

Installation and Operational Instructions for EAS®-Sp clutch Type 45..1 .. Sizes 01 to 5

(B.4.12.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:

- Page 1:** - Contents
- Safety and Guideline Signs
- Safety Regulations
- Page 2:** - Clutch Illustrations
- Page 3:** - Parts List
- Technical Data
- Page 4:** - Design
- Scope of Delivery / State of Delivery
- Function
- Drive Element Installation
- Page 5:** - Mounting onto the Shaft
- De-Installation of the Cone Bushing
- Removing the Clutch
- Friction Support Installation
- Page 6:** - Permitted Shaft Misalignments
- Clutch Alignment
- Page 7:** - Torque Adjustment
- Torque Curves Static
- Page 8:** - Pneumatic Control
- Compressed Air Characteristics
- Control Examples / Switching Examples
- Page 9:** - Electrical Connection of the Proximity Switch
- Maintenance and Maintenance Intervals
- Disposal

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 must not be complete!

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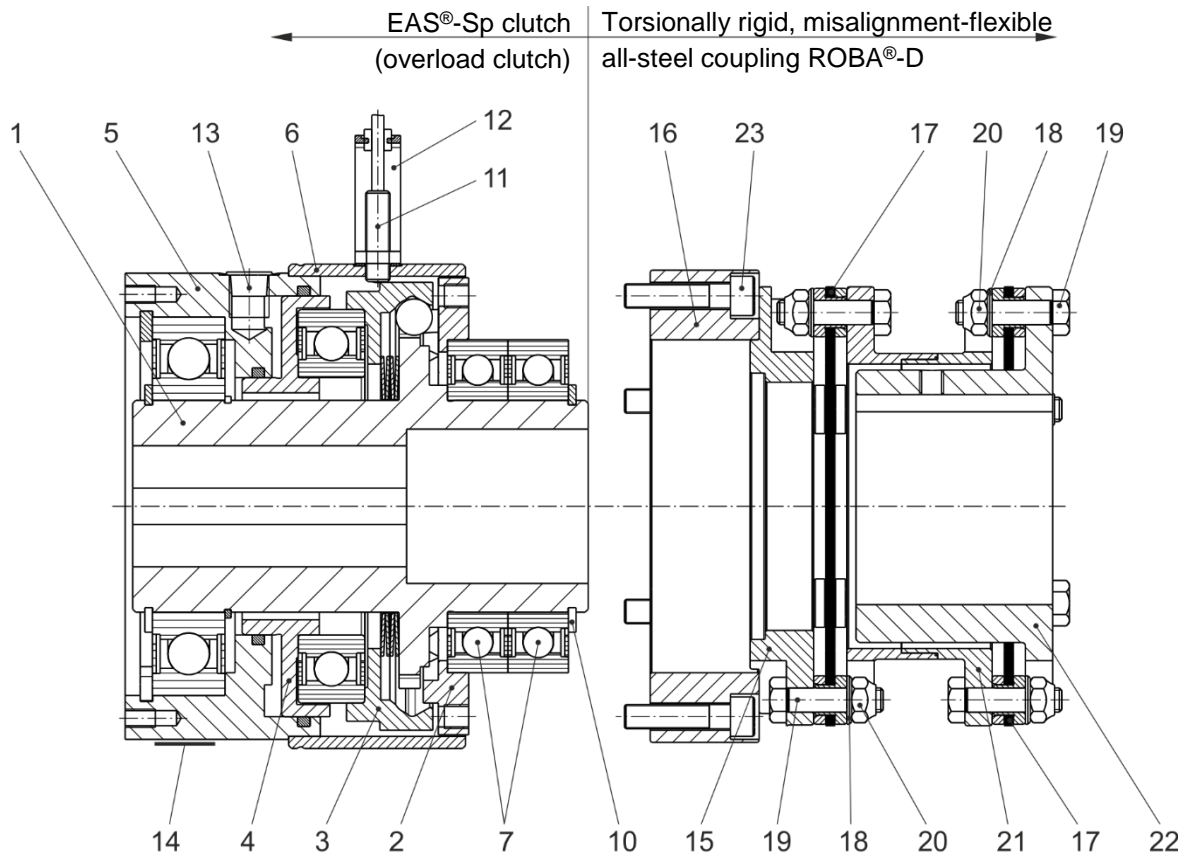


Fig. 1: Type 45_12_._.

