# Installation and Operational Instructions for EAS®-compact®-F overload clutch Type 419_._ _ _ _X Sizes 01 to 3

**(B.419.1.ATEX.EN)**

## Translation of the Original Operational Instructions

**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.
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.**

### Contents






*Chr. Mayr GmbH + Co. KG*
*Eichenstraße 1, D-87665 Mauerstetten, Germany*
*Phone: +49 8341 804-0, Fax: +49 8341 804-421*
*www.mayr.com, email: public.mayr@mayr.com*

## 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.
- ❒ If 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. 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 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 (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.**

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



*Chr. Mayr GmbH + Co. KG*
*Eichenstraße 1, D-87665 Mauerstetten, Germany*
*Phone: +49 8341 804-0, Fax: +49 8341 804-421*
*www.mayr.com, email: public.mayr@mayr.com*

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

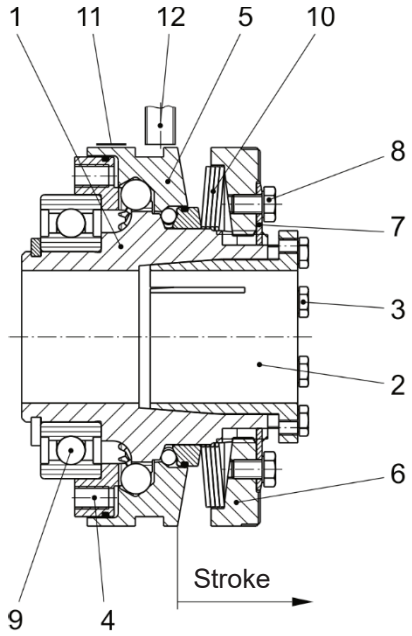



**Fig. 1**
**Type 4190._0/3_ _ _**

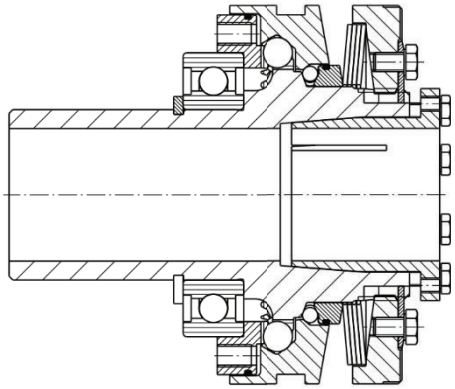


**Fig. 1a**
**Type 4190._1/4_ _ _**
**Design with long protruding hub**

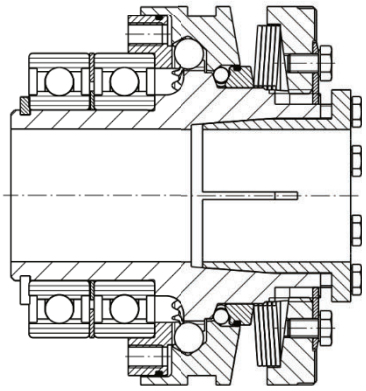


**Fig. 1b**
**Type 4190._2/5_ _ _**
**2-bearing design**



*Chr. Mayr GmbH + Co. KG*
*Eichenstraße 1, D-87665 Mauerstetten, Germany*
*Phone: +49 8341 804-0, Fax: +49 8341 804-421*
*www.mayr.com, email: public.mayr@mayr.com*

