Installation and Operational Instructions for EAS®-elements Type 44_._04.0 Sizes 02 - 2

(B.4.4.GB)

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 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®-elements 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®-elements 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.

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!

Chr. Mayr GmbH + Co. KG
Eichenstraße 1
D-87665 Mauerstetten
Germany

Tel.: 08341 / 804-0
Fax: 08341 / 804-421
http://www.mayr.de
E-Mail: info@mayr.de

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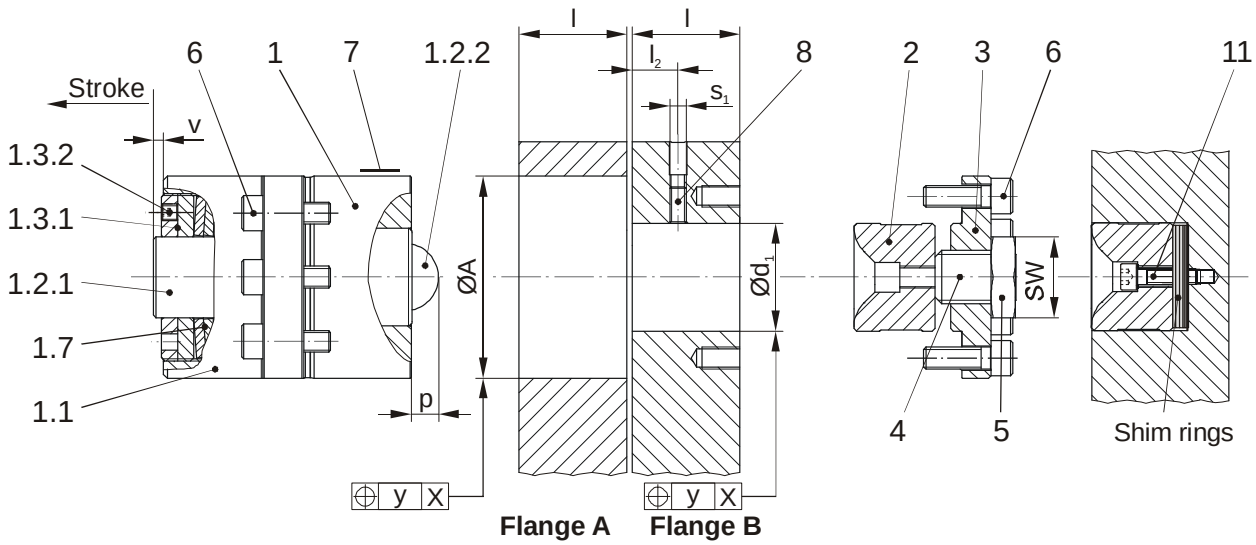

Fig. 1 (Sizes 0 – 2)
The reference letter X refers to the customer-side flange position

Fig. 1a **Fig. 1b**

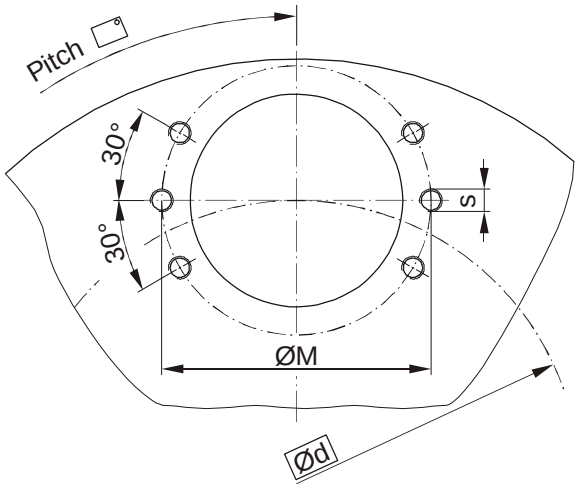

Fig. 2 (Sizes 0 – 2)