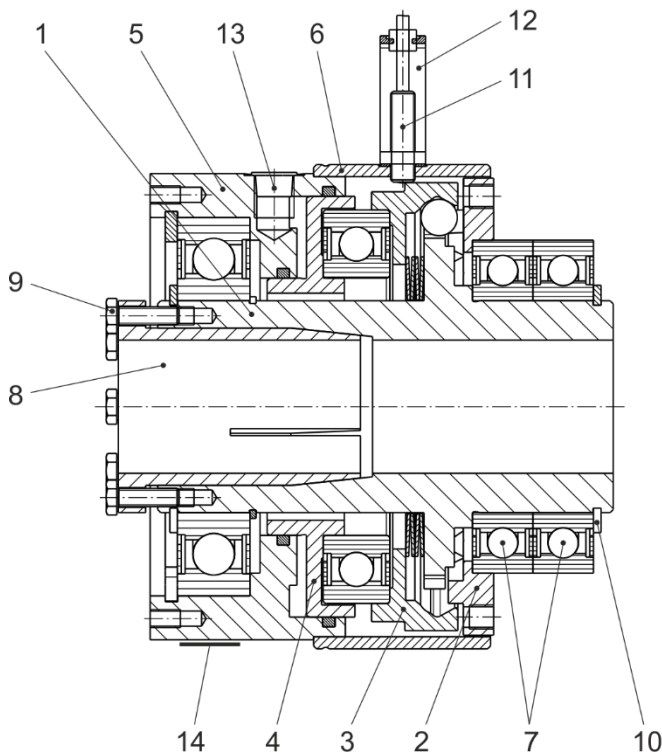


Fig. 2: Type 45_11_._.

Installation and Operational Instructions for EAS®-Sp clutch Type 45..1.. Sizes 01 to 5

(B.4.12.EN)

Parts List Type 450.1..0

(Only use *mayr*® original parts)

Item	Name
1	Hub
2	Pressure flange
3	Thrust washer
4	Piston
5	Stator part
6	Sealing cover
7	Deep groove ball bearing
8	Cone bushing
9	Hexagon head screw
10	Locking ring
11	Proximity switch
12	Hoop guard
13	Cone plug
14	Type tag

Parts List Type 456.1..8

(Only use *mayr*® original parts)

Item	Name
1 – 14	Same parts as Type 450.1..0
15	Flange
16	Intermediate flange
17	Disk pack
18	Washer
19	Fitting bolt
20	Hexagon nut
21	Sleeve
22	Hub
23	Cap screw

Table 1: Technical Data (General)

	Size	01	0	1	2	3	4	5
Max. torque:	[Nm]	40 *	75	150	200	500	1000	2500
Min. torque:	[Nm]	4 *	15	25	50	100	200	500
Max. speed:	[rpm]	5000	4000	2500	2000	2000	1500	500
Connection thread for the pneumatic unit:		G 1/8"	G 1/8"	G 1/8"	G 1/8"	G 1/4"	G 1/4"	G 1/4"
Thread in pressure flange (2):		6 x M5	6 x M5	6 x M5	6 x M6	6 x M8	6 x M10	6 x M12
Max. screw-in depth in the pressure flange (2):	[mm]	5.5	5.5	6.5	8	8	11	15
Thread in the stator part (5):		4 x M5	4 x M4	4 x M5	4 x M5	4 x M6	4 x M8	4 x M10
Max. screw-in depth in the stator part (5):	[mm]	10	8	8	10	10	12	15
Tightening torque (Item 9):	[Nm]	3	3	3	6	9.5	22	42
Tightening torque (Items 19/20):	[Nm]	-	10.5	10.5	26	26	89	215
Tightening torque (Item 23):	Nm	-	6.1	6.1	10.5	26	51	89
Weight Type 450.1 (with max. bore):	[kg]	2.5	3.7	7	9.7	15	29.5	82
Weight Type 456.1 (with max. bore):	[kg]	-	6	10	15.8	24	48.5	114.5
Axial displacement ΔK_a (Type 456.1):	[mm]	-	0.8	1.0	1.2	1.4	1.6	1.8
Radial misalignment ΔK_r (Type 456.1):	[mm]	-	0.65	0.7	0.85	1.0	1.25	1.4
Angular misalignment ΔK_w (Type 456.1):	[°]	-	2	2	2	2	2	2
Permitted ambient temperature:		-20 °C to +80 °C						

