Installation and Operational Instructions for EAS®-element clutch Sizes 6 – 14

(B.4.3.EN)

Please read these Operational Instructions carefully and follow them accordingly!
Ignoring these Instructions may lead to malfunctions or to clutch failure, resulting in damage to other parts.

Contents:

Safety and Guideline Signs

CAUTION

Danger of injury to personnel and damage to machines.

Please Observe!
Guidelines on important points.

According to German notation, decimal points in this document are represented with a comma (e.g. 0,5 instead of 0.5).

Safety Regulations

These Installation and Operational Instructions (I + O) are part of the clutch delivery.
Please keep them handy and near to the clutch at all times.

It is forbidden to start use of the product until you have ensured that all applicable EU directives, directives for the machine or system into which the product has been installed have been fulfilled.
At the time these Installation and Operational Instructions go to print, the EAS®-clutches accord with the known technical specifications and are operationally safe at the time of delivery.
Without a conformity evaluation, this product is not suitable for use in areas where there is a high danger of explosion. This statement is based on the ATEX directive.

CAUTION

- ❒ If the EAS®-clutches are modified.
- ❒ If the relevant standards for safety and / or installation conditions are ignored.

User-implemented Protective Measures

- ❒ Cover all moving parts to protect against seizure, dust or foreign body impact.
- ❒ The clutches may not be put into operation without a limit switch unless *mayr*® has been contacted and has agreed otherwise.

To prevent injury or damage, only professionals and specialists should work on the devices, following the relevant standards and directives. Please read the Installation and Operational Instructions carefully before installation and initial operation of the device.

These Safety Regulations are user hints only and may not be complete!

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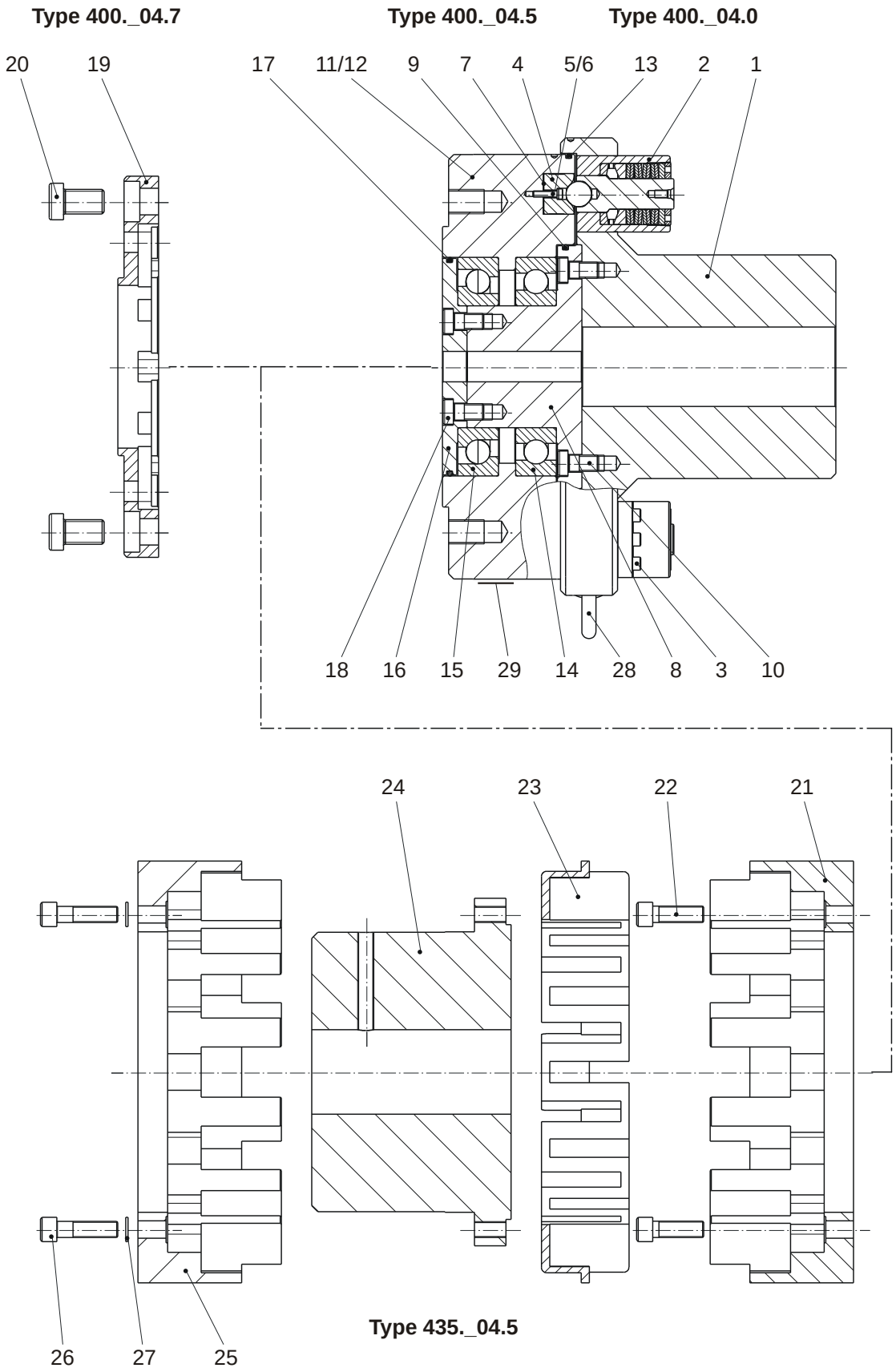

