Installation and Operational Instructions for EAS®-Compact® overload clutch Type 419_._ _ _ _ Size 01 to 3

(B.419.1.EN)

Please read these Operational Instructions carefully and follow them accordingly!
Ignoring these Instructions may lead to malfunctions or to clutch failure, resulting in damage to other parts.

Contents

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Safety and Guideline Signs

CAUTION

Danger of injury to personnel and damage to machines.

Please Observe!
Guidelines on important points.

Safety Regulations

These Installation and Operational Instructions (I + O) are part of the clutch delivery.
Please keep them handy and near to the clutch at all times.

It is forbidden to start initial operation of the product until you have ensured that all applicable EU directives and directives for the machine or system, into which the product has been installed, have been fulfilled.
At the time these Installation and Operational Instructions go to print, the EAS®-clutches accord with the known technical specifications and are operationally safe at the time of delivery.
Without a conformity evaluation, this product is not suitable for use in areas where there is a high danger of explosion.
This statement is based on the ATEX directive.

CAUTION

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

User-implemented Protective Measures

- Cover all moving parts to protect against seizure, dust impacts or foreign body impact.
- Replace self-locking hexagon nuts when they become ineffective after frequent loosening and tightening (for ROBA®-DS connection).
- The clutches may not be put into operation without a limit switch unless *mayr* ® has been contacted and has agreed otherwise.

To prevent injury or damage, only specialist personnel are allowed to work on the components. They must be familiar with the dimensioning, transport, installation, initial operation, maintenance and disposal according to the relevant standards and regulations.
Please read the Installation and Operational Instructions carefully prior to installation and initial operation of the device.

These Safety Regulations are user hints only and may not be complete!

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Clutch Illustrations: Flange Design / Basic Type, Type 4190._ _ _ _ _

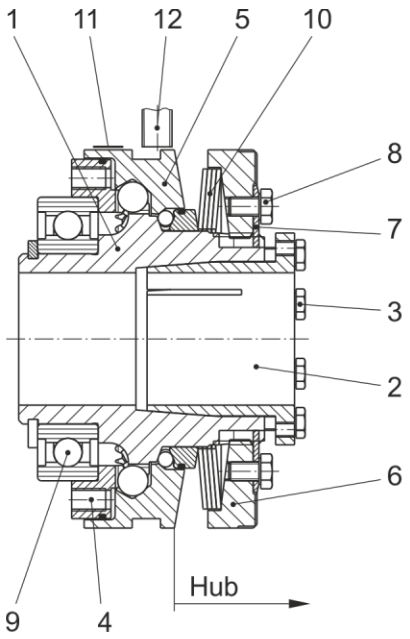

Fig. 1
Type 4190._0/3_ _ _

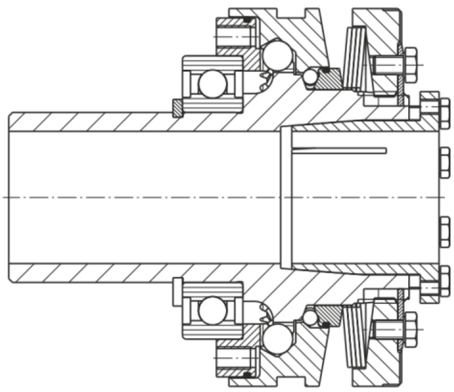

Fig. 1a
Type 4190._1/4_ _ _
Design with long protruding hub

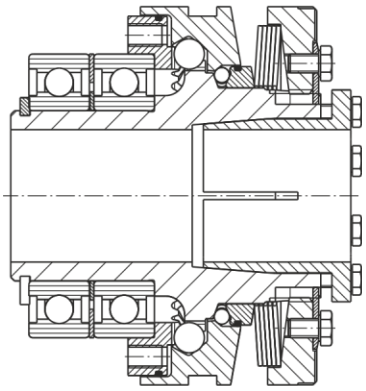

Fig. 1b
Type 4190._2/5_ _ _
2-bearing design

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Clutch Illustrations: Design with ROBA®-ES Connection, Type 4194._ _ _ _ _

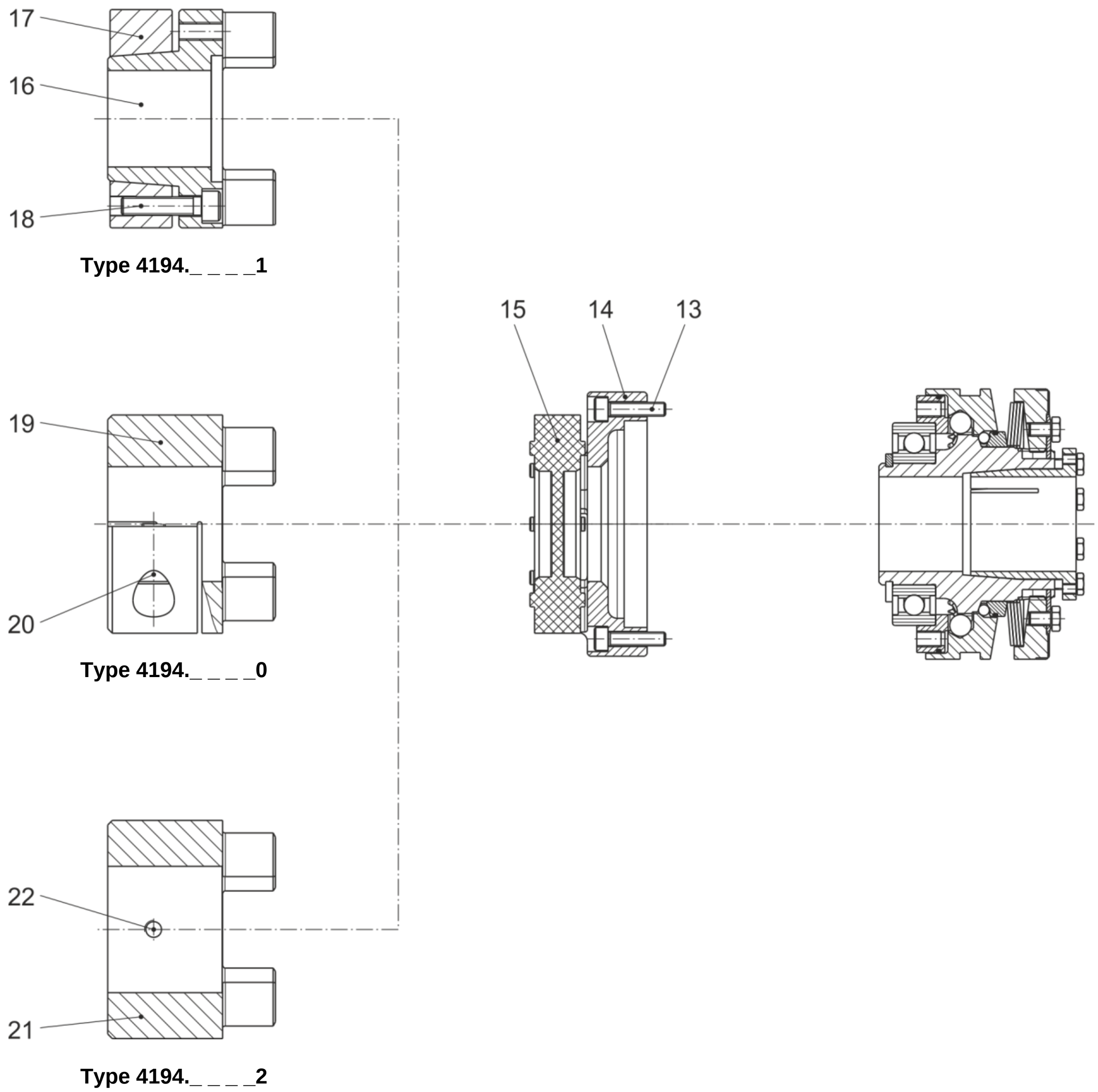

Fig. 2

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Clutch Illustrations: Design with ROBA®-DS Connection, Type 4196._ _ _ _ _ / Size 01 and 0

