Installation and Operational Instructions for EAS®-Compact® overload clutch Type 49_._ _4._ Sizes 01 to 3

(B.4.14.1.ATEX.EN)

Please read these Operational Instructions carefully and follow them accordingly!

Ignoring these Instructions may lead to malfunctions or to coupling failure, resulting in damage to other parts.
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.

The product must be specially marked for use in areas where there is a danger of explosion.
The product will only be marked if it is ordered especially for an Ex-area.

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Safety and Guideline Signs

DANGER

Immediate and impending danger, which can lead to severe physical injuries or to death.

CAUTION

Danger of injury to personnel and damage to machines.

Please Observe!
Guidelines on important points.

Guidelines on explosion protection

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.

Danger

- ❒ If the EAS®-clutches are modified.
- ❒ The relevant standards for safety and / or installation conditions are ignored.

The EAS®-clutch is permitted for use in areas where there is a danger of explosion.
For application in Ex-areas, please observe the special safety-related guidelines and directives on pages 16 and 21. The product must be especially marked for this area.
The product will only be marked if it is ordered especially for an Ex-area.

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 (for Ex-areas) 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.

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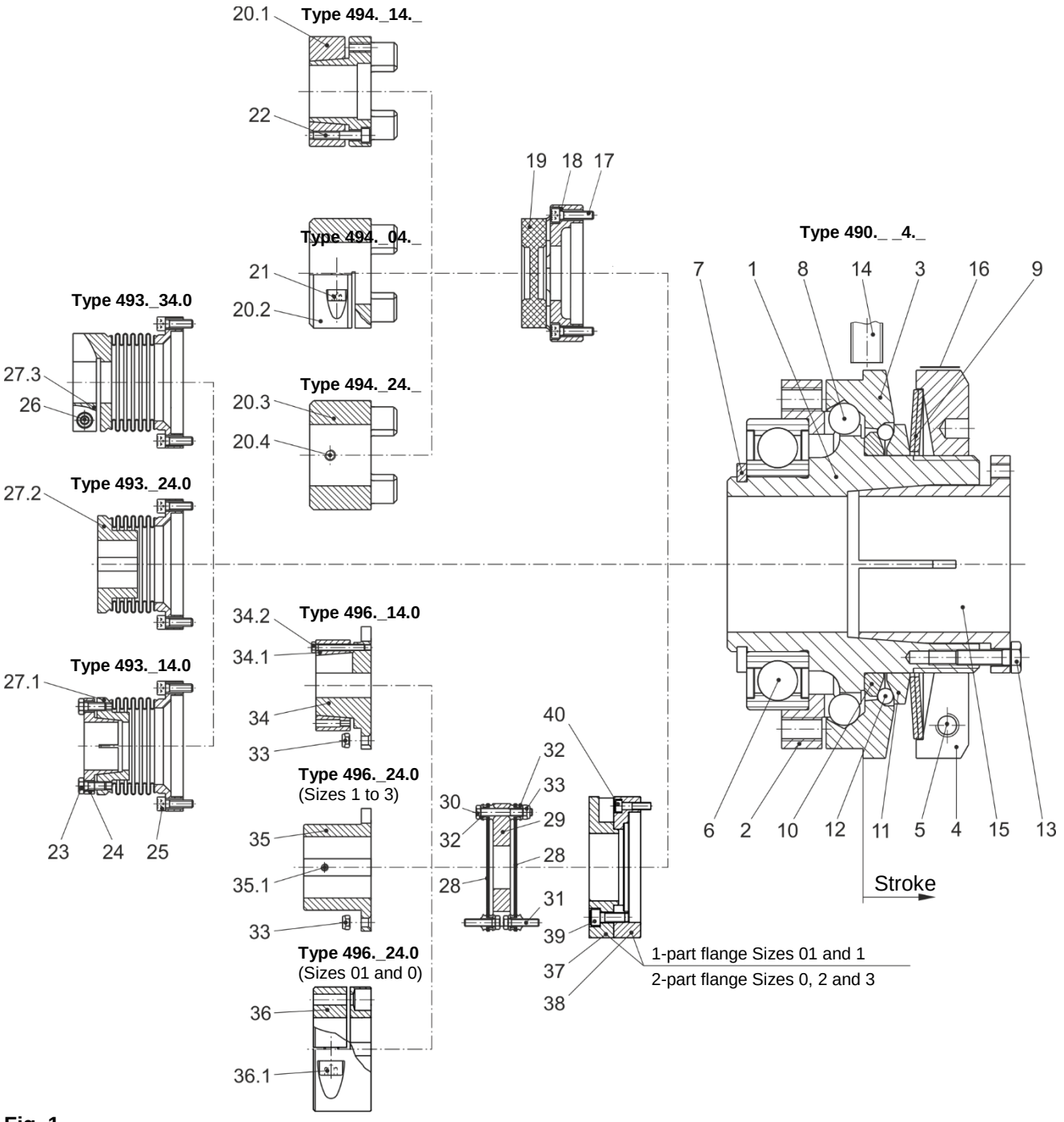

Fig. 1

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Parts List

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

Parts for Type 490.-:	
Item	**Name**
1	Hub
2	Pressure flange
3	Thrust washer
4	Adjusting nut
5	Cap screw
6	Deep groove ball bearing
7	Locking ring
8	Steel ball
9	Cup spring
10	Supporting ring
11	Thrust ring
12	Steel ball
13	Hexagon head screw
14	Limit switch [1]
15	Cone bushing
16	Type tag

Additional parts for Type 494.-:	
Item	**Name**
17	Cap screw [2]
18	Connection flange
19	Elastomeric element [3]
20.1	Shrink disk hub
20.2	Clamping hub
20.3	Key hub
20.4	Set screw
21	Cap screw
22	Cap screw

Additional parts for Type 493.-:	
Item	**Name**
23	Hexagon head screw
24	Cone bushing
25	Cap screw [2]
26	Cap screw
27.1	Steel bellows with flange and hub for cone bushing
27.2	Steel bellows with flange and key hub
27.3	Steel bellows with flange and clamping hub

Additional parts for Type 496.-:	
Item	**Name**
28	Disk pack
29	Connection plate
30	Hexagon head screw
31	Hexagon head screw
32	Washer
33	Hexagon nut
34	Shrink disk hub
34.1	Shrink disk
34.2	Hexagon head screw
35	Key hub
35.1	Set screw
36	Clamping hub
36.1	Cap screw
37	Connection flange
38	Intermediate flange
39	Cap screw
40	Cap screw [2]

[1] The limit switch Item 14 is not part of the standard scope of delivery
[2] Secure the cap screws Items 17, 25 and 40 with Loctite 243
[3] Elastomeric element colours (hardness): red (98 Sh A), yellow (92 Sh A), green (64 Sh D)

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General Technical Data

Table 1

Size	Limit torque for overload M_G Type 490.5_4._ [Nm]	Type 490.6_4._ [Nm]	Type 490.7_4._ [Nm]	Type 490.8_4._ [Nm]	Max. speed [rpm]
01	5 – 12.5	10 – 25	20 – 50	not	8000
0	10 – 25	20 – 50	40 – 100	permitted	7000
1	20 – 50	40 – 100	80 – 200	for	6000
2	40 – 100	80 – 200	160 – 400	ATEX	5000
3	80 – 200	160 – 400	320 – 800		4000

Table 2

Size	Thrust washer stroke (Fig. 1; Item 3) on overload [mm]	Bore from – to Hub (1) with cone bushing (15) Ø d [mm]	Hub (1) with keyway Ø d_p [mm]
01	2.0	10 – 20	12 – 20
0	2.6	15 – 25	15 – 25
1	3.2	22 – 35	22 – 30
2	3.8	32 – 45	28 – 40
3	4.5	35 – 55	32 – 50

Table 3

Size	Type 49_.5_4._ Maximum torque M_G [Nm]	Inspection dimension “a” (Fig. 10) at approx. 70 % M_G [mm]	Type 49_.6_4._ Maximum torque M_G [Nm]	Inspection dimension “a” (Fig. 10) at approx. 70 % M_G [mm]	Type 49_.7_4._ Maximum torque M_G [Nm]	Inspection dimension “a” (Fig. 10) at approx. 70 % M_G [mm]	Type 49_.8_4._ Maximum torque M_G [Nm]	Inspection dimension “a” (Fig. 10) at approx. 70 % M_G [mm]
01	12.5	4.4	25	3.7	50	2.2	not	
0	25	4.7	50	3.8	100	1.8	permitted	
1	50	5.1	100	4.0	200	1.5	for	
2	100	6.6	200	5.3	400	2.5	ATEX	
3	200	5.0	400	3.1	800	-0.4		