Fig. 1

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Parts List (Only use *mayr*® original parts)

Item	Name
1	Hub
2	Overload element
2.1	Screw-on bushing
2.2.1	Bolt
2.2.2	Steel ball
2.3.1	Adjusting nut
2.3.2	Set screw (Sizes 6 – 11)
2.4	Thrust washer
2.5	Control segment
2.6	Supporting washer
2.7	Cup spring
2.8	Hexagon nut
2.9	Set screw (Sizes 12 - 14)
3	Cap screw
4	Thrust piece
5	Cap screw
6	Spring ring
7	Shim rings
8	Bearing flange
9	O-ring

Item	Name
10	Cap screw
11	Pressure flange [1)] (Type 400.604.5)
12	Pressure flange [1)] (Type 435.604.5)
13	O-ring
14	Deep groove ball bearing
15	Angular ball bearing
16	Bearing cover
17	O-ring
18	Cap screw
19	Flange (cardan shaft connection)
20	Cap screw
21	Cam ring
22	Cap screw
23	Flexible intermediate ring
24	Flange hub
25	Claw ring
26	Cap screw
27	Locking ring
28	Eyebolt
29	Type tag

1) The pressure flange (11) and the pressure flange (12) differ in the pitch and pitch circle of the tapped hole. If the EAS®-clutch is to be retrofitted with a flexible coupling (Items 21-27), the pressure flange (11) must be replaced by the pressure flange (12).

Table 1: Technical Data and Screw Tightening Torques

Size	Air gap a_1 [mm]	Dimension p [mm]	Bolt-pre-tension [mm]	Max. radial forces [kN]	Max. axial forces [kN]	Screw tightening torques [Nm]						
						Item 3	Item 5	Item 10	Item 18	Item 20	Item 22	Item 26
6	2	8,0	0,5 $^{+0,2}$	30	21	9	9	13	13	72	100	100
7	2	8,0	0,5 $^{+0,2}$	45	31,5	9	9	25	25	174	100	100
8	2	8,0	0,5 $^{+0,2}$	60	42	9	9	45	45	340	160	160
9	2	10,5	0,6 $^{+0,2}$	90	63	19	9	120	120	580	240	240
10	2	10,5	0,6 $^{+0,2}$	120	84	19	9	110	110	580	240	240
11	2	10,5	0,6 $^{+0,2}$	180	126	19	9	110	110	- - -	490	490
12	3	15,5	0,6 $^{+0,2}$	240	168	76	46	160	160	- - -	- - -	- - -
13	3	15,5	0,6 $^{+0,2}$	360	252	76	46	330	330	- - -	- - -	- - -
14	3	15,5	0,6 $^{+0,2}$	480	336	76	46	330	330	- - -	- - -	- - -

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Design

The EAS®-element clutches are designed as mechanically disengaging overload clutches with overload elements (2) according to the ball-detent principle.

