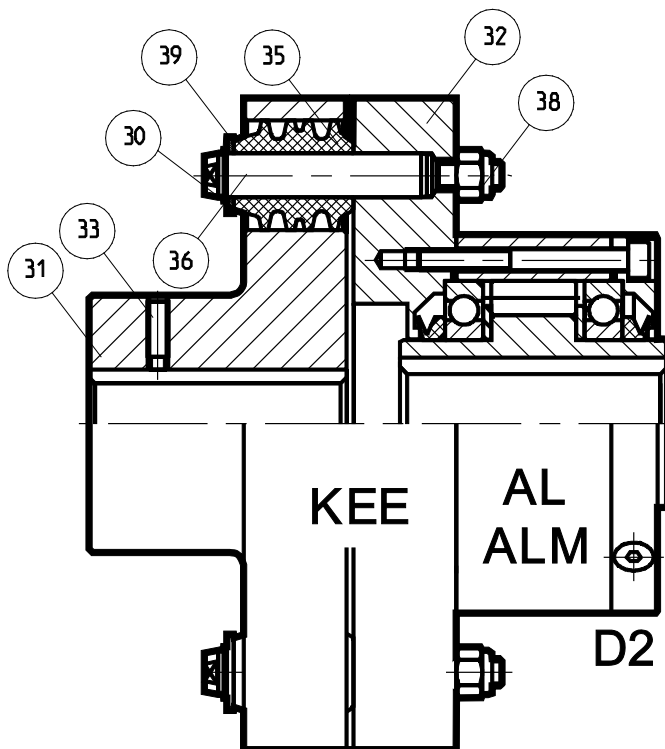


Figure 3g Structure of AL/ALM...KEED2

### 3.2 Functional principle

AL/ ALP/ AL..F2D2/ AL..F4D2/ ALP..F7D7/ ALMP..F7D7/ AL..KMSD2/ AL..KEED2 model one-way clutches are fitted with individually spring-loaded clamp rollers. Spring-loading ensures that all clamp rollers are continuously in contact with the one-way clutch's inner and outer race and are thus ready for operation. When turning the inner or outer clutch race (see Fig. 4) in the pulling direction, the rollers create a frictional connection between the inner and outer race so that a torque or output can be transmitted. The torque is always transmitted here from the actuation shaft to the output shaft. In driving operation, the speeds of the inner ring and outer race are identical.

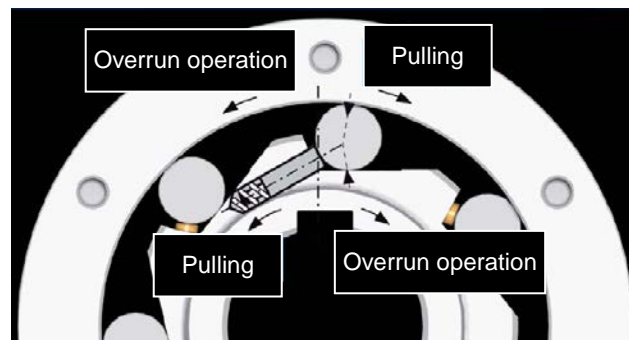


Fig. 4 Pulling/overrun operation

Overrun operation is carried out if the inner race or outer race is turned in the overrun direction. This interrupts the frictional connection (see Fig. 4) between the inner and outer race. In overrun operation the speeds of the inner race and outer race are different.

## 4 Transport and packaging



### NOTICE

The local provisions regarding the disposal of transport and packaging materials are to be observed.

The one-way clutch is shipped in a box or on a pallet.

Transport damage to the packaging and/or the one-way clutch is to be reported to the respective transit company without delay.

The one-way clutch must be unpacked in a clean and dry environment.

## 5 Storage

### 5.1 Short-term storage

AL/ ALP/ AL..F2D2/ AL..F4D2/ ALP..F7D7/ ALMP..F7D7/ AL..KMSD2/ AL..KEED2 model one-way clutches come with an oil film as corrosion protection. This corrosion protection is to be renewed at regular intervals. The frequency of these renewal intervals is dependent on the environmental conditions (temperature, moisture, salt content of the air, etc.) at the storage site.

The maximum storage period (short-term storage) is 6 months. Moreover, the one-way clutch must have long-term storage corrosion protection applied to it.