Table 4

Size	Max. permitted bearing loads Axial forces [N]	Radial forces [N] 1-bearing design	Radial forces [N] 2-bearing design	Transverse force torques [4] [Nm]	Permitted ambient temperature
01	650	650	1000	5	-15 °C to +80 °C
0	1000	1000	1500	10	-15 °C to +80 °C
1	1500	1500	2250	20	-15 °C to +80 °C
2	2400	2400	3600	30	-15 °C to +80 °C
3	4200	4200	6300	40	-15 °C to +80 °C

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

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Table 5

Size	Screw tightening torques [Nm]													
	Item 5	Item 13	Item 17	Item 21	Item 22	Item 23	Item 25	Item 26	Item 30	Item 31	Item 34.2	Item 36.1	Item 39	Item 40
01	3	4	2.9	10	6	3	4.5	10	8.5	8.5	6	33	-	4.5
0	5	4	5.8	25	6	5	9.5	18	8.5	8.5	6	33	17.4	9.5
1	9	4	10.1	25	10	9.5	16	18	8.5	8.5	6	-	-	16
2	9	8	16	70	25	17	16	43	14	14	8.5	-	42	16
3	15	12	40	120	30	17	40	87	35	35	10	-	83	40

Technical Data Type 493._ _4.0

Table 6

Size	Shaft misalignments steel bellows coupling Type 493.-			Nominal torque T_{KN} steel bellows coupling Type 493.- [Nm]	Bores steel bellows side		
	Axial ΔK_a [mm]	Radial ΔK_r [mm]	Angular ΔK_w [°]		Type 493._14._ [mm]	Type 493._24._ [mm]	Type 493._34._ [mm]
01	0.4	0.15	2	50	9 – 20	9 – 20	12 – 25
0	0.6	0.15	2	100	12 – 25	12 – 25	15 – 32
1	0.8	0.20	2	200	15 – 35	15 – 35	25 – 42
2	1.0	0.25	2	350	22 – 42	22 – 42	30 – 45
3	1.0	0.30	2	600	32 – 50	32 – 50	35 – 55

Table 7

	Transmittable torques [Nm] on clamping hubs frictional locking (Type 493._34.0) - dependent on bore - suitable for tolerance constellation H7/h6																					
Size	Ø 12	Ø13	Ø 14	Ø 15	Ø 16	Ø 17	Ø 18	Ø 19	Ø 20	Ø 21	Ø 22	Ø 23	Ø 24	Ø 25	Ø 26	Ø 27	Ø 28	Ø 29	Ø 30	Ø 31	Ø 32	Ø33
01	21	23	24	25	25	25	25	25	25	25	25	25	25	25	-	-	-	-	-	-	-	-
0	-	-	-	38	40	43	45	47	49	50	50	50	50	50	50	50	50	50	50	50	50	-
1	-	-	-	-	-	-	-	-	-	-	-	-	-	63	65	67	69	71	73	75	77	79
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	133	136	140	144
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Size	Ø 34	Ø 35	Ø 36	Ø 37	Ø 38	Ø 39	Ø 40	Ø 41	Ø 42	Ø 43	Ø 44	Ø 45	Ø 46	Ø 47	Ø 48	Ø 49	Ø 50	Ø 51	Ø 52	Ø 53	Ø 54	Ø 55
01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	82	83	85	87	89	91	93	95	97	-	-	-	-	-	-	-	-	-	-	-	-	-
2	147	151	155	158	162	166	169	173	176	180	183	187	-	-	-	-	-	-	-	-	-	-
3	-	250	256	262	268	274	280	286	292	298	304	309	315	321	327	332	338	344	349	350	350	350

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Technical Data Type 494._ _4._

Table 8

Size	Bore lastic-side from – to			Nominal and maximum torques flexible backlash-free shaft coupling T_{KN} and $T_{K\ max.}$					
	Clamping hub Type 494._04._ [mm]	Shrink disk hub Type 494._14._ [mm]	Key hub Type 494._24._ [mm]	Type 494._ _ 4.3 (yellow elastomeric element 92 Sh A)		Type 494._ _ 4.4 (red elastomeric element 98 Sh A)		Type 494._ _ 4.6 (green elastomeric element 64 Sh D)	
				T_{KN} [Nm]	$T_{K\ max.}$ [Nm]	T_{KN} [Nm]	$T_{K\ max.}$ [Nm]	T_{KN} [Nm]	$T_{K\ max.}$ [Nm]
01	15 – 28	15 – 28	8 – 28	35	70	60	120	75	150
0	19 – 35	19 – 38	10 – 38	95	190	160	320	200	400
1	20 – 45	20 – 45	12 – 45	190	380	325	650	405	810
2	28 – 50	28 – 50	14 – 55	265	530	450	900	560	1120
3	35 – 55	35 – 60	20 – 60	310	620	525	1050	655	1310

Table 9

Size	Transmittable torques [Nm] on clamping hubs frictional locking (Type 494._04._ / Ø d_3) / on shrink disk hubs frictional locking (Type 494._14._ / Ø d_4) – dependent on bore - suitable for tolerance constellation F7/k6 for clamping hubs and H7/k6 for shrink disk hubs																					
	Ø 15		Ø 16		Ø 19		Ø 20		Ø 22		Ø 24		Ø 25		Ø 28		Ø 30		Ø 32		Ø 35	
	d_3	d_4	d_3	d_4	d_3	d_4	d_3	d_4	d_3	d_4	d_3	d_4	d_3	d_4	d_3	d_4	d_3	d_4	d_3	d_4	d_3	d_4
01	34	56	36	62	43	81	45	87	50	100	54	120	57	125	63	135	-	-	-	-	-	-
0	-	-	-	-	79	141	83	153	91	177	100	203	104	216	116	256	124	282	133	308	145	343
1	-	-	-	-	-	-	83	197	91	228	100	261	104	279	116	332	124	368	133	405	145	460
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	208	300	228	350	248	400	280	500
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	350	450

Size	Ø 38		Ø 40		Ø 42		Ø 45		Ø 48		Ø 50		Ø 52		Ø 55		Ø 58		Ø 60	
	d_3	d_4	d_3	d_4	d_3	d_4	d_3	d_4	d_3	d_4	d_3	d_4	d_3	d_4	d_3	d_4	d_3	d_4	d_3	d_4
01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0	-	373	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	158	513	166	547	174	577	187	617	-	-	-	-	-	-	-	-	-	-	-	-
2	315	600	340	680	365	730	404	790	442	850	470	880	-	-	-	-	-	-	-	-
3	390	500	420	600	455	720	505	850	560	1000	600	1180	640	1270	705	1353	-	1428	-	1471

Table 10

Size	Shaft misalignments flexible coupling Type 494.							Dimension "E" (Fig. 7) [mm]	Locking set screw (20.4) for hub (Item 20.3 / Fig. 1)	
	Axial ΔK_a	Radial ΔK_r			Angular ΔK_w				Thread	Tightening torque [Nm]
	[mm]	92 Sh A [mm]	98 Sh A [mm]	64 Sh D [mm]	92 Sh A [°]	98 Sh A [°]	64 Sh D [°]			
01	1.4	0.14	0.10	0.07	1.0	0.9	0.8	18	M5	2
0	1.5	0.15	0.11	0.08	1.0	0.9	0.8	20	M6	4.1
1	1.8	0.17	0.12	0.09	1.0	0.9	0.8	24	M8	8.5
2	2.0	0.19	0.14	0.1	1.0	0.9	0.8	26	M8	8.5
3	2.1	0.21	0.16	0.11	1.0	0.9	0.8	28	M8	8.5

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Technical Data Type 496._ _4.0

Table 11

Size	Bore torsionally rigid side from – to			Nominal torque and peak torque torsionally rigid backlash-free shaft coupling T_{KN} and T_{KS}	
	Shrink disk hub	Key hub	Clamping hub with keyway	Type 496._ _ 4.0	
	Type 496._14.0 [mm]	Type 496._24.0 [mm]	Type 496._24.0 [mm]	T_{KN} [Nm]	T_{KS} [Nm]
01	19 – 38	–	19 – 35	100	150
0	25 – 45	–	25 – 42	150	225
1	25 – 45	16 – 32	–	300	450
2	40 – 60	25 – 50	–	650	975
3	45 – 70	30 – 55	–	1100	1650

Table 12

Size	Transmittable torques [Nm] on shrink disk hubs frictional locking (Type 496._14.0) - dependent on bore - suitable for tolerance constellation H7/g6																			
	Ø 19	Ø 20	Ø 22	Ø 24	Ø 25	Ø 28	Ø 30	Ø 32	Ø 35	Ø 38	Ø 40	Ø 42	Ø 45	Ø 48	Ø 50	Ø 52	Ø 55	Ø 60	Ø 65	Ø 70
01	150	150	150	150	150	150	150	150	150	150	-	-	-	-	-	-	-	-	-	-
0	-	-	-	-	225	225	225	225	225	225	225	225	225	-	-	-	-	-	-	-
1	-	-	-	-	339	404	448	492	558	620	659	694	738	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	873	937	1036	1132	1195	1255	1338	1454	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	1268	1394	1480	1565	1691	1890	2065	2204

Table 13

Size	Max. permitted shaft misalignments torsionally rigid coupling Type 496._ _4.0			Locking set screw (35.1) for hub (Item 35 / Fig. 1)	
	Axial ΔK_a [5] [mm]	Radial ΔK_r [mm]	Angular ΔK_w [°]	Thread	Tightening torque [Nm]
01	0.9	0.2	2.0	-	-
0	1.1	0.2	2.0	-	-
1	0.8	0.2	1.4	M5 ($Ød_p \leq 22$) - M6 ($Ød_p > 22$)	2 / 4.1
2	1.1	0.25	1.4	M6	4.1
3	1.3	0.3	1.4	M8	8.5

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

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Design

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

Scope of Delivery / State of Delivery

- ❑ The 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).
  Unless the customer requests a particular torque setting when ordering, the clutch will be pre-set to approx. 70 % of the maximum torque.

