Installation and Operational Instructions for EAS®-Compact® overload clutch, Type 49_._ _4._ Sizes 4 and 5 (B.4.14.2.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®-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 clutch 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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Design with keyway Type 490. _ 24. _

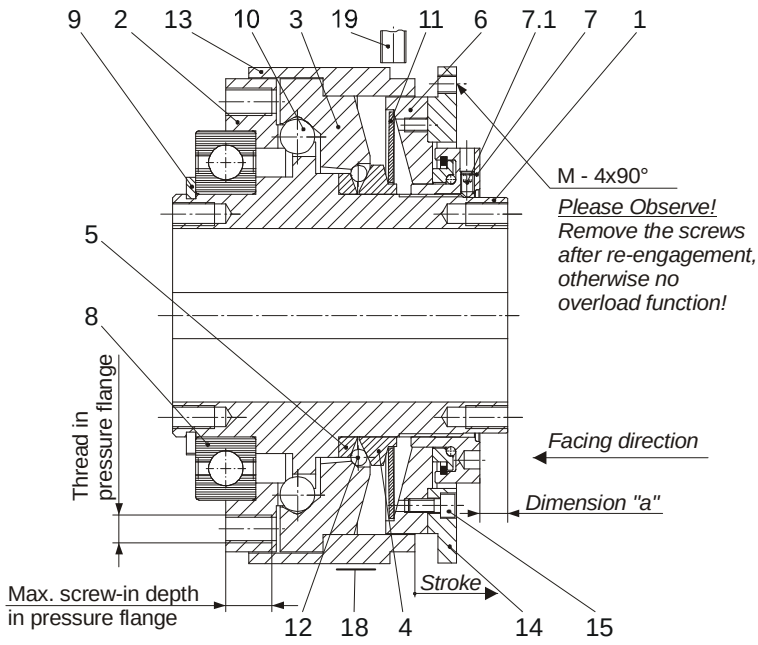

Fig. 1

Design with cone bushing Type 490. _ 14. _

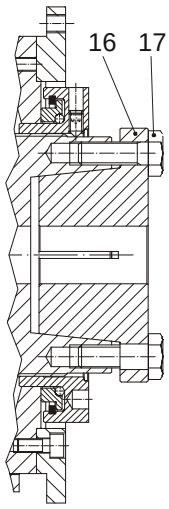

Fig. 2

Design with flexible coupling part Type 494. _ _ 4. _

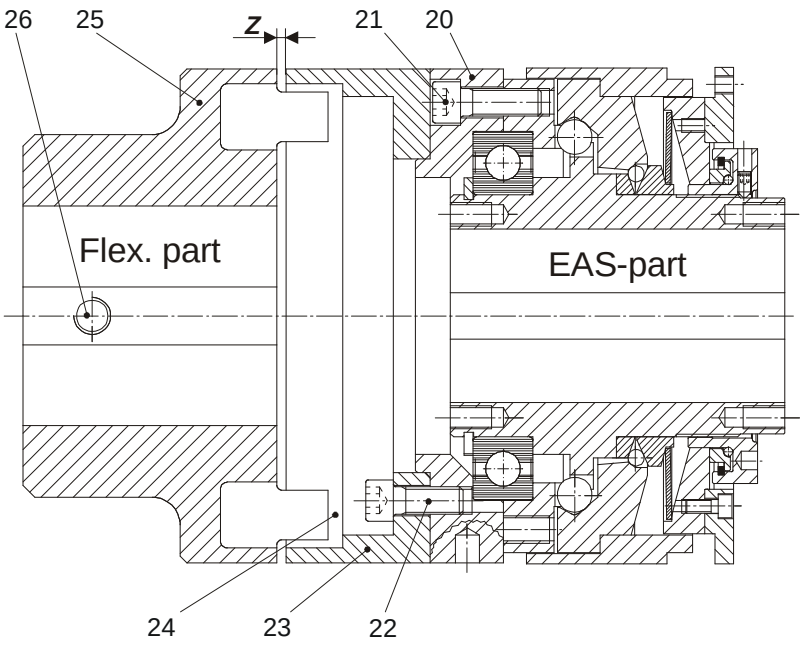

Fig. 3

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

1	Hub EAS®	10	Steel ball	**Additional parts for Type 494. _ _ 4._:**	
2	Pressure flange	11	Cup spring	20	Flange
3	Thrust washer	12	Steel ball	21	Cap screw
4	Thrust ring	13	Sealing cover	22	Cap screw
5	Supporting ring	14	Engagement washer	23	Claw ring
6	Intermediate disk	15	Cap screw	24	Flexible intermediate ring (elastomeric element)
7	Adjusting nut	16	Cone bushing	25	Hub lastic
7.1	Set screw	17	Hexagon head screw	26	Adjusting screw
8	Deep groove ball bearing	18	Type tag		
9	Locking ring	19	Limit switch		

- ❒ The limit switch Item 19 is not included in the standard delivery.
- ❒ Secure the set screws Item 7.1 with Loctite 243.

