Installation and Operational Instructions for EAS®-HSE element clutch Type 403_._04 _ _ Sizes 02, 01 and 0

(B.4030.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.

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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 impacts 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 must not be complete!

Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
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Type 4030._0400

Flange design (Basic Type)

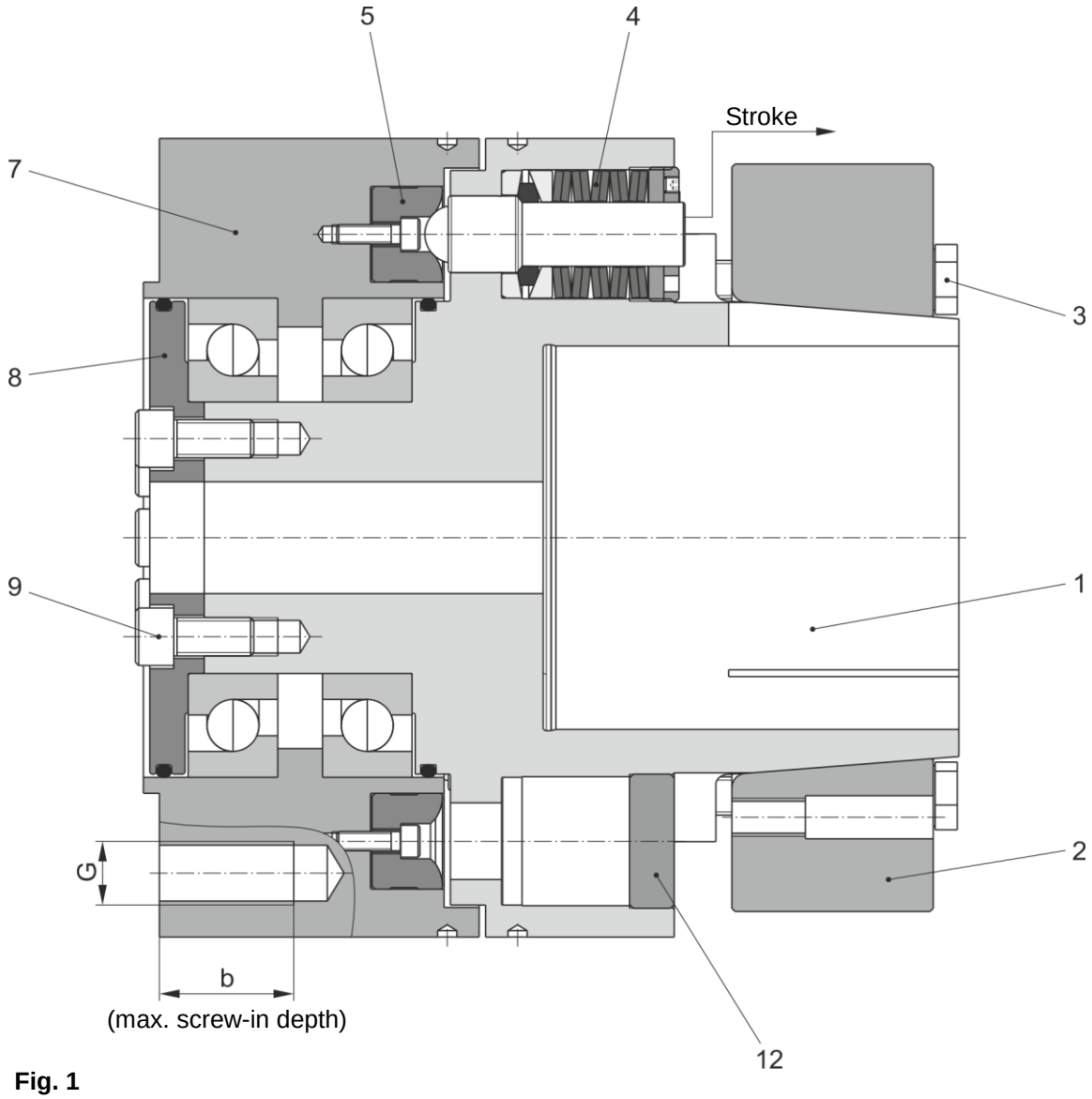

Fig. 1

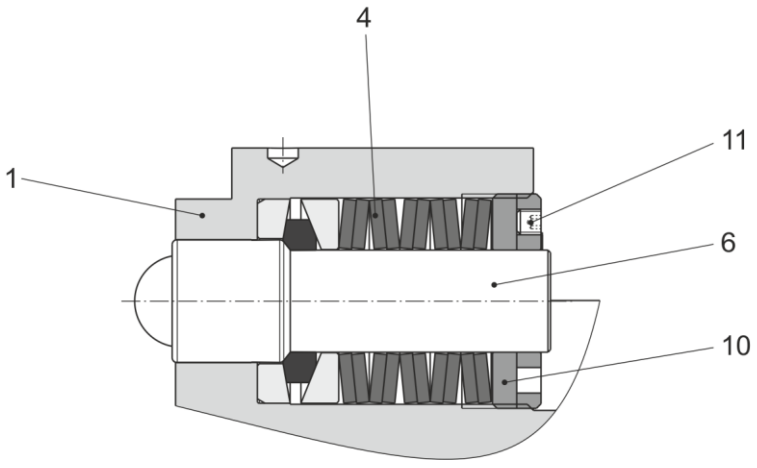

Fig. 1a

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Type 4036._04_ _

Design with ROBA-DS connection (Basic Type combined with a torsionally rigid, misalignment-flexible all-steel coupling)