Function

The EAS®-clutch protects the drive line from excessively high, unpermitted torque impacts which can occur due to unintentional blockages.
After overload has taken place, the transmitting mechanism is completely disconnected. Only the bearing friction continues to have an effect.
This means that no re-engagement impacts or metallic sliding movements occur on the clutch torque transmission geometries when using this clutch variant.
When in operation, the set torque is transmitted from the hub (1) (input) via the pressure flange (11) or the flange hub (24) (flexible coupling) onto the output.
If the set limit torque is exceeded (overload), the clutch disengages.
On disengagement, the bolts (2.2.1) in the overload elements (2) perform an axial movement (stroke);
a contactless limit switch provided customer-side can be used here for recognition of overload.
The bolts (2.2.1) remain disengaged. Input and output are separated residual torque-free.
After-acting masses can run free.

CAUTION

After overload occurrence, the clutch has no load-holding function.

The run-out time after disengagement must be max. 10 minutes.

In order to prepare the clutch for renewed operation, the bolts (2.2.1) must be re-engaged manually (see section Re-engagement).

Scope of Delivery / State of Delivery

- ❑ The EAS®-clutch is manufacturer-assembled ready for installation.
- ❑ The torque is set manufacturer-side according to the customer's request (please compare the torque stipulated in the order with the torque imprinted/engraved in the identification).
  Otherwise, the clutch must be adjusted to the required torque by using the Adjustment Diagram (attachment) (see section Torque Adjustment).

Please check the scope of delivery according to the Parts List as well as the state of delivery immediately after receiving the goods.
mayr® will take no responsibility for belated complaints.
Please report transport damage immediately to the deliverer.
Please report incomplete delivery and obvious defects immediately to the manufacturer.

General Installation Guidelines

The bore tolerances in the hub (1) and in the flange hub (24) are produced to tolerance quality H7. The surface roughness depth in the bores is produced to Ra 1,6 µm.
Please secure screws with Loctite 243 (medium hard).

Please observe the screw tightening torques acc. Table 1!

CAUTION

Before initial operation of the clutch, please remove the eyebolt (28) (installation aid).

Mounting onto the Shaft

Mount the EAS®-element clutch using a suitable mounting device onto the drive shaft and secure it axially (e.g. using a washer and a screw, screwed into the shaft threaded centre hole).

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Overload Element (2) Pre-tensioning:

In order to guarantee problem-free function of the EAS®-element clutch, a defined bolt pre-tension (acc. Table 1) is necessary.
This bolt pre-tensioning has already been adjusted manufacturer-side with the exception of Type 400._04.0.

- ❑ The overload element (2) and the thrust piece (4) must align exactly with each other (Fig. 3).
- ❑ The distance dimension "a_1" acc. Table 1 must be given (Fig. 3 / air gap between the hub (1) and the pressure flange (11/12) or the customer flange, on engaged elements).
- ❑ Determine the pre-tensioning using difference dimension measurement "v" (see Figs. 2 and 3). Dimension "v" is the distance from the bolt end (2.2.1) to the facing side of the screw-on bushing (2.1).
- ❑ Pre-tension the element by placing shim rings (7) under the thrust piece (2).
- ❑ For de-installation of the thrust piece (4), please see Fig. 4.

Procedural Method:

1. De-install the overload element (2).
2. Move the bolts (Item 2.2.1) up against the control segments (2.5) by applying axial force onto the ball (2.2.2), e.g. by tapping them with a plastic hammer.
3. Using the inspection dimension "p" (see Table 1 and Fig. 2), the axial contact of the bolt (2.2.1) can be checked.
4. Measure and note the bolt excess length "v" (Fig. 2) on the de-installed overload element (2).
5. Mount the thrust piece (4) and the overload element (2) into the adaptor bores.
6. Measure the bolt excess length "v" (Fig. 3) again and compare it to the noted value. The difference dimension equals the bolt pre-tension.
7. In order to correct the pre-tension, both the overload element (2) and the thrust piece (4) must be de-installed again.
8. Now the required pre-tension acc. Table 1 can be set by adding or removing shim rings (7) under the thrust piece (4).
9. After correct pre-tension adjustment, apply a screw-securing product, e.g. Loctite 243, to the cap screws (Items 3 and 5).