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Technical Data

Table 1:

Size	Limit torques for overload M_G Type 490.5_4._ [Nm]	Limit torques for overload M_G Type 490.6_4._ [Nm]	Limit torques for overload M_G Type 490.7_4._ [Nm]	Max. speed [rpm]	Stroke of the thrust washer with sealing cover (Fig. 1; Items 3/13) on overload [mm]	Bore from – to Type 490._14._ [mm]	Bore from – to Type 490._24._ [mm]
4	175 – 350	350 – 700	700 – 1400	3000	5,5	42 – 65	40 – 70
5	350 – 700	700 – 1400	1400 – 2800	2000	7,0	50 – 75	45 – 90

Table 2:

Size	Type 49_.5_4._ Maximum torque M_G [Nm]	Type 49_.5_4._ Inspection dimension "a" (Fig. 1) at approx. 70 % M_G [mm]	Type 49_.6_4._ Maximum torque M_G [Nm]	Type 49_.6_4._ Inspection dimension "a" (Fig. 1) at approx. 70 % M_G [mm]	Type 49_.7_4._ Maximum torque M_G [Nm]	Type 49_.7_4._ Inspection dimension "a" (Fig. 1) at approx. 70 % M_G [mm]
4	350	12,4	700	10,4	1400	6,2
5	700	13,6	1400	11,2	2800	6,1

Table 3:

Size	Thread in the pressure flange (Fig. 1)	Max. screw-in depth in the pressure flange (2) (Fig. 1) [mm]	Thread "M" in the engagement washer (14) (Fig. 1)	Screw tightening torques Item 7.1 [Nm]	Item 17 [Nm]	Item 21 [Nm]	Item 22 [Nm]
4	6 x M12	20	4 x M8	4,1	40	120	75
5	6 x M16	22	4 x M10	8,5	60	175	120

Table 4:

Size	Max. permitted Axial forces [N]	Max. permitted Radial forces [N]	Max. permitted Transverse force torques [1] [Nm]	Bore lastic-side Type 494._ _ 4._ from – to [mm]	Nominal torque T_{KN} for flexible, backlash-free shaft coupling on Type 494._ _ 4._ T_{KN} [Nm]	Nominal torque T_{KN} for flexible, backlash-free shaft coupling on Type 494._ _ 4._ $T_{KN\ max.}$ [Nm]
4	4800	4800	50	58 – 95	1500	3100
5	7700	7700	70	65 – 110	2400	4800

[1] Torques, which put strain on the deep groove ball bearing due to the non-centric axial forces having an effect on the pressure flange.

Table 5:

Size	Connection dimensions (Fig. 4, page 4) a $^{+0,1}$ [mm]	Connection dimensions (Fig. 4, page 4) e [2] [mm]
4	13	160 h5
5	14	180 h5

[2] User-side tolerance H7

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Installation and Operational Instructions for EAS®-Compact® overload clutch, Type 49_._ _4._ Sizes 4 and 5 (B.4.14.2.GB)

Design

The EAS®-Compact® overload clutch is designed as a mechanical disengaging overload clutch according to the ball detent principle.

State of Delivery

The clutch is manufacturer-assembled and set to the torque stipulated in the order.
Unless the customer requests a particular torque setting, the clutch will be pre-set to approx. 70 % of the maximum torque.
The 4 locking set screws (7.1) do not have screw securement on a pre-set clutch.

Before initial operation of the clutch, please secure the locking set screws (7.1) with Loctite 243.

Please check state of delivery!

Function

The 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 backlash-free onto the output from the motor shaft via the EAS®-Compact® overload clutch (pressure flange (2)). If the set limit torque is exceeded (overload), the clutch disengages. The input and the output are separated residual torque-free.
An installed limit switch registers the disengagement movement and switches off the drive.
After-acting masses can run free.