Store packages under the following conditions:

- Do not keep outdoors.
- Keep dry and free from dust.
- Do not expose to aggressive media.
- Keep away from direct sunlight.
- Avoid mechanical shocks and vibrations.
- Storage temperature:  $-10$  to  $+60^{\circ}\text{C}$  ( $14^{\circ}\text{F}$  to  $140^{\circ}\text{F}$ )
- Relative humidity: max. 95%, non-condensing

### 5.2 Long-term storage





For long-term storage, the one-way clutch must be shrink-wrapped with a desiccant and provided with a hygroscope. The corrosion protection must be checked after a period not exceeding one year or else depending on the environmental conditions (temperature, moisture, salt content of the air, etc.) at the storage site.

Store packages under the following conditions:

- Do not keep outdoors.
- Keep dry and free from dust.
- Do not expose to aggressive media.
- Keep away from direct sunlight.
- Avoid mechanical shocks and vibrations.
- Storage temperature:  $-10$  to  $+60^{\circ}\text{C}$  ( $14^{\circ}\text{F}$  to  $140^{\circ}\text{F}$ )
- Relative humidity: max. 95%, non-condensing

## 6 Installation

### 6.1 Checking the direction of rotation

	<b>WARNING</b>	<p><b>Risk of injury due to incorrect assembly!</b>            Incorrect assembly and maintenance can cause severe property damage and personal injury.            Assembly, maintenance, and repair work may only be performed by personnel with the requisite training and expertise.</p>
	<b>WARNING</b>	<p><b>Risk of injury due to moving components!</b>            Rotating, driven components can cause severe injuries. Therefore, during operation:</p> <ul style="list-style-type: none"> <li>➤ It is strictly forbidden for persons to loiter in the hazard area or in its immediate vicinity.</li> <li>➤ Do not disable, render unusable, or circumvent safety equipment and/or safety functions.</li> </ul> <p>Prior to entering the hazard area:</p> <ul style="list-style-type: none"> <li>➤ Switch off the power supply and secure it against being switched on again.</li> <li>➤ Wait for still moving components to come to a standstill.</li> </ul>
	<b>WARNING</b>	<p><b>Risk of injury due to the one-way clutch falling down or tipping over!</b>            The weight of the one-way clutch can injure people and cause severe crushing.            Therefore:</p> <ul style="list-style-type: none"> <li>➤ When lifting, use suitable lifting gear (slings, etc.) able to support the weight of the one-way clutch.</li> </ul>
	<b>WARNING</b>	<p><b>Risk of injury for insufficiently qualified personnel!</b>            Improper handling can cause significant personal injury and property damage. Therefore:</p> <ul style="list-style-type: none"> <li>➤ Only ever have tasks performed by those persons to whom the tasks have been assigned.</li> </ul>

Before installation, the direction of rotation of the one-way clutch must be checked.

### 6.2 Changing the direction of rotation

For AL / ALP/ ALM models, the direction of rotation is changed by reversing the one-way clutch.

For AL..F2D2/ AL..F4D2/ ALP..F7D7/ ALMP..F7D7/ AL..KMSD2/ AL..KEED2 models, the direction of rotation is changed by swapping the flange and cover or clutch and cover.

Procedural steps:

- Remove the cylinder screws from the cover and remove the components.
- Place the flange and cover or clutch cover onto the opposite side and insert the cylinder screws with Loctite and tighten (see Table 3 Tightening torques).

Tightening torques [Nm]			
One-way clutch size	Size	Strength class 10.9	Oil filling plugs
12 to 25	M5	8	4
30 to 35	M6	14	7
40 to 50	M8	34	9
55 to 80	M10	68	15
90	M12	118	63
100 to 120	M16	290	150
150	M20	550	300
200	M24	950	
250	M30	1,420	

Table 6 Tightening torques

- Check overrunning. The one-way clutch must be easy to turn in the overrun direction of rotation.

### 6.3 Oil lubrication

AL..F2D2, AL..F4D2 model one-way clutches come filled with oil.

AL/ALM..F7D7, ALP..F7D7, AL..KMSD2, AL..KEED2 model one-way clutches must be filled with oil after mounting (see Section 2.5 Limitations of use).

AL/ALM and ALP model one-way clutches must be supplied with an adequate amount of oil during operation.

### 6.4 Grease lubrication





AL/ ALP/ AL..F2D2/ AL..F4D2/ ALP..F7D7/ ALMP..F7D7/ AL..KMSD2/ AL..KEED2 model one-way clutches are designed for oil lubrication. In cases where oil lubrication is not possible, it is possible to switch to grease lubrication under the appropriate operating conditions. With grease lubrication, the reinforced design AL(..)VV is used. Please consult with the manufacturer.