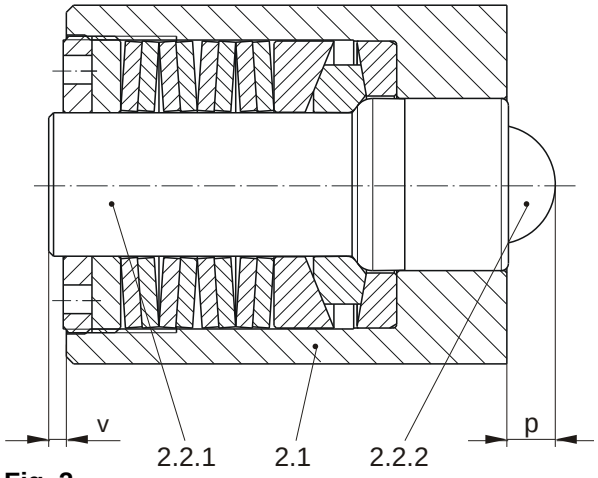

Fig. 2

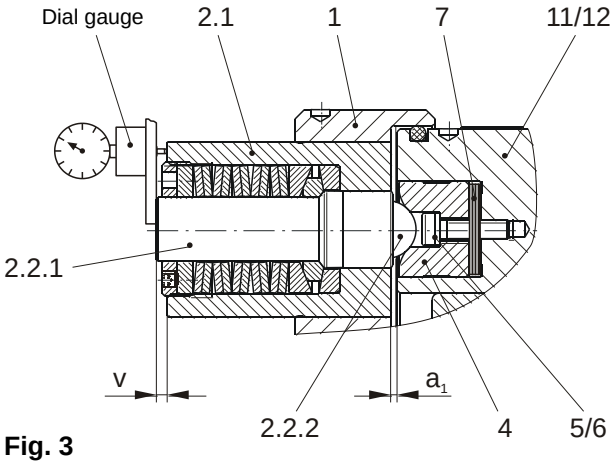

Fig. 3

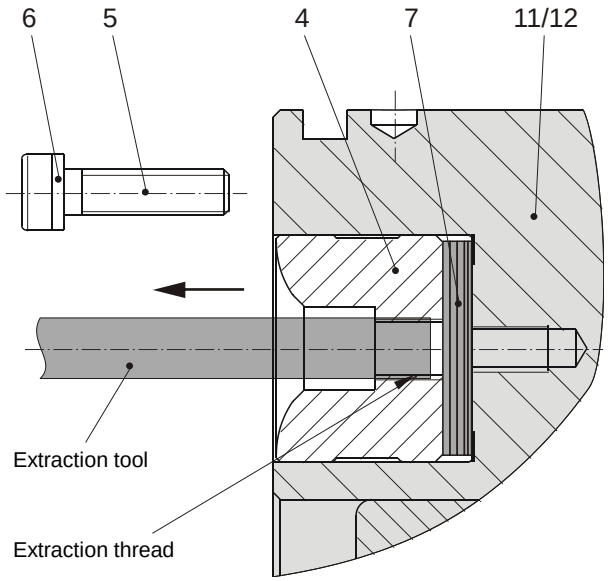

Fig. 4

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Flange Design Type 400._04.0 (Fig. 5).

The flange design consists of Items 1 – 7, 28 and 29 (see Parts List and Fig. 1). The thrust pieces (4) are installed in the output element (Fig. 5) or a flange, and greased. For greasing, please use NLGI Class 1,5 grease with a basic oil viscosity of 460 mm^2/s at 40 °C, e.g. Mobilith SHC460.
The input and the output elements must be supported on their bearings axially and radially backlash-free.
Please observe the axial forces occurring in operation!