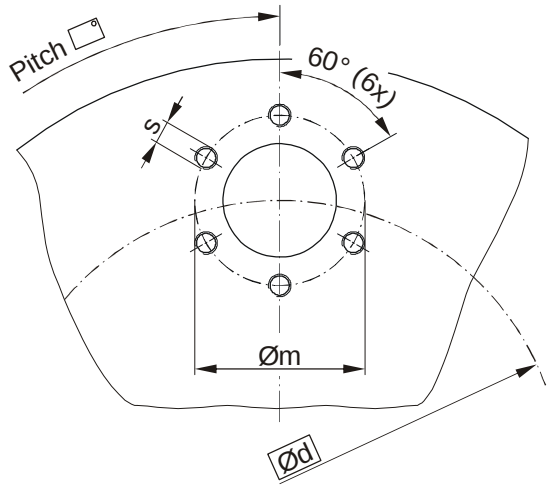

Fig. 3 (Sizes 0 – 2)

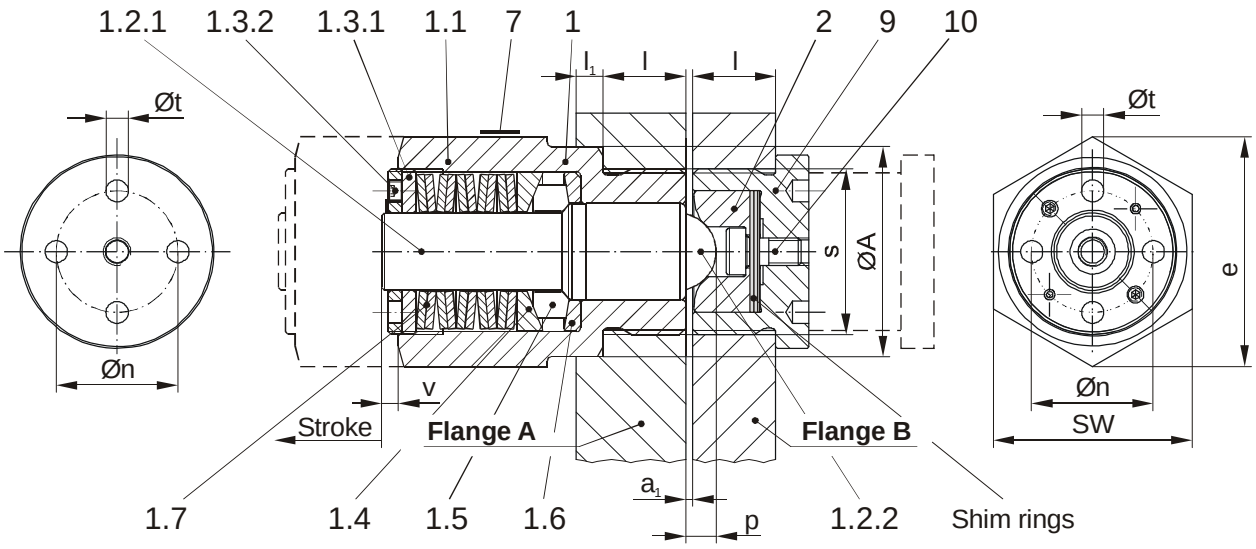

Fig. 4 (Sizes 02 – 01)

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Eichenstraße 1
D-87665 Mauerstetten
Germany

Tel.: 08341 / 804-0
Fax: 08341 / 804-421
http://www.mayr.de
E-Mail: info@mayr.de

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

Item	Name
1	EAS®-element (assembly)
1.1	Screw-on bushing
1.2.1	Bolt
1.2.2	Steel ball
1.3.1	Adjusting nut
1.3.2	Set screw (only on Sizes 02, 01, 0 and 1)
1.4	Thrust washer
1.5	Control segment
1.6	Supporting disk
1.7	Cup spring
1.8	Hexagon nut (only on Size 2 / Fig. 8, page 6)
1.9	Set screw (only on Size 2 / Fig. 8, page 6)
2	Thrust piece
3	Cover (only on Sizes 0, 1 and 2)
4	Set screw (only on Sizes 0, 1 and 2)
5	Hexagon nut (only on Sizes 0, 1 and 2)
6	Cap screw (only on Sizes 0, 1 and 2) EN ISO 4762 12.9
7	Type tag
8	Set screw (not included in delivery) (Sizes 0 – 2)
9	Adaptor bushing (only on Sizes 01 and 02)
10	Cap screw (only on Sizes 01 and 02)
11	Cap screw (Sizes 0 – 2) EN ISO 4762 12.9

Please Observe!