CAUTION

The clutch has no load-holding function after overload occurrence!

Re-engagement

Re-engagement must only take place when the device is not running or at low differential speeds (< 10 rpm).

Re-engagement of the EAS®-Compact® overload clutch takes place using 4 hexagon head screws (Fig. 1; provided customer-side: M8 for Size 4; M10 for Size 5), evenly screwed into the engagement washer (14) by placing axial pressure on the sealing cover (13).
It may be necessary to twist slightly between the pressure flange (2) and the thrust washer (3) incl. sealing cover (13).

CAUTION

After re-engagement has taken place, the 4 hexagon head screws must be removed immediately, as they could stop the clutch functioning (blockage).

General Installation Guidelines

The bore tolerances in the hub (1) and the hub lastic (25) are stated as H7, the surface roughness depth in the bores is stated as Ra = 1,6 µm.

Installation of the Output Elements (Fig. 4)

The output element is centred on the deep groove ball bearing (8) (tolerance H7/h5) and screwed together with the pressure flange (2).

Please observe the maximum screw-in depth in the pressure flange (Item 2 / Fig. 1 and Table 3).

If the resulting radial force from the output element is anywhere near the centre of the ball bearing (8) and under the max. permitted radial load acc. Table 4, an additional bearing for the output element is not necessary.
No appreciable axial forces (see Table 4) should be transferred from the output element onto the clutch pressure flange (2).
For extremely wide output elements or for elements with a small diameter, we recommend the EAS®-Compact® with long protruding hub (Type 490._ _ 4.1).
On very small diameters, the output element is screwed together with the clutch pressure flange (2) via a customer-side intermediate flange.
Ball bearings, needle bearings or bearing bushings are suitable as bearings for the output element, depending on the installation situation and the installation space.
In order to prevent the output element (pressure flange (2)) from moving axially in the direction of the thrust washer (3) during overload, please make sure that the bearing of the output element is designed as a location bearing (Fig. 4).

Please observe the connection dimensions "a" and "e" for the output elements acc. Fig. 4 and Table 5, page 3.

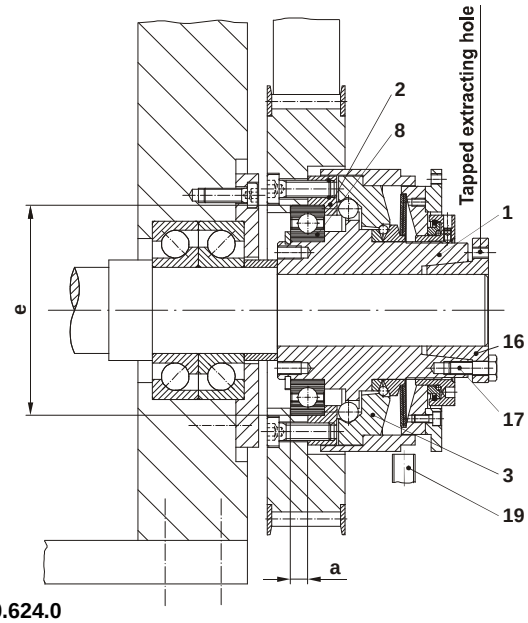

Fig. 4
Type 490.624.0

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Mounting onto the Shaft

EAS®-Compact® clutches include manufacturer-installed cone bushings or keyways as part of the standard delivery.
Please observe the following when mounting cone bushings:

- ❒ Shaft tolerances from h8 to k6 are permitted.
- ❒ Shaft surface: finely turned or ground (Ra = 0,8 µm)
- ❒ Shaft material: yield point at least 400 N/mm^2, e.g. St 60, St 70, C 45, C 60.
- ❒ Degrease or remove preservation layers on the shafts and bores before installing the clutch.
  Greasy or oily bores or shafts do not transmit the torque T_R specified on order.
- ❒ Mount the clutch or clutch hubs onto both shaft ends using a suitable device and bring it / them into the correct position.
- ❒ Tighten the tensioning screws (17) in steps (in 3 to max. 6 tightening sequences) evenly using a torque wrench to the torque stated in Table 3.

The clutch or the clutch hub carries out an axial movement in the direction of the cone bushing (16) when tightening the cone bushing (16).

De-installation

In the cone bushing (16), tapped extracting holes are located next to the tensioning screws (17).

