Installation and Operational Instructions for EAS®-HT clutch Type 405_._ _400 Sizes 7 – 10

(B.4050.1.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.

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 initial operation of the product until you have ensured that all applicable EU directives and 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 specialist personnel are allowed to work on the components. They must be familiar with the dimensioning, transport, installation, initial operation, maintenance and disposal according to the relevant standards and regulations.
Please read the Installation and Operational Instructions carefully prior to installation and initial operation of the device.

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

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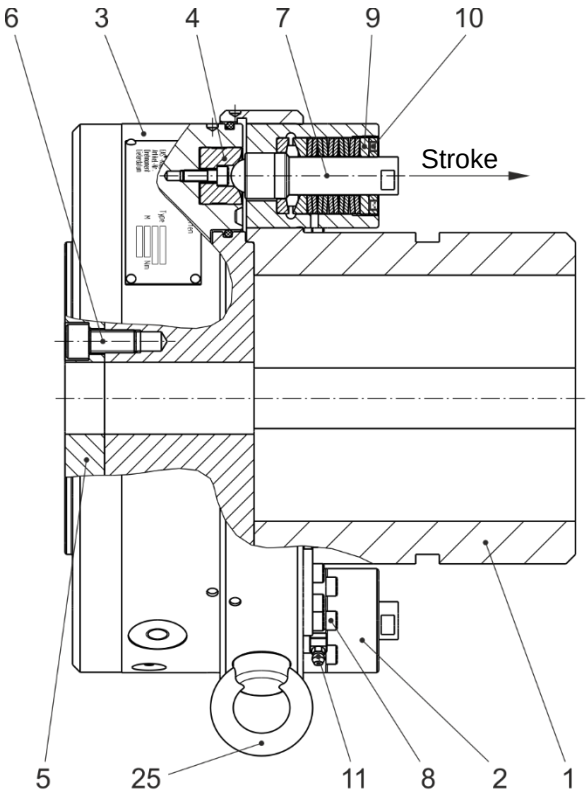