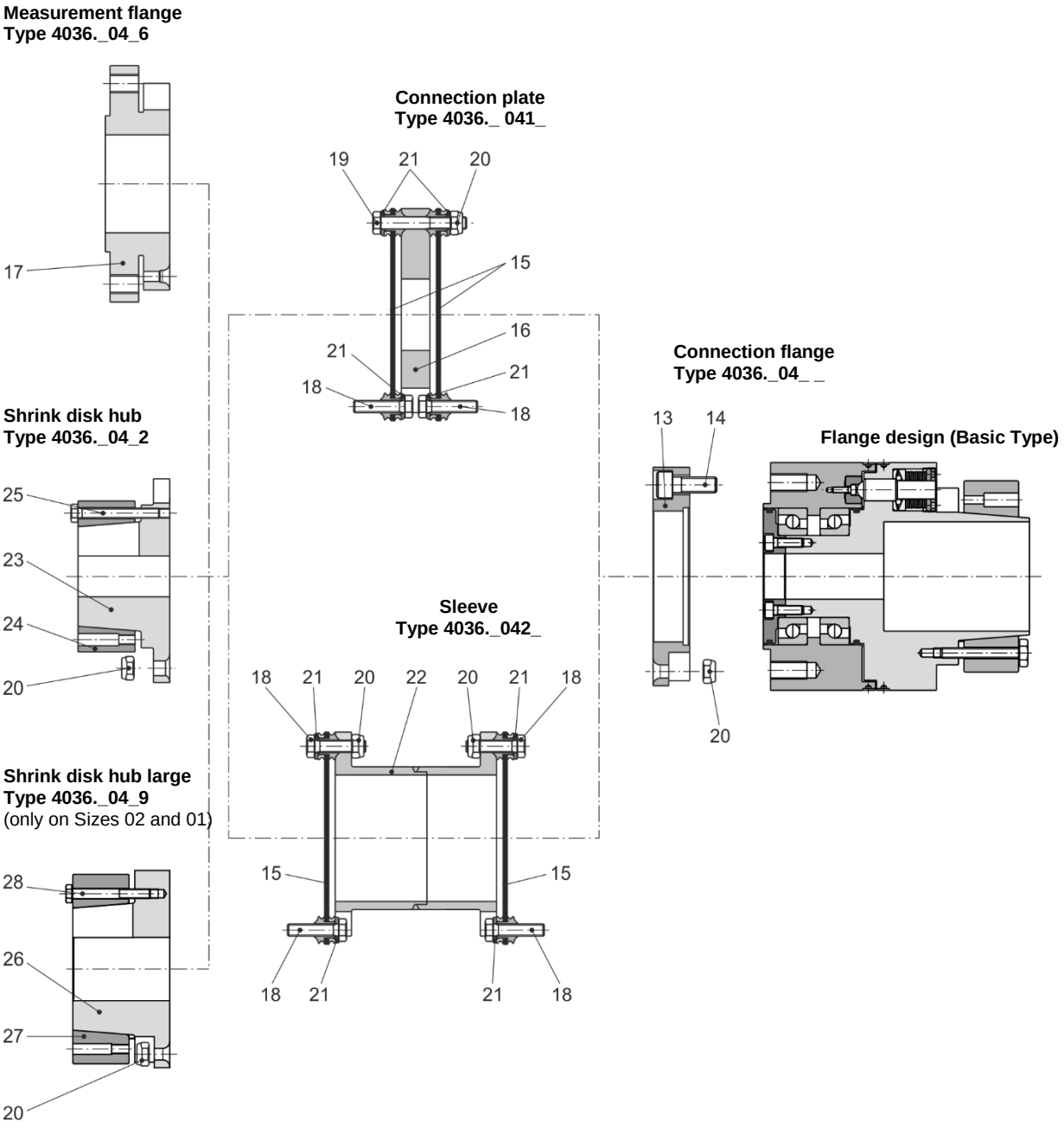

Fig. 2

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Eichenstraße 1, D-87665 Mauerstetten, Germany
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Parts List (Only use *mayr*® original parts)

Item	Name
1	Hub
2	Shrink disk
3	Hexagon head screw
4	Overload element
5	Thrust piece
6	Bolt
7	Pressure flange
8	Bearing cover
9	Cap screw
10	Adjusting nut
11	Set screw
12	Cover (if elements bore not occupied)
13	Flange
14	Cap screw
15	Disk pack
16	Connection plate
17	Flange
18	Hexagon head screw
19	Hexagon head screw
20	Hexagon nut
21	Washer
22	Sleeve
23	Shrink disk hub
24	Shrink disk
25	Hexagon head screw
26	Shrink disk hub GR (only on Sizes 02 and 01)
27	Shrink disk GR (only on Sizes 02 and 01)
28	Hexagon head screw (only on Sizes 02 and 01)

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Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
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Table 1:

Technical Data	Type	Number of overload elements		Sizes 02	01	0	
Limit torques on overload	**403_.404_ _**	**2**	[Nm]	100 – 250	325 – 650	1400 – 2800	- - -
	403_.504_ _	**4**	[Nm]	250 – 500	685 – 1250	2800 – 5600	- - -
	403_.604_ _	**6**	[Nm]	375 – 750	1000 – 2000	- - -	4200 – 8400
	403_.704_ _	**8**	[Nm]	500 – 1000	1250 – 2500	- - -	- - -
Max. speed			[rpm]	12000	10000	7000	7000
Bolt (6) stroke on overload			[mm]	2.5	4	6	6
Connection thread G in the pressure flange (Fig. 1, Item 7)				6 x 60° M10	6 x 60° M14	8 x 45° M20	8 x 45° M20
Max. screw-in depth b in the pressure flange (Fig. 1, Item 7)			[mm]	20	25	25	42
Nominal torque of the ROBA®-DS connection			[mm]	1100	2600	5800	9500
Permitted misalignments Type 4036._04_ _	**axial** [1]	**ΔK_a**	[mm]	0.4	0.5	0.45	0.5
	radial	**ΔK_r**	[mm]	0,1	0,1	0,1	0,1
	angular	**ΔK_w**	[°]	0.4	0.4	0.3	0.3
Permitted ambient temperature				+10 °C to +80 °C			

[1] Only permitted as a static or virtually static value.