1) Loosen all tensioning screws (17) by several thread turns.
2) Screw out the tensioning screws (17) 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.

Shaft Installation via Key Connection

On the EAS®-Compact® with keyway, the clutch must be secured axially after mounting onto the shaft, e.g. using a press cover and a screw, screwed into the shaft threaded centre hole (EAS®-side) and/or a set screw (adjusting screw (26), lastic-side, see Fig. 3).

Cup Spring Layering (Fig. 5)

Correct cup spring layering is a prerequisite for problem-free clutch function and torque adjustment.
For all sizes, **one** cup spring (Type 49_.5_4._) is installed for the lower torque range. For the medium torque range, **two** cup springs (Type 49_.6_4._) and for the high torque range **four** cup springs (Type 49_.7_4._) are installed.

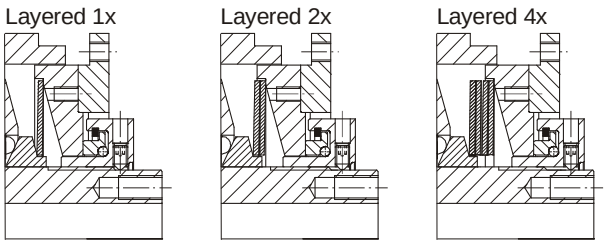

Fig. 5

Joining Both Clutch Hubs (1/25) EAS®-Compact® Type 494._ _ 4._ (Fig. 3)

Due to the pre-tensioning of the intermediate ring (24), axial installation force is required for joining both clutch hubs (1 and 25).
The amount of force required can be reduced by lightly greasing the intermediate ring (24).

Use PU - compatible lubricants (e.g. Vaseline).

Do not place axial pressure on the intermediate ring (24) in fully installed state.
Please observe the distance dimension "Z" acc. Fig. 3 and Table 6.

Table 6

	Size 4	Size 5
Dimension "Z" (Fig. 3) [mm]	4	4

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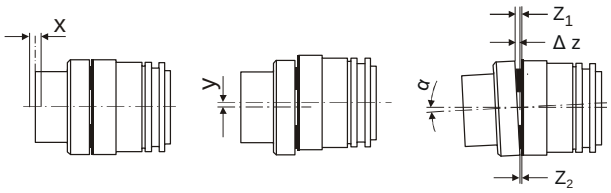
Permitted Shaft Misalignments Type 494.-

EAS®-Compact® clutches Type 494._ _ 4._ (lastic backlash-free) compensate for angular, axial and radial shaft misalignments (Fig. 6) without losing their backlash-free function. However, the permitted shaft misalignments indicated in Table 7 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. 7.
The sum total of the actual misalignments in percent of the maximum value must not exceed 100 %.
The misalignment values given in Table 7 refer to clutch operation at nominal torque, an ambient temperature of +30 °C and a operating speed of 1500 rpm. If the clutch is operating in other or more extreme operating conditions, please contact the manufacturers.

Table 7

Max. permitted shaft misalignments for Type 494. - - 4. -		Size 4	Size 5
"x"	[mm]	± 1,5	± 2
"y"	[mm]	± 0,3	± 0,3
"Δ z"	[mm]	0,3	0,3
"α"	[°]	0,09	0,07

Type 494._ _ 4._ (lastic backlash-free)



Differential dimension $\Delta z = z_1 - z_2$
dimensions z_1 and z_2, measure offset by 180° vertically and horizontally

Axial displacement | Radial misalignment | Angular misalignment

Fig. 6

Coupling Alignment Type 494.-

Exact alignment of the coupling reduces the load on the shaft bearings and increases the coupling lifetime greatly.
We recommend alignment of the coupling using a dial gauge or special laser on drives operating at very high speeds.
However, in most of the applications, coupling alignment using a straight edge in two levels vertical to each other is sufficient.