- ❒ Secure the cap screws (Item 6) with Loctite 243 on Sizes 0, 1 and 2
- ❒ Secure the element (Item 1), the adaptor bushing (Item 9) and the cap screws (Item 10) with Loctite 243 on Sizes 01 and 02

Design

EAS®-elements are mechanically disengaging overload elements according to the ball detent principle for installation into two flanges that are mounted axially backlash-free facing one another or for integration into existing constructions.

State of Delivery

The EAS®-element (1) is installed ready for assembly.
The other parts are included loose in the delivery.
Unless the customer requests a particular axial force setting on order, the EAS®-element remains unadjusted.
Only the adjusting nut (1.3.1) is turned up to its contact on the cup spring (1.7) (no cup spring pre-tensioning).
On Size 2, the set screws (1.9) are turned up to their contact on the cup spring (1.7) (no cup spring pre-tensioning).
Please check the state of delivery!

Function

The EAS®-element transmits circumferential forces between the input and the output flange. If the set circumferential force is exceeded (overload), the EAS®-element disengages.
Instead of securing circumferential forces, the EAS®-elements can also be used to protect drives which are moved translationally.
On disengagement, the bolt (1.2.1) in the overload element (1) carries out an axial movement (stroke) and remains disengaged.
The input and the output are separated residual torque-free.
After acting masses can run free.

CAUTION

The clutch has no load-holding function after overload.

Installation Guidelines:

- ❑ The bearings of flanges A and B must be dimensioned so that the axial forces occurring in operation are absorbed. The axial forces on the EAS®-element must be observed.
- ❑ The adaptor bores and the threaded holes for the EAS®-element are to be designed according to Figs. 1 to 4 or Tables 4 and 5.
- ❑ Please keep to the maximum permitted position deviation "y" according to Fig. 1 and Table 1.
- ❑ Before installation, please check whether the elements (1) are engaged. Please observe inspection dimension "p" according to Figs. 1 and 4 or Table 1.
  The EAS®-elements are delivered ex-works in engaged condition. However, on an uninstalled EAS®-element, the bolt (1.2.1) may move in the direction of the steel ball (1.2.2).

Chr. Mayr GmbH + Co. KG
Eichenstraße 1
D-87665 Mauerstetten
Germany

Tel.: 08341 / 804-0
Fax: 08341 / 804-421
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E-Mail: info@mayr.de

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Table 1: Technical Data, General

Size	Tightening torque [Nm] Item 1	Item 6	Item 9	Item 10	Inspection dimension "p" [mm]	Distance dimension "a_1" [mm]	Bolt-pre-tensioning [mm]	Max. permitted position deviation "y" [mm]	Weight [kg]	Stroke [mm]
02	40	–	40	1,3	3,5	1,0	$0,2^{+0,1}$	0,05	0,25	2,5
01	60	–	60	5,5	5,5	1,5	$0,2^{+0,1}$	0,05	0,60	4
0	–	9	–	–	8,0	2,0	$0,5^{+0,2}$	0,07	1,75	6
1	–	19	–	–	10,5	2,0	$0,6^{+0,2}$	0,1	4,1	8
2	–	76	–	–	15,5	3,0	$0,6^{+0,2}$	0,1	11,3	12

Table 2: Technical Data Type 440._04

Size	Circumferential force F_u Type 440.404.0 [kN]	Type 440.504.0 [kN]	Type 440.604.0 [kN]	Axial force F_{ax} Type 440.404.0 [kN]	Type 440.504.0 [kN]	Type 440.604.0 [kN]
02	0,22 – 0,54	0,50 – 1,40	1,20 – 2,50	0,20 – 0,48	0,45 – 1,26	1,08 – 2,25
01	1,00 – 2,00	1,25 – 2,50	2,50 – 5,00	0,90 – 1,80	1,12 – 2,25	2,25 – 4,50
0	1,80 – 5,00	3,75 – 7,50	7,50 – 15,0	1,62 – 4,50	3,37 – 6,75	6,75 – 13,5
1	5,00 – 10,0	7,50 – 15,0	15,0 – 30,0	4,50 – 9,00	6,75 – 13,5	13,5 – 27,0
2	4,00 – 11,0	10,0 – 30,0	30,0 – 60,0	3,60 – 9,90	9,00 – 27,0	27,0 – 54,0