Table 2:

Screw Tightening Torques		Sizes 02	01	0	
Item 3	[Nm]	36	25	93	93
Item 9	[Nm]	6	7	45	45
Item 14	[Nm]	83	143	650	650
Items 18/19/20	[Nm]	35	69	240	450
Item 25	[Nm]	10	25	56	93
Item 28	[Nm]	14	32	- - -	- - -

Table 3:

Mass Moments of Inertia and Weights [2]			Sizes 02	01	0	
EAS®-hub side	**Type 4030._04_ _**	[10^{-3} kgm²]	10.271	47.180	341.804	
EAS®-pressure flange side	**Type 4030._04_ _**	[10^{-3} kgm²]	8.081	37.321	233.775	
ROBA®-DS-side	**ROBA®-DS Size**		64	160	500	850
	Type 4036._0416	[10^{-3} kgm²]	10.223	40.896	193.757	281.625
	Type 4036._041$^{2}_{9}$	[10^{-3} kgm²]	12.024	53.899	241.013	405.591
Weights	**Type 4030._0400**	[kg]	9	22.5	69	
	Type 4036._0416	[kg]	13.5	32.5	94	100
	Type 4036._041$^{2}_{9}$	[kg]	14	85	103	116

[2] The mass moments of inertia and weights are valid for maximum bore and designs with 4 overload elements

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Eichenstraße 1, D-87665 Mauerstetten, Germany
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Installation and Operational Instructions for EAS®-HSE element clutch Type 403_._04 _ _ Sizes 02, 01 and 0

(B.4030.EN)

Design

The EAS®-HSE element clutch **Type 4030._0400** is designed as a mechanically disengaging overload clutch according to the ball detent principle.
On **Type 4036._04**_ _ , this clutch is combined with a torsionally rigid, misalignment-flexible all-steel coupling (ROBA®-DS coupling) for connecting two shafts with shaft misalignment compensation capability.
The misalignment-flexible coupling part compensates for axial, radial and angular shaft misalignments, whereby the total sum of misalignments must not exceed 100%.

Scope of Delivery / State of Delivery

- ❑ EAS®-HSE element 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).
- ❑ All screw connections are tightened to tightening torque.
- ❑ The clutch is balanced with a balance quality of G2.5 at 3000 rpm.

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.

Function

The clutch protects the drive line from excessively high, unpermitted torques 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.
In order to make the clutch ready for operation again after an overload occurrence, the clutch must be re-engaged.
When in operation, the set torque is transmitted backlash-free from the motor shaft via the EAS®-HSE element clutch and, if required, the torsionally rigid shaft coupling (ROBA®-DS) onto the output.
If the set limit torque is exceeded (overload), the clutch disengages.
On disengagement, the bolts (6) in the overload elements (4) perform an axial movement (stroke); a contactless limit switch provided customer-side can be used here for recognition of overload.
The bolts (6) 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. 2 minutes.

In order to prepare the clutch for renewed operation, the bolts (6) must be re-engaged manually (see section Re-engagement).

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General Installation Guidelines

- ❑ Recommended shaft tolerance: h6
- ❑ Shaft surface: finely turned or ground Ra = 0.8 µm
- ❑ Shaft material: Yield point min. 350 N/mm².
- ❑ The bores in the hubs (1/23/26) are produced to tolerance quality H6.
- ❑ The shafts must not have a keyway or hollow bore.
- ❑ The shafts and the hub bores must not be oiled or greased.
- ❑ Any conserving layers in the clutch bores must be removed.

Clutch Installation (Figs. 1 and 2)

1. Mount the EAS®-element clutch onto the input shaft using a suitable device and bring it into position.
2. Tighten the tensioning screws (3) of the shrink disk (2) using a torque wrench evenly and one after the other in max. 6 sequences to the torque stated in Table 2.
3. Establish the output-side connection. Tighten the tensioning screws (Items 25/28) of the shrink disk (24/27) using a torque wrench evenly and one after the other in max. 6 sequences to the torque stated in Table 2.

De-Installation of the Shrink Disks (Items 2/24/27):

1. Unscrew all hexagon head screws (Items 3/25/28) completely and screw them into the tapped extracting holes next to them up to their limits.
2. Tighten the hexagon head screws (Items 3/25/28) evenly and step-wise so that the shrink disk (Items 2/24/27) is loosened from the hub (1/23/26).