#### NOTICE

With grease lubrication, the maximum overrun rotation speeds of the outer and inner race decrease by 50%.

## 6.5 Assembly

	<b>WARNING</b>	<p><b>Risk of injury due to incorrect assembly!</b></p> <p>Incorrect assembly and maintenance can cause severe property damage and personal injury.</p> <p>Assembly, maintenance, and repair work may only be performed by personnel with the requisite training and expertise.</p>
	<b>WARNING</b>	<p><b>Risk of injury due to moving components!</b></p> <p>Rotating, driven components can cause severe injuries. Therefore, during operation:</p> <ul style="list-style-type: none"> <li>➤ It is strictly forbidden for persons to loiter in the hazard area or in its immediate vicinity.</li> <li>➤ Do not disable, render unusable, or circumvent safety equipment and/or safety functions.</li> </ul> <p>Prior to entering the hazard area:</p> <ul style="list-style-type: none"> <li>➤ Switch off the power supply and secure it against being switched on again.</li> <li>➤ Wait for still moving components to come to a standstill.</li> </ul>
	<b>WARNING</b>	<p><b>Risk of injury due to falling components!</b></p> <p>Falling components can lead to serious injuries to persons.</p> <p>Secure the one-way clutch against falling down.</p>
	<b>WARNING</b>	<p><b>Risk of injury for insufficiently qualified personnel!</b></p> <p>Improper handling can cause significant personal injury and property damage. Therefore:</p> <ul style="list-style-type: none"> <li>➤ Only ever have tasks performed by those persons to whom the tasks have been assigned.</li> </ul>

### 6.5.1 Assembly of the AL/ ALM/ ALP one-way clutch

Procedural steps:

- Insert the AL/ ALM/ ALP one-way clutch with paper seals (11) between the outer race (1) and the connecting parts.
- Insert the supporting fitting key according to DIN 6885 Sheet 1 over the entire length of the one-way clutch in the shaft. To transmit the torque on the outer race, the ALP version is additionally fitted with a parallel keyway.
- Push the one-way clutch onto the oiled machine shaft, attaching suitable lifting equipment if necessary.
- Tighten the machine element with the outer race. To do so, use fastening screws (e.g. as per standard DIN EN ISO 4762 and with screw quality 10.9) (see Table 3 Tightening torques in Section 6.2).

- Fasten the inner race axially.
- Check overrunning. After the assembly, the one-way clutch must be easy to turn in the overrun direction of rotation.

**NOTICE**

Use screw quality 10.9 only.

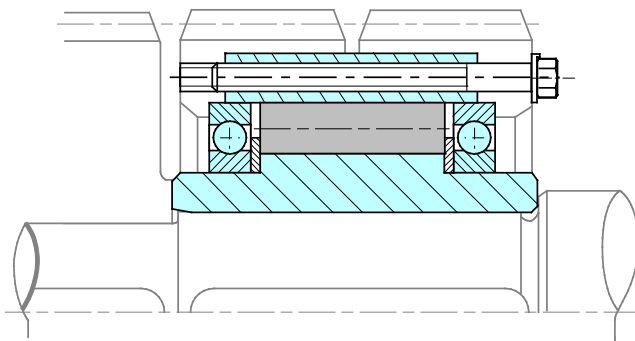


Figure 5: AL/ ALM/ ALP installation example

### 6.5.2 Installation of AL..F2D2 one-way clutch

#### Procedural steps:

- Slide machine element onto outer race.
- Insert the supporting fitting key according to DIN 6885 Sheet 1 over the entire length of the one-way clutch in the shaft.
- Push the one-way clutch onto the oiled machine shaft, attaching suitable lifting equipment if necessary.
- Fasten flange F2 and the machine element with fastening screws (e.g. as per standard DIN EN ISO 4762 and with screw quality 10.9) (see Table 3 Tightening torques in Section 6.2).
- Fasten the inner race axially.
- Check overrunning. After the assembly, the one-way clutch must be easy to turn in the overrun direction of rotation.

**NOTICE**

Use screw quality 10.9 only.