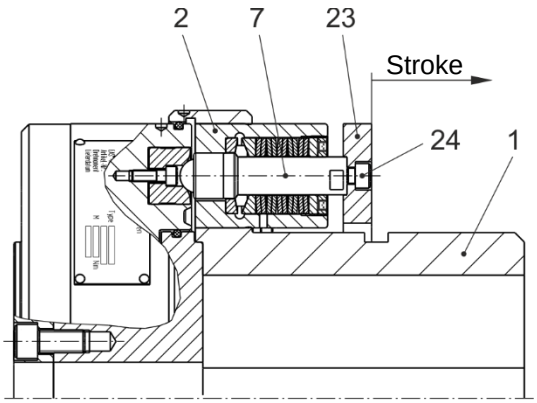

Fig. 1a: switching disk option

Fig. 1: Type 4050._ _400

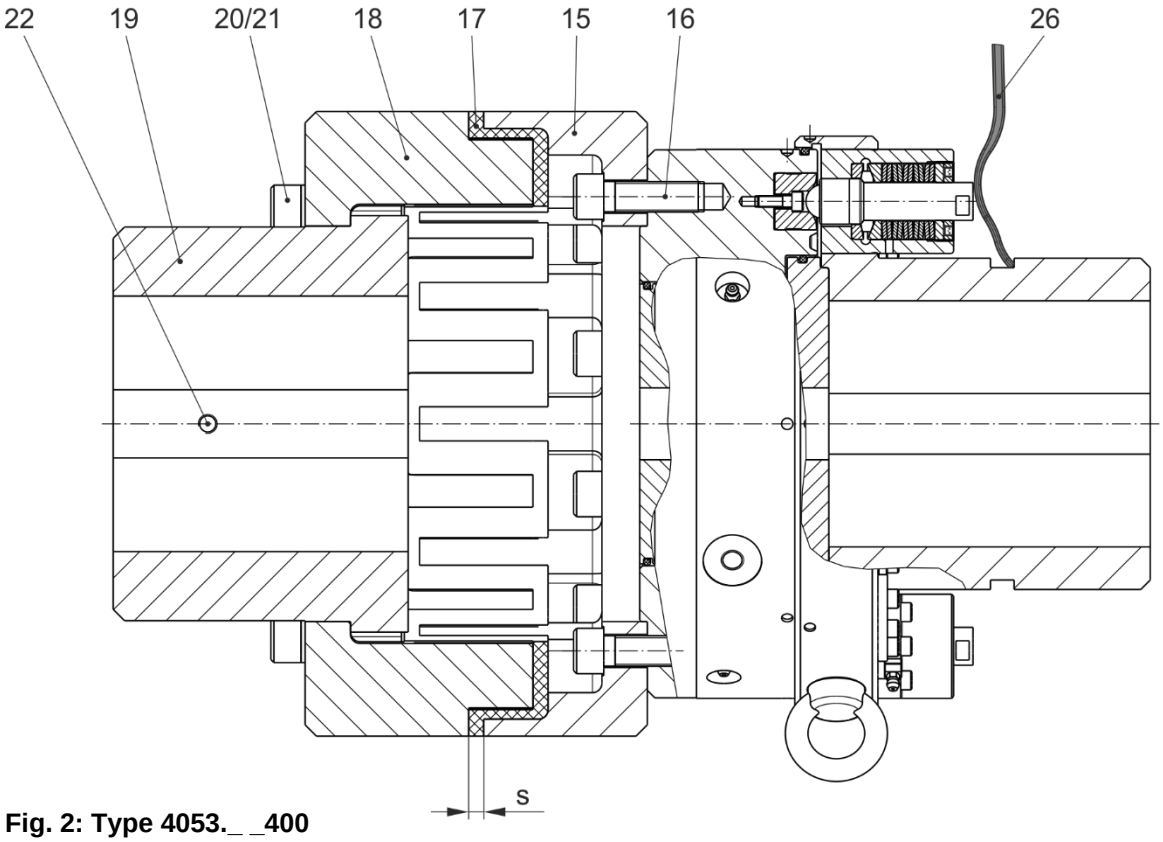

Fig. 2: Type 4053._ _400

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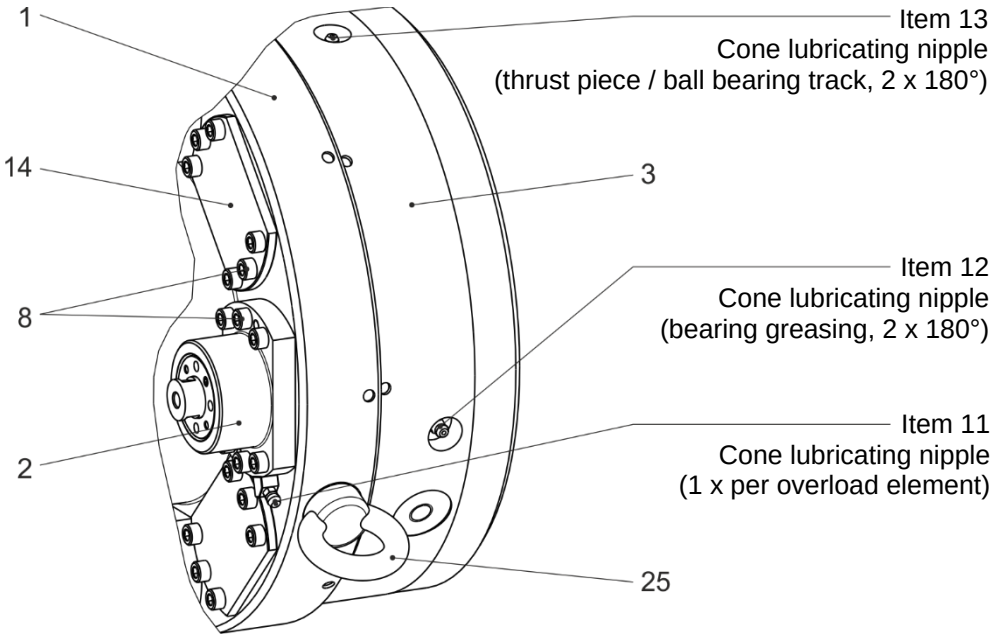

Fig. 3

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

Item	Name
1 – 14	EAS-HT
15 – 22	Flexible coupling Nor-Mex® G
23	Switching disk (option / Fig. 1a)
24	Cap screw (with switching disk option / Fig. 1a)
25	Eyebolt
26	Pry bar (not included in the standard scope of delivery)

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(B.4050.1.EN)

Design

The EAS®-HT clutch **Type 4050._ _400** is designed as a mechanically disengaging overload clutch according to the ball-detent principle.
On **Type 4053._ _400**, this clutch is combined with a plug-in elastomer compensating coupling (flexible coupling Nor-Mex® G) for connecting two shafts with shaft misalignment compensation capability.
The flexible coupling part compensates for axial, radial and angular shaft misalignments, whereby the total sum of misalignments must not exceed 100%.