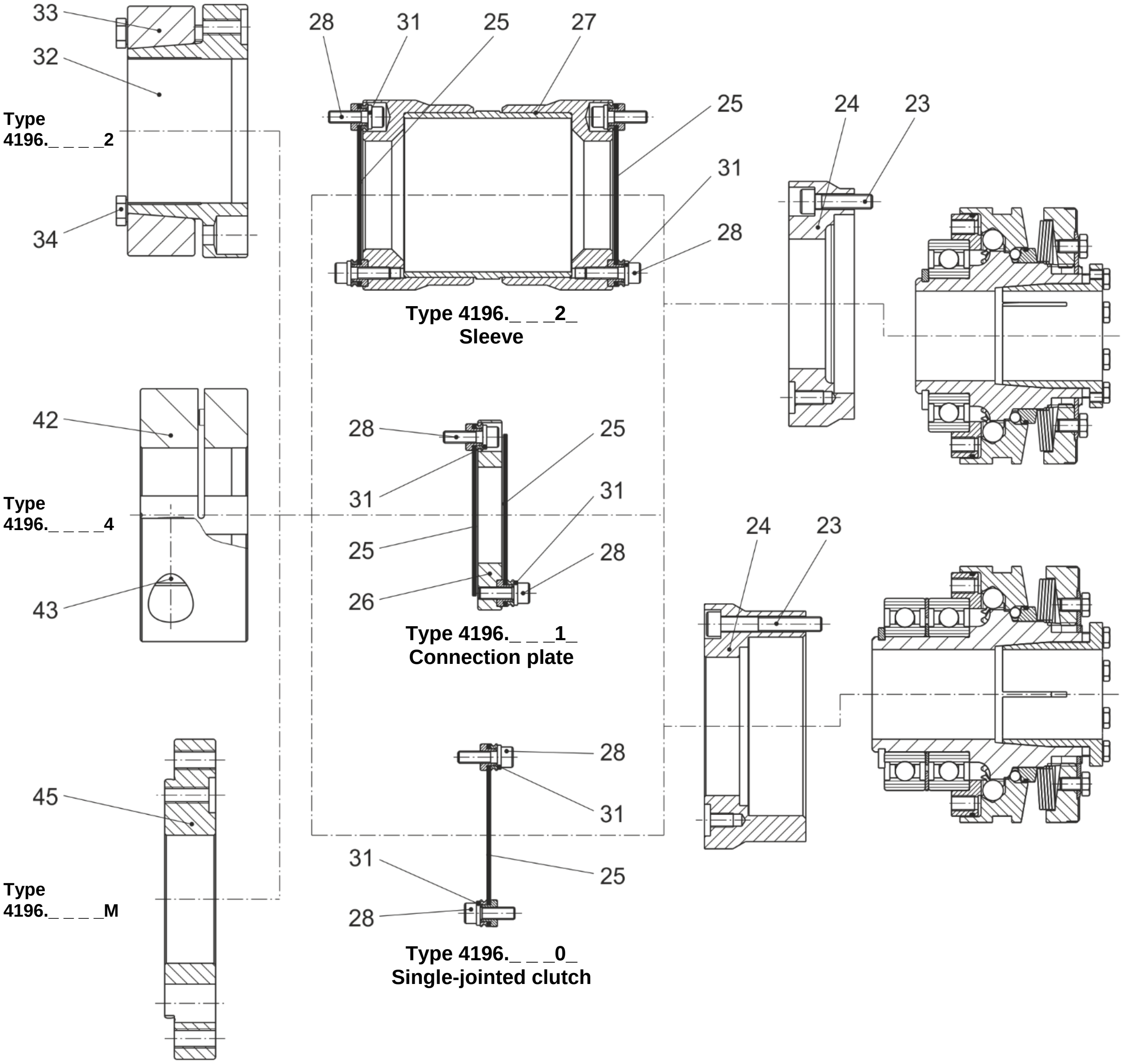

Fig. 3

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Clutch Illustrations: Design with ROBA®-DS Connection, Type 4196._ _ _ _ _ / Size 1 to 3

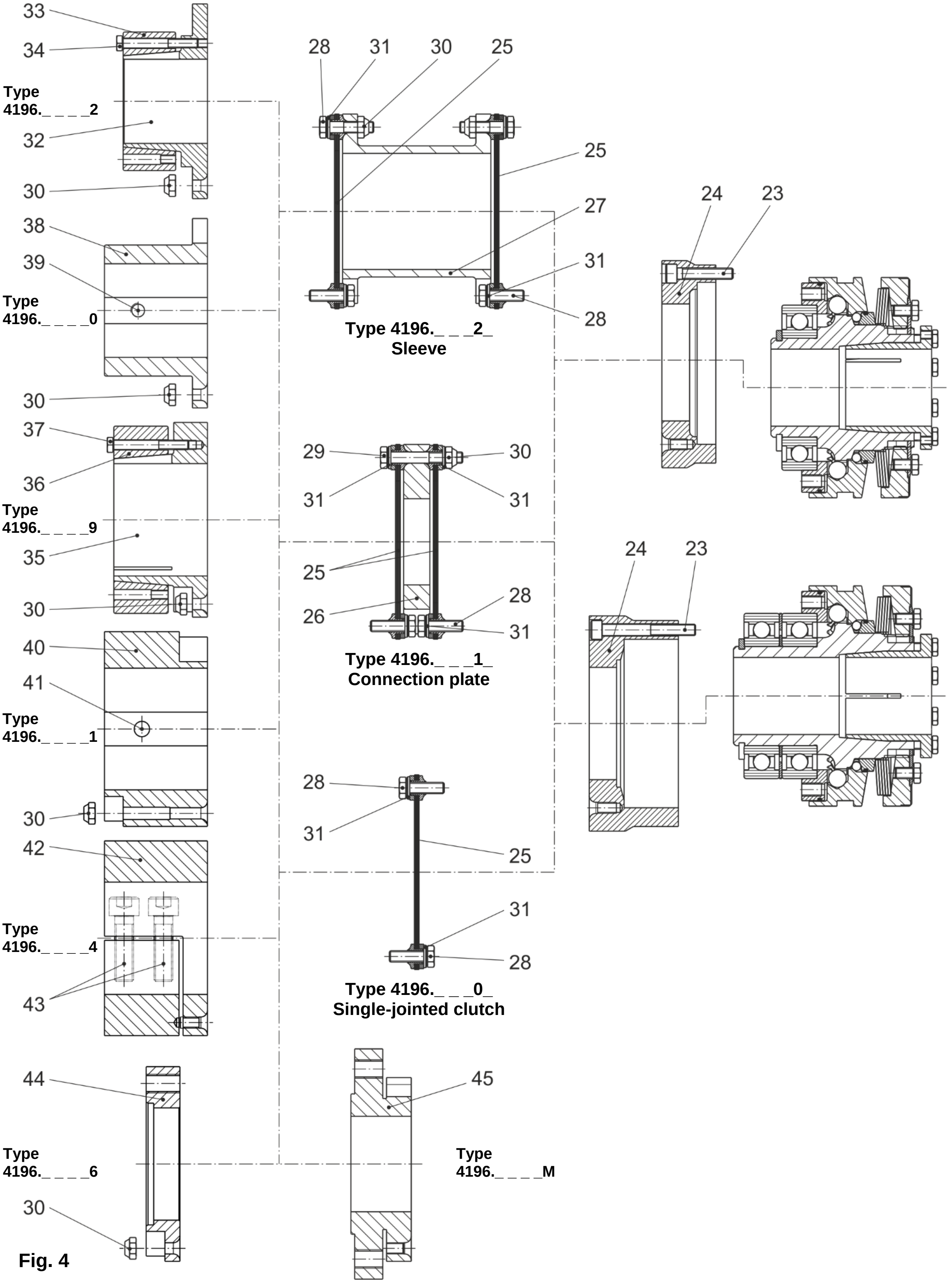

Fig. 4

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Parts List

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

Parts for Type 4190._ _ _ _ _:	
Item	**Name**
1	Hub (key design or cone bushing design)
2	Cone bushing
3	Hexagon head screw
4	Pressure flange
5	Thrust washer
6	Adjusting nut
7	Locking ring
8	Hexagon head screw
9	Deep groove ball bearing
10	Cup spring
11	Type tag
12	Limit switch [1)]

Additional parts for Type 4194._ _ _ _ _:	
Item	**Name**
13	Cap screw [2)]
14	Connection flange
15	Elastomeric element [3)]
16	Shrink disk hub
17	Shrink disk
18	Cap screw
19	Clamping hub
20	Cap screw
21	Key hub
22	Set screw

Additional parts for Type 4196._ _ _ _ _:	
Item	**Name**
23	Cap screw [2)]
24	Connection flange
25	Disk pack
26	Connection plate
27	Sleeve
28	Screw
29	Screw
30	Hexagon nut
31	Washer
32	Shrink disk hub
33	Shrink disk
34	Hexagon head screw
35	Shrink disk hub, large
36	Shrink disk, large
37	Hexagon head screw
38	Key hub
39	Set screw
40	Key hub, large
41	Set screw
42	Clamping hub
43	Cap screw
44	Flange
45	Flange (for measurement flange connection)

[1)] The limit switch Item 12 is not part of the standard scope of delivery.
[2)] Secure the cap screws Items 13 and 23 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