Table 3: Technical Data Type 441.604

Size	Circumferential force F_u [kN]	Axial force F_{ax} [kN]
0	19 – 38	10 – 20
1	38 – 75	20 – 40
2	75 – 150	40 – 80

Table 4: Dimensions

Size	Ø A^{H8} with surface Ra = 1,6 [mm]	Ø d_1^{H8} [mm]	e [mm]
02	–	–	31,2
01	–	–	41,6
0	55	30	–
1	75	40	–
2	100	60	–

Table 5: Dimensions

Size	l [mm]	l_1 min. [mm]	l_2 min. [mm]	Ø M [mm]	Ø m [mm]	Ø n [mm]	s [mm]	s_1 [mm]	SW [mm]	Ø t [mm]	v [mm]
02	12	$6_{-0,5}$	–	–	–	17	M24x1	–	27	3	2
01	15	$9_{-0,5}$	–	–	–	22	M30x1,5	–	36	4	3
0	30	–	12	72	44	–	M6	M5	19	–	3
1	40	–	17	95	60	–	M8	M6	30	–	4
2	50	–	22	128	80	–	M12	M8	36	–	15

Chr. Mayr GmbH + Co. KG
Eichenstraße 1
D-87665 Mauerstetten
Germany

Tel.: 08341 / 804-0
Fax: 08341 / 804-421
http://www.mayr.de
E-Mail: info@mayr.de

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Installation (Variant 1)

1. Install the EAS®-element (1) into flange A, keeping to the tightening torques acc. Table 1.
2. Grease the thrust piece (2) or adaptor bushing (9) well, (please use NLGI grease class 2 with a basis oil viscosity of 220 mm^2/s at 40 °C, e.g. Mobilgrease HP222) and push it or screw it into flange B.
   The set screw (8) must be removed.
3. Screw on the cover (3). The set screw (4) must be removed. Please keep to the tightening torque of the fixing screws (6) acc. Table 1.
4. Adjust the suitable bolt pre-tensioning for the EAS®-element (1).

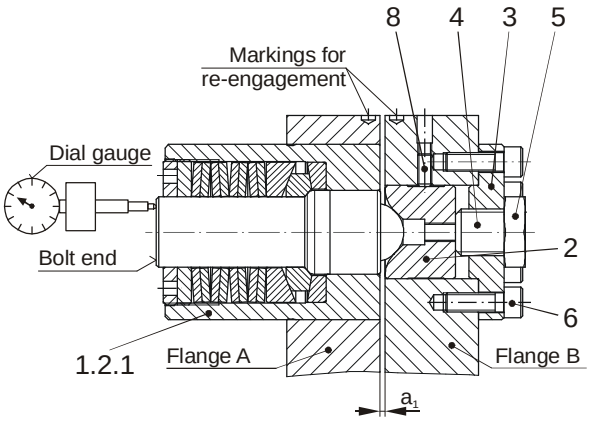

Fig. 5

EAS®-element Pre-tensioning

A defined bolt pre-tensioning (acc. Table 1) is necessary for correct EAS®-element function.

- ❑ The EAS®-elements (1) and the thrust piece (2) or adaptor bushing (9) must be aligned exactly (Fig. 5).
- ❑ Keep to the distance dimension "a_1" (the air gap between flange B and flange A on engaged elements) acc. Table 1.
- ❑ Apply the dial gauge to the bolt end (not centrically due to the centring bore) and set to zero.
- ❑ Pre-tension the element on Sizes 0, 1 and 2 by axially moving the thrust piece (2), which means by tightening the set screws (Item 4 / Fig. 5).