Re-engagement

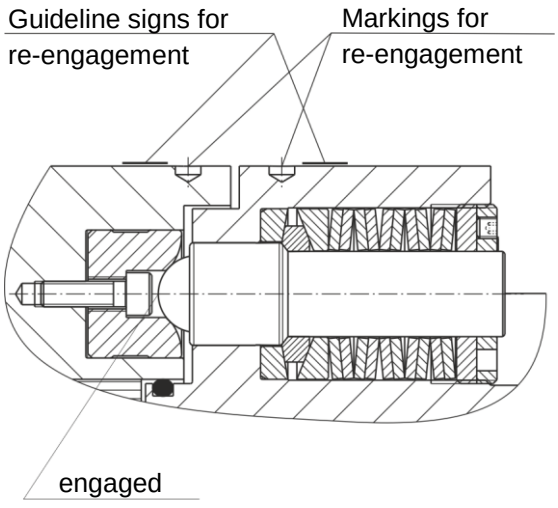

Fig. 3

In order to make the clutch ready for operation again after overload occurrence, the bolts (6) in the overload elements (4) must be re-engaged.
Both of the yellow guideline signs for regaining the synchronous position (due to balance quality) on the outer diameters of the hub (1) and the pressure flange (7) must align with each other (Fig. 3).
Re-engagement takes place by placing axial pressure onto the bolt end of each overload element (4).
Depending on the equipment available, the accessibility of the installation point etc.,
re-engagement can be carried out in the following ways:

- ❒ Manually, using a suitable tool (Fig. 4).
- ❒ By using an engagement mechanism. The engagement procedure can also be automated using pneumatic or hydraulic cylinders.

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 = 1.5 x M_G [kN]

F_E = Total engagement force of all clutch overload elements [kN].
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

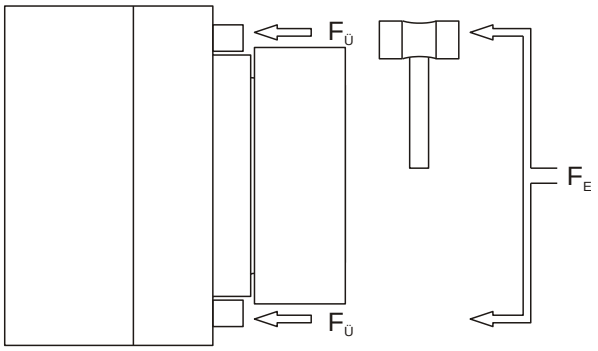

Fig. 4

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Eichenstraße 1, D-87665 Mauerstetten, Germany
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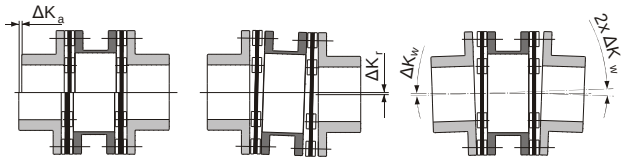
Permitted Shaft Misalignments

ROBA®-DS coupling compensates for radial, axial and angular shaft misalignments (Fig. 5) without losing its backlash-free function. However, the permitted shaft misalignments indicated in Table 1 must not simultaneously reach their maximum value. 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. 6.
The sum total of the actual misalignments in percent of the maximum value must not exceed 100 %.
The permitted misalignment values given in Table 1 refer to clutch operation at nominal torque, an ambient temperature of +30 °C.
If the clutch is operated in other or more extreme operating conditions, please contact the manufacturers.



Axial displacement | Radial misalignment | Angular misalignment

Fig. 5

Clutch Alignment

Exact alignment of the clutch improves the running smoothness of the clutch substantially, reduces the load on the shaft bearings and increases the clutch service lifetime.
We recommend alignment of the clutch using a dial gauge or special laser on drives operating at very high speeds.