The combination of the EAS®-HT clutch with other shaft couplings is possible.
In this case, please also observe the Operational Instructions included in the delivery of the shaft coupling.

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 motor shaft (input) via the hub (1) and the pressure flange (3) or the flange hub (Item 19 / flexible coupling) onto the output.
If the set limit torque is exceeded (overload), the clutch disengages.
On disengagement, the bolts (7) 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 (7) 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 (7) 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 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 (19) 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 3!

CAUTION

Before initial operation of the clutch, please remove the eyebolt (25) (installation aid).

Clutch Installation (Figs. 1 to 3)

Type 4050._ _400

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

Type 4053._ _400

1. Mount the EAS®-HT clutch using a suitable mounting device onto the drive shaft with inserted key and secure it axially (e.g. using a washer and a screw, screwed into the shaft threaded centre hole).
2. Mount the flange hub (19) incl. the claw ring (18) onto the shaft using a suitable mounting device, and secure it axially using a set screw (22).
3. Push the input and output shafts together axially and establish the positive locking of the elastomer compensating coupling.
   While doing this, please observe the distance dimension “s” and the permitted misalignment values (see Fig. 2 and Table 2, page 7).
4. When in position, screw the input and output units together.

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Overload Element (2) Pre-tensioning:

In order to guarantee problem-free function of the EAS®-HT clutch, a defined bolt pre-tension (acc. Table 3) is necessary.
This bolt pre-tensioning has already been adjusted manufacturer-side.

Alignment is only necessary in case of replacement of the elements assembly (2) and the thrust pieces (4).

- ❑ The overload element (2) and the thrust piece (4) must align exactly with each other (Fig. 10 / page 7).
- ❑ The distance dimension "a_1" acc. Table 3 must be given (Fig. 5 / air gap between the hub (1) and the pressure flange (3), on engaged elements).
- ❑ Determine the pre-tensioning using difference dimension measurement "v" (see Figs. 4 and 5). Dimension "v" is the distance from the bolt end (7) to the facing side of the overload element (2), see Fig. 3.
- ❑ Pre-tension the element by placing shim rings (P) under the thrust piece (4).
- ❑ For de-installation of the thrust piece (4), please see Fig. 6.

Procedural Method:

1. De-install the overload element (2).
2. Move the bolts (Item 7) up against the control segments (G) by applying axial force onto the ball (7a), e.g. by tapping them with a plastic hammer.
3. Using the inspection dimension "p" (see Table 3 and Fig. 4), the axial contact of the bolt (7) can be checked.
4. Measure and note the bolt excess length "v" (Fig. 4) on the de-installed overload element (2).
5. Mount the thrust piece (4) and the overload element (2) into the adaptor bores using a tightening torque of 9 Nm.
6. Measure the bolt excess length "v" (Fig. 5) 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 3 can be set by adding or removing shim rings (P) 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 Z and 8).