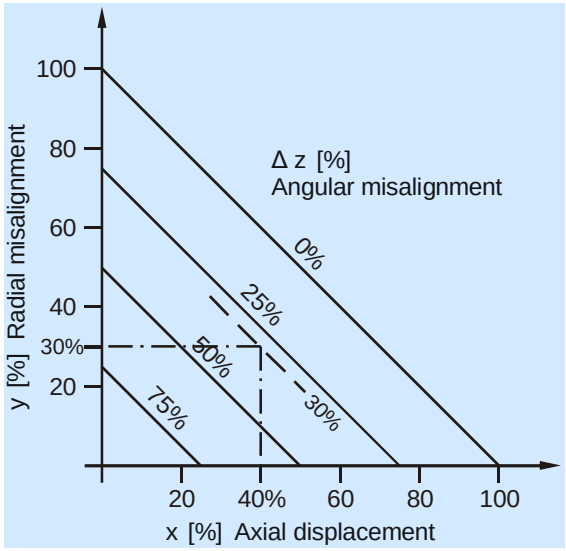


Fig. 7

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Torque Adjustment (Figs. 8, 9, and 10)

Torque adjustment is carried out by turning the adjusting nut (7). The installed cup springs (11) are operated in the negative range of the characteristic curve (see Fig. 10). This means that tightening the adjusting nut (7) causes the spring force to decrease, and loosening the adjusting nut (7) causes the spring force to increase.
If no particular torque adjustment is requested customer-side, the clutch will always be **pre-set a**nd **marked** (calibrated) to approximately 70 % of the maximum torque.
It is possible to check the **"Spring operation in the operating range"** (Fig. 10) using the dimension "a" (distance from the adjusting nut, facing side (7) to the hub edge (1) (Fig. 8)).
Please see Table 2 for the respective values.

Turning the adjusting nut (7) clockwise causes a reduction in torque.
Turning it anti-clockwise causes an increase in torque.
You should be facing the adjusting nut (7) as shown in Fig. 8 and Fig. 9.

Changing the Torque

1) Please convert the required torque using the formula below into percent of the maximum adjustment value (see Table 2).

$$\frac{\text{Required torque adjustment}}{\text{Max. torque adjustment (Table 2)}} \times 100 = \text{Adjustment in \%}$$

2) Loosen the 4 set screws (7.1) in the adjusting nut (7).
3) Turn the adjusting nut (7) using the engraved adjustment scale (Fig. 9) clockwise or anti-clockwise using a hook or a face wrench until the required torque is reached.
4) The required torque results from the marking overlap on the hub (1) and the percent value on the adjusting nut (7) (Fig. 9).
Alternatively, the torque can also be adjusted using dimension "a" (Fig. 8) acc. Adjustment Diagram (request at the place of manufacture, if required).
5) Paint the 4 locking set screws (7.1) with Loctite 243, screw them in and tighten them.
Please observe the tightening torque acc. Table 3.