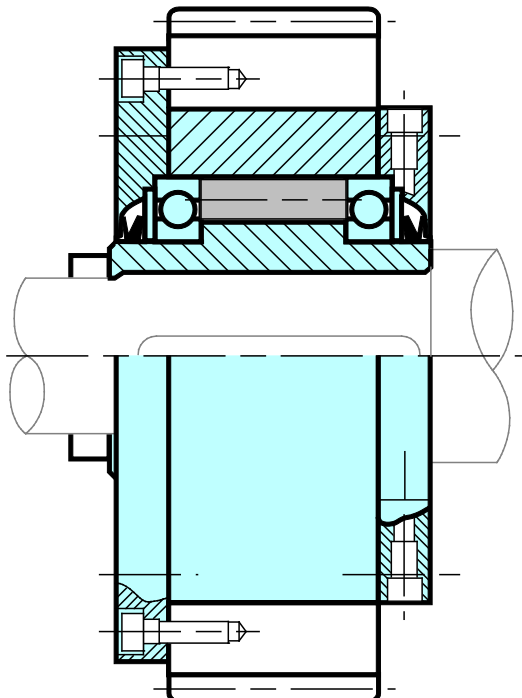


Figure 6: AL..F2D2 installation example

### 6.5.3 Assembly of AL..F4D2 one-way clutch

#### Procedural steps:

- Insert the supporting fitting key according to DIN 6885 Sheet 1 over the entire length of the one-way clutch in the shaft.
- Push the one-way clutch onto the oiled machine shaft, attaching suitable lifting equipment if necessary.
- Fasten centering flange F4 and the machine element with fastening screws (e.g. as per standard DIN EN ISO 4762 and with screw quality 10.9) (see Table 3 Tightening torques in Section 6.2).
- Fasten the inner race axially.
- Check overrunning. After the assembly, the one-way clutch must be easy to turn in the overrun direction of rotation.



#### NOTICE

Use screw quality 10.9 only.

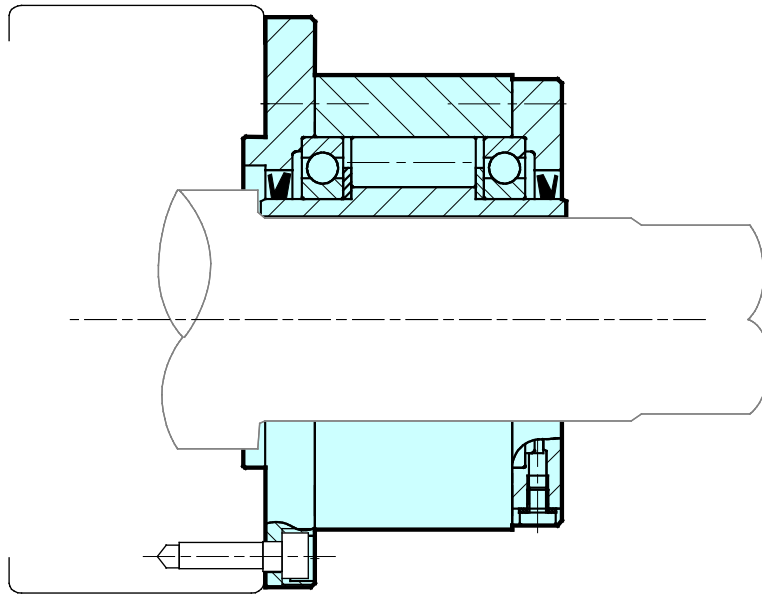


Figure 7: AL..F4D2 installation example

#### 6.5.4 Assembly of ALP/ ALMP..F7D7 one-way clutch

##### Procedural steps:

- Unfasten cover F7 (16) or cover D7 (15) from the outer race.
- Insert the fitting key.
- Slide the machine element onto the outer race and reinstall the removed cover again (see Table 3 Tightening torques in Section 6.2).
- Insert the supporting fitting key according to DIN 6885 Sheet 1 over the entire length of the one-way clutch in the shaft.
- Push the one-way clutch onto the oiled machine shaft, attaching suitable lifting equipment if necessary.
- Fasten the inner race axially.
- Fill in the oil (see Table 1b Specifications and Table 2 Recommended lubricants in Section 2.5 Limitations of use).
- Check overrun. After the assembly, the one-way clutch must be easy to turn in the overrun direction of rotation.