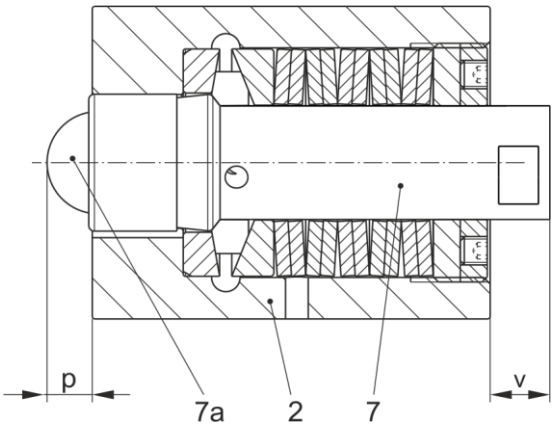

Fig. 4

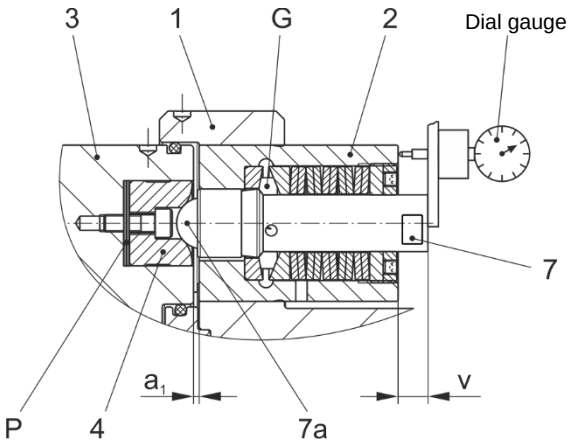

Fig. 5

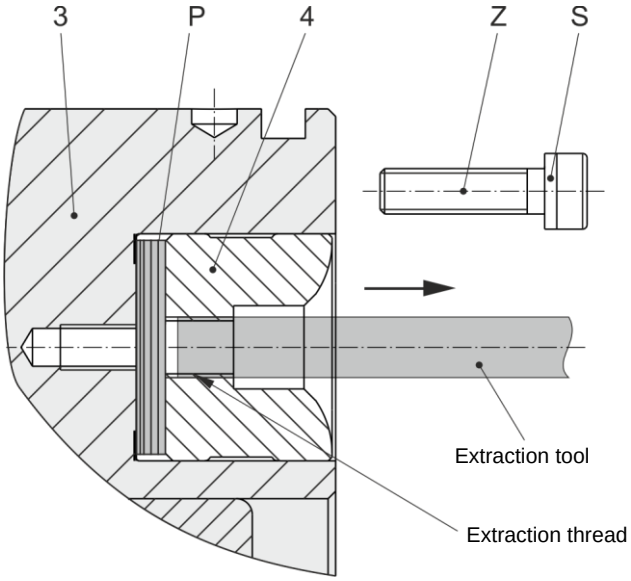

Fig. 6

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Design with Short Bearing-Supported Hub Type 4050._ _400 (Figs. 1 and 7)

The design Type 4050._ _400 consists of Items 1 to 14, see Fig. 1.
The output element can be mounted directly onto the bearing-supported output-side pressure flange (3) of the clutch. Please find the maximum permitted forces on the flange connection in radial and axial direction in Table 3.

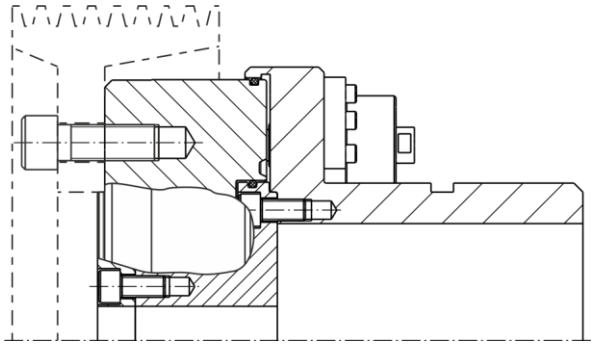

Fig. 7

EAS®-lastic Design Type 4053._ _400 (Figs. 1, 2 and 8)

The EAS®-HT clutch, combined with a positive-locking, flexible coupling component, consists of Items 1 to 22, see Figs. 1 and 2.
The flexible coupling component (Items 15 – 22) 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. 8 and Table 2, page 8).

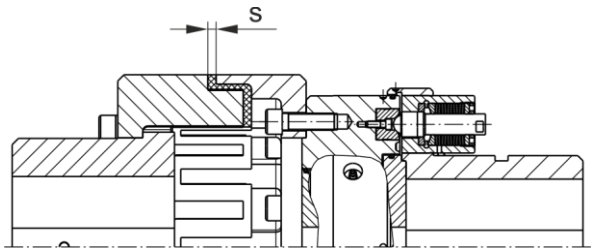

Fig. 8

Torque Adjustment (Fig. 8)

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 clutches the adjusting nut (9) is adjusted by turning it in the overload element (2) using a face wrench.

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 determine dimension “a” using the Adjustment Diagram included in the clutch delivery.
   This dimension is equal to the required limit torque M_G.
3. If necessary, unscrew the switching disk (23) and remove the cap screws (24).
4. Loosen the locking set screws (10) on the adjusting nuts (9).
5. Set all overload elements (2) by turning the adjusting nut (9) to the dimension “a” (Fig. 9) found in the Adjustment Diagram.
6. Tighten the locking set screws (10) again in the adjusting nuts (9).
7. If necessary, screw the cap screws (24) via the switching disk (23) in the bolts (7); then tighten them with a tightening torque acc. Table 3.