Sizes	Limit torque for overload M_G				Max. speed [rpm]
	Type 419_.5_ _ _ _ [Nm]	Type 419_.6_ _ _ _ [Nm]	Type 419_.7_ _ _ _ [Nm]	Type 419_.8_ _ _ _ [Nm]	
01	5 – 12.5	10 – 25	20 – 50	25 – 62.5	8000
0	10 – 25	20 – 50	40 – 100	50 – 125	7000
1	20 – 50	40 – 100	80 – 200	100 – 250	6000
2	40 – 100	80 – 200	160 – 400	200 – 500	5000
3	80 – 200	160 – 400	320 – 800	400 – 1000	4000

Table 2

Sizes	Thrust washer stroke (Fig. 1; Item 5) on overload [mm]	Bore from – to	
		Hub (1) with cone bushing (2) 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

Sizes	Type 419_.5_ _ _ _		Type 419_.6_ _ _ _		Type 419_.7_ _ _ _		Type 419_.8_ _ _ _	
	Maximum torque M_G [Nm]	Inspection dimension "a" (Fig. 14) at approx. 70 % M_G [mm]	Maximum torque M_G [Nm]	Inspection dimension "a" (Fig. 14) at approx. 70 % M_G [mm]	Maximum torque M_G [Nm]	Inspection dimension "a" (Fig. 14) at approx. 70 % M_G [mm]	Maximum torque M_G [Nm]	Inspection dimension "a" (Fig. 14) at approx. 70 % M_G [mm]
01	12.5	2.0	25	1.1	50	1.5	62.5	0.7
0	25	2.4	50	1.4	100	2.4	125	1.4
1	50	2.9	100	1.7	200	2.6	250	1.4
2	100	3.8	200	2.4	400	3.1	500	1.7
3	200	4.2	400	2.3	800	3.6	1000	1.8

Table 4

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

Sizes	Screw tightening torques [Nm]											
	Item 3	Item 8	Item 13	Item 18	Item 20	Item 23	Item 28	Item 29	Item 30	Item 34	Item 37	Item 43
01	4	5.8	2.9	6	10	4.5	8.5	8.5	8.5	6	-	33
0	4	2.9	5.8	6	25	9.5	8.5	8.5	8.5	6	-	33
1	4	5.8	10.1	10	25	16	8.5	8.5	8.5	6	6.5	17.4
2	8	10.1	16	30	70	16	14	14	14	8.5	8.5	83
3	13	10.1	40	52	120	83	35	35	35	10	14	122

Technical Data Type 4194._ _ _ _ _

Table 6

Sizes	Respective ROBA®-ES Size	Bore lastic-side from – to		
		Clamping hub (19) Type 4194._ _ _ _0 [mm]	Shrink disk hub (16) Type 4194._ _ _ _1 [mm]	Key hub (21) Type 4194._ _ _ _2 [mm]
01	24	15 – 28	15 – 28	8 – 28
0	28	19 - 35	19 – 38	10 – 38
1	38	20 – 45	20 – 45	12 – 45
2	42	28 – 50	28 – 50	14 – 55
3	48	35 – 55	35 – 60	20 – 60

Table 7

Sizes	Nominal and maximum torques, flexible backlash-free shaft coupling, T_{KN} and $T_{K\,max.}$					
	Type 4194._ _ _3_ (yellow elastomeric element 92 Sh A)		Type 4194._ _ _4_ (red elastomeric element 98 Sh A)		Type 4194._ _ _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	35	70	60	120	75	150
0	95	190	160	320	200	400
1	190	380	325	650	405	810
2	265	530	450	900	560	1120
3	310	620	525	1050	655	1310

Table 8

Sizes	Shaft misalignments, flexible coupling Type 4194._ _ _ _ _							Dimension "E" (Fig. 10) [mm]	Locking set screw (22) for hub (Item 21 / Fig. 2)	
	Axial ΔK_a	Radial ΔK_r			Angular ΔK_w					
	[mm]	92 Sh A [mm]	98 Sh A [mm]	64 Sh D [mm]	92 Sh A [°]	98 Sh A [°]	64 Sh D [°]		Thread	Tightening torque [Nm]
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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Table 9

Sizes	Transmittable torques T_R [Nm] on clamping hubs frictional locking (Item 19 / Type 4194._ _ _ _0) - dependent on bore - suitable for tolerance constellation F7/k6									
	Ø 15	Ø 16	Ø 19	Ø 20	Ø 22	Ø 24	Ø 25	Ø 28	Ø 30	Ø 32
01	34	36	43	45	50	54	57	63	-	-
0	-	-	79	83	91	100	104	116	124	133
1	-	-	-	83	91	100	104	116	124	133
2	-	-	-	-	-	-	-	208	228	248
3	-	-	-	-	-	-	-	-	-	-

Sizes	Ø 35	Ø 38	Ø 40	Ø 42	Ø 45	Ø 48	Ø 50	Ø 52	Ø 55
01	-	-	-	-	-	-	-	-	-
0	145	-	-	-	-	-	-	-	-
1	145	158	166	174	187	-	-	-	-
2	280	315	340	365	404	442	470	-	-
3	350	390	420	455	505	560	600	640	705

Table 10

Sizes	Transmittable torques T_R [Nm] on shrink disk hubs frictional locking (Item 16 / Type 4194._ _ _ _1) - dependent on bore - suitable for tolerance constellation H7/k6										
	Ø 15	Ø 16	Ø 19	Ø 20	Ø 22	Ø 24	Ø 25	Ø 28	Ø 30	Ø 32	Ø 35
01	67	78	109	121	143	166	178	212	-	-	-
0	-	-	194	214	255	296	317	381	423	462	528
1	-	-	-	247	299	352	379	463	519	567	653
2	-	-	-	-	-	-	-	275	345	390	505
3	-	-	-	-	-	-	-	-	-	-	565

Sizes	Ø 38	Ø 40	Ø 42	Ø 45	Ø 48	Ø 50	Ø 52	Ø 55	Ø 58	Ø 60
01	-	-	-	-	-	-	-	-	-	-
0	594	-	-	-	-	-	-	-	-	-
1	739	797	855	942	-	-	-	-	-	-
2	620	700	785	910	1010	1105	-	-	-	-
3	700	800	900	1055	1150	1265	1350	1530	1720	1840

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Technical Data Type 4196._ _ _ _ _

Table 11

Sizes	Respective ROBA®-DS Sizes	Dimension "S" [mm]	Nominal torques and peak torques of the ROBA®-DS connection		Max. permitted shaft misalignments			
			T_{KN} [Nm]	T_{KS} [Nm]	Axial [5] ΔK_a [mm]	Radial [6] ΔK_r [mm]	Radial [7] ΔK_r [mm]	Angular [8] ΔK_w [°]
01	10	2.9	100	150	0.9	0.2	$(H_S\text{-}S) \times 0.0174$	1.0
0	15	2.9	150	225	1.1	0.2	$(H_S\text{-}S) \times 0.0174$	1.0
1	16	4.6	300	450	0.8	0.2	$(H_S\text{-}S) \times 0.0122$	0.7
2	40	6.1	650	975	1.1	0.25	$(H_S\text{-}S) \times 0.0122$	0.7
3	64	8	1100	1650	1.3	0.3	$(H_S\text{-}S) \times 0.0122$	0.7

[5] Values refer to couplings with 2 disk packs. Only permitted as a static or virtually static value.
[6] The values refer to couplings with a connection plate (26).
[7] The values refer to couplings with a sleeve (27).
[8] The values refer to 1 disk pack.

Table 12

Sizes	Bore, torsionally rigid side, from – to				
	Shrink disk hub (Item 32) Type 4196._ _ _ _2 [mm]	Shrink disk hub, large (Item 35) Type 4196._ _ _ _9 [mm]	Key hub (Item 38) Type 4196._ _ _ _0 [mm]	Key hub, large (Item 40) Type 4196._ _ _ _1 [mm]	Clamping hub (Item 42) Type 4196._ _ _ _4 [mm]
01	19 – 38	–	–	–	19 - 35
0	25 – 45	–	–	–	25 – 42
1	14 – 26	25 – 45	16 – 32	30 – 45	20 – 45
2	25 – 45	40 – 60	25 – 50	45 – 65	25 – 60
3	30 – 45	45 – 70	30 – 55	55 – 75	28 – 70

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Table 13

Sizes	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
	Transmittable torques T_R [Nm] on shrink disk hubs frictional locking (Item 32 / Type 4196._ _ _ _2) - dependent on bore - suitable for tolerance constellation H7/g6																			
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 14

Sizes	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
	Transmittable torques T_R [Nm] on shrink disk hubs frictional locking (Item 35 / Type 4196._ _ _ _9) - dependent on bore - suitable for tolerance constellation H7/g6												
1	526	602	679	730	780	851	913	948	978	-	-	-	-
2	-	-	-	873	937	1036	1132	1195	1255	1338	1454	-	-
3	-	-	-	-	-	1268	1394	1480	1565	1691	1890	2065	2204