* For Type 450.1..H: max. torque 40 Nm / min. torque 8 Nm

* For Type 450.1..L: max. torque 20 Nm / min. torque 4 Nm

Installation and Operational Instructions for EAS®-Sp clutch Type 45_1_._. Sizes 01 to 5

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Design

The EAS®-Sp clutch **Type 450.1_._.** is a pneumatically actuated overload clutch with switching function. On **Type 456.1_._.**, this clutch is combined with a torsionally rigid, misalignment-flexible all-steel coupling (ROBA®-D 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

- The EAS®-Sp clutch is completely installed, including the proximity switch (11).
- The EAS®-Sp control unit device for monitoring or control can be delivered as an accessory for the device.
- The pneumatic unit must be provided and connected by the customer.
- For the dimensions of the connection thread for the pneumatic unit, please see the Technical Data (Table 1). Switching examples are depicted in Figs. 7 and 8 on page 8.

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 (Fig. 1)

The torque transmission takes place via steel balls in radially and axially positioned recesses in the hub (1) and the pressure flange (2) and is therefore positive locking. Using the supply pressure of 1 – 6 bar, the limit torque for overload (disengagement torque) can be continuously adjusted.

Overload function:

During operation, the clutch transmits the torque regulated by the pneumatic pressure backlash-free from the input to the output. If this torque is exceeded (due to overload), the steel balls are pushed out of the recesses in the hub (1) and the pressure flange (2). The clutch disengages. At the same time, the integrated proximity switch (PNP NC contact) is damped and a signal is passed on to the EAS®-Sp control unit device. The clutch is de-pressurised (quick-action ventilating valve), input and output are separated residual torque-free.

Switching function:

The clutch is pneumatically switchable. When pressure is applied, the steel balls are pressed into the recesses of the hub (1) and the pressure flange (2). This leads to backlash-free torque transmission. Re-engagement takes place after reaching an engagement position. As long as the engagement position is not reached, the clutch transmits a residual torque of approx. 10 % of the set torque.

The ratchetting division on the EAS®-Sp **Type 45_1_5_.** is 360°. The ratchetting division on the EAS®-Sp **Type 45_1_0_.** is 15°.



Engagement of the clutch should only take place at crawl speed or when the system is stopped. It may not be carried out under load. In order to couple larger flywheel masses at high speed values or in order to transmit high start-up torques, it is possible for the re-engagement pressure of the EAS®-Sp clutch to deviate from the operating pressure (2-pressure system); however, the maximum pressure (6 bar) must not be exceeded.

Control function:

The limit torque for overload on the clutch can be adjusted continuously via the compressed air supply and can be changed during operation.

Drive Element Installation (Figs. 1 to 3)

The drive elements of the EAS®-Sp short hub are centred on both deep groove ball bearings (7) and are screwed together with the pressure flange (2). Please see Table 1 for the thread diameter, max. screw-in depth and tightening torque. The drive elements must be secured against axial movement in the direction of the sealing cover (6) (on pressureless clutch), via a collar, a locking ring or similar component (see Fig. 3). If the resulting radial force from the drive element is anywhere near the centre of both ball bearings (7), an additional bearing for the drive element is unnecessary (see Fig. 3).

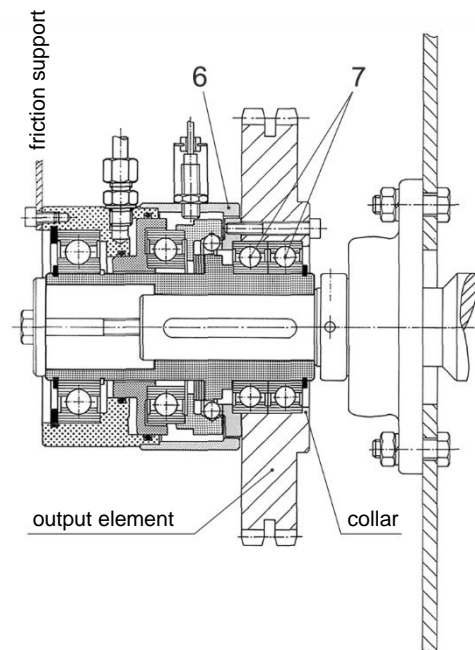


Fig. 3

Installation and Operational Instructions for EAS®-Sp clutch Type 45_1_._. Sizes 01 to 5

(B.4.12.EN)

Mounting onto the Shaft

EAS®-Sp clutches include keyways or cone bushings as part of the standard delivery.