  As an alternative to bolt pre-tensioning via the set screw (4), pre-tensioning can be carried out by placing shim rings under the thrust piece (2) (see Fig. 1b / page 2). This method of bolt pre-tensioning should be used in operations subject to impacts and vibrations.
- ❑ On Sizes 02 and 01, pre-tensioning must be carried out by inserting shim rings between the adaptor bushings (9) and the thrust piece (2). For correct pre-tensioning, please see Table 1. The pre-tensioning can be checked using the dial gauge.

Procedure:

1. Pre-tension the bolts (1.2.1) until the dial gauge deflects.
2. Decrease the tension on the bolts (1.2.1) again, until the dial gauge no longer deflects (thereby marking the zero point).
3. Set the dial gauge to zero and set the pre-tension according to Table 1.
4. Counter the set screw (4) with the hexagon nut (5).
5. Secure the thrust piece (2) with the set screw (8).
6. Note the set distance dimension "a_1" for later inspections. This dimension serves to check the correct position of flanges A and B.
7. Mark flanges A and B when the EAS®-elements are engaged, see Fig. 5. These markings assist in finding the correct angular position for re-engagement after overload.
   On re-engagement, the EAS®-elements (1) and the thrust piece (2) must align exactly.

Chr. Mayr GmbH + Co. KG
Eichenstraße 1
D-87665 Mauerstetten
Germany

Tel.: 08341 / 804-0
Fax: 08341 / 804-421
http://www.mayr.de
E-Mail: info@mayr.de

Installation (Variant 2)

1. Install the EAS®-element (1) into flange A, keeping to the tightening torques acc. Table 1.
2. Grease the thrust piece (2) well, (please use NLGI grease class 2 with a basis oil viscosity of 220 mm^2/s at 40 °C, e.g. Mobilgrease HP222) and push it or screw it into flange B.
3. Adjust the suitable bolt pre-tensioning for the EAS®-element (1).

EAS®-element Pre-tensioning:

A defined bolt pre-tensioning (acc. Table 1) is necessary for correct EAS®-element function.

- ❑ The EAS®-element (1) and the thrust piece (2) must align exactly (Fig. 6).
- ❑ Keep to the distance dimension "a_1" (the air gap between flange B and flange A on engaged elements) acc. Table 1.
- ❑ Determine the pre-tensioning using difference dimension measurement "v" (see Fig. 6, distance between the bolt end and the screw-on bushing).
- ❑ Pre-tension the element by placing shim rings under the thrust piece (2).

Procedure:

1. Move the bolts (Item 1.2.1) up against the control segments (1.5) by applying axial force onto the ball (1.2.2), e.g. by tapping them with a plastic hammer.
2. Using the inspection dimension "p" (see Table 1 and Fig. 1), the axial contact of the bolt (1.2.1) can be checked.
3. Measure and note the bolt excess length "v" (Figs. 1 and 6) on the de-installed EAS®-element (1).
4. Mount the thrust piece (2) and the EAS®-element (1) into the adaptor bores.
5. Measure the bolt excess length "v" again and compare it to the noted value. The difference dimension equals the bolt pre-tension.
6. In order to correct the pre-tension, both the EAS®-element (1) and the thrust piece (2) must be de-installed again.
7. Now the required pre-tension acc. Table 1 can be set by adding or removing shim rings under the thrust piece (2).
8. After correct pre-tension adjustment, apply screw securing lacquer, e.g. Loctite 243, to the cap screws (Items 11 and 6).
9. Please note the set distance dimension "a_1" for later inspections. This dimension serves to check the correct position of flanges A and B.
10. Mark flanges A and B when the EAS®-elements (1) are engaged, see Fig. 6. These markings serve to find the correct angular position for re-engagement after overload occurrence. On re-engagement, the EAS®-elements (1) and the thrust piece (2) must align exactly.