Table 15

Sizes	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
	Transmittable torques [Nm] on clamping hubs frictional locking (Item 42 / Type 4196._ _ _ _4) - dependent on bore - suitable for tolerance constellation H7/k6 for Sizes 01 and 0 suitable for tolerance constellation H7/h6 for Sizes 1, 2 and 3																			
01	99	105	116	128	135	151	162	173	189	-	-	-	-	-	-	-	-	-	-	-
0	-	-	-	-	143	163	177	191	211	229	241	253	-	-	-	-	-	-	-	-
1	-	83	202	220	229	257	275	293	321	348	367	385	412	-	-	-	-	-	-	-
2	-	-	-	-	604	677	725	773	846	918	967	1015	1087	1160	1208	1257	1329	1450	-	-
3	-	-	-	-	-	821	880	938	1026	1114	1173	1232	1319	1407	1466	1525	1613	1759	1906	2053

Table 16

	Locking set screw (39) for key hub (Item 38 / Type 4196._ _ _ _0)		Locking set screw (41) for key hub, large (Item 40 / Type 4196._ _ _ _1)	
Sizes	**Thread**	**Tightening torque [Nm]**	**Thread**	**Tightening torque [Nm]**
1	M5 (Ød_p ≤ 22) - M6 (Ød_p > 22)	2 / 4.1	M8	8.5
2	M6	4.1	M10	14
3	M8	8.5	M10	14

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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.
  The locking screws (hexagon head screws Item 8) are not secured with Loctite on pre-set clutches.
  Before initial operation of the clutch, please secure the locking screws (8) with Loctite 243.
- ❑ On overload-synchronous designs (Type 4190._ _3_ _ or 4196._ _3_ _) with cone bushing (2) the cone bushing is mounted in delivery condition in such a way that its marking bore and the marking bore in the pressure flange (4) align (see Fig. 6). This represents the synchronous re-engagement position of the clutch.

> On these designs, the cone bushing (2) must not be turned in the direction of the hub (1) as otherwise the marked synchronous position is lost.

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 Item 4). If the set limit torque is exceeded (overload), the clutch disengages and remains disengaged.
The input and output are separated residual torque-free.
A limit switch (not included in delivery) can send a signal to switch off the drive.
After-acting masses can run free.

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

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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 (5).
For this, different procedures are possible:

- Manually, using a plastic hammer or installation levers (Fig. 5) supported on the adjusting nut (6), 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 all variants, it may be necessary to turn between the clutch input and output sides slightly.

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].

Re-engagement can only take place at the synchronous position for the overload-synchronous designs (Type 419_._ _3_ _).
The marking bores on the outer diameters of the pressure flange (4) and the cone bushing (2) must align (Fig. 6).
On key designs, a radial notch at the hub end (Item 1 / adjustment nut-side) is used as a marking.
This represents the synchronous re-engagement position of the clutch.
In addition, a yellow guideline sign for the re-engagement position is attached to the clutch.

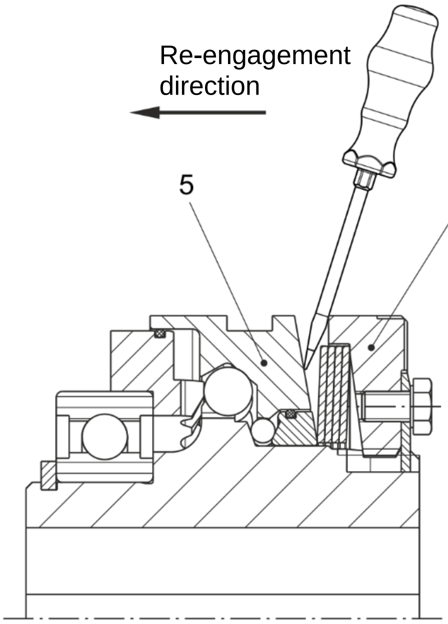

Fig. 5

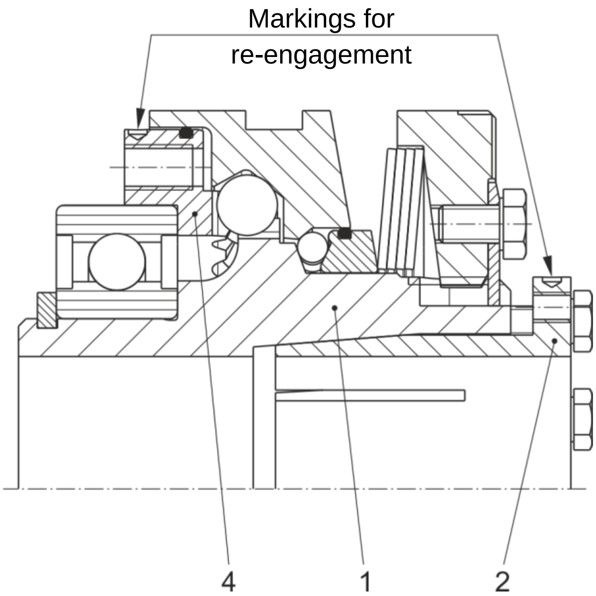

Fig. 6

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Output Elements Installation

The output element is centred on a deep groove ball bearing (9) (tolerance H7/h5) and bolted together with the pressure flange (4).

The radial forces, axial forces and transverse force torques, which are introduced into the clutch bearing, must not exceed the maximum permitted values acc. Table 4.

Please observe the maximum permitted screw-in depth in the pressure flange (4) as well as the connection dimensions "a" and "e" for the output elements, see Figs. 7 or 8 and Table 17.

If the resulting radial force from the output element is anywhere near the centre of the ball bearing (9) 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 (4).
The EAS®-Compact® with a long protruding hub (Fig. 1b / Type 4190._1_ _ _ or 4190._4_ _ _).) 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 (4) 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 (4)) from moving axially in the direction of the thrust washer (5) during overload, please make sure that the bearing of the output element is designed as a locating bearing (Fig. 8).

Output elements which protrude over the thrust washer (5) (see Fig. 8) must be designed with sufficient radial air.
➢ dimension X ≥ 1 mm

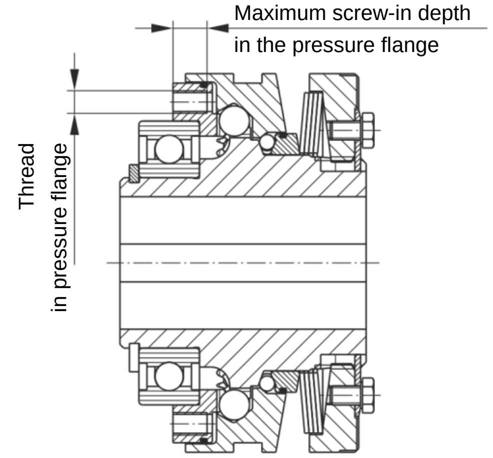

Fig. 7

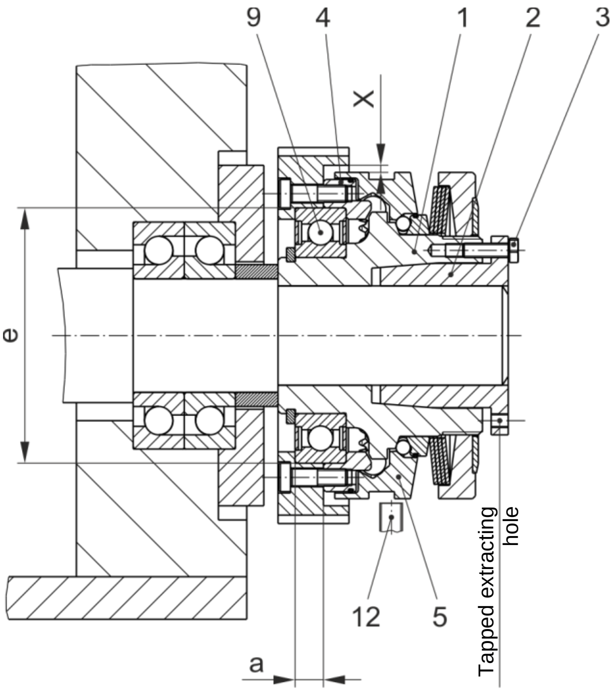

Fig. 8

Table 17

Sizes	Thread in the pressure flange (Fig. 7) with required screw quality and tightening torque for the customer-side screw connection	Max. screw-in depth [mm] in the pressure flange (Fig. 7)	Connection dimensions [mm] (Fig. 8)	
			a $^{+0.1}$	e $^{H7}_{h5}$
01	8 x M4 / 12.9 / 4.5 Nm	6	5	47
0	8 x M5 / 12.9 / 9 Nm	7	7	62
1	8 x M6 / 12.9 / 16 Nm	9	9	75
2	8 x M6 / 12.9 / 16 Nm	10	10	90
3	8 x M8 / 12.9 / 37 Nm	12	10	100

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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
  - ➢ for clamping hubs: see Tables 9 and 15
  - ➢ for shrink disk hubs: see Tables 10, 13 and 14
- ❒ Shaft surface: finely turned or ground (Ra = 0.8 µm).
- ❒ Shaft material: yield point at least 400 N/mm², 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 maximum torques.
- ❒ 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 (Item 3) of the cone bushing (2) 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 4194.-:
  Tighten the tensioning screws (18) in the shrink disks (17) stepwise (in 3 to max. 6 tightening sequences) and cross-wise evenly using a torque wrench to the torque stated in Table 5.
- ❒ Type 4196.-:
  Tighten the tensioning screws (34/37) of the shrink disk (33/36) 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 9, 10, 13, 14 and 15.