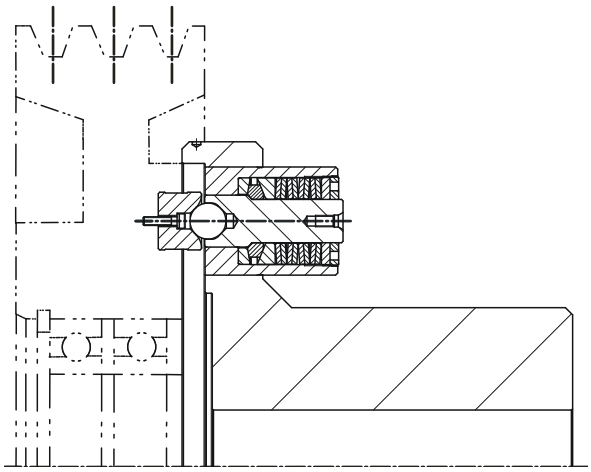

Fig. 5

Joining the Clutch Components on the Flange Design Type 400._04.0 (Input and Output Figs. 1, 5 and 6)

- ❒ The bolt (2.2.1) in the overload element (2) must be engaged.
- ❒ The bolts (2.2.1) in the overload element (Item 2 / input) and the thrust piece (Item 4 / output) must align (max. position deviation 0,1 mm).
- ❒ **The air gap "a_1" acc. Table 1 and Fig. 6 must be kept to!**
- ❒ Mark the position.

Please make sure that the defined bolt pre-tension in the overload elements (2) acc. Table 1 is kept to.

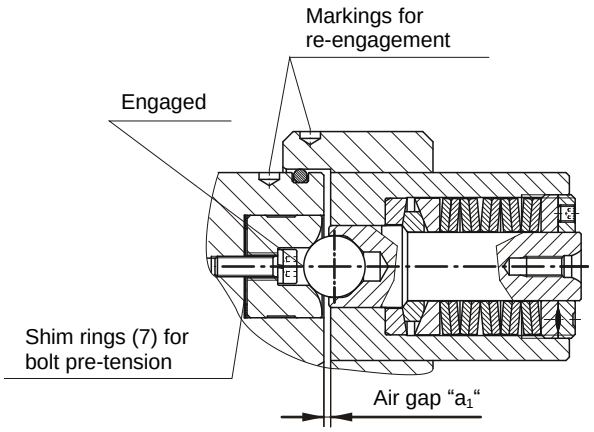

Fig. 6

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Design with Short Bearing-Supported Hub Type 400._04.5 (Figs. 1 and 7)

The design Type 400._04.5 consists of Items 1 to 11, 13 to 18, 28 and 29, see Parts List and Fig. 1.
The output element can be mounted directly onto the bearing-supported output-side pressure flange (11) of the clutch. Please find the maximum permitted forces on the flange connection in radial and axial direction in Table 1.

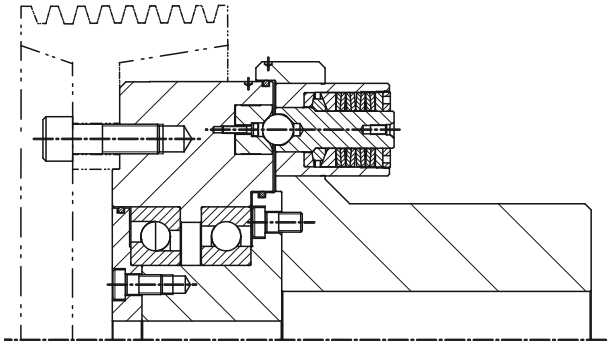

Fig. 7

Design with Cardan Shaft Connection Type 400._04.7 (Figs. 1 and 8)

The design Type 400._04.7 consists of the Items 1 to 11, 13 to 20, 28 and 29, see Parts List and Fig. 1.
The cardan shaft can be screwed to the flange (19) without an additional bearing, and then screwed to the pressure flange (11). The cardan shaft additional forces are absorbed by the clutch bearing (see Table 1).