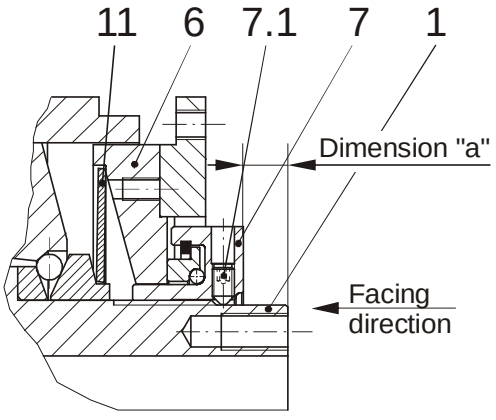

Fig. 8

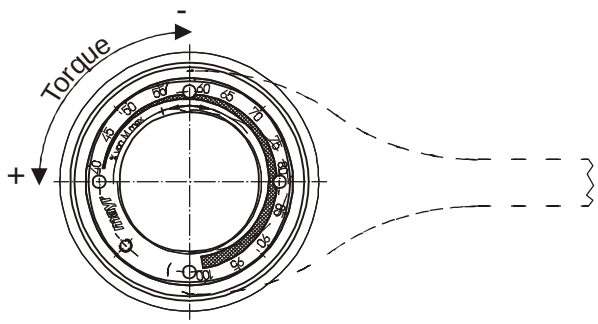

Fig. 9

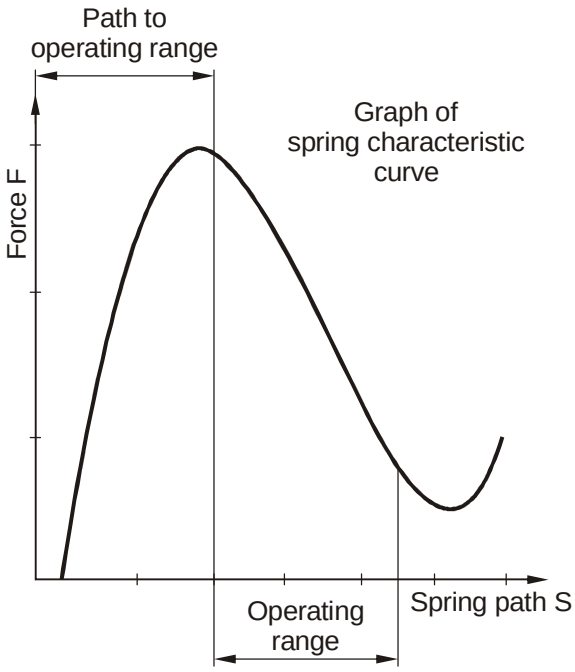

Fig. 10

Adjusting the adjusting nut (7) or distorting the cup springs (11) outside of the cup spring characteristic curve (see Fig. 10) stops the clutch functioning.
The inspection dimension "a" can show deviations due to construction tolerances or to clutch wear.

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Limit Switch (Item 19; Figs. 1 and 11)

In order to limit run-out times after overload has taken place, a limit switch must be mounted onto the overload clutch.
The contactless limit switch is to be mounted onto the switching edge of the clutch (Fig. 11) so that no signal changes are caused during normal operation on the limit switch by the usual clutch run-out errors.
In case of overload, the thrust washer (3) incl. sealing cover (13) carries out a stroke (see Table 1) in the direction of the engagement washer (14) (Figs. 1 and 11), which is used to change the signal on the limit switch. The signal change should take place at the latest after an axial stroke of the thrust washer (3) incl. the sealing cover (13) of 0,5 mm. At the same time, please maintain a radial minimum distance of 0,5 mm in order to prevent start-up of the contactless limit switch.

Limit Switch Installation

Adjust the switch distances for the contactless limit switch acc. Fig. 11. The distance of the sealing cover (13) to the switching point can be easily adjusted using a hexagon head screw, wrench opening 7.

Contactless limit switch (attachment example)

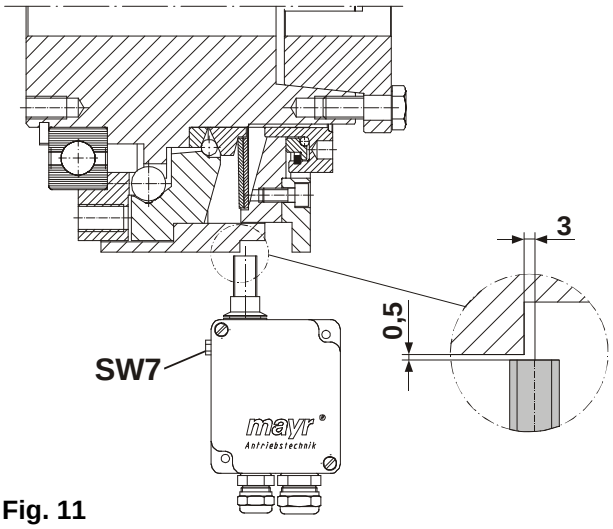

Fig. 11

Maintenance and Inspection Intervals

The maintenance intervals refer to the set clutch torque, hub-shaft connection and screw tightening torque inspections. The specified tightening torques acc. Table 3 must be maintained. Re-greasing work on the clutch may only be carried out by specially-trained personnel and is only required in extreme operating conditions such as very dusty or dirty conditions or at very high operating speeds. In this case, the ball transmission geometries must be re-greased.

The following maintenance and inspection intervals are to be maintained:

1.) Visual inspections, installation parameter inspections (tightening torques), clutch running behaviour, clutch release, set torque
before initial operation.

2.) Visual inspections, tightening torque inspections, clutch release inspections, torque inspections and, if necessary, re-greasing
after 2000 hours, after 100 overload occurrences or at the latest every 6 months.