The clutch or clutch hub carries out an axial movement in the direction of the cone bushing (2) when tightening the cone bushing (2). Because of this effect, please ensure that on the EAS®-Compact® clutch with disk pack (Type 4196._ _ _ _ _), first the cone bushing (2) is completely tightened, then the other (disk pack) side.

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.

On overload-synchronous designs (Type 4190._ _3_ _ or 4196._ _3_ _), the cone bushing (2) must not be turned in the direction of the hub (1) as otherwise the marked synchronous position is lost.

Cup Spring Layering (Fig. 9)

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

Torque range “medium”:
one cup spring and **wide** thrust ring (Type 419_.**5**_ _ _)

Torque range “high”:
two cup springs and **wide** thrust ring (Type 419_.**6**_ _ _)

Torque range “very high”:
for cup springs and **narrow** thrust ring (Type 419_.**7**_ _ _)

Torque range “maximum”:
five cup springs and **narrow** thrust ring (Type 419_.**8**_ _ _)

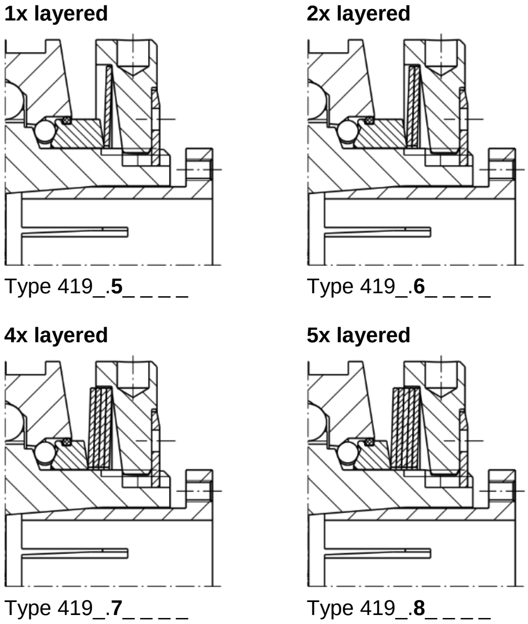

Fig. 9

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Clutch 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 4190.
  with a press cover and a screw, screwed into the shaft threaded centre hole
- for Types 4194. and 4196.
  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 (22) for hub (21), see Fig. 2 on page 4 and Table 8 on page 9,
  - ➔ locking set screw (39/41) for hub (38/40), see Fig. 4 on page 6 and table 16 on page 12.

> There must be sufficient radial air between the press cover and the inner diameter of the output element (see Fig. 10).
> ➢ Dimension X ≥ 1 mm

Joining Both Clutch Components Type 4194._ _ _ _ _ (Figs. 2 and 10)

The flexible elastomeric element (15) is pre-tensioned between the metal claws by joining components 16/19/21 with component 14. To do this, an axial installation force is required.
The force required can be reduced by lightly greasing the elastomeric element (15).

> Use PU-compatible lubricants (e. g. Vaseline or a multi-purpose grease based on mineral oil, NLGI Class 2, with a basic oil viscosity of approx. 200 mm²/s).
> No unpermittedly high axial pressure should be placed on the elastomeric element (15) in completely assembled condition.
> **Keep to distance dimension "E" acc. Fig. 10 and Table 8!**

Joining Both Clutch Components Type 4196._ _ _ _ _ (Figs. 3 and 4)

Join the misalignment-flexible part and the overload clutch and screw together with cap screws (Item 23) to the tightening torque given in Table 5.
The cap screws (Item 23) must be protected using a screw-securing product, e.g. Loctite 243.

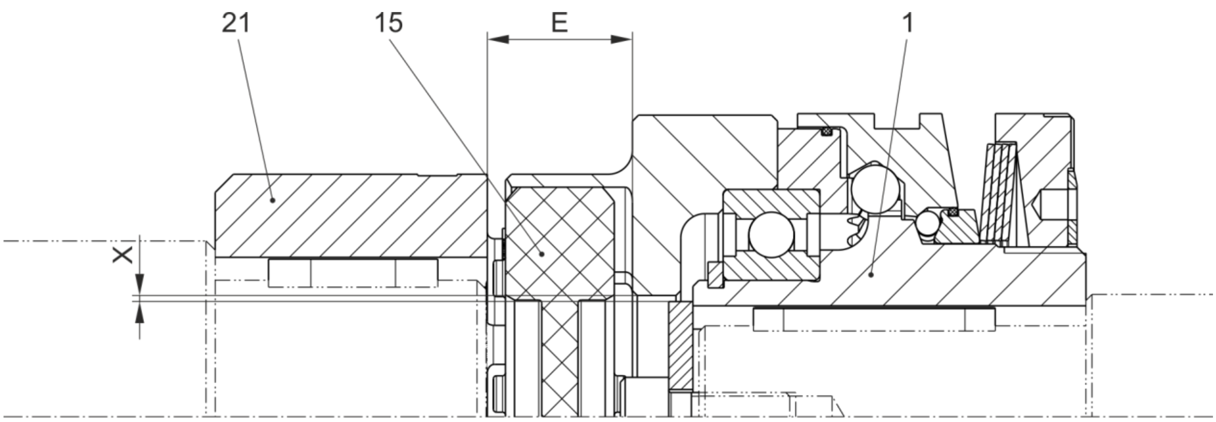

Fig. 10

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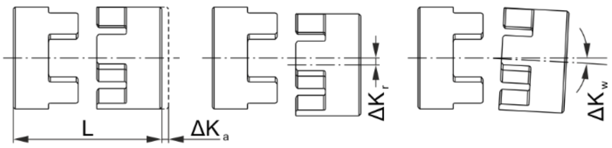
Permitted Shaft Misalignments

The EAS®-Compact® clutches Types 4194._ _ _ _ _ (lastic backlash-free) and 4196._ _ _ _ (torsionally rigid backlash-free / 2 disk packs) compensate for radial, axial and angular shaft misalignments (Fig. 11) without losing their backlash-free function.
The EAS®-Compact® clutches Type 4196._ _ _0_ (torsionally rigid backlash-free / 1 disk pack) compensate only for axial and angular shaft misalignments.

> The EAS®-Compact® clutches Type 4196._ _ _0_ (torsionally rigid backlash-free / 1 disk pack) do not compensate for radial shaft misalignments.

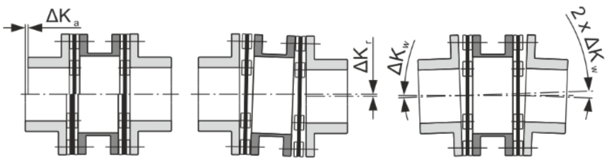
However, the Type-specific permitted shaft misalignments indicated in Tables 8 and 11 must not simultaneously reach their maximum value.
If more than one kind of misalignment takes place simultaneously, they influence each other. This means that the permitted misalignment values are dependent on one another, see Fig. 12.
The sum total of the actual misalignments in percent of the maximum value must not exceed 100 %.
The permitted misalignment values given in Tables 8 and 11 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 of the individual shaft couplings or contact the manufacturer.