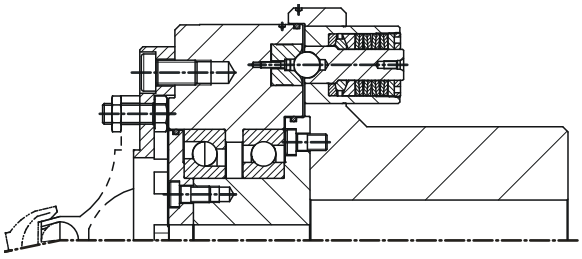

Fig. 8

EAS® Positive-Locking Design Type 435._04.5 (Figs. 1, 9 and 12)

The EAS®-element clutch, combined with a positive-locking, flexible coupling component, consists of Items 1 to 10, 12 to 18 and 21 to 29, see Parts List and Fig. 1.
The flexible coupling component (Items 21 – 27) is in simple plug-in coupling form and compensates for axial, radial and angular shaft misalignments, whereby the total sum of misalignments must not exceed 100 %.
When installing the clutch, the EAS®-clutch component and the flexible component are mounted onto the shafts (input and output) and secured axially. After this, both clutch/coupling components can be joined to dimension “s” (see Fig. 12 and Table 3, Page 10).

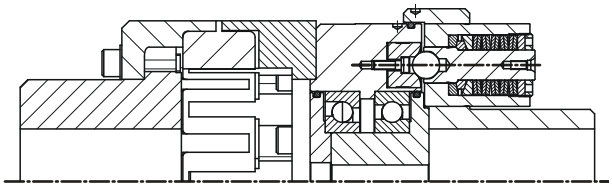

Fig. 9

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Torque Adjustment (Fig. 10)

Set the limit torque M_G for overload on the clutch by changing the cup spring pre-tension on each overload element (2) according to the Adjustment Diagram.
On the clutch Sizes 6 – 11, the adjusting nut (2.3.1) is adjusted by turning it in the overload element (2) using a face wrench. On Sizes 12 – 14, adjustment takes place via 4 set screws (2.9).

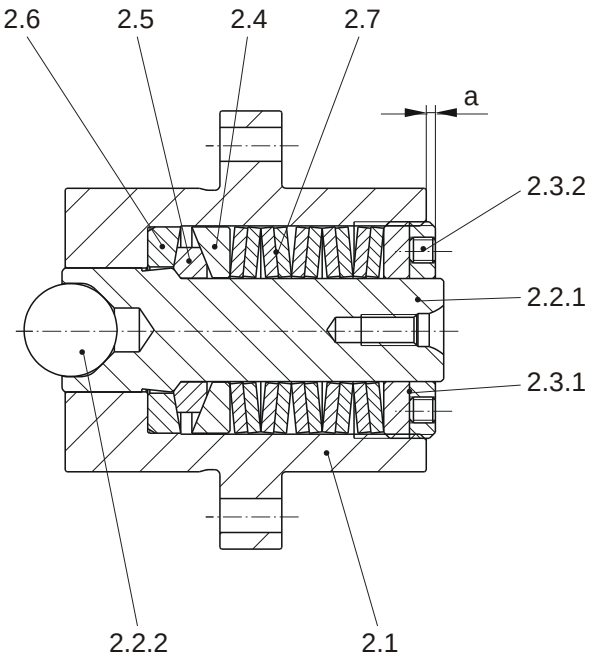
During torque adjustment, please ensure that all overload elements (2) on the clutch are evenly adjusted!

Torque Adjustment:

1. Determine the limit torque M_G for overload.
2. Please find the dimension “a” from the Adjustment Diagram included in clutch delivery.
   This dimension is equal to the required limit torque M_G.
3. Loosen the set screws (2.3.2) on Sizes 6 – 11 or the hexagon nuts (2.8) on the Sizes 12 – 14.
4. Set all overload elements (2) by turning the adjusting nut (2.3.1) or by turning the set screws (2.9) to the dimension “a” found in the Adjustment Diagram (Fig. 10).
5. Tighten the set screws (2.3.2) again in the adjusting nuts (2.3.1) or counter the set screws (2.9) with the hexagon nuts (2.8).

In order to guarantee low-wear clutch operation, it is essential that the clutch torque is set to a sufficiently high service factor (overload torque to operating torque). Our experience has shown that an adjustment factor of 1,5 to 4 gives good results. On very high load alternations, high accelerations and irregular operation, please set the adjustment factor higher.