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.

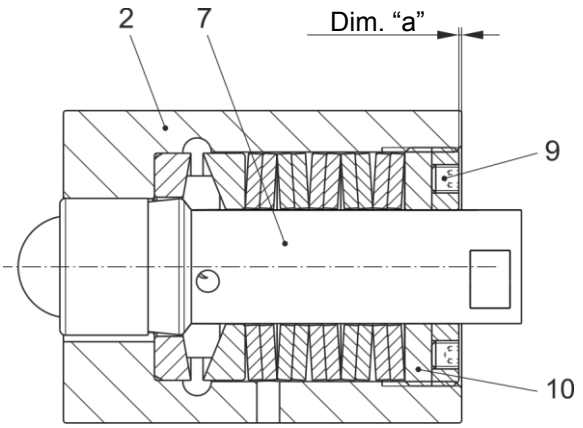

Fig. 9

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Re-engagement (Figs. 10 and 11)

In order to make the clutch ready for operation again after overload occurrence, the bolts (7) in the overload elements (2) must be re-engaged. The marking bores on the outer diameters of the hub (1) and the pressure flange (3) must align with each other (Fig. 10).
Re-engagement takes place by placing axial pressure on the bolt end of each overload element (2).
The level of engagement force is dependent on the set limit torque for overload and can be roughly calculated using the formula below.
Depending on the means available, the accessibility of the installation space etc., re-engagement can be carried out in different ways:

- ❒ Manually, using a suitable tool (e.g. pry bar or plastic hammer).
- ❒ By using an engagement mechanism. The engagement procedure can also be automated using pneumatic or hydraulic cylinders.

The level of engagement force required is dependent on the set limit torque for overload, and can be roughly calculated using the following formula:

F_E = k x M_G [kN]

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

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

Table 1: Calculation Factor k

Size	Calculation factor k [1/m]
7	1.4
8	1.3
9	1.0
10	0.8

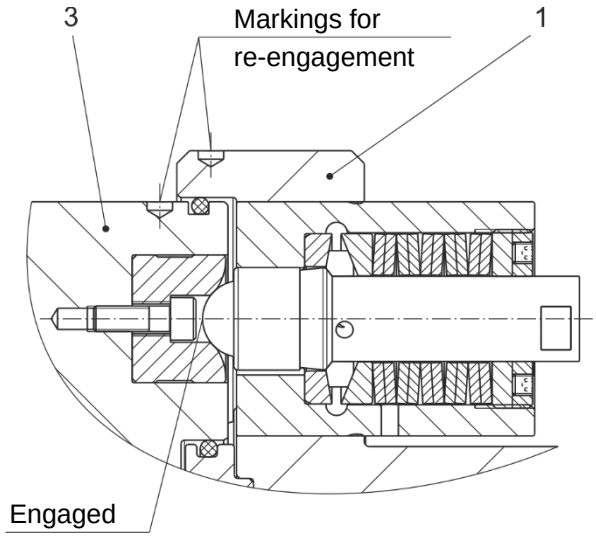

Fig. 10

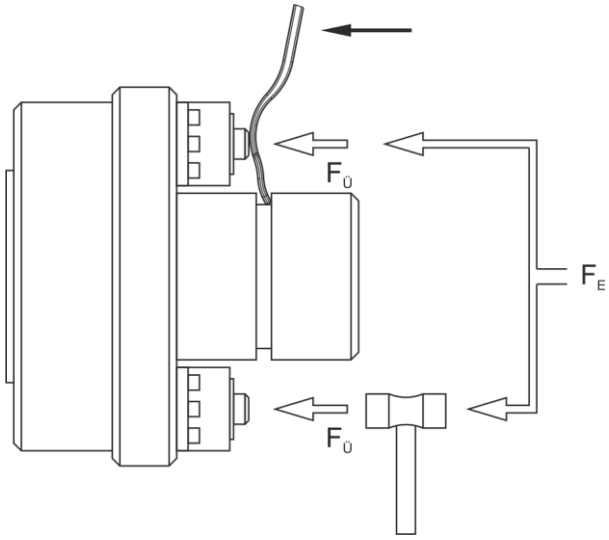

Fig. 11

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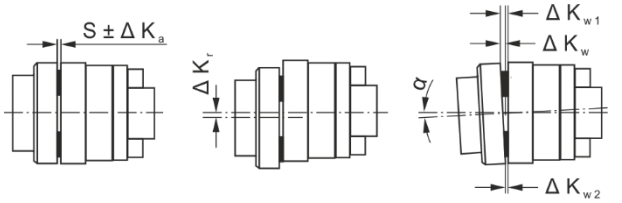
Permitted Shaft Misalignments (Figs. 12 and 13)

EAS®-lastic Type 4053._ _400 for compensation of axial, radial and angular shaft misalignments, Fig. 12.
Please see Table 2 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 $\Delta K_w = K_{w1} - K_{w2}$
=> Measure dimensions ΔK_{w1} and ΔK_{w2} vertically and horizontally offset by 180°.