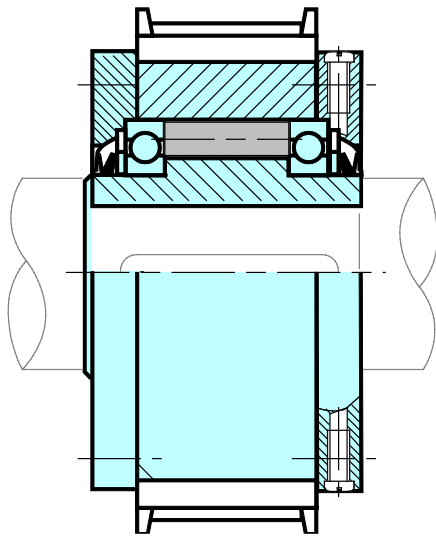


Figure 8: ALP/ ALPM..F7D7 installation example

### 6.5.5 Assembly of AL/ ALM..KEED2 one-way clutch

Procedural steps:

- Insert the supporting fitting key according to DIN 6885 Sheet 1 over the entire length of the KEE clutch hub (31) in the shaft.
- Slide the clutch onto the shaft.
- Secure the clutch hub axially by tightening the threaded pin (33) using the fitting key.
- Insert the supporting fitting key according to DIN 6885 Sheet 1 over the entire length of the one-way clutch with AL-KEE flange (32) in the shaft.
- Push the one-way clutch with AL-KEE flange (32) onto the oiled machine shaft, attaching suitable lifting equipment if necessary.
- Fasten the inner race axially.
- Check overrunning. After the assembly, the one-way clutch with AL-KEE flange (32) must be easy to turn in the overrun direction of rotation.
- The axial alignment of the clutch parts must be such that space "S" is not exceeded under any circumstances during operation (see Table 7 Installation of KEE clutch).



#### NOTICE

Never grease or oil the profile sleeves as well as the sleeve holes in the part (31).

- With KEE sizes 5 to 28, tap the bolts (36) slightly to drive them into the greased holes of the two clutch parts (32 and 31).

With KEE sizes 2 to 4, the bolts (36) are designed as grooved pins and must be firmly inserted into the clutch parts (32 und 31).

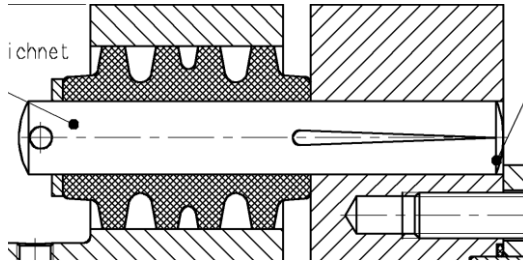


Figure 9a Grooved pins with KEE sizes 2 to 4

- Put on the profile sleeves (35), the washers (39), and the locking rings (30).
- The transfer bolts are tightened evenly after putting on the nuts (38) using a torque wrench (see Table 7 Installation of KEE clutch) until their conical element makes contact in the shoulder of the hole.



#### NOTICE

Placing a wrench on the wrench flat of the bolt head prevents the transfer bolts from turning while the nuts are tightened.

Clutch size KEE	Nominal installation dimension $S_{nom} = 0.5 S_{max}$ [mm]	Thread	Width across flats	Tightening torque in [Nm]
2	3	—	—	—
3	3	—	—	—
4	3	—	—	—
5	2	M8	Width 13	11
6	2	M8	Width 13	11
7	2.5	M8	Width 13	11
8	3	M10	Width 17	22
10	3	M12	Width 19	39
11	3	M12	Width 19	39
12	3.5	M16	Width 24	95
14	3.5	M16	Width 24	95
16	4	M20	Width 30	184
18	4	M20	Width 30	184
22	4.5	M24	Width 36	315
28	5	M30	Width 46	635

Table 7 Installation of KEE clutch

- After the installation of the transfer element, gap “ $S_{nom}$ ” must be checked again (see Table 7 Installation of KEE clutch).