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 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.
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 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 and remains disengaged.
The input and the output are separated residual torque-free.
A **limit switch with ATEX-approval** (not included in the standard scope of delivery) must be installed. The limit switch registers the disengagement movement and switches off the drive.
After-acting masses can run free.

CAUTION

After overload occurrence, the clutch has no load-holding function.

Re-engagement

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

EAS®-Compact® overload clutch re-engagement is carried out by applying axial pressure onto the thrust washer (3).
For this, different procedures are possible:

- ❒ Manually, using a plastic hammer or installation levers (Fig. 2) supported on the cup springs (9), e. g. two screwdrivers placed opposite each other.
- ❒ By using an engagement mechanism.
  The engagement procedure can also be automated using pneumatic or hydraulic cylinders.

On both variants, it may be necessary to turn between the clutch input and output sides slightly.

Please observe the information on the dangers of re-engagement in areas where there is a danger of explosion on page 16.

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 = 2.5 x M_G [N]

F_E = Engagement force of the clutch [N].

M_G = Set limit torque for overload [Nm].

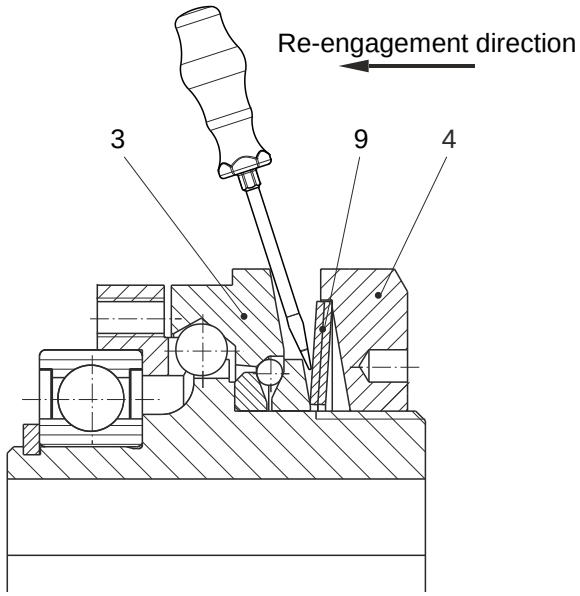

Fig. 2

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Output Elements Installation

The output element is centred on a deep groove ball bearing (6) (tolerance H7/h5) and bolted together with the pressure flange (2).

Please observe the maximum permitted screw-in depth in the pressure flange (2) as well as the connection dimensions "a" and "e" for the output elements, see Figs. 4 or 5 and Table 14.

If the resulting radial force from the output element is anywhere near the centre of the ball bearing (6) 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).
The EAS®-Compact® with a long protruding hub (Type 490._ _ 4.1 / Fig. 3) is recommended for extremely wide output elements, or for elements with small diameters. On very small diameters, the output element is screwed together with the clutch pressure flange (2) via a customer-side intermediate flange.

Example:
Type 490.614.0 Type 490.614.1

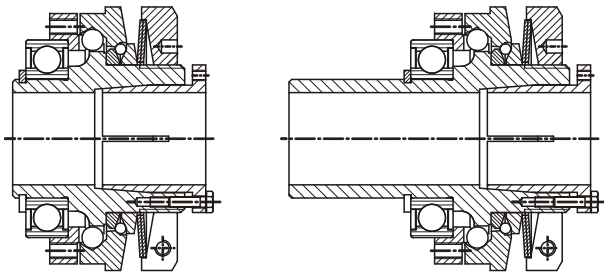

Fig. 3

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 locating bearing (Fig. 5).

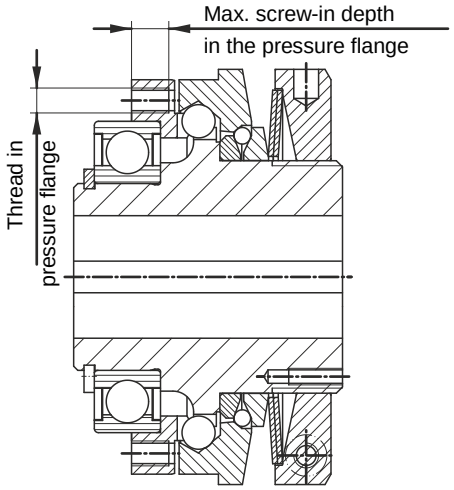

Fig. 4

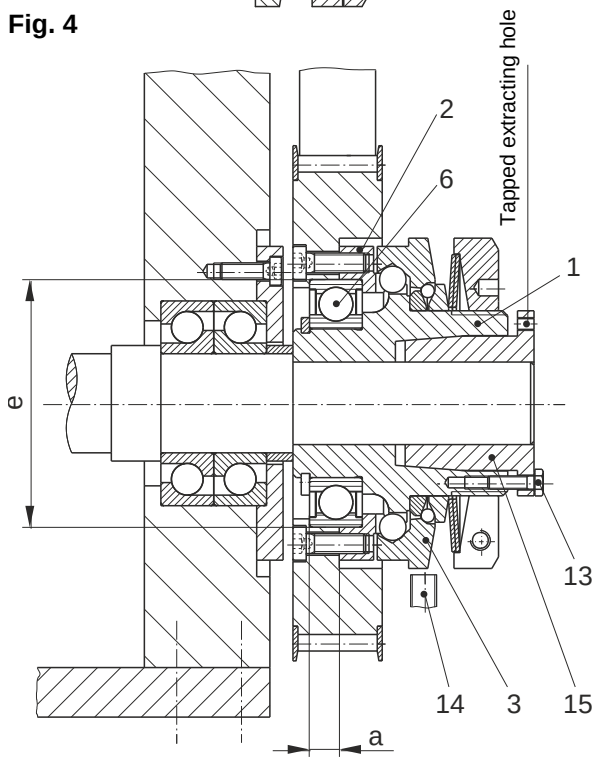

Fig. 5

Table 14

Size	Thread in pressure flange (Fig. 4) with required screw quality and tightening torque for the customer-side screw connection	Max. screw-in depth [mm] in the pressure flange (Fig. 4)	Connection dimensions [mm] (Fig. 5)	
			a $^{+0.1}$	e $^{H7}_{h5}$
01	8 x M4 / 8.8 / 2.6 Nm	6	5	47
0	8 x M5 / 8.8 / 5.1 Nm	7	7	62
1	8 x M6 / 8.8 / 9 Nm	9	9	75
2	8 x M6 / 12.9 / 16 Nm	10	10	90
3	8 x M8 / 12.9 / 40 Nm	12	10	100

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Cup Spring Layering (Fig. 6)

Correct cup spring layering is a prerequisite for problem-free clutch function and torque adjustment.

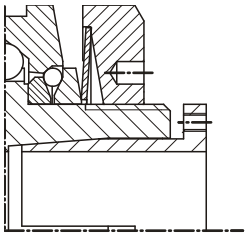
For the lower torque range, **one** cup spring (Type 49_.**5**_ 4._),

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.

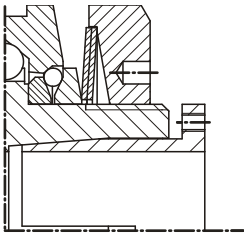
The maximum torque range with **five** cup springs (Type 49_.**8**_ 4._) is **not** permitted for ATEX.