Type 4194._ _ _ _ _ (lastic backlash-free)



Axial displacement | Radial misalignment | Angular misalignment

Type 4196._ _ _ _ _ (torsionally rigid backlash-free)



Axial displacement | Radial misalignment | Angular misalignment

Fig. 11

Example (Size 0 / Type 4196.60412):
Axial displacement occurrence ΔK_a = 0.44 mm equals 40 % of the permitted maximum value ΔK_a = 1.1 mm.
Radial misalignment occurrence ΔK_r = 0.06 mm equals 30 % of the permitted maximum value ΔK_r = 0.2 mm.
=> permitted angular misalignment K_w = 30 % of the maximum value ΔK_w = 2.0° => ΔK_w = 0.6°

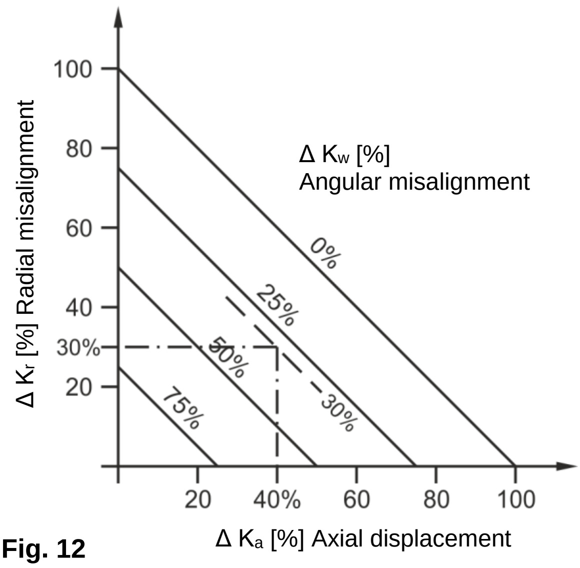


Fig. 12

Clutch Alignment

Exact alignment of the clutch increases the clutch service lifetime and reduces the load on the shaft bearings.
In most of the applications, clutch alignment using a straight edge in two levels vertical to each other is sufficient.
However, we recommend alignment of the clutch (of the shaft ends) using a dial gauge or laser measurement devices on drives operating at very high speeds.

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Torque Adjustment

In order to guarantee low-wear clutch operation, it is essential that the clutch torque is set to a sufficiently high service factor (overload torque to operating torque).
Our experience has shown that an **adjustment factor of 1.5 to 3** gives good results.
On very high load alternations, high accelerations and irregular operation, please set the adjustment factor higher.
Torque adjustment is carried out by turning the adjusting nut (6). The installed cup springs (10) are operated in the negative range of the characteristic curve (see Fig. 15); this means that a stronger pre-tensioning of the cup spring results in a decrease of the spring force.
The torque is set manufacturer-side according to the customer's request. If no particular torque adjustment is requested customer-side, the clutch will always be **pre-set** and **marked** (calibrated) manufacturer-side to approx. 70 % of the maximum torque.
It is possible to check the **"Spring operation in the operating range"** (Fig. 15) using the dimension "a" (distance from the adjusting nut (6) facing side to the hub (1) facing side, as shown in Fig. 14).
Please see Table 3 for the respective values.

> Turning the adjusting nut (6) clockwise causes a reduction in torque.
> Turning it anti-clockwise causes an increase in torque. You should be facing the adjusting nut (6) as shown in Fig. 13 and Fig. 14.
> If no changes to the pre-set clutch torque are required customer-side, the locking screws (hexagon head screws Item 8) must nevertheless be secured using Loctite 243 by the customer.

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) Remove both locking screws (hexagon head screws Item 8) from the adjusting nut (6).

c) Turn the adjusting nut (6) using the adjustment scale on the outer diameter of the adjusting nut (Item 6 / Fig. 14) clockwise or anti-clockwise using a hook wrench until the required torque is reached. The required torque results from the marking overlap on the locking ring (7) as well as on the adjusting nut (6) and the percent value of the adjustment scale on the adjusting nut (6), as shown in Fig. 14.

d) If necessary, the adjusting nut (6) must be turned slightly, so that both threaded holes for the locking screws (8) align with one of the bores in the locking ring (7).

e) Paint both locking screws (8) with Loctite 243 and screw them into the adjusting nut (6).

> 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. After de-installing the clutch (e.g. due to cup spring replacement or changes to the cup spring layering), the clutch must be re-adjusted and calibrated using dimension "a" (see Table 3 and Fig. 14).

> If the locking screws (8) are not screwed back in again, the lock washer is not secured and the torque adjustment is not consistent.

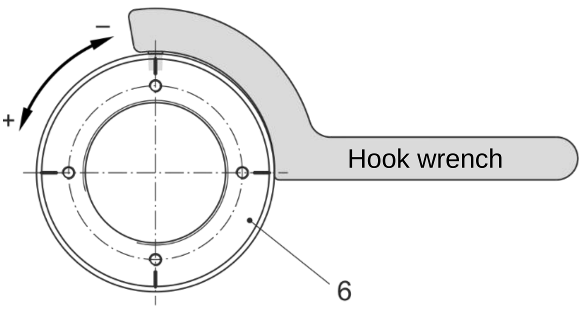

Fig. 13

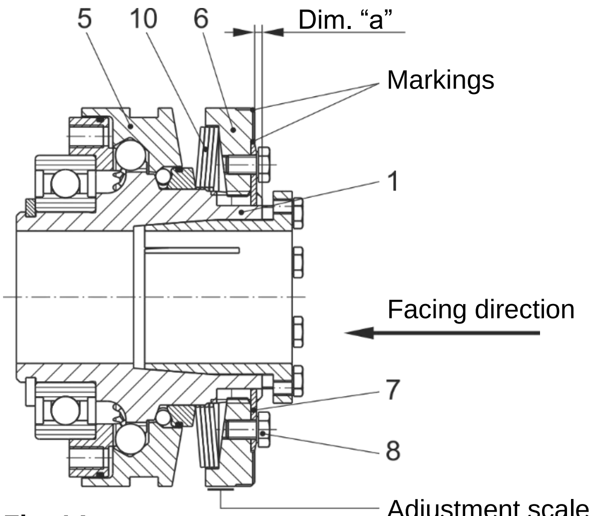

Fig. 14

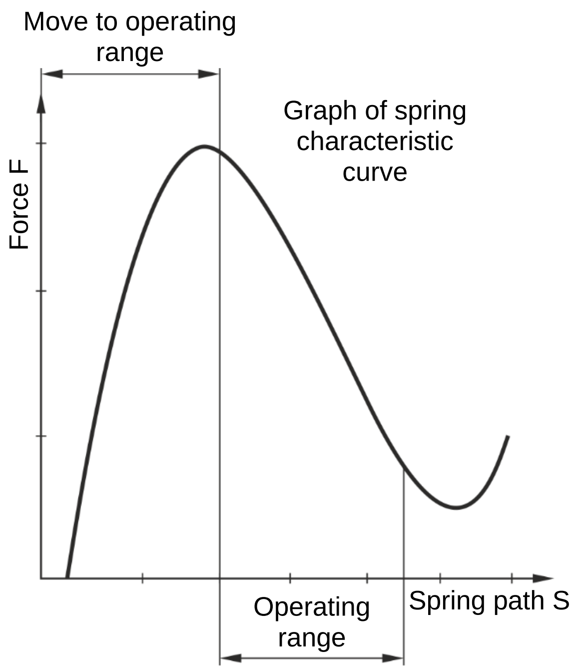

Fig. 15

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Limit Switch (Item 12; Figs. 1 and 16)

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. 16) 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 (5) carries out a stroke (see Fig. 1 and Table 2) in the direction of the adjusting nut (6), which is used to signal change on the limit switch (12).
The signal change should take place at the latest after an axial thrust washer (5) 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.

Limit Switch Installation

- Adjust the switch distance for the contactless limit switch acc. Fig. 15. The distance of the thrust washer (5) to the switching point can be adjusted using a hexagon head screw, wrench opening 7.
- Please ensure that the limit switch is functioning correctly.

Contactless limit switch (mounting example)

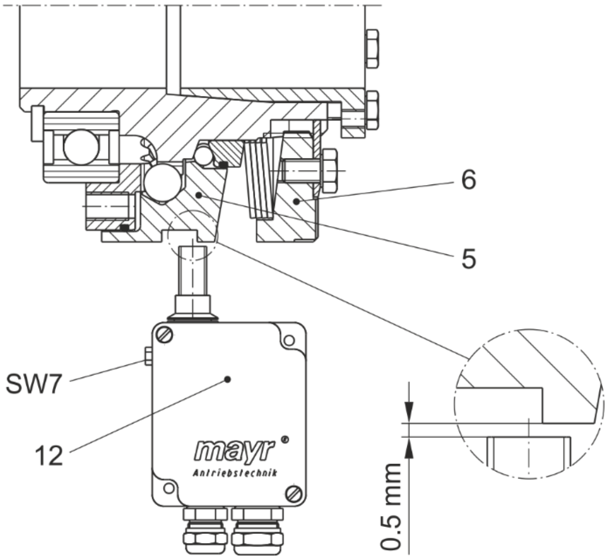

Fig. 16

Designs for Fast-Rotating Drives (e.g. Test Stand Applications)

For fast-rotating applications, the clutches can be ordered in specified design.