Fig. 12

Example:

EAS®-HT clutch, Size 8

- Axial displacement occurrence: $\Delta K_a = 1.0$ mm
- Angular misalignment occurrence: $\Delta K_w = 0.09$ mm
- Required: Permitted radial misalignment **ΔK_r**

$\Delta K_a = 1.0$ mm
⇒ 40 % of the permitted Table value $\Delta K_{a\,zul.} = 2.5$ mm

$\Delta K_w = 0.09$ mm
⇒ 30 % of the permitted Table value $\Delta K_{w\,zul.} = 0.3$ mm

The permitted radial misalignment in % is determined from Fig. 13:
⇒ **$\Delta K_r = 30$ %**
⇒ 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**.

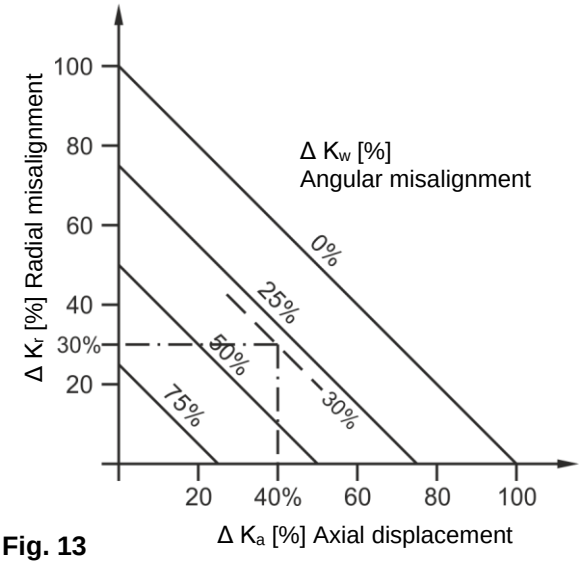


Fig. 13

Table 2:
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]
7	5.5	2.5	0.3	0.3
8	8	2.5	0.3	0.3
9	8	2.5	0.3	0.3
10	8	2.5	0.3	0.3

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 clutch using a suitable measuring device, e.g. a laser.

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Table 3: 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 6	Item 8	Item 16	Item 20	Item 24	Item Z
7	2	8.0	$0.5^{+0.2}$	22.5	16	44	9	160	160	32	9
8	2	8.0	$0.5^{+0.2}$	30	21	76	9	240	240	32	9
9	2	8.0	$0.5^{+0.2}$	45	31.5	182	9	240	240	32	9
10	2	10.5	$0.6^{+0.2}$	60	42	182	19	490	490	63	9

Maintenance and Maintenance Intervals

- ❑ Re-greasing of the overload elements (2), the bearing, the thrust pieces (4) and the ball bearing track via the cone lubricating nipples (Items 11, 12 and 13 / Fig. 3) at least every 20 overload occurrences or 1x per year, see Table 4.
- ❑ Maintenance work, which should be carried out after approx. 2000 operating hours, after 100 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 table 3) must be maintained.
  - ➔ Inspection of the set torque
  - ➔ Clutch release inspection
  - ➔ Inspection of the bearing or bearing pre-tension
  - ➔ Re-greasing of the overload elements (2) via the cone lubricating nipples (11) on each overload element (2), see Fig. 3.
  - ➔ Re-greasing of the bearings via the cone lubricating nipples (Item 12 / Fig. 3) in the pressure flange (3), 2 x 180° offset.
  - ➔ Re-greasing of the thrust pieces (4) and the ball bearing track via the cone lubricating nipples (Item 13 / Fig. 3) in the pressure flange (3), 2 x 180° offset.

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.

Table 4: Greasing

Lubrication points	Quantity
Item 11	2 ccm
Item 12	8 ccm
Item 13	10 ccm

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 3.

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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