1x layered



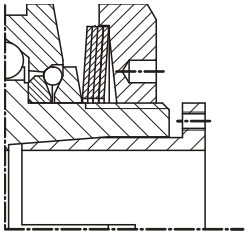
Type 49_.**5**_4._

2x layered



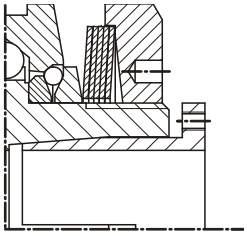
Type 49_.**6**_4._

4x layered



Type 49_.**7**_4._

5x layered



Type 49_.**8**_4._

Attention!
Not permitted for ATEX

Fig. 6

Mounting onto the Shaft

EAS®-Compact® clutches include cone bushings, shrink disks, clamping hubs or keyways as part of the standard delivery.
During installation of cone bushings, shrink disks or clamping hubs, please observe the following:

- ❒ Recommended shaft tolerance for cone bushings: h6
- ❒ Recommended shaft tolerance for clamping hubs: h6
- ❒ Recommended shaft tolerance for shrink disk hubs: g6
- ❒ Shaft surface: finely turned or ground (Ra = 0.8 µm).
- ❒ Shaft material: yield point at least 400 N/mm^2, e.g. C45 +QT, 42CrMoS4 +QT.
- ❒ 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 or clutch hubs onto both shaft ends using a suitable device and bring it / them into the correct position.
- ❒ Tighten the tensioning screws (13) of the cone bushing (15) 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 5.
- ❒ Type 494.-:
  Tighten the tensioning screws (22) in the shrink disks (20.1) stepwise (in 3 to max. 6 tightening sequences) and cross-wise evenly using a torque wrench to the torque stated in Table 5.
- ❒ Type 496.-:
  Tighten the tensioning screws (34.2) in the shrink disks (34.1) using a torque wrench evenly and one after the other in max. 6 sequences to the torque stated in Table 5.
- ❒ The transmittable torques of the shaft-hub connection are dependent on the bore diameter and the quality of the drive shafts used. Please observe the respective transmission tables in the valid and applicable product catalogue.

The clutch or clutch hub carries out an axial movement in the direction of the cone bushing (15) when tightening the cone bushing (15). Because of this effect, please ensure that on the EAS®-Compact® clutch with steel bellows (Type 493._ _ 4.0), first one cone bushing is completely tightened (e.g. Item 15), then the other (steel bellows) side (Item 24, page 3).
Please also ensure during installation of Type 493._ _4.0 that no axial pressure is placed on the steel bellows (can cause damage).

De-installation of the Cone Bushings and Shrink Disks

In the cone bushings and the shrink disks, there are tapped extracting holes next to the tensioning screws.

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

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Shaft Installation via Key Connection

On the EAS®-Compact® with a keyway, the clutch must be axially secured both EAS®-side and lastic-side after mounting onto the shaft, e.g.:

- ❒ for Types 490._24._ and 493._24.0
  with a press cover and a screw, screwed into the shaft threaded centre hole
- ❒ for Types 494._24._ and 496._24.0
  on the EAS®-side with a press cover and a screw, screwed into the shaft threaded centre hole and on the lastic-side with a locking set screw:
  - ➔ Locking set screw (20.4) for hub (20.3), see Fig. 1 on page 3 and table 10 on page 7,
  - ➔ Locking set screw (35.1) for hub (35), see Fig. 1 on page 3 and table 13 on page 8.

Joining Both Clutch Hubs (Items 1 / 27) Type 493._ _4.0 (Fig. 1)

When mounting the hubs (1 and 27), the joining force must not be transferred via the steel bellows
=> danger of bellows deformation.

Joining Both Clutch Components (1/20) Type 494._ _ 4._ (Figs. 1 and 7)

The flexible elastomeric element (19) is pre-tensioned between the metal claws by joining components 20.1/20.2/20.3 with component 18. To do this, an axial installation force is required. The force required can be reduced by lightly greasing the elastomeric element.

Use PU-compatible lubricants (e. g. Mobilith SHC460)!
No unpermittedly high axial pressure should be placed on the elastomeric element (19) in completely assembled condition.
Keep to distance dimension “E” acc. Fig. 7 and Table 10!

Joining Both Clutch Components Type 496._ _4.0 (Fig. 1)

Join the misalignment-flexible part and the overload clutch and screw together with cap screws (Item 40) to the tightening torque given in Table 5.
The cap screws (Item 40) must be protected using a screw-securing product, e.g. Loctite 243.

The clutch or clutch hub carries out an axial movement in the direction of the cone bushing (15) when tightening the cone bushing (15). Because of this effect, please ensure that on the EAS®-Compact® clutch with disk pack (Type 496._ _ 4.0), first the cone bushing (15) is completely tightened, then the other (disk pack) side.

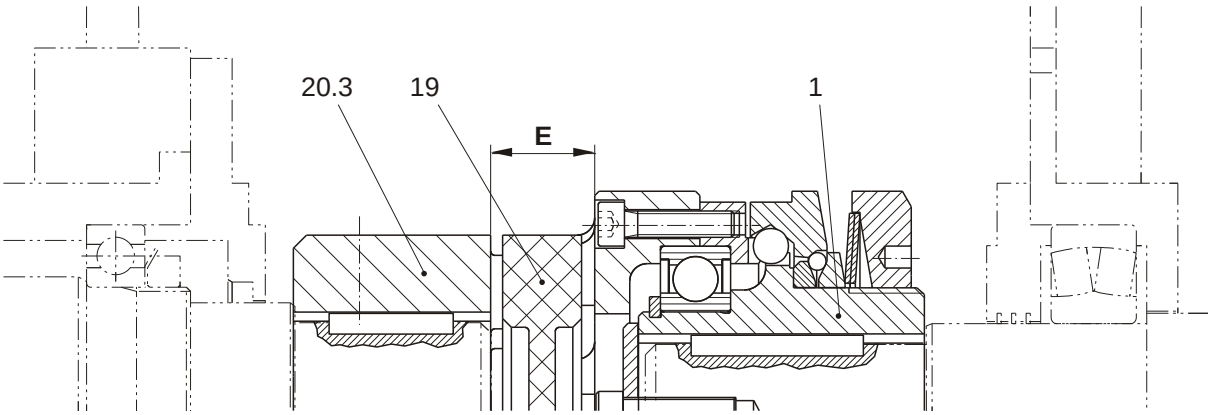

Fig. 7

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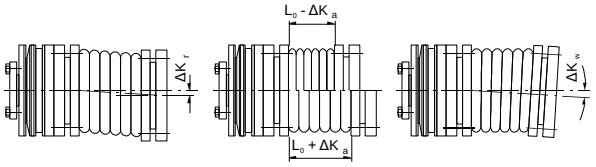
Permitted Shaft Misalignments

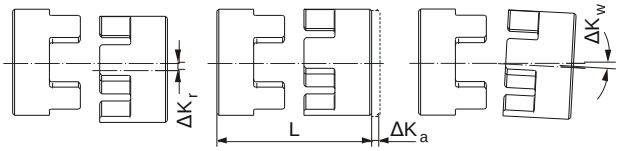
The EAS®-Compact® clutches Types 494._ _ 4._ (lastic backlash-free), 493._ _ 4.0 (with steel bellows) and 496._ _ 4.0 (torsionally rigid backlash-free) compensate for radial, axial and angular shaft misalignments (Fig. 8) without losing their backlash-free function. However, the Type-specific permitted shaft misalignments indicated in Tables 6, 10 and 13 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. 9.
The sum total of the actual misalignments in percent of the maximum value must not exceed 100 %.
The permitted misalignment values given in Tables 6, 10 and 13 refer to clutch operation at nominal torque, an ambient temperature of +30 °C and an operating speed of 1500 rpm. If the clutch is operated in other or more extreme operating conditions, please observe the dimensioning guidelines stated in the individual shaft coupling catalogues or contact the manufacturer.

Type 493._ _ 4.0 (with steel bellows)



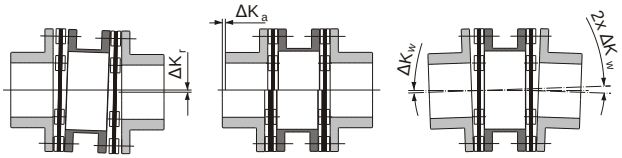
Radial misalignment | Axial displacement | Angular misalignment

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



Radial misalignment | Axial displacement | Angular misalignment

Type 496._ _ 4.0 (torsionally rigid backlash-free)



Radial misalignment | Axial displacement | Angular misalignment

Fig. 8

Example (Size 3 / Type 493. _ _ 4.0):

Axial displacement occurrence ΔK_a = 0,4 mm equals 40 % of the permitted maximum value ΔK_a = 1,0 mm.
Radial misalignment occurrence ΔK_r = 0,09 mm equals 30 % of the permitted maximum value ΔK_r = 0,3 mm.
=> permitted angular misalignment K_w = 30 % of the maximum value ΔK_w = 2,0° => ΔK_w = 0,6°

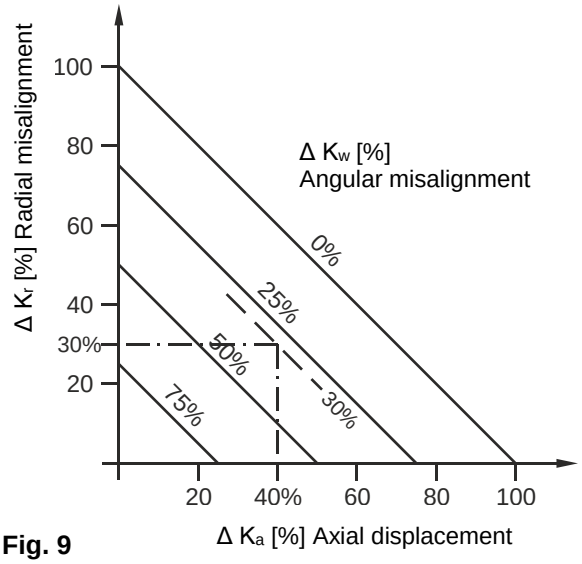


Fig. 9

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.