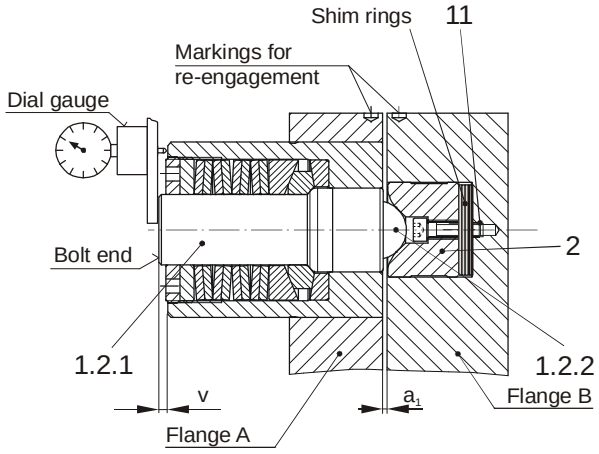

Fig. 6

Thrust Piece Removal:

In order to add shim rings, the thrust piece must be removed using a removal tool after the cap screw (11) has been screwed out (Fig. 7).

Cap screw ISO 4762 –12.9

EAS®-element	Removal thread	Cap screw	Tightening torque
Size 02	M4	M3x8	2 Nm
Size 01	M6	M5x10	8 Nm
Size 0	M8	M6x18	14 Nm
Size 1	M8	M6x25	14 Nm
Size 2	M12	M10x30	70 Nm

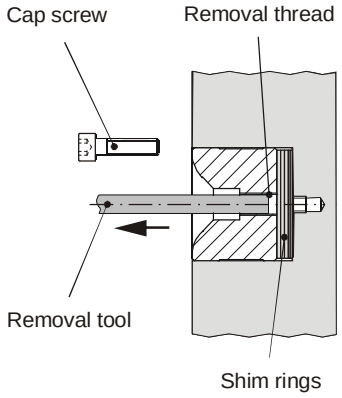

Fig. 7

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Eichenstraße 1
D-87665 Mauerstetten
Germany

Tel.: 08341 / 804-0
Fax: 08341 / 804-421
http://www.mayr.de
E-Mail: info@mayr.de

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Re-engagement

On overload, the EAS®-elements disengage and remain disengaged. The flanges A and B turn against each other. In order to re-engage, both flanges A and B are turned to each other to the correct angular position, until the EAS®-element (1) and the thrust piece (2) or adaptor bushing (Item 9 / Fig. 4) align exactly (refer to the markings on the outside diameter of flanges A and B, Fig. 5).
The EAS®-elements are re-engaged by applying pressure to the bolt end, (axial force F_E) (Fig. 8). The clutch is operationally ready when all of the clutch EAS®-elements are re-engaged.
The engagement force F_E measurement is dependent upon the set peripheral force F_U and can be roughly calculated using the formula below.

$F_E = 0{,}12 \times F_U$ [kN] for element Type 440._04.0

$F_E = 0{,}08 \times F_U$ [kN] for element Type 441.604.0

F_E = Engagement force per overload element in [kN]
F_U = Set circumferential force in [kN]

The engagement procedure can also be automated or remote-controlled using mechanical, pneumatic or hydraulic aids.

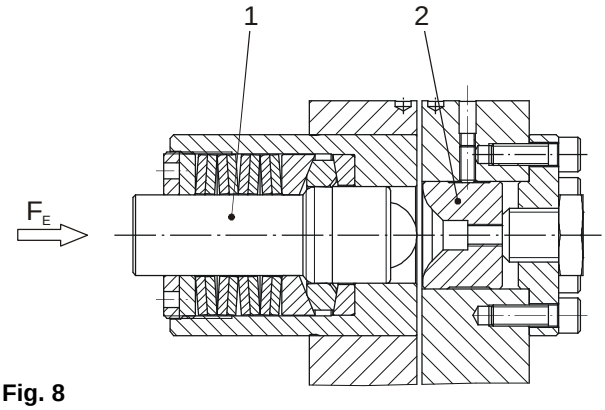

Fig. 8

Torque Adjustment (Figs. 9 and 10)

To adjust the limit torque M_G for clutch overload, alter the cup spring pre-tension on every EAS®-element.
On the elements Size 02 – 1 (Fig. 9), the adjusting nut is turned for adjustment using a face wrench. For Size 2 (Fig. 10), only 4 set screws (1.9) are used for adjustment.

When adjusting the torque, please make certain that all EAS®-elements on the clutch are evenly adjusted.

The EAS®-elements are set to a particular circumferential force F_U which is proportional to the limit torque M_G for the clutch overload.