During installation of key hubs, please observe the following:

- ❑ As standard the bore in the hub (1) is provided with a H7 tolerance and the keyway is produced acc. DIN 6885.
- ❑ The surface roughness depth in the bores is Ra 1.6 µm.
- ❑ Recommended shaft tolerance: h6
- ❑ Shaft surface: finely turned or ground Ra = 1.6 µm
- ❑ Shaft material: Yield point min. 350 N/mm².
- ❑ Mount the clutch onto the shaft using a suitable device and bring it into the correct axial position.
- ❑ The device is fixed axially onto the shaft, e.g. via a press cover and a screw, screwed into the central thread of the shaft (see Figs. 3 and 4).
On EAS®-Sp with torsionally rigid flexible all-steel coupling, a set screw holds the hub (22) of the flexible coupling onto the shaft (Fig. 4).

During installation of cone bushings, please observe the following:

- ❑ Recommended shaft tolerance for cone bushings: h6
- ❑ Shaft surface: finely turned or ground (Ra = 0.8 µm)
- ❑ Shaft material: Yield point at least 400 N/mm², e.g. St 60, St 70, C 45, C 60.
- ❑ Degrease or remove conserving layers on the shafts and bores before installing the clutch.
Greasy or oily bores or shafts do not transmit the torques defined in the catalogue.
- ❑ Mount the clutch onto the shaft using a suitable device and bring it into the correct axial position.
- ❑ Hub (1) clamping:
Tighten the tensioning screws (9) in 2 steps cross-wise and then in 3 to max. 6 tightening sequences evenly using a torque wrench to the torque stated in Table 1.



The clutch carries out an axial movement in the direction of the cone bushing (8) when tightening the cone bushing (8) (Fig. 2).

De-Installation of the Cone Bushing

There are tapped extracting holes next to the tensioning screws (9) in the cone bushing (8).

- 1) Loosen all tensioning screws (Item 9) by several thread turns.
- 2) Screw out the tensioning screws (9) located next to the tapped extracting holes and screw them into the tapped extracting holes up to their limits. Then tighten these screws until the tensioning connection loosens.

Removing the Clutch

A suitable fitting device must be used to remove the EAS®-Sp clutch from the shafts.



Avoid damage to the bearings. Do not overexpand the disk packs (17), as otherwise the function of the clutch can no longer be guaranteed.

Friction Support Installation

The deep groove ball bearing which holds the stator (5) causes a minor friction torque on the stator part (5) or on the sealing cover (6): the customer must add a friction support.

The stator part (5) or the sealing cover (6) must not rotate. One of the four threaded holes on the facing side of the stator part (5) are to be used when mounting the friction support. The friction support must not transmit any appreciable forces onto the clutch or cause tensions on the stator part (5) bearing (Figs. 3 and 4).

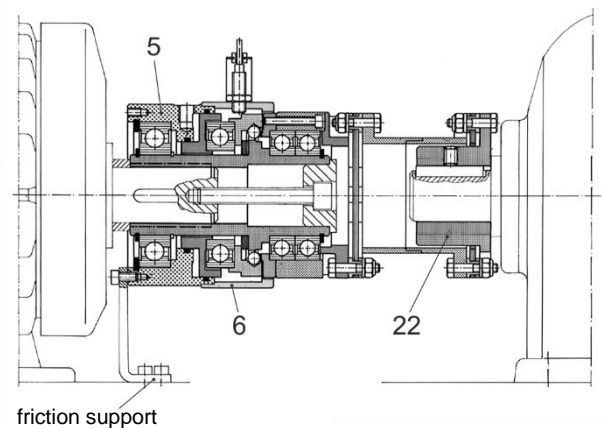


Fig. 4

Installation and Operational Instructions for EAS[®]-Sp clutch Type 45_1_._. Sizes 01 to 5

(B.4.12.EN)

Permitted Shaft Misalignments

ROBA[®]-D coupling compensates for radial, axial and angular shaft misalignments (Fig. 5). 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 %, as shown in the example (Fig. 6).

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.