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Torque Adjustment

The torque is set manufacturer-side according to the customer's request.
Torque adjustment is carried out by turning the adjusting nut (4). The installed cup springs (9) are operated in the negative range of the characteristic curve (see Fig. 12); this means that a stronger pre-tensioning of the cup spring results in a decrease of the spring force.
If no particular torque adjustment is requested customer-side, the clutch will always be **pre-set** and **marked** (calibrated) to approx. 70 % of the maximum torque.
It is possible to check the **"Spring operation in the operating range"** (Fig. 12) using the dimension "a" (distance from the adjusting nut (4) facing side to the hub (1) facing side, as shown in Fig. 10).
Please see Table 3 for the respective values.

Turning the adjusting nut (4) clockwise causes a reduction in torque.
Turning it anti-clockwise causes an increase in torque.
You should be facing the adjusting nut (4) as shown in Fig. 10 and Fig. 11.

Changing the Torque

a) Please convert the required torque using the formula below into percent of the maximum adjustment value (see Table 3).

$$\frac{\text{Required torque adjustment}}{\text{max. adjustment value}} \times 100 = \text{Adjustment in \%}$$

b) Loosen the locking screw (5) in the adjusting nut (4).

c) Turn the adjusting nut (4) using the engraved adjustment scale (Fig. 11) clockwise or anti-clockwise using a hook or a face wrench until the required torque is reached.

d) The required torque results from the marking overlap on the hub (1) and the percent value on the adjusting nut (Item 4 / Figs. 10 and 11).

e) Re-tighten the locking screw (5)
(please observe the tightening torque acc. Table 5).

Adjusting the adjusting nut (4) or distorting the cup spring (9) outside of the cup spring characteristic curve (see Fig. 12) stops the clutch functioning.
The inspection dimension “a” (see Table 3) can show deviations due to construction tolerances or to clutch wear.

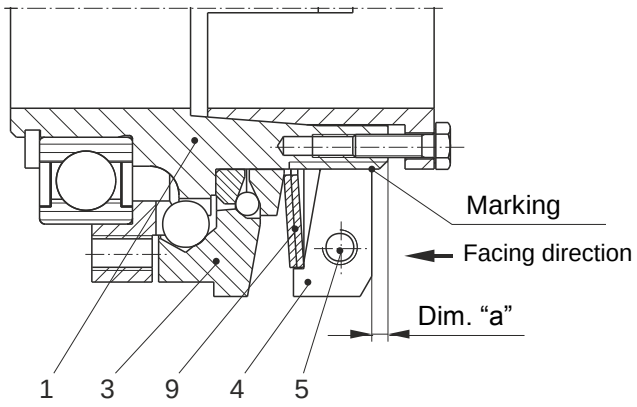

Fig. 10

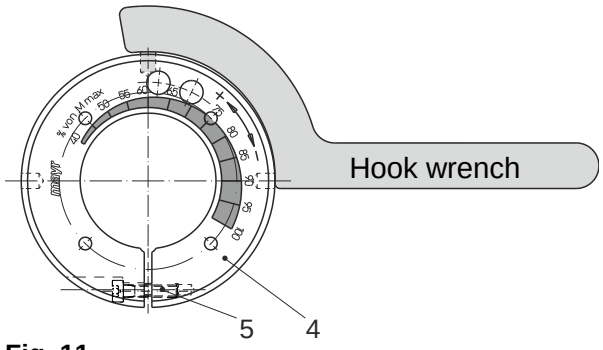

Fig. 11

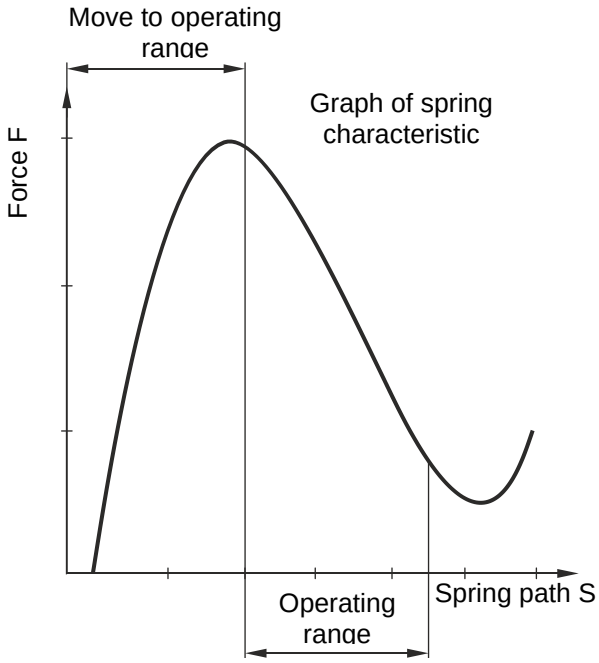

Fig. 12

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Limit Switch (Item 14; Figs. 1 and 13)

In order to limit run-out times after overload has taken place, a limit switch must be mounted onto the overload clutch.
Limit switches with appropriate explosion protection certification are suitable.
Grinding, mechanically actuated limit switches are only permitted for application in areas where there is a danger of explosion if it can be proved that there is no danger of ignition caused by the grinding movement of the mechanical limit switch on the clutch.
The contactless limit switch is to be mounted onto the switching edge of the clutch (Fig. 13) 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) carries out a stroke (see Fig. 1 and Table 2) in the direction of the adjusting nut (4), which is used to signal change on the limit switch (14).
The signal change should take place at the latest after an axial thrust washer (3) stroke of 0.5 mm. At the same time, please maintain a radial minimum distance of 0.5 mm in order to prevent rubbing of the contactless limit switch, meaning a danger of ignition.

Limit Switch Installation

- ❒ Adjust the switch distance for the contactless Ex-limit switch acc. Fig. 13.
- ❒ Please ensure that the Ex-limit switch is functioning correctly.

Contactless limit switch (mounting example)

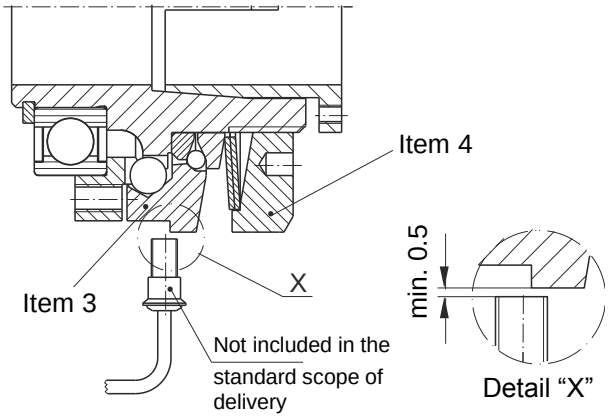

Fig. 13

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

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

- ➔ Re-greasing of the 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 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.

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.

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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Guidelines and Directives for Operation in Ex Areas Where There is a Danger of Explosion

Conditions to Observe in Ex Areas Where There is a Danger of Explosion

For malfunction-free coupling operation, it is necessary to keep to the coupling characteristic values (Technical Data) indicated on pages 5 to 8 and in the catalogue.

Clutch Dimensioning

A suitable adjustment factor (service factor) is required so that the clutch can protect the drive line from overload without excessive wear over a long lifetime. The service factor is the relationship between the maximum load torque on the system in normal operation and the set clutch torque. This factor must be at least 1.5 and is selected depending on the complex of loads acting on the system. Adjustment factors of up to 3 may be necessary for very severe impacts and load peaks or alternating loads.
Regular functional inspections on the clutch (see Maintenance Intervals) confirm the functioning, unworn condition of the clutch. Wear on the clutch can lead to changes in the switch-off torque, or even to clutch blockage.
On overload, the clutch run-out times must be limited via a limit switch capable of recognising a clutch overload occurrence (usually with an inductive proximity switch for Ex-areas). Max. permitted run-out time: 3 minutes, with reference to an average speed of 3000 rpm. After overload has been registered, the sensor must emit a signal to stop the drive line. The blockage or malfunction must be removed.

CAUTION

Operation outside of the indicated characteristic data is not permitted. There is a danger of coupling destruction and of ignition.