The circumferential force F_U is calculated from:

$$F_U = \frac{2 \times M_G}{z \times d}$$

F_U = Circumferential force per element [kN]
M_G = Limit torque for overload [kNm]
z = Number of installed elements [-]
d = Pitch circle diameter onto which the elements are mounted [m] (see Figs. 2 and 3)

Torque Adjustment:

1. Set the limit torque M_G for overload.
2. Calculate the circumferential force F_U.
3. Determine the dimension "a", which fits to the calculated circumferential force F_U from the adjustment diagram supplied.
4. Loosen the securing set screw (1.3.2 for Sizes 02 - 1) or the counter nuts (1.8 for Size 2).
5. Adjust all the EAS®-elements by turning the adjusting nut (1.3.1) (for size 2 via set screws (1.9)) to this dimension "a".
6. Tighten the securing set screws (1.3.2) or counter the set screws (1.9) with hexagon nuts (1.8).

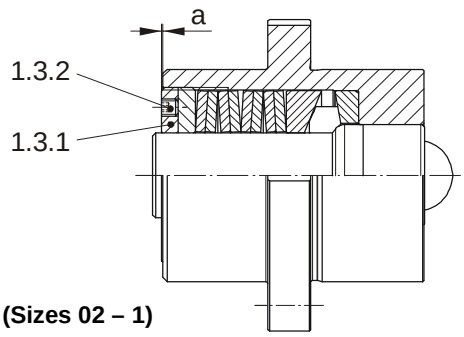

Fig. 9 (Sizes 02 – 1)

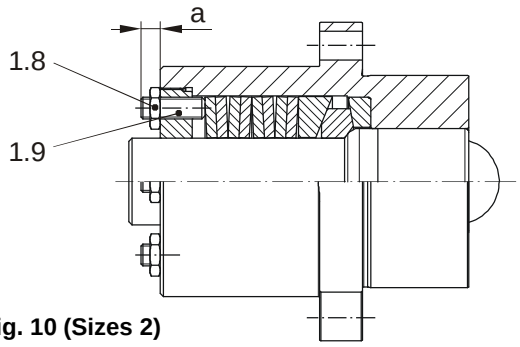

Fig. 10 (Sizes 2)

Chr. Mayr GmbH + Co. KG
Eichenstraße 1
D-87665 Mauerstetten
Germany

Tel.: 08341 / 804-0
Fax: 08341 / 804-421
http://www.mayr.de
E-Mail: info@mayr.de

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Operational Behaviour

In order to guarantee low-wear clutch operation, it is essential to adjust the torque 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.
For very high load changes, high accelerations and uneven operation, please set the adjustment factor higher
In operation which is subject to impacts and vibrations, bolt pre-tensioning should be carried out by aligning the thrust piece via shim rings, as shown in Fig. 1b on page 2.

Maintenance

The EAS®-elements are completely enclosed, have an initial grease filling and are therefore mainly maintenance-free. Maintenance work on the clutch is reduced to the following:

- ❑ After the first 20 disengagements, please check the circumferential backlash on the clutch and the original setting of the distance dimension "a_1" (Fig. 4, Table 1), and, if necessary, readjust the bolt pre-tension.
- ❑ Re-grease contact components and thrust pieces (2).

For greasing, please use NLGI class 2 grease with a basis oil viscosity of 220 mm^2/s at 40 °C, e.g. Mobilgrease HP222.

These checks and the re-greasing of contact components and thrust pieces (2) are also necessary later during routine inspections.

Inspection Intervals:

For EAS®-element Type 440._04.0 approx. 1 year or after each 1000 disengagements.

For EAS®-element Type 441.604.0 approx. 1 year or after each 100 disengagements.

Should the distance dimension "a_1" show an unusually large increase the axial bearing on both of the clutch flanges must be checked.

Size 02	at 0,1 mm
Size 01	at 0,1 mm
Size 0	at 0,3 mm
Size 1	at 0,4 mm
Size 2	at 0,4 mm

Disposal

Electronic Components (Limit switch):
Products which have not been dismantled can be disposed of under the 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)

Chr. Mayr GmbH + Co. KG
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