Sizes 6 – 11



Sizes 12 – 14

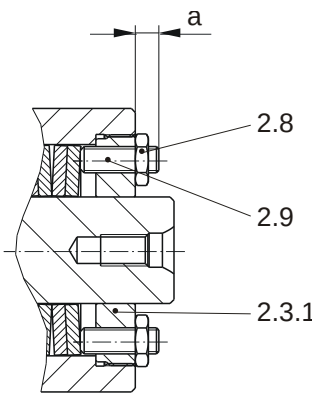


Fig. 10

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Re-engagement (Figs. 6 and 11)

In order to make the clutch ready for operation again after overload occurrence, the bolts (2.2.1) in the overload elements (2) must be re-engaged.
The marking bores on the outer diameters of the hub (1) and the pressure flange (11/12) must align with each other (Fig. 3).
Re-engagement takes place by placing axial pressure on the bolt end of each overload element (2). Tap gently all around with a plastic hammer, see Fig. 11, so that the bolts (2.2.1) are inserted evenly.
The level of engagement force is dependent on the set limit torque for overload and can be roughly calculated using the formula below.

F_E = k x M_G [kN]

k = Calculation factor [1/m] acc. Table 2

M_G = Set limit torque for overload [kNm].

$F_Ü$ = Engagement force per overload element [kN].

$$F_Ü = \frac{F_E}{n}$$

n = Number of overload elements

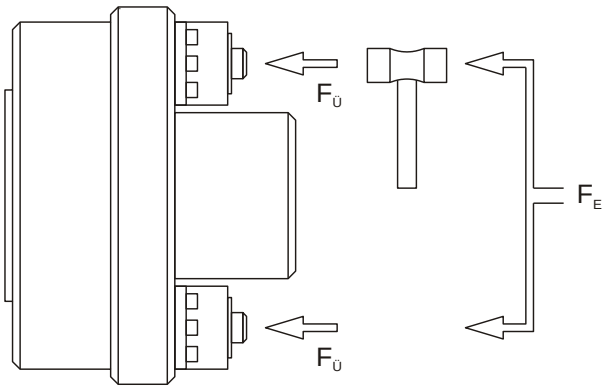

Fig. 11

Table 2: Calculation factor k

Size	Calculation factor k [1/m]
6	1,7
7	1,4
8	1,3
9	1,0
10	0,8
11	0,6
12	0,5
13	0,4
14	0,3

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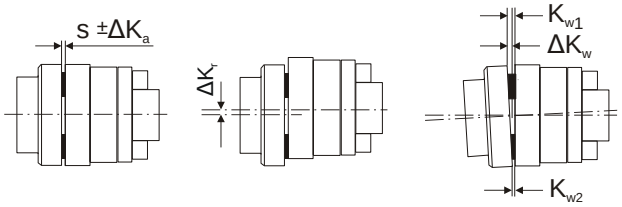
Permitted Shaft Misalignments (Figs. 12 and 13)

EAS®-positive locking Type 435._04 for compensation of axial, radial and angular shaft misalignments, Fig. 12.
Please see Table 3 for the maximum permitted shaft misalignments. If more than one kind of misalignment takes place simultaneously, they influence each other. This means that the permitted misalignment values are dependent on one another, see Fig. 13.



Difference dimension $\Delta K_w = K_{w\,1} - K_{w\,2}$
=> Measure dimensions $\Delta K_{w\,1}$ and $\Delta K_{w\,2}$ vertically and horizontally offset by 180°.

Fig. 12

Example:

EAS®-element clutch, Size 6

- Axial displacement occurrence: $\Delta K_a = 0{,}8$ mm
- Angular misalignment occurrence: $\Delta K_w = 0{,}09$ mm
- Required: Permitted radial misalignment **ΔK_r**

$\Delta K_a = 0{,}8$ mm
$\Rightarrow$ 40 % of the permitted Table value $\Delta K_{a\,zul.} = 2{,}0$ mm

$\Delta K_w = 0{,}09$ mm
$\Rightarrow$ 30 % of the permitted Table value $\Delta K_{w\,zul.} = 0{,}3$ mm

The permitted radial misalignment in % is determined from Fig. 13:
$\Rightarrow$ **ΔK_r = 30 %**
$\Rightarrow$ 30 % of the permitted Table value $\Delta K_{r\,zul.} = 0{,}3$ mm means that the permitted radial misalignment in this particular case is **0,09 mm**.