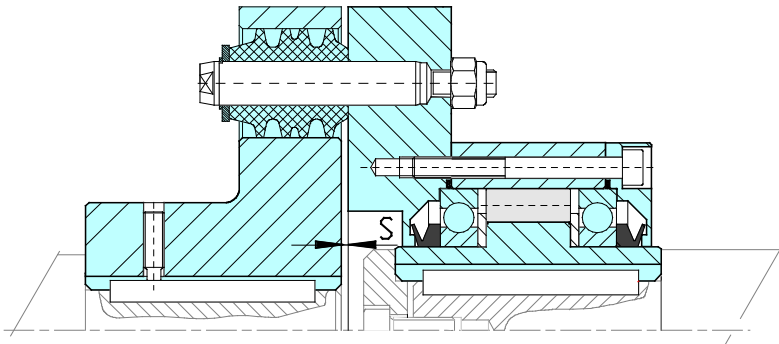


Figure 9b: AL/ ALM..KEED2 installation example

#### 6.5.6 Assembly of AL/ ALM..KMSD2 one-way clutch

##### Procedural steps:

- Insert the supporting fitting key according to DIN 6885 Sheet 1 over the entire length of the KMS clutch hub (41) in the shaft.
- Secure the clutch hub axially by tightening the threaded pin using the fitting key.
- Insert the supporting fitting key according to DIN 6885 Sheet 1 over the entire length of the one-way clutch with AL-KMS flange (42) in the shaft.
- Push the one-way clutch with AL-KMS flange (42) onto the oiled machine shaft, attaching suitable lifting equipment if necessary.
- Fasten the inner race axially, e.g., with a shaft end disk.
- Check overrunning. After the assembly, the one-way clutch with AL-KMS flange (42) must be easy to turn in the overrun direction of rotation.
- The shafts must be placed into the bearings such that gap dimension “ $S_1$ ” is maintained during operation (see Table 2b Alignment tolerances of KMS clutches).

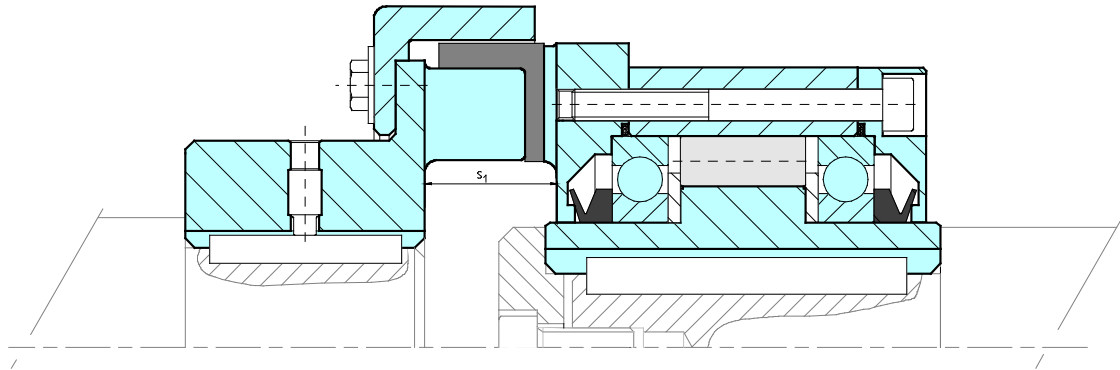








Figure 10: AL/ ALM..KMSD2 installation example

## 7 Maintenance


	<p><b>WARNING</b></p>	<p><b>Risk of injury due to moving components!</b> Rotating, driven components can cause severe injuries. Therefore, during operation:</p> <ul style="list-style-type: none"> <li>➤ It is strictly forbidden for persons to loiter in the hazard area or in its immediate vicinity.</li> <li>➤ Do not disable, render unusable, or circumvent safety equipment and/or safety functions.</li> </ul> <p>Prior to entering the hazard area:</p> <ul style="list-style-type: none"> <li>➤ Switch off the power supply and secure it against being switched on again.</li> <li>➤ Wait for still moving components to come to a standstill.</li> </ul>
	<p><b>WARNING</b></p>	<p><b>Risk of injury due to incorrect assembly!</b> Incorrect assembly and maintenance can cause severe property damage and personal injury. Assembly, maintenance, and repair work may only be performed by personnel with the requisite training and expertise.</p>
	<p><b>WARNING</b></p>	<p><b>Risk of injury due to falling components!</b> Falling components can lead to serious injuries to persons. Secure the one-way clutch against falling down.</p>

	<b>WARNING</b>	<b>Risk of injury for insufficiently qualified personnel!</b> Improper handling can cause significant personal injury and property damage. Therefore: <ul style="list-style-type: none"><li>➤ Only ever have tasks performed by those persons to whom the tasks have been assigned.</li></ul>
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	<b>WARNING</b>	<b>Danger of scalding due to hot surfaces!</b> There is a risk of burns and danger of scalding during operation due to hot surfaces. Therefore: <ul style="list-style-type: none"><li>➤ Do not touch one-way clutches during operation.</li></ul>
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	<b>NOTICE</b>	New grooved ball bearings (10) must be installed after all maintenance operations.
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## 7.1 Oil level check

	<b>NOTICE</b>	The oil level must be checked depending on the operating conditions and the installation position, however, after half a year at the latest.
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Procedural steps:

- To check the oil level, the oil filling plugs on the perimeter of the cover or the flange must be in the following position:  
One of the plugs at the top, the other at the side below the center