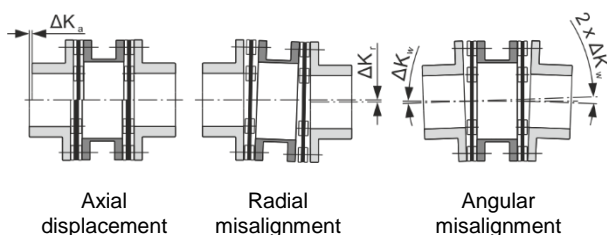


Fig. 5

Clutch Alignment

Exact alignment of the clutch improves the running smoothness of the drive line 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.

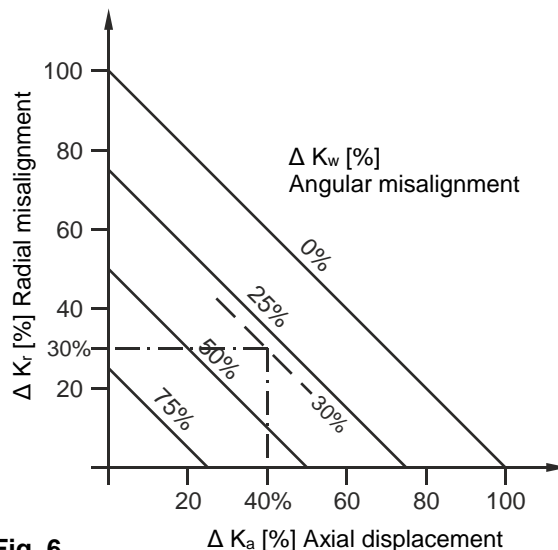


Fig. 6

Example (Size 4):

Axial displacement occurrence $\Delta K_a = 0.6$ mm equals 40 % of the permitted maximum value $\Delta K_a = 1.6$ mm.

Angular misalignment occurrence $\Delta K_w = 0.6^\circ$ equals 30 % of the permitted maximum value $\Delta K_w = 2^\circ$.

=> permitted radial misalignment $\Delta K_r = 30$ % of the maximum value

$\Delta K_r = 1.25$ mm => $\Delta K_r = 0.4$ mm

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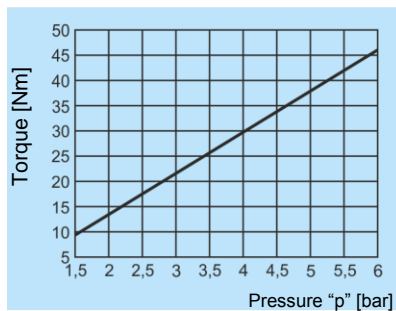
Torque Adjustment

Torque adjustment takes place using air pressure.
The torque value is proportional to the air pressure (see the
Torque Curves below).

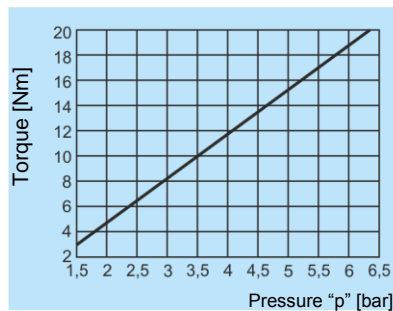


The values stated in the following diagrams are
reference values, which are subject to certain
tolerances.