Torque Adjustment

The clutch must only be adjusted within the specified torque range. The torque range is defined via the adjusting nut graduation from 40 % to 100 %.
If the clutch is set outside of the permitted adjustment range, it is possible that the clutch will not actuate in case of overload. This means that the overload protection will be blocked. This does not mean that the clutch can directly cause ignition. However, if the system torque increases to an unpermitted value, component breakage can be expected.
The user must ensure via simulated disengagement of the clutch before initial operation that the clutch actuates at the required torque value after torque adjustment or torque changes have taken place.

CAUTION

Danger of ignition!

Re-engagement

Attention: Impacts using metal tools made of steel or aluminium are not to be used for re-engagement, as there is a danger of impact sparks. Tools made of plastic or bronze are suitable. Please observe the danger of electrostatic charging when using plastic tools. In general, please observe the Guidelines in EN 1127-1. When using an automatic re-engagement mechanism, a locking device must be provided which guarantees free stroke on the thrust washer (3) in case of overload, even if re-engagement is actuated. Interfering contours which prevent the thrust washer (3) from disengaging or which are mounted especially for this purpose are not permitted. Free rotation of the clutch and free movement of the clutch components must be ensured before initial operation.

CAUTION

Danger of ignition!

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Guidelines and Directives for Operation in Ex Areas Where There is a Danger of Explosion

Initial Operation

If no stipulations regarding lacquering or other surface treatments have been made customer-side on order, the clutch surface is protected by a phosphate coating. The clutch must only be used in areas protected from the weather. Additional corrosion protection is required for use in the open air or if the device is subject to weather conditions. Severely corroded clutch components mean a danger of ignition.
The functional components of the clutch must not be stuck together due to paint coatings or other sticky media, and electrostatic charges must not be caused (see EN 13463-1 7.4). A functional inspection must be carried out before initial operation.
The penetration of dirt or dust influences the grease condition of the clutch and therefore its lifetime. Organic dust binds the grease filling and the lubrication qualities of the grease are lost.

The clutch must be axially secured onto the shaft. Correct securement must be checked before initial operation.

Do not allow bending torques to be transmitted onto the pressure flange (2) when output elements (toothed belt wheel, sprocket wheels, flanges) are mounted onto the pressure flange (2).

Please observe the permitted thread screw-in depths (Table 14, page 10). If the screws inserted into the pressure flange (2) are too long, there is a danger of component destruction and therefore of ignition.

Overload clutches are rotating parts, which can cause danger of injury due to striking foreign bodies or can cause danger of ignition, should they not be secured properly by a cover. The user is responsible for providing covers for these parts (we recommend rustproof steel). The minimum distance of 5 mm must be observed. The covers must not be made of aluminium. The respective guidelines and standards must be observed. Operation in dust layers or in piles of dust is not permitted.

Only minor radial and axial forces or transverse force torques are permitted to be transferred onto the clutch bearing (Table 15).

Modifications of the clutch are not permitted. This also refers to changes to the cup spring layering.

Table 15 (Max. Permitted Bearing Loads)

Size	Axial forces [N]	Radial forces [N]		Transverse force torques [6] [Nm]
		1-bearing design	2-bearing design	
01	650	650	1000	5
0	1000	1000	1500	10
1	1500	1500	2250	20
2	2400	2400	3600	30
3	4200	4200	6300	40

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

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Installation and Operational Instructions for EAS®-Compact® overload clutch Type 49_._ _4._ Sizes 01 to 3

(B.4.14.1.ATEX.EN)

Guidelines and Directives for Operation in Ex Areas Where There is a Danger of Explosion

EAS®-Compact® overload clutch without a mounted coupling Type 490._ _4.0 and EAS®-Compact® overload clutch with a ROBA®-DS mounted coupling Type 496._ _4.0

Classification of Ex Areas Where There is a Danger of Explosion and Permitted Types

Torque transmission via a key connection acc. DIN 6885/1:

Dimensioning according to the requirements shaft diameter, transmittable torque and operating conditions must be carried out. For this, the corresponding user data must be known or the customer must carry out the dimensioning according to the valid calculation basis DIN 6892. For the calculation, a hub quality of Re = 400 N/mm^2 should be used.
For the dimensioning of the key connections, the permitted tensions common in machine construction must be considered.
During initial operation, check whether the key is inserted correctly and whether the clutch is secured axially.
According to the described clutch combinations and if the measures and guidelines described in the Installation and Operational Instructions are observed, the EAS®-Compact® overload clutch is suitable for use in areas where there is a danger of explosion according to the category:

CE Ex II 2G c T5 –15°C≤Ta≤+80°C D110°C

Permitted Types: 490.524.0 / 490.624.0 / 490.724.0
490.524.1 / 490.624.1 / 490.724.1
496.524.0 / 496.624.0 / 496.724.0

If they are professionally mounted according to the regulations, **backlash-free cone-shaft-hub connections** on the overload clutch are secure connections.
Malfunctions are to be expected if parameters which cannot be influenced by the manufacturers affect the device (surface quality, strength class, shaft tolerance quality) and affect each other. Designs with backlash-free cone-shaft-hub connections are suitable without an additional keyway or without inspection of the transmittable torque in the system (the calculatory transmission guarantee of at least S = 2 must be maintained) for application in areas in which there is a danger of explosion, category:

CE Ex II 3G c T5 –15°C≤Ta≤+80°C D110°C

Permitted Types: 490.514.0 / 490.614.0 / 490.714.0
490.514.1 / 490.614.1 / 490.714.1
496.514.0 / 496.614.0 / 496.714.0

Please observe the guidelines referring to the transmittable torque on cone bushing hubs in the currently valid EAS®-Compact® overload clutch catalogue.
Expected malfunctions can be avoided if the respective customer-side application constellation is checked as to whether the torque transmission capability of the shaft-hub connection can be sufficiently guaranteed (at least 1.5 to the maximum torque on the system).

This inspection must be repeated at regular intervals during maintenance work (see maintenance intervals). Furthermore, the transmission guarantee is maintained if a positive locking e.g. a key connection is used in addition to a clamping connection.

In these conditions, clutch application is possible in the following areas:

CE Ex II 2G c T5 –15°C≤Ta≤+80°C D110°C

Permitted Types: 490.514.0 / 490.614.0 / 490.714.0
490.514.1 / 490.614.1 / 490.714.1
496.514.0 / 496.614.0 / 496.714.0

Conditions to Observe in Ex Areas Where There is a Danger of Explosion

Clutch Dimensioning
Type 496._ _4.0 (ROBA®-DS mounted coupling):

For suitable clutch dimensioning, please observe the following points:

a.) Coupling nominal torque
b.) Coupling peak torque
c.) Max. speed
d.) Max. misalignment compensation capability
e.) Ambient conditions (see currently valid ROBA®-DS catalogue)

Despite technical clutch dimensioning, system-dependent vibration excitations may occur during operation, which might lead to resonances and therefore to destructions on the ROBA®-DS coupling. In principle, the coupling is for operation in the subcritical speed range. The total load profile of the system must be run through during initial operation in order to confirm the suitability of the coupling in the system.

Furthermore, clutch malfunctions must be expected if the Installation Guidelines are not observed. The data stated in these Installation and Operational Instructions must be observed.
All tightening torques must be observed.
After having reached the specified Maintenance and Inspection Intervals, the tightening torques must be inspected using a torque wrench. If the specified torques are not observed, component movements due to metal contact and therefore warming up and formation of sparks must be expected.
Constructional modifications of the coupling are not permitted.

Please observe the applicable ATEX Installation and Operational Instructions for ROBA®-DS couplings.

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Installation and Operational Instructions for EAS®-Compact® overload clutch Type 49_._ _4._ Sizes 01 to 3

(B.4.14.1.ATEX.EN)

Guidelines and Directives for Operation in Ex Areas Where There is a Danger of Explosion

EAS®-Compact® overload clutch with a mounted elastomer coupling Type 494._ _4._

Classification of Ex Areas Where There is a Danger of Explosion and Permitted Types

ROBA®-ES- mounted coupling with key hub and EAS®-side key hub

According to the described clutch combinations and if the measures and guidelines described in the Installation and Operational Instructions are observed, the EAS®-Compact® overload clutch with a mounted elastomer coupling is suitable for use in areas where there is a danger of explosion according to the category:

CE Ex II 2G c T4/T5
–15°C≤Ta≤+80/60°C D110°C

Permitted Types: 494.524.3 / 494.624.3 / 494.724.3
494.524.4 / 494.624.4 / 494.724.4
494.524.6 / 494.624.6 / 494.724.6

For the dimensioning of the key connections, the permitted tensions common in machine construction must be considered. During initial operation, check whether the key is inserted correctly and whether the clutch is secured axially.