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)

All aluminium components:
Non-ferrous metals (Code No. 160118)

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

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Malfunctions / Breakdowns

Malfunction	Possible Causes	Solutions
Premature clutch release	Incorrect torque adjustment	1) Set the system out of operation 2) Check the torque adjustment 3) Secure the adjusting nut 4) If the cause of malfunction cannot be found, the clutch must be inspected at the place of manufacture
	Adjustment nut has changed position	
	Worn clutch	
Clutch does not release on overload	Incorrect torque adjustment	1) Set the system out of operation 2) Check whether foreign bodies influence the disengagement mechanism function 3) Check the torque adjustment 4) Secure the adjusting nut 5) If the cause of malfunction cannot be found, the clutch must be inspected at the place of manufacture
	Adjustment nut has changed position	
	Disengagement mechanism blocked by a foreign body	
	Worn clutch	
Running noises on overload occurrence as clutch slows down	Bearing on output flange is worn or has been previously damaged	1) Set the system out of operation 2) Inspect the clutch at the place of manufacture
	Worn disengagement mechanism	
Running noises in normal operation	Insufficient clutch securement	1) Set the system out of operation 2) Check the clutch securement 3) Check the screw tightening torques 4) Check the torque adjustment and that the adjusting nut sits securely
	Loosened screws	
	Loosened adjusting nut	
Changes in running noise and / or vibration occurrence Type 494.-	Incorrect alignment	1) Set the system out of operation 2) Find / resolve the cause of incorrect alignment (e.g. loose foundation screw, broken motor attachment, warmth expansion of system components, changes in coupling installation dimension "Z") 3) Check the coupling for wear
	Worn elastomeric element, temporary torque transmission via metal contact	1) Set the system out of operation 2) Dismantle the coupling and remove the remainders of the elastomeric element 3) Check the coupling parts and replace if damaged 4) Insert new elastomeric element, mount the coupling parts 5) Check the alignment and correct if necessary
	Unbalance	1) Set the system out of operation 2) Check the balance condition of the system components and correct if necessary 3) Check the coupling parts for wear 4) Check the alignment and correct if necessary
	Loose connection screws	1) Set the system out of operation 2) Check the coupling alignment 3) Tighten the connection screws to the required torque or tighten the locking set screw and secure it against self-loosening using sealing lacquer 4) Check the coupling for wear

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Malfunctions / Breakdowns

Malfunction	Possible Causes	Solutions
Cam breakage Type 494.-	Worn elastomeric element, torque transmission via metal contact	1) Set the system out of operation 2) Replace the entire coupling 3) Check the alignment
	Cam breakage due to high impact energy / overloading	1) Set the system out of operation 2) Replace the entire coupling 3) Check the alignment 4) Find the cause of overload
	Operating parameters are not appropriate for the coupling performance	1) Set the system out of operation 2) Check the operating parameters and select a suitable coupling (observe installation space) 3) Install a new coupling 4) Check the alignment
	Operating errors on the system unit by exceeding clutch characteristic data	1) Set the system out of operation 2) Check the coupling dimensioning 3) Replace the entire coupling 4) Check the alignment 5) Train and advise operating personnel
Premature wear of the elastomeric element Type 494.-	Incorrect alignment	1) Set the system out of operation 2) Find / resolve the cause of incorrect alignment (e.g. loose foundation screw, broken motor attachment, warmth expansion of system components, changes in coupling installation dimension "Z") 3) Check the coupling for wear 4) Insert new elastomeric element
	e.g. contact with aggressive fluids / oils, ozone influence, too high ambient temperatures, etc, which cause physical changes in the elastomeric element	1) Set the system out of operation 2) Dismantle the coupling and remove the remainders of the elastomeric element 3) Check the coupling parts and replace if damaged 4) Insert new elastomeric element, mount the coupling parts 5) Check the alignment and correct if necessary 6) Make sure that further physical changes in the elastomeric element can be excluded
	The ambient or contact temperatures permitted for the elastomeric element are exceeded	1) Set the system out of operation 2) Dismantle the coupling and remove the remainders of the elastomeric element 3) Check the coupling parts and replace if damaged 4) Insert new elastomeric element, mount the coupling parts 5) Check the alignment and correct if necessary 6) Check the ambient or contact temperature and regulate them (possibly using other elastomeric element materials)
Premature wear of the elastomeric element (liquefied material in the interior of the elastomeric element cams) Type 494.-	Drive vibrations	1) Set the system out of operation 2) Dismantle the coupling and remove the remainders of the elastomeric element 3) Check the coupling parts and replace if damaged 4) Insert new elastomeric element, mount the coupling parts 5) Check the alignment and correct if necessary 6) Determine the cause of vibration (maybe the problem can be resolved by using an elastomeric element with lower or higher shore hardness)

mayr ® will take no responsibility or guarantee for replacement parts and accessories which have not been delivered by *mayr* ®, or for damage resulting from the use of these products.

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