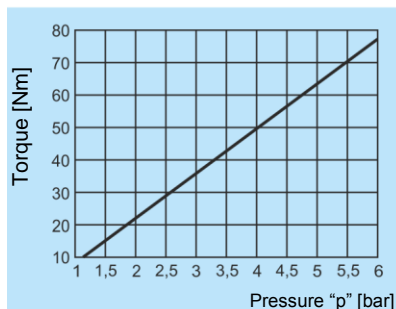
Torque Curves Static



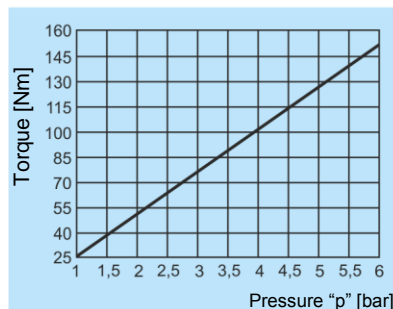
EAS®-Sp 01/450.1_._.H



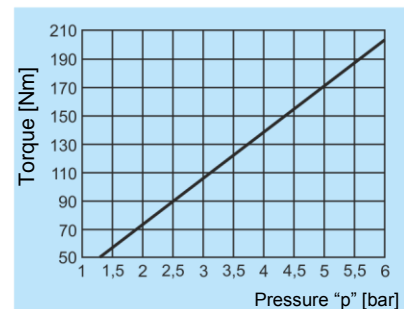
EAS®-Sp 01/450.1_._.L



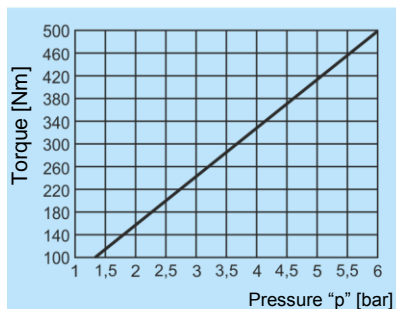
EAS®-Sp 0/45_1_._._



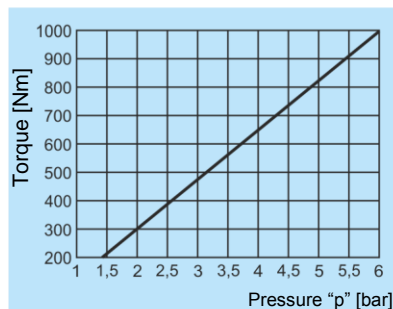
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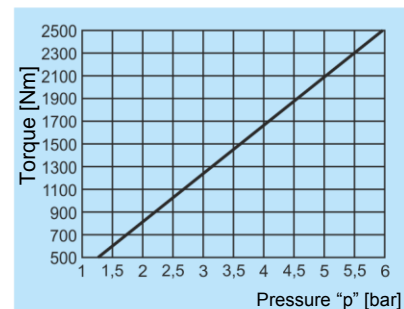
EAS®-Sp 2/45_1_._._



EAS®-Sp 3/45_1_._._



EAS®-Sp 4/45_1_._._



EAS®-Sp 5/45_1_._._

Installation and Operational Instructions for EAS®-Sp clutch Type 45_.1_._. Sizes 01 to 5

(B.4.12.EN)

Pneumatic Control

In order to reach a high switching dynamic, the cable wire cross sections are to be adequately dimensioned.

The cable lengths between the pressure reservoir and the clutch are to be kept short.

In order to make immediate de-pressurisation of the clutch (the piston space) possible, a quick-action ventilating valve positioned as near to the clutch as possible must be installed (see Control Examples /Switching Examples Figs. 7 and 8 below).

Compressed Air Characteristics

The compressed air must be filtered and oiled. Viscosity Class VG32 according to ISO 3448.

The quality of the compressed air according to ISO 8573-1 should have a quality class 4 or higher.