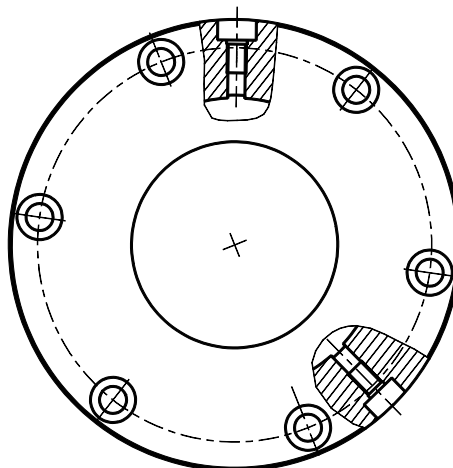



Figure 11: Position of oil filling plugs

- Unfasten the upper and side oil filling plugs with the sealing ring.
- Fill in the prescribed oil into the upper hole until it starts to emerge at the side hole.
- Tighten the oil filling plugs with the seal again with the tightening torque (see Table 6 Tightening torques in Section 6.2).


	<b>NOTICE</b>	Check the oil filling plug and the oil drain plug for firm seating and leak tightness. If leaks occur at the plugs during operation, new seals must be installed.
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## 7.2 Oil change


An oil change is required after approx. 9,000 operating hours or after one year at the latest. In very dirty environments, the interval is reduced to 5,000 operating hours or every half year.

Procedural steps:

- Position the one-way clutches so that the oil filling plugs on the perimeter of the cover are in the following position:  
One of the plugs at the top, the other at the side below the center (see Figure 11). To drain, one of the plugs must be at the bottom.
- Unfasten both oil filling plugs with the seal and drain the oil. To do so, place a suitable drip pan with an appropriate capacity beneath it.

	<b>NOTICE</b>	The local provisions regarding the disposal of waste oil must be observed.
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- Fill the one-way clutches with the prescribed oil quantity (see Section 2.5 Specifications) or until oil emerges on the side.
- Screw the oil filling plug with the seal into the bottom hole and tighten with the tightening torque (see Table 6 Tightening torques in Section 6.2 ).
- Tighten the upper oil filling plug with the seal with the tightening torque (see Table 6 Tightening torques in Section 6.2).

	<b>NOTICE</b>	Check the oil filling plug and the oil drain plug for firm seating and leak tightness. If leaks occur at the plugs during operation, new seals must be installed.
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## 7.3 Maintenance and replacement of the elastic elements of the KEE clutch

The KEE clutches are fitted with paraffin-coated profile sleeves (35), from which the paraffin emerges slowly in order to lubricate the bolts and plugs during operation. As a result, the sleeves become gray. This does not have any effect on the durability or the function.

No special maintenance of the KEE clutch is required.



## Procedural steps:

- With KEE clutches sizes 2 to 4, the grooved locking pins and end disks must be removed before the profile sleeves are removed.
- With KEE clutches at or above size 5, the locking nuts (38) should first be released and the transfer bolts should be driven out slightly.
- Next, remove the locking rings (30) and end disks (39).
- Remove the profile sleeve (35).
- With KEE sizes 5 to 28, tap the bolts (36) slightly to drive them into the greased holes of the two clutch parts (32 and 31).  
With KEE sizes 2 to 4, firmly insert the bolts (36) (grooved pins) into the clutch parts (32 und 31). This is why it must be possible to move one of the two shafts to be connected longitudinally for installation and removal.
- Put on the profile sleeves (35), the washers (39), and the locking rings (30).

**NOTICE**

To achieve a uniform transmission of force, the entire set of profile sleeves should always be replaced.

- The transfer bolts are tightened evenly after putting on the nuts (38) using a torque wrench (see Table 7 Installation of KEE clutch) until their conical element makes contact in the shoulder of the hole.

**NOTICE**

Placing a wrench on the wrench flat of the bolt head prevents the transfer bolts from turning while the nuts are tightened.

#### 7.4 Maintenance and replacement of the elastic elements of the KMS clutch

No special maintenance of the KMS clutch is required.

**NOTICE**

When mounting the elastic elements, ensure that the clutch halves are not mounted too close, in order to prevent the elastic elements from being exposed to lateral pressure and to ensure that the clutch remains flexible in the axial direction during use.

**NOTICE**

The clutch halves must not be mounted too far from each other; this ensures that the rubber blocks are capable of transmitting over the entire width between the coupling claws.

## Procedural steps:

- Loosen all screws from the retaining caps (46) and remove (from sizes 10 to 1600).