➢ **Possible Types are:**

4190.52300 / 4190.62300 / 4190.72300
4196.523_2 / 4196.623_2 / 4196.723_2
4196.523_6 / 4196.623_6 / 4196.723_6
4196.523_9 / 4196.623_9 / 4196.723_9
4196.523_M / 4196.623_M / 4196.723_M
available in all sizes

➢ **Deviating conditions of delivery:**

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

➢ **For deviating Technical Data, please see Table 18:**

Table 18

Sizes	Max. speed [rpm]	Max. permitted shaft misalignments for fast-rotating applications			
		Axial [5] ΔK_a [mm]	Radial [6] ΔK_r [mm]	Radial [7] ΔK_r [mm]	Angular [8] ΔK_w [°]
01	12000	0.3	0.05	$(H_S\text{-}S) \times 0.0058$	0.6
0	10000	0.35	0.05	$(H_S\text{-}S) \times 0.0058$	0.6
1	9000	0.25	0.06	$(H_S\text{-}S) \times 0.004$	0.45
2	7000	0.35	0.08	$(H_S\text{-}S) \times 0.004$	0.45
3	6000	0,4	0.1	$(H_S\text{-}S) \times 0.004$	0.45

[5] Values refer to couplings with 2 disk packs. Only permitted as a static or virtually static value.
[6] The values refer to couplings with a connection plate (26).
[7] The values refer to couplings with a sleeve (27).
[8] The values refer to 1 disk pack.

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Clutch Dimensioning for ROBA®-DS Mounted Couplings

$$T_{KN} \geq \frac{9550 \times P \times f_B \times f_t}{n}$$

Definition of terms:

T_{KN} [Nm]	Coupling nominal torque
T_{KS} [Nm]	Coupling peak torque
T_B [Nm]	Operating torque
T_S [Nm]	Operating peak torque
P [kW]	Drive machine nominal power
f_B [-]	Service factor according to Table 19
f_t [-]	Temperature factor according to Fig. 17
n [rpm]	Drive machine nominal speed

Table 19

Service factor f_B		Work Machine Load Class		
		I	II	III
Drive machine	**Electromotor, turbine, hydraulic motor**	1.1	1.4	1.9
Drive machine	**Piston machine** with more than 3 cylinders	1.4	1.7	2.2
Drive machine	**Piston machine** with up to 3 cylinders	1.7	2.0	2.5

If the operating torque is known, the coupling nominal torque must be higher than the maximum occurring operating torque $T_{KN} > T_B$ (T_{KN} acc. Table 11). Please also observe the height and type of start-up impacts or sporadic load impacts.
As individual events, these may not exceed the stated clutch peak torque $T_{KS} > T_S$ (T_{KS} acc. Table 11). The max. number of impact occurrences over the entire coupling lifetime must not exceed pulsating 1 x 10e5 or alternating 1 x 10e4 .

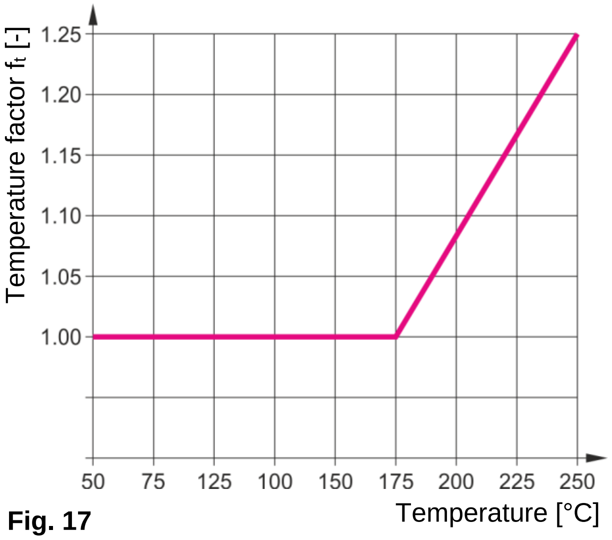

Fig. 17

Table 20

Classification of Work Machines into Load Classes	
Construction machinery - Concrete blenders - Chain conveyors - Chain carriages - Crushers	 II III III III
Chemical industry - Mixers (thick fluids) - Mixers (thin fluids) - Centrifuges - Blenders	 II I II II
Fans/vents	II
Generators / convertors - Frequency converters - Generators	 I II
Foodstuffs machines - Kneading machines - Mills - Packaging machines	 II III II
Paper machines	III
Compressors	II
Conveyor systems - Conveyor belts - Sloping elevators - Goods elevators - Passenger elevators	 II III II II
Wood / plastic processing - Planing machines - Reciprocating saws - Extruders - Blenders	 II III II II
Crane systems	II
Metal processing - Punching / Pressing - Machine tools	 III II
Pumps - Centrifugal pump (thin fluids) - Centrifugal pump (thick fluids) - Pistons / plunger pumps	 I II III
Textile machines	II
Washing machines	II

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Clutch Dimensioning for ROBA®-ES Mounted Couplings

1. Approximate calculation of the coupling torque:

1.1. **T_N from the nominal power**

$$T_N = \frac{9550 \times P_{AN/LN}}{n}$$

1.2. **Dynamic torques T_S and T_W (5.1 and 5.2):**

Drive-side excitation:

Peak torque: $T_S = T_{AS} \times \frac{J_L}{J_A + J_L} \times S_A$

Alternating torque: $T_W = T_{AW} \times \frac{J_L}{J_A + J_L} \times V_R$

Output-side excitation:

Peak torque: $T_S = T_{LS} \times \frac{J_A}{J_A + J_L} \times S_L$

Alternating torque: $T_W = T_{LW} \times \frac{J_A}{J_A + J_L} \times V_R$

2. Comparison of torques occurring in the coupling with the permitted torques

The coupling must be dimensioned so that the loads occurring do not exceed the permitted values in any operating condition.

2.1. **Load due to nominal torque**

$$T_{KN} \geq T_N \times S_\delta$$

2.2. **Load due to torque impacts (5.3)**

$$T_{K\,max} \geq T_S \times S_Z \times S_\delta + T_N \times S_\delta$$

2.3. **Load due to resonance passing through (5.4)**

$$T_{K\,max} \geq T_S \times S_Z \times S_\delta \times V_R + T_N \times S_\delta$$

2.4. **Load due to constantly alternating torque – cycle operation (5.5 and 5.6)**
Permitted alternating torque on coupling:

$T_{KW} = 0.25 \times T_{KN}$ **(for aluminium hubs)**

$T_{KW} = 0.35 \times T_{KN}$ **(for steel hubs)**

$$T_{KW} \geq T_W \times S_\delta \times S_f$$

3. Inspection of permitted misalignments

$$\Delta K_a \geq \Delta W_a \times S_\delta$$
$$\Delta K_r \geq \Delta W_r \times S_\delta \times S_n$$
$$\Delta K_w \geq \Delta W_w \times S_\delta \times S_n$$

If more than one kind of misalignment occurs at the same time, please observe Fig. 12 (page 18).

4. Frictional locking inspection on hub connection

$T_R > T_{max}$: T_{max} is the maximum torque occurring in the coupling.

For values for T_R: see Tables 9 and 10 on page 10.

5. Explanations

5.1. The torque determination on the coupling is applicable if the shaft coupling in the system is the torsionally softest element, and therefore the system can be considered as a double-mass oscillator. If this is not the case, the calculation of the torque on the coupling requires a more detailed calculation procedure.

5.2. The impact factors S_A / S_L describe the impact progression. A rectangular progression of the peak torque is the heaviest impact (S_A/S_L = 2.0). A flat sinus progression of the peak torque is a light impact (S_A/S_L = 1.2).

5.3. T_S, the peak torque in the coupling, is the maximum torque on the coupling during the impact minus the system torque having an effect on the coupling during normal operation.

$T_S = T_{max,\,impact} - T_N$

5.4. If a drive is operated supercritically, meaning that the operating speed n lies above the resonance speed n_R, then resonance passing through causes particular loads.
If the resonance passes through quickly below the operating speed, only a few resonance peaks occur. The alternating torque in resonance can therefore be compared to the maximum torque on the coupling (see also 5.6).

5.5. S_f takes the frequency dependency of lifetime into account. The frequency dependency is first taken into account above 5 Hz.

5.6. On appreciable vibration excitation, the resonance must be moved out of the operating range by selecting a suitable torsional spring rigidity of the coupling.