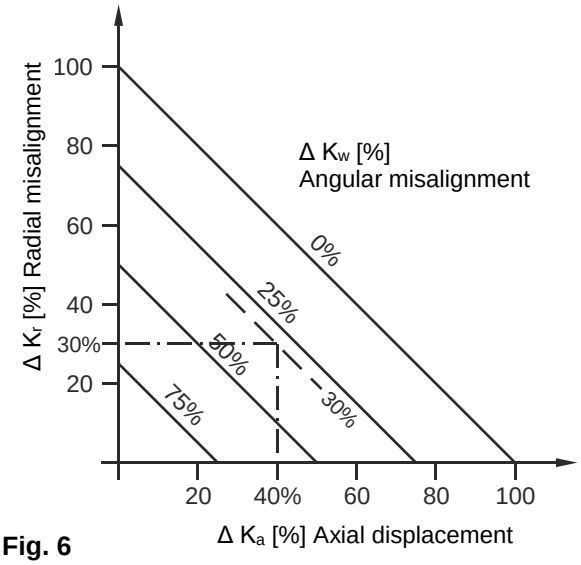


Fig. 6

Example (Size 01 / Type 4036.60416):

Axial displacement occurrence ΔK_a = 0.2 mm equals 40 % of the permitted maximum value ΔK_a = 0.5 mm.
Angular misalignment occurrence ΔK_w = 0.12° equals 30 % of the permitted maximum value ΔK_w = 0.4°.
=> permitted radial misalignment K_r = 30 % of the maximum value ΔK_r = 0.1 mm => ΔK_r = 0.03 mm

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Torque Adjustment (Figs. 1 and 7)

Set the limit torque M_G for overload on the clutch by changing the cup spring pre-tension on each overload element (4) according to the Adjustment Diagram.
On the clutches the adjusting nut (10) is adjusted by turning it in the overload element (4) using a face wrench.

During torque adjustment, please ensure that all overload elements (4) 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. Loosen the locking set screws (11) on the adjusting nuts (10).
4. Set all overload elements (4) by turning the adjusting nut (10) to the dimension “a” found in the Adjustment Diagram.
5. Tighten the locking set screws (11) again in the adjusting nuts (10).

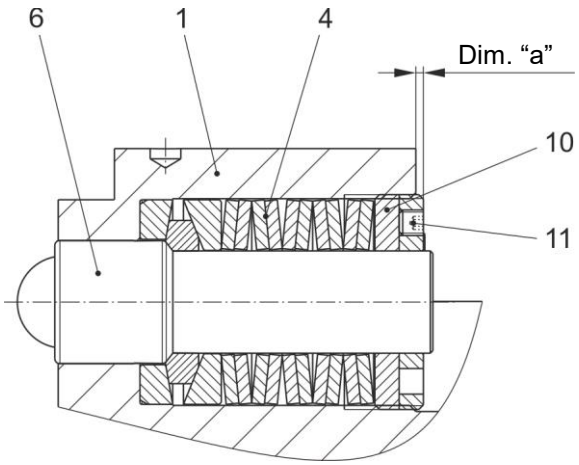

Fig. 7

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.

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 Table 2) must be maintained.
- ➔ Inspection of the set torque
- ➔ Clutch release inspection
- ➔ Inspection of the bearing or bearing pre-tension

We recommend that this maintenance work is carried out at the site of manufacture.

- ➔ Re-greasing of the contact components of the overload elements (4) and the thrust pieces (5) as well as the bearing.

Clutch re-greasing must only be carried out at the place of manufacture or by specially trained personnel.
For greasing of the contact components of the overload elements (2) and the thrust pieces (4), please use NLGI Class 1.5 grease with a basic oil viscosity of 460 mm²/s at 40 °C, e.g. Mobilith SHC460.
For bearing greasing, please use NLGI Class 2 grease with a basic oil viscosity of 100 mm²/s at 40 °C, e.g. Mobiltemp SHC100.

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 maintenance intervals.

We recommend that maintenance work is carried out at the site of manufacture.

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)

Chr. Mayr GmbH + Co. KG
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