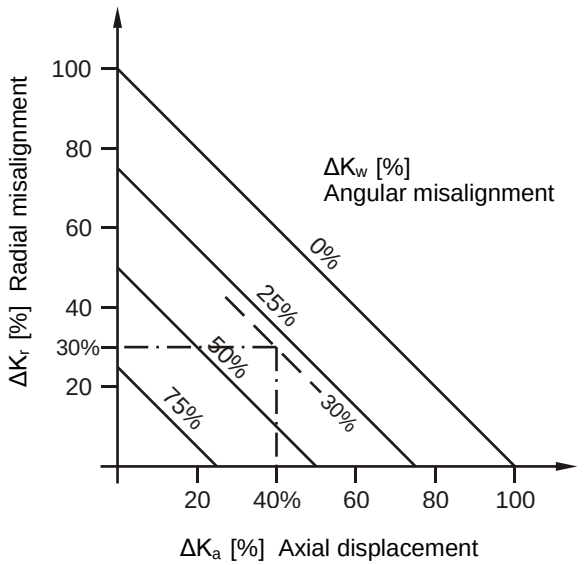


Fig. 13

Clutch Alignment

Exact alignment of the clutch minimises the compensating forces having an effect in the drive line, improves the running smoothness of the clutch and reduces the load on the shaft bearings. The clutch service lifetime and therefore also the engagement accuracy in case of overload are also increased. We recommend aligning the coupling using a suitable measuring device, e.g. a laser.

Table 3:
Max. Permitted Shaft Misalignments

The misalignment values are valid for a referential speed of 1500 rpm.

Size	s [mm]	ΔK_a [mm]	ΔK_r [mm]	ΔK_w [mm]
6	4	2	0,3	0,3
7	4	2	0,3	0,3
8	5,5	2,5	0,3	0,3
9	8	2,5	0,3	0,3
10	8	2,5	0,3	0,3
11	8	2,5	0,3	0,3
12	12	0,5	0,55	1,0
13	13	0,7	0,55	1,25
14	13	0,7	0,65	1,25

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Maintenance and Maintenance Intervals

Maintenance work, which should be carried out after 2000 operating hours, after 1000 disengagements or at the latest after 1 year, includes:

- ➔ Visual inspection
- ➔ Functional inspection
- ➔ Inspection of the shaft-hub connection
- ➔ Inspection of the screw tightening torques
  The specified tightening torques (see Technical Data, page 3) must be maintained.
- ➔ Inspection of the set torque
- ➔ Clutch release inspection
- ➔ Bearing
  or bearing pre-tension inspection
- ➔ Re-greasing of the contact components of the overload elements (2) and the thrust pieces (4) as well as the bearing.

Clutch re-greasing must only be carried out by specially trained personnel.
For greasing, please use NLGI Class 1,5 grease with a basic oil viscosity of 460 mm^2/s at 40 °C, e.g. Mobilith SHC460.
When re-installing the clutch, please secure all screws with Loctite 243 (medium hard).

If large amounts of dirt or dust are present or in extreme ambient conditions, it may well be necessary to carry out inspections at shorter intervals.
We recommend that maintenance work is carried out at the site of manufacture.

On balanced clutches, please observe:

Maintaining the exact angular position between the clutch components is absolutely necessary for maintaining the balance quality.
On balanced clutches, the components are therefore marked and are, on re-installation, to be screwed together again in the **marked angular position** to the tightening torque according to Table 1.

Disposal

Electronic components
(Limit switch):
Products which have not been disassembled can be disposed of under Code No. 160214 (mixed materials) or components under Code No. 160216, or can be disposed of by a certified disposal firm.

All steel components:
Steel scrap (Code No. 160117)

Seals, O-rings, V-seals, elastomers:
Plastic (Code No. 160119)

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