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

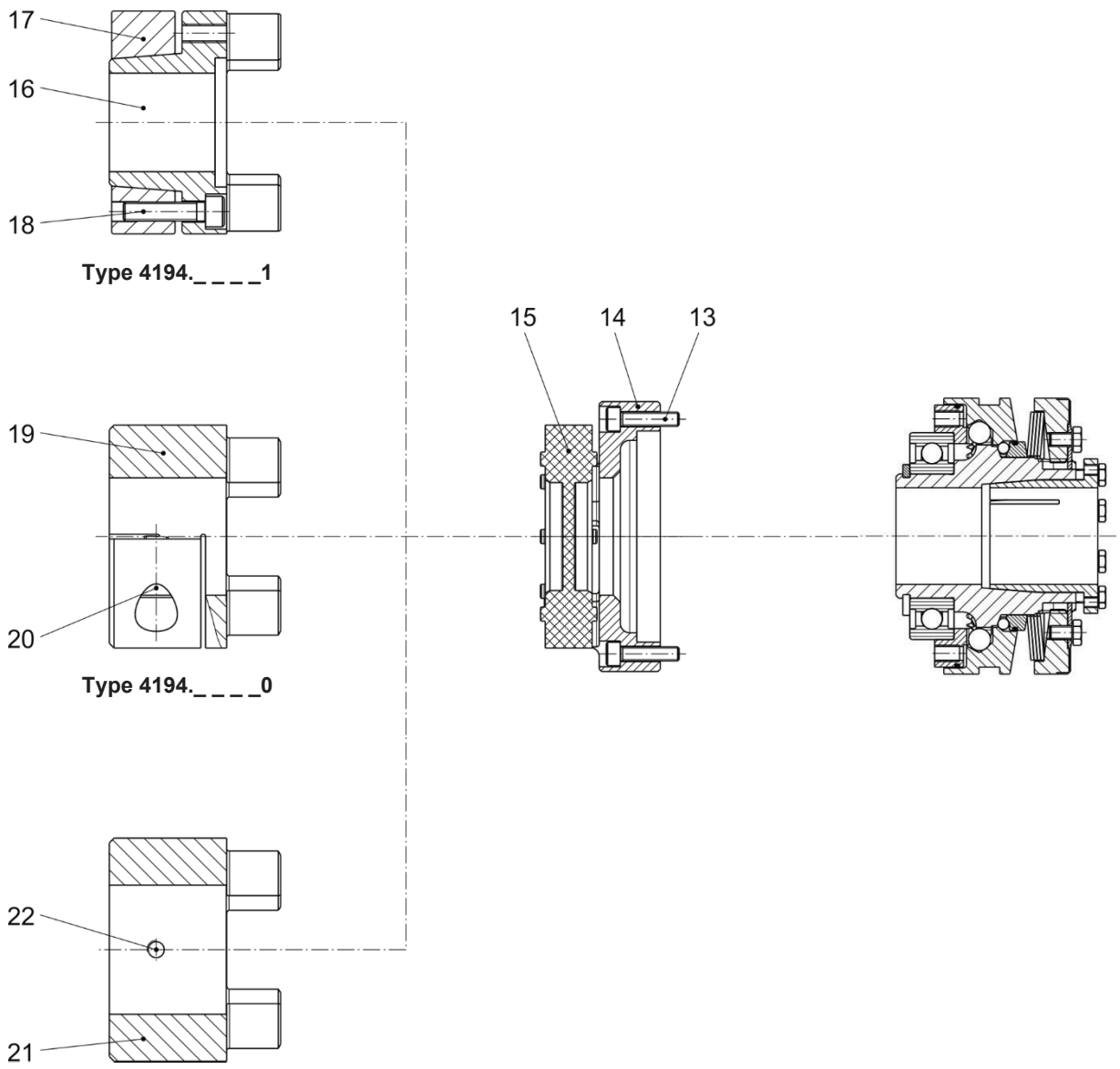



**Fig. 2**


Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

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

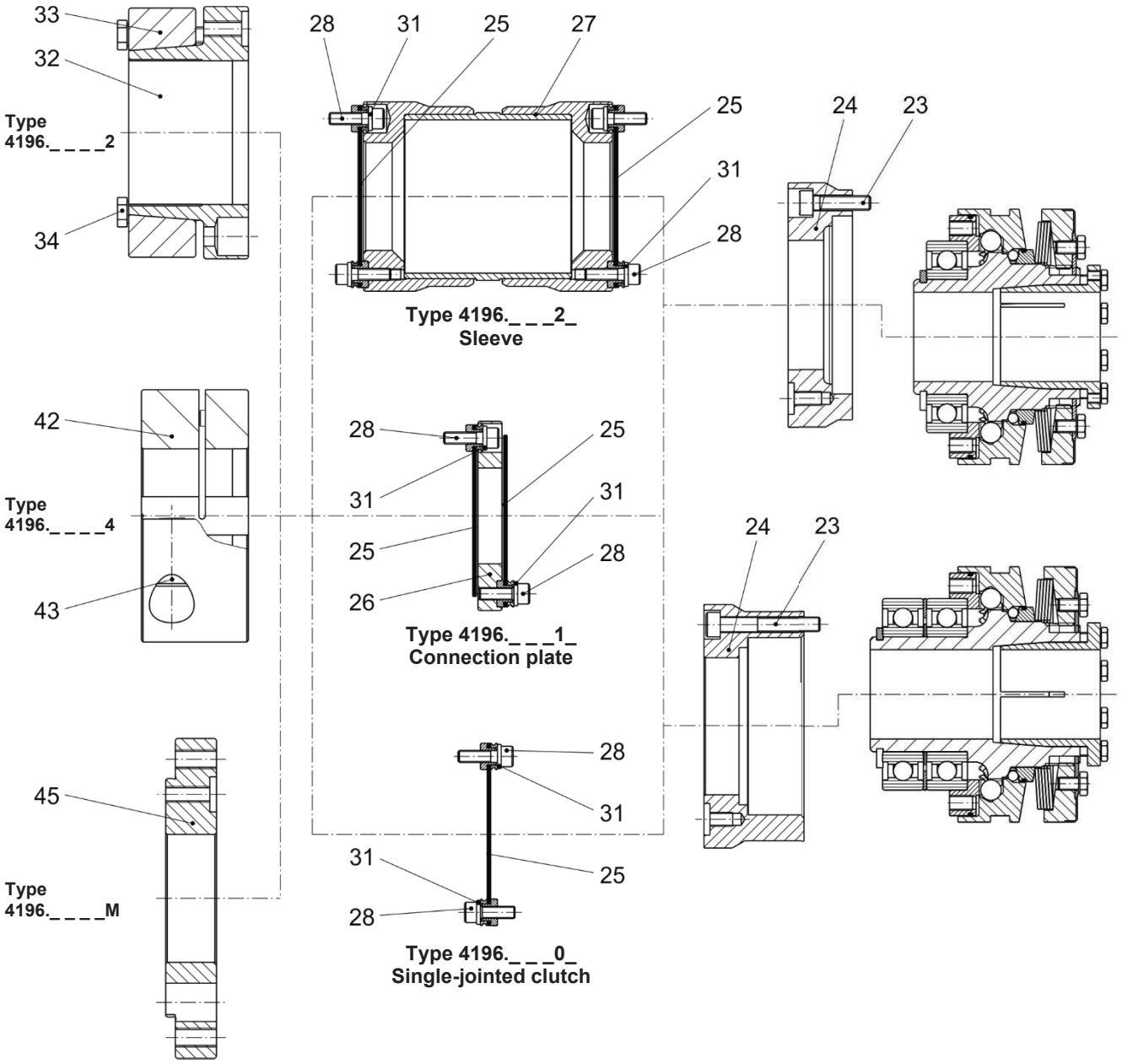



**Fig. 3**



Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

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