ROBA®-ES mounted coupling with clamping hub and shrink disk hub and EAS®-side cone bushing

The designs with backlash-free shaft-hub connections are in the standard design suitable for application in areas where there is a danger of explosion according to the category:

CE Ex II 3G c T4/T5
–15°C≤Ta≤+80/60°C D110°C

Permitted Types: 494.504.3 / 494.604.3 / 494.704.3
494.504.4 / 494.604.4 / 494.704.4
494.504.6 / 494.604.6 / 494.704.6
494.514.3 / 494.614.3 / 494.714.3
494.514.4 / 494.614.4 / 494.714.4
494.514.6 / 494.614.6 / 494.714.6

Please observe the guidelines referring to the transmittable torque on clamping and shrink disk hubs in the currently valid ROBA®-ES catalogue.

For the bore diameters on the lastic hubs shown in Table 16, an additional keyway can be used in these designs for secure torque transmission. Furthermore, secure torque transmission is guaranteed if the respective customer-side application constellation is checked as to whether the torque transmission capability of the shaft-hub connection can be sufficiently guaranteed (at least 1.5 to the maximum torque on the system). This inspection must be repeated at regular intervals during maintenance work (see maintenance intervals).

In these conditions, clutch application is possible in the following areas:

CE Ex II 2G c T4/T5
–15°C≤Ta≤+80/60°C D110°C

Permitted Types: 494.504.3 / 494.604.3 / 494.704.3
494.504.4 / 494.604.4 / 494.704.4
494.504.6 / 494.604.6 / 494.704.6
494.514.3 / 494.614.3 / 494.714.3
494.514.4 / 494.614.4 / 494.714.4
494.514.6 / 494.614.6 / 494.714.6

Conditions to Observe in Ex Areas Where There is a Danger of Explosion

For malfunction-free clutch operation, it is necessary to keep to the coupling characteristic values (Technical Data) indicated in Tables 5, 8, 9 and 10 and in the ROBA®-ES catalogue.

Suitable clutch dimensioning according to the currently valid ROBA®-ES catalogue is necessary for a malfunction-free and extremely low-wear operation.
Large shaft misalignments, in particular with high speeds and an alternating overall load configuration with high frequency, strain and heat up the elastomer material.
Unpermittedly high overall load configuration, unpermittedly high speeds and unpermitted shaft misalignments can destroy the clutch.

CAUTION

Danger of ignition!

For suitable clutch dimensioning (see calculation in the currently valid catalogue), please observe the following points:

a.) Coupling nominal torque
b.) Coupling peak torque
c.) Max. speed
d.) Max. shaft misalignments
e.) Ambient conditions
(see currently valid ROBA®-ES catalogue)
f.) Service factors
(see currently valid ROBA®-ES catalogue)

CAUTION

Operation outside of the indicated characteristic data is not permitted. There is a danger of clutch destruction.

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Guidelines and Directives for Operation in Ex Areas Where There is a Danger of Explosion

The number and type of start-up impacts must be taken into account according to the ROBA®-ES catalogue during coupling dimensioning. Furthermore, elastomer heating may occur due to speed resonance. This must also be taken into account according to the catalogue during coupling dimensioning. Changed operating parameters in the system require a renewed inspection of the clutch dimensioning. The maximum given ambient temperatures are to be kept to. The maximum surface temperature of the coupling changes in dependence of the ambient temperature, see coupling marking. Exceeding the permitted ambient temperature means a danger of elastomer destruction, or the maximum permitted surface temperature of the coupling is exceeded. With destroyed or heavily worn elastomer there is the danger that the metallic claws of the hubs hit each other.

CAUTION

Danger of ignition!

Table 16

Type	Bore [mm]	Size 01	0	1	2	3
494._04._	d_{min}	15	19	20	28	35
	d_{max}	28	35	45	45	55
494._14._	d_{min}	15	19	20	28	35
	d_{max}	28	38	45	50	60

Electrical potential equalization on the coupling must be possible via the mounted shaft ends using the motor or gearbox.

All screws must be secured against loosening using a sealing lacquer, e.g. Loctite 243.

Despite technical clutch dimensioning, system-dependent vibration excitations may occur during operation, which might lead to resonances and therefore to destructions on the coupling. On critical applications, the total load profile of the system must be run through during initial operation in order to confirm the suitability of the coupling in the system.

Furthermore, clutch malfunctions must be expected if the Installation Guidelines are not observed. The data stated in these Installation and Operational Instructions must be observed.
All tightening torques must be observed.
After having reached the specified Maintenance and Inspection Intervals, the tightening torques must be inspected using a torque wrench. If the specified torques are not observed, component movements due to metal contact and therefore warming up and formation of sparks must be expected.
Constructional modifications of the coupling are not permitted.

Initial Operation

Steel hubs and steel shrink disks have been phosphated manufacturer-side to form a basic corrosion protection. All other components are untreated.

The clutch must be axially secured onto the input and output shaft. Correct securement must be checked before initial operation.
In the key design, please secure the locking set screw with sealing lacquer, e.g. Loctite 243.

Layers of dust on the coupling or operation in piles of dust is not permitted.

The rotating coupling components must be protected against contact and against foreign body impacts.
Please mount a suitable cover onto the clutch.
We recommend using a clutch cover made of stainless steel.
The design must be arranged in such a way that no deformations occur by impacting parts which cause a rubbing of the cover at the clutch (danger of ignition).
The distance from the cover to the rotating components must be at least 5 mm.
The cover must be electrically conductible.
Covers made of aluminium are not permitted.

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Installation and Operational Instructions for EAS®-Compact® overload clutch Type 49_._ _4._ Sizes 01 to 3

(B.4.14.1.ATEX.EN)

Guidelines and Directives for Operation in Ex Areas Where There is a Danger of Explosion

Maintenance and Inspection Intervals for ROBA®-ES Couplings in Ex Areas Where There is a Danger of Explosion

The following maintenance and inspection intervals are to be maintained:

1.) Visual inspection, inspection of the installation parameters (misalignment and tightening torques) and the coupling running behaviour **before initial operation.**

2.) Inspection of the misalignment and the tightening torques, coupling running behaviour **after 1000 h, at the latest after 3 months.**

3.) If no irregularities or wear are found during the second maintenance and inspection interval, further inspection intervals can, with unchanged operating parameters, take place **after 4000 operating hours or after maximum 12 months.**

Elastomer wear limit:
No abraded particles are allowed on the elastomeric element (19), as the ROBA®-ES is a backlash-free coupling. The gap between two claws must be filled with the elastomer, with no room for backlash. You should not be able to insert a feeler gauge with a thickness of 0.1 mm (Fig. 14).

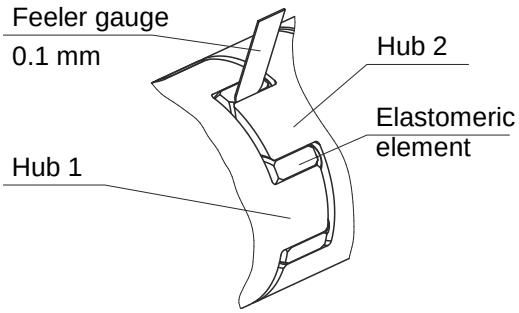

Fig. 14

If wear or damages are detected, the affected components must be replaced immediately and the cause of the malfunction must be determined.

Causes of malfunctions could be:

a.) Excessive misalignment
b.) Excessive load
(load alternations, start-up impacts, overload)
c.) Ambient influences

Wear or damage on the elastomer coupling manifest themselves as:

a.) Noise development
b.) Troubled running behaviour, vibration occurrences
c.) Formation of cracks on the components
d.) Warming
e.) Loosening of the components
f.) Friction tracks

CAUTION Should any irregularities occur, the system must be stopped independently of imminent maintenance and inspection intervals, and the cause of the malfunction must be determined using the Malfunctions / Breakdowns Table.

EAS®-Compact® overload clutch with a bellows mounted coupling Type 493._ _4.0

Classification of Ex Areas Where There is a Danger of Explosion and Permitted Types

These coupling variants have the required safety standard for normal operation.
Vibration resonances or strong vibrations on the coupling, which can cause heating of components or coupling destruction, must be avoided at all costs.
According to the described clutch combinations and if the measures and guidelines described in the Installation and Operational Instructions are observed, the EAS®-Compact® overload clutch with a bellows mounted coupling is suitable for use in areas where there is a danger of explosion according to the category:

CE Ex II 3G c T5 –15°C≤Ta≤+80°C D110°C

Permitted Types: 493.514.0 / 493.614.0 / 493.714.0
493.524.0 / 493.624.0 / 493.724.0
493.534.0 / 493.634.0 / 493.734.0

The safe securement of the clutch as well as the safe torque transmission on the shaft-hub connection is to be inspected before initial operation and during all specified maintenance intervals.