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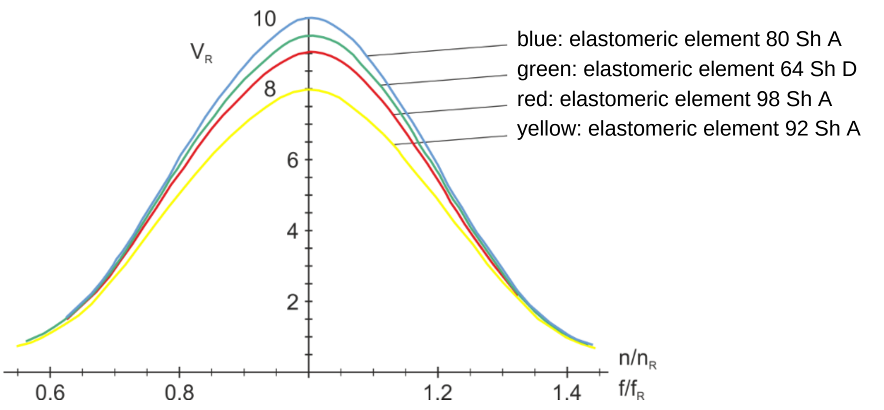
Service Factors for Coupling Dimensioning

V_R = Resonance factor



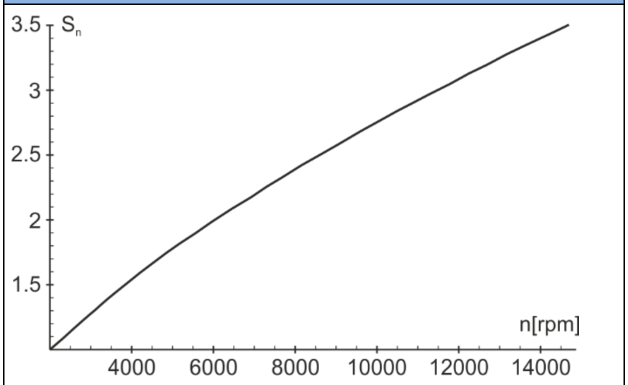
n_R = Resonance speed

$$n_R = \frac{30}{\pi} \sqrt{C_{T\,dyn.} \frac{J_A + J_L}{J_A \times J_L}} \text{ [rpm]}$$

f_R = Resonance frequency

$$f_R = \frac{1}{2\pi} \sqrt{C_{T\,dyn.} \frac{J_A + J_L}{J_A \times J_L}} \text{ [1/s]}$$

S_n = Speed factor



S_f = Frequency factor

F in Hz	≤ 5	> 5
S_f	1	$\sqrt{\frac{f}{5}}$

f shows the load alternation per second (Hz = 1/s)

S_z = Start-up factor/impact frequency

S/h	0 – 100	101 – 200	201 – 400	401 – 800	801 – 1000
S_z	1	1.2	1.4	1.6	1.8

S_δ = Safety factor for temperature

T	-30 °C / +30 °C	+60 °C	+90 °C
S_δ	1	1.5	2

S_A or S_L = Impact factor

Impacts	S_A or S_L
Light impacts	1.2
Medium impacts	1.6
Heavy impacts	2.0

Terms

$P_{AN/LN}$	[kW]	Drive-side/load-side power
T_R	[Nm]	Transmittable torque (frictional locking, Tables 9 + 10 on page 10)
$T_{AS/AW}$	[Nm]	Excitational torque, drive end
$T_{LS/LW}$	[Nm]	Excitational torque, load side
T_N	[Nm]	System torque
T_W	[Nm]	System alternating torque
T_S	[Nm]	Peak torque
T_{max}	[Nm]	Maximum torque in the coupling
T_{KN}	[Nm]	Permitted nominal torque
T_{Kmax}	[Nm]	Permitted maximum torque
T_{KW}	[Nm]	Permitted permanent alternating torque
J_A	[kgm²]	Mass moment of inertia, drive end
J_L	[kgm²]	Mass moment of inertia, load side
ΔK_a	[mm]	Permitted axial displacement
ΔK_r	[mm]	Permitted radial misalignment
ΔK_w	[°]	Permitted angular misalignment
ΔW_a	[mm]	Axial shaft misalignment
ΔW_r	[mm]	Radial shaft misalignment
ΔW_w	[°]	Angular shaft misalignment
c_T	[Nm/rad]	Torsional spring rigidity
n	[rpm]	Nominal speed
n_R	[rpm]	Resonance speed
$S_{A/L}$	[-]	Impact factor, drive end/load side
S_n	[-]	Speed factor
S_z	[-]	Start-up factor/impact frequency
S_δ	[-]	Temperature factor
S_f	[-]	Frequency factor
V_R	[-]	Resonance factor
f	[1/s]=[Hz]	Load factor
f_R	[Hz]	Resonance frequency

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Maintenance and Maintenance Intervals

The following maintenance and inspection intervals are to be maintained:

1.) **Before initial operation:**
   - ➢ Visual inspection. Inspection of the installation parameters (misalignment and tightening torques (see Table 5)) and the clutch running behaviour

2.) **After 5 to 10 operating hours:**
   - ➢ Check the tightening torques produced

3.) **After 1000 h, at the latest after 3 months:**
   - ➢ Visual inspection
   - ➢ Inspection of the screw tightening torques
     The specified tightening torques (see Table 5) must be maintained.
   - ➢ Inspection of torsional backlash and elastomer wear (Type 4194._ _ _ _ _)
   - ➢ Inspection of the misalignment and the clutch running behaviour

4.) If no irregularities or wear are found during the maintenance and inspection interval defined in point 3.), further inspection intervals can, with unchanged operating parameters, take place **after 2000 operating hours, after 1000 disengagements or after maximum 12 months.** The following work must be carried out:
   - ➢ 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
   - ➢ Inspection of the bearing or bearing pre-tension
   - ➢ Inspection of torsional backlash and elastomer wear (Type 4194._ _ _ _ _)
   - ➢ Inspection of the misalignment and the clutch running behaviour

   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.

5.) Replacement of the elastomeric element (Type 4194._ _ _ _ _) **after 5 years.**

Clutch re-greasing must only be carried out at the place of manufacture or by specially trained personnel.
For greasing, please use NLGI Class 1.5 grease with a basic oil viscosity of 460 mm²/s at 40 °C, e.g. Mobilith SHC460.
When re-installing the clutch, please secure all screws with Loctite 243 (medium hard).

If large amounts of dirt or dust are present or in extreme ambient conditions, it may well be necessary to carry out inspections at shorter maintenance intervals.

Elastomer wear limit (Type 4194._ _ _ _ _):

> ℹ Elastomeric elements are parts subject to wear, which change their characteristics depending on the ambient conditions and loads.
> The maximum operating time for the elastomer is 5 years.

No abraded particles are allowed on the elastomeric element (15).
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. 18).

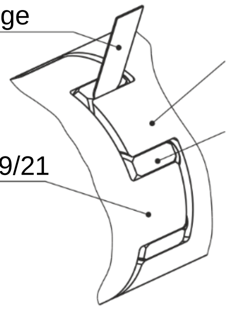

Fig. 18

If wear or damages are detected on the clutch in general, 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 shaft 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) Buckling of the disk packs (Type 4196._ _ _ _ _)
g) Friction tracks

> ℹ 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.

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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Malfunctions / Breakdowns Type 4190._ _ _ _ _

Result of 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
	Adjusting 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
	Adjusting 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	

Malfunctions / Breakdowns Type 4194._ _ _ _ _

Result of Malfunction	Possible Causes	Solutions
Cam breakage	Wear on the elastomeric element, torque transmission due to metal contact	1) Set the system out of operation 2) Replace the entire clutch 3) Check the alignment
	Cam breakage due to high impact energy / overload / excessively high shaft misalignments	1) Set the system out of operation 2) Replace the entire clutch 3) Check the alignment 4) Find the cause of overload
	Operating parameters are not appropriate for the clutch performance	1) Set the system out of operation 2) Check the operating parameters and select a suitable clutch (observe installation space) 3) Install a new clutch 4) Check the alignment
	Operational mistakes due to clutch characteristic data being exceeded	1) Set the system out of operation 2) Check clutch dimensioning 3) Replace the entire clutch 4) Check the alignment 5) Train and advise operating personnel

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Malfunctions / Breakdowns Type 4194._ _ _ _ _

Result of Malfunction	Possible Causes	Solutions
Changes in running noise and / or vibration occurrence	Incorrect alignment	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	1) Set the system out of operation 2) Dismantle the clutch 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	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
Premature wear on the elastomeric element	Incorrect alignment	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 4) Insert a new 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	1) Set the system out of operation 2) Dismantle the clutch 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	1) Set the system out of operation 2) Dismantle the clutch 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	1) Set the system out of operation 2) Dismantle the clutch 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 4196._ _ _ _ _

Result of Malfunction	Possible Causes	Solutions
Changes in running noise and / or vibration occurrence	Incorrect alignment, incorrect installation	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	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	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	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 clutch performance	1) Set the system out of operation 2) Check the operating parameters and select a suitable clutch (observe installation space) 3) Install a new clutch 4) Check the alignment
	Incorrect operation of the system unit	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	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!
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