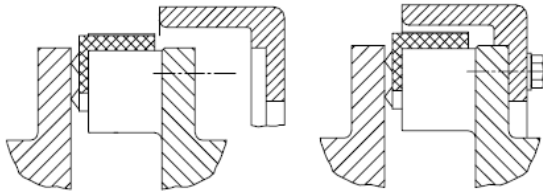



Figure 12 Fastened retaining caps (from sizes 10 to 1,600)

- Remove the retaining cap. A threaded rod can be used as an aid to slide on the retaining cap.
- Remove the saddle element/annular gears.
- Install a new saddle element/annular gears (see Table 8 Elastic KMS clutch elements).

Element type	Size	Number per clutch
KMS annular gears	4 to 6.3 (without retaining caps)	1
KMS annular gears	10 to 63 (with retaining caps)	1
KMS saddle element	100 to 1600	6

Table 8 Elastic KMS clutch elements


- Install retaining caps and tighten again with the tightening torque (Table 9 Tightening torques for KMS retaining caps).


	<b>NOTICE</b>	To help with the assembly when moving over the retaining cap while the saddle elements are inserted, the perimeter of the saddle elements can be coated with talcum or soft soap (no grease or oil).
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Screw size	M6	M8	M10	M12	M16	M20	M24	M27	M30
Tightening torque [Nm]	10	25	49	86	210	410	710	1,050	1,450


Table 9 Tightening torques for KMS retaining caps

## 8 Disassembly

	<p><b>WARNING</b></p>	<p><b>Risk of injury due to incorrect assembly!</b>            Incorrect assembly and maintenance can cause severe property damage and personal injury.            Assembly, maintenance, and repair work may only be performed by personnel with the requisite training and expertise.</p>
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	<p><b>WARNING</b></p>	<p><b>Risk of injury due to moving components!</b>            Rotating, driven components can cause severe injuries. Therefore, during operation:</p> <ul style="list-style-type: none"> <li>➤ It is strictly forbidden for persons to loiter in the hazard area or in its immediate vicinity.</li> <li>➤ Do not disable, render unusable, or circumvent safety equipment and/or safety functions.</li> </ul> <p>Prior to entering the hazard area:</p> <ul style="list-style-type: none"> <li>➤ Switch off the power supply and secure it against being switched on again.</li> <li>➤ Wait for still moving components to come to a standstill.</li> </ul>
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	<p><b>WARNING</b></p>	<p><b>Danger of scalding due to hot surfaces!</b>            There is a risk of burns and danger of scalding during operation due to hot surfaces. Therefore:</p> <ul style="list-style-type: none"> <li>➤ Do not touch one-way clutches during operation.</li> </ul>
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	<p><b>WARNING</b></p>	<p><b>Risk of injury due to falling components!</b>            Falling components can lead to serious injuries to persons.            Secure the one-way clutch against falling down.</p>
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### Procedural steps:

- Drain the oil. To do so, bring the screws into position and unfasten. To collect the oil, place a suitable container beneath the one-way clutch.
- Remove the axial fastening of the inner race (1).
- Loosen the fastening screws from the flange and from driven machine elements.
- Pull the one-way clutch from the machine shaft using suitable lifting equipment, if required.
- With KMS clutches, pull apart the respective shaft ends, loosen the threaded pin at the KMS clutch hub, and pull off the clutch hub from the shaft.

- With KEE clutches sizes 2 to 4, the grooved locking pins and end disks must be removed before the profile sleeves are removed).
- With KEE clutches at or above size 5, the locking nuts (38) should first be released and the transfer bolts should be driven out slightly.
- Next, remove the locking races (30) and end disks (39).
- Remove the profile sleeve (35).
- Pull apart the respective shaft ends, loosen the threaded pin at the KEE clutch hub, and pull off the clutch hub from the shaft.

## 9 Disposal



### NOTICE

The local provisions regarding the disposal of metallic components and any lubricants present are to be observed.

The one-way clutch is comprised of metallic materials that are coated with grease or oil. Metallic materials are fully recyclable. Lubricants and anticorrosive agents are to be disposed of separately. The local disposal provisions are to be observed in this regard.

## 10 Faults

The manufacturer is to be contacted immediately should any faults arise.

STIEBER GMBH, D-69126 Heidelberg, Hatschekstr. 36, Germany  
Phone +49 (0) 6221 3047-0, Fax -31

## 11 Spare parts



### WARNING

#### **Risk of injury due to incorrect spare parts!**

Incorrect or faulty spare parts can cause damage, malfunctions or total failure as well as impair safety.

Therefore:

- Only use original spare parts from the manufacturer.

Procure spare parts only from authorized dealers or from the manufacturer directly.