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Malfunctions / Breakdowns Type 490._ _4._

Result of Malfunction	Possible Causes	Danger Guidelines for Ex Areas	Solutions
Premature clutch release	Incorrect torque adjustment Adjusting nut has changed position Worn clutch	None	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
Clutch does not release on overload	Incorrect torque adjustment Adjusting nut has changed position Disengagement mechanism blocked by a foreign body Worn clutch	Danger of component destruction and related danger of ignition	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
Running noises on overload occurrence as clutch slows down	Bearing on output flange is worn or has been previously damaged Worn disengagement mechanism	Bearing heat-up to bearing destruction Danger of ignition	1) Set the system out of operation 2) Inspect the clutch at the place of manufacture
Running noises in normal operation	Insufficient clutch securement Loosened screws Loosened adjusting nut	Danger of ignition	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

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Malfunctions / Breakdowns Type 494._ _ 4._

Result of Malfunction	Possible Causes	Danger Guidelines for Ex Areas	Solutions
Changes in running noise and / or vibration occurrence	Incorrect alignment	Increased temperature on the elastomeric element surface; Danger of ignition due to hot surfaces	1) Set the system out of operation 2) Find / resolve the cause of incorrect alignment (e. g. loose foundation screws, motor securement breakage, heat expansion of system components, changes in the coupling distance dimension “E”) 3) Check the clutch for wear
	Wear on the elastomeric element, temporary torque transmission due to metal contact	Danger of ignition due to formation of sparks	1) Set the system out of operation 2) Dismantle the coupling and remove the remainders of the elastomeric element 3) Check the clutch parts and replace if damaged 4) Insert a new elastomeric element, install clutch components 5) Check the alignment and correct if necessary
	Tensioning and clamping screws or locking set screw for axial hub securement or connection screws are loose	Danger of ignition due to hot surfaces and formation of sparks	1) Set the system out of operation 2) Check the clutch alignment 3) Tighten the tensioning and clamping screws for axial hub securement and 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 clutch for wear
Cam breakage	Wear on the elastomeric element, torque transmission due to metal contact	Danger of ignition due to hot surfaces and formation of sparks	1) Set the system out of operation 2) Replace the entire coupling 3) Check the alignment
	Cam breakage due to high impact energy / overload / excessively high shaft misalignments	Danger of ignition due to hot surfaces and formation of sparks	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	Danger of ignition due to hot surfaces and formation of sparks	1) Set the system out of operation 2) Check the operating parameters and select a suitable clutch (observe installation space) 3) Install a new coupling 4) Check the alignment
	Operational mistakes due to clutch characteristic data being exceeded	Danger of ignition due to hot surfaces and formation of sparks	1) Set the system out of operation 2) Check coupling dimensioning 3) Replace the entire coupling 4) Check the alignment 5) Train and advise operating personnel
Premature wear on the elastomeric element	Incorrect alignment	Increased temperature on the elastomeric element surface; Danger of ignition due to hot surfaces	1) Set the system out of operation 2) Find / resolve the cause of incorrect alignment (e. g. loose foundation screws, motor securement breakage, heat expansion of system components, changes in the coupling distance dimension “E”) 3) Check the clutch for wear

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Malfunctions / Breakdowns Type 494._ _ 4._ (continued)

Result of Malfunction	Possible Causes	Danger Guidelines for Ex Areas	Solutions
Premature wear on the elastomeric element	e.g. contact with aggressive liquids / oils, ozone influences, excessively high ambient temperature etc., which lead to physical changes in the elastomeric element	Danger of ignition due to Formation of sparks on metallic contact of the cams	1) Set the system out of operation 2) Dismantle the coupling and remove the remainders of the elastomeric element 3) Check the clutch parts and replace if damaged 4) Insert a new elastomeric element, install clutch components 5) Check the alignment and correct if necessary 6) Make sure that further physical changes to the elastomeric element can be ruled out
	The ambient or contact temperatures permitted for the elastomeric element are exceeded	Danger of ignition due to formation of sparks on metallic contact of the cams	1) Set the system out of operation 2) Dismantle the coupling and remove the remainders of the elastomeric element 3) Check the clutch parts and replace if damaged 4) Insert a new elastomeric element, install clutch components 5) Check the alignment and correct if necessary 6) Check the ambient or contact temperature and regulate them (if necessary, use other elastomeric element materials)
Premature wear on the elastomeric element (material liquidation inside the elastomeric element toothing)	Drive vibrations	Danger of ignition due to formation of sparks on metallic contact of the cams	1) Set the system out of operation 2) Dismantle the coupling and remove the remainders of the elastomeric element 3) Check the clutch parts and replace if damaged 4) Insert a new elastomeric element, install clutch components 5) Check the alignment and correct if necessary 6) Find the cause of vibration (if necessary, use an elastomeric element with a lower or higher shore hardness)

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Malfunctions / Breakdowns Type 493._ _4.0

Result of Malfunction	Possible Causes	Danger Guidelines for Ex Areas	Solutions
Steel bellows breakage	Incorrect alignment	Increased temperature on the elastomeric element surface; Danger of ignition due to hot surfaces	1) Set the system out of operation 2) Replace the entire coupling 3) Check the alignment
	Steel bellows have already been damaged in transport or during installation	Danger of ignition due to formation of sparks	1) Set the system out of operation 2) Replace the entire coupling 3) Check the alignment
	Operating parameters are not appropriate for the clutch performance	Danger of ignition due to hot surfaces	1) Set the system out of operation 2) Check the operating parameters and select a suitable clutch (observe installation space) 3) Install a new coupling 4) Check the alignment
	Steel bellows is energised in natural frequency; resonance	Danger of ignition due to hot surfaces and formation of sparks	1) Set the system out of operation 2) Re-align the line characteristics 3) Replace the entire coupling 4) Check the alignment
Changes in running noise and / or vibration occurrence	Loosened screws, resonances, insufficient clutch securement	Danger of ignition due to formation of sparks	1) Set the system out of operation 2) Check the screw tightening torques 3) Check the line characteristics 4) Check the clutch parts and replace if damaged

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Malfunctions / Breakdowns Type 496._ _ 4.0

Result of Malfunction	Possible Causes	Danger Guidelines for Ex Areas	Solutions
Changes in running noise and / or vibration occurrence	Incorrect alignment, incorrect installation	Danger of ignition due to hot surfaces	1) Set the system out of operation 2) Find / resolve the cause of incorrect alignment 3) Check the clutch for wear
	Loose connecting screws, minor fretting corrosion under the screw head and on the disk pack	Danger of ignition due to hot surfaces	1) Set the system out of operation 2) Check the clutch parts and replace if damaged 3) Tighten the connecting screws to the specified torque 4) Check the alignment and correct if necessary
	Tensioning screws or locking set screw for axial securement of the hubs are loose	Danger of ignition due to hot surfaces or impact sparks	1) Set the system out of operation 2) Check the clutch alignment 3) Tighten the tensioning and clamping screws for axial hub securement to the required torque or tighten the locking set screw and secure it against self-loosening using sealing lacquer 4) Check the clutch for wear
Disk pack breakage	Disk pack breakage due to high load impacts / overload	Danger of ignition due to impact sparks	1) Set the system out of operation 2) Dismantle the clutch and remove the remainders of the disk packs 3) Check the clutch parts and replace if damaged 4) Find the cause of overload and remove it
	Operating parameters are not appropriate for the coupling performance	Danger of ignition due to impact sparks	1) Set the system out of operation 2) Check the operating parameters and select a suitable clutch (observe installation space) 3) Install a new coupling 4) Check the alignment
	Incorrect operation of the system unit	Danger of ignition due to impact sparks	1) Set the system out of operation 2) Dismantle the clutch and remove the remainders of the disk packs 3) Check the clutch parts and replace if damaged 4) Train and advise operating personnel
Disk packs / connecting screws cracks or breakage	Drive vibrations	Danger of ignition due to impact sparks	1) Set the system out of operation 2) Dismantle the clutch and remove the remainders of the disk packs 3) Check the clutch parts and replace if damaged 4) Check the alignment and correct if necessary 5) Find the cause of vibration and remove it

Please Observe!
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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EU Declaration of Conformity

According to the EU Directive on the harmonisation of the laws of the Member States concerning devices and protective systems intended for use in areas where there is a danger of explosion (ATEX) 2014/34/EU, we:

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hereby declare that the product described in these Installation and Operational Instructions

EAS®-Compact® overload clutch
Type 49_._ _4._X
Sizes 01, 0, 1, 2, 3

has been developed, constructed and produced by us in accordance with the EU Directive named above.

Applied Standards, Regulations and Inspections (ASRI)

1 DIN EN 1127-1: 2011-10
Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology

2 DIN EN 13463-1: 2009-07
Non-electrical equipment intended for use in potentially explosive atmospheres - Part 1: Basic method and requirements

3 DIN EN 13463-5: 2011-10
Non-electrical equipment intended for use in potentially explosive atmospheres - Part 5: Protection by constructional safety “c”

Mauerstetten, May 02, 2016
Place / Date

Graduate Engineer (FH, University of Applied Science) Günther Klingler
(Managing Director ppa.)

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