Control Examples / Switching Examples

1-Pressure System

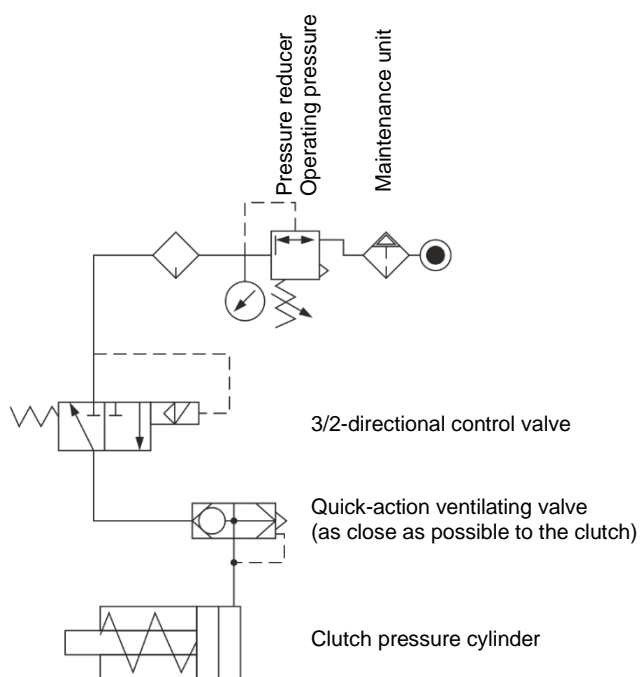


Fig. 7

2-Pressure System

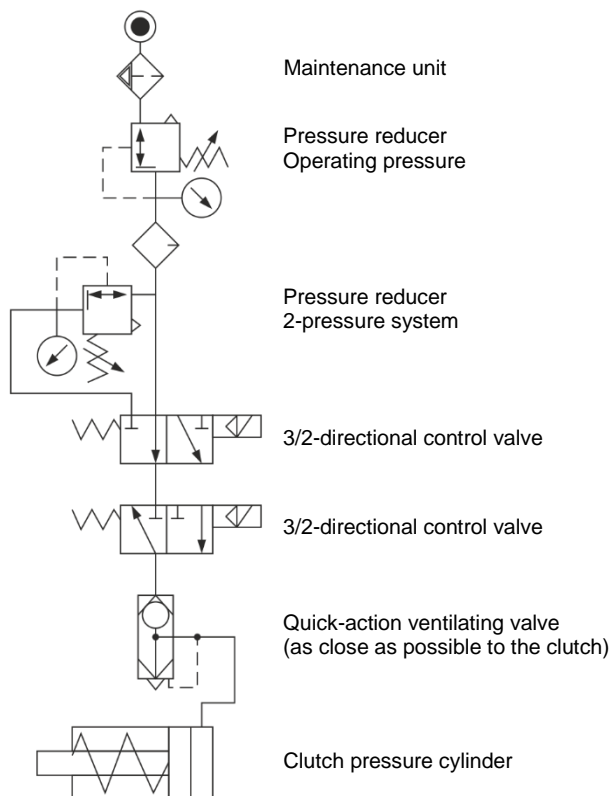


Fig. 8

Installation and Operational Instructions for EAS®-Sp clutch Type 45..1..

Sizes 01 to 5

(B.4.12.EN)

Electrical Connection of the Proximity Switch

The proximity switch (11) integrated in the sealing cover (6) is examined for functionality and adjusted manufacturer-side. The electrical connection usually takes place via a EAS®-Sp control unit device. The data for connection and for control unit adjustment can be found in the Operational Instructions B.0090002..

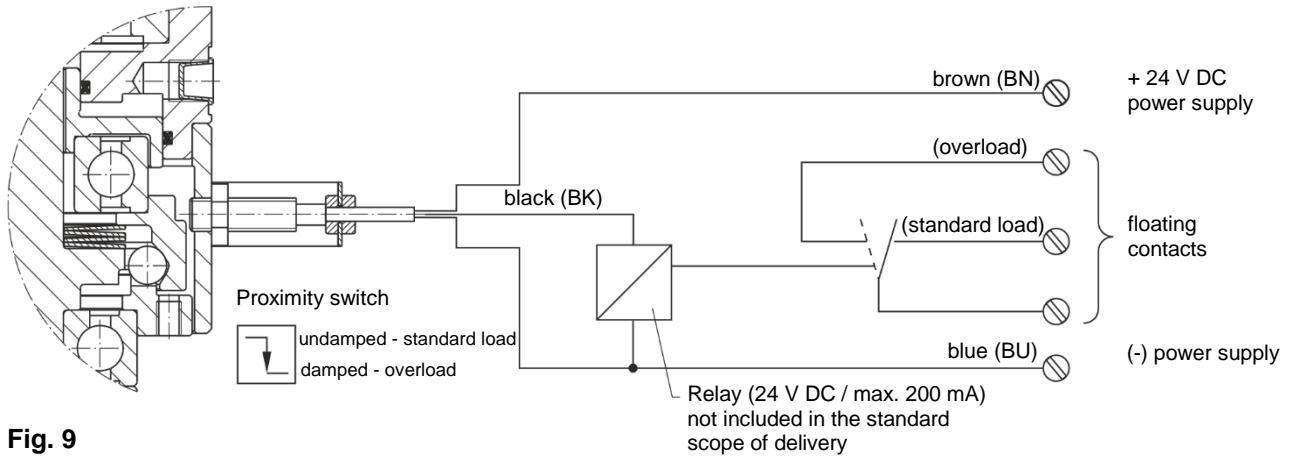


Fig. 9

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 acc. Table 1
- 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 bearing, transmission geometries, balls, recesses and sealing elements.

Clutch re-greasing must only be carried out at the place of manufacture or by specially trained personnel.

For greasing, please use NLGI Class 1.5 grease with a basic oil viscosity of 460 mm²/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.

Disposal

Electronic Components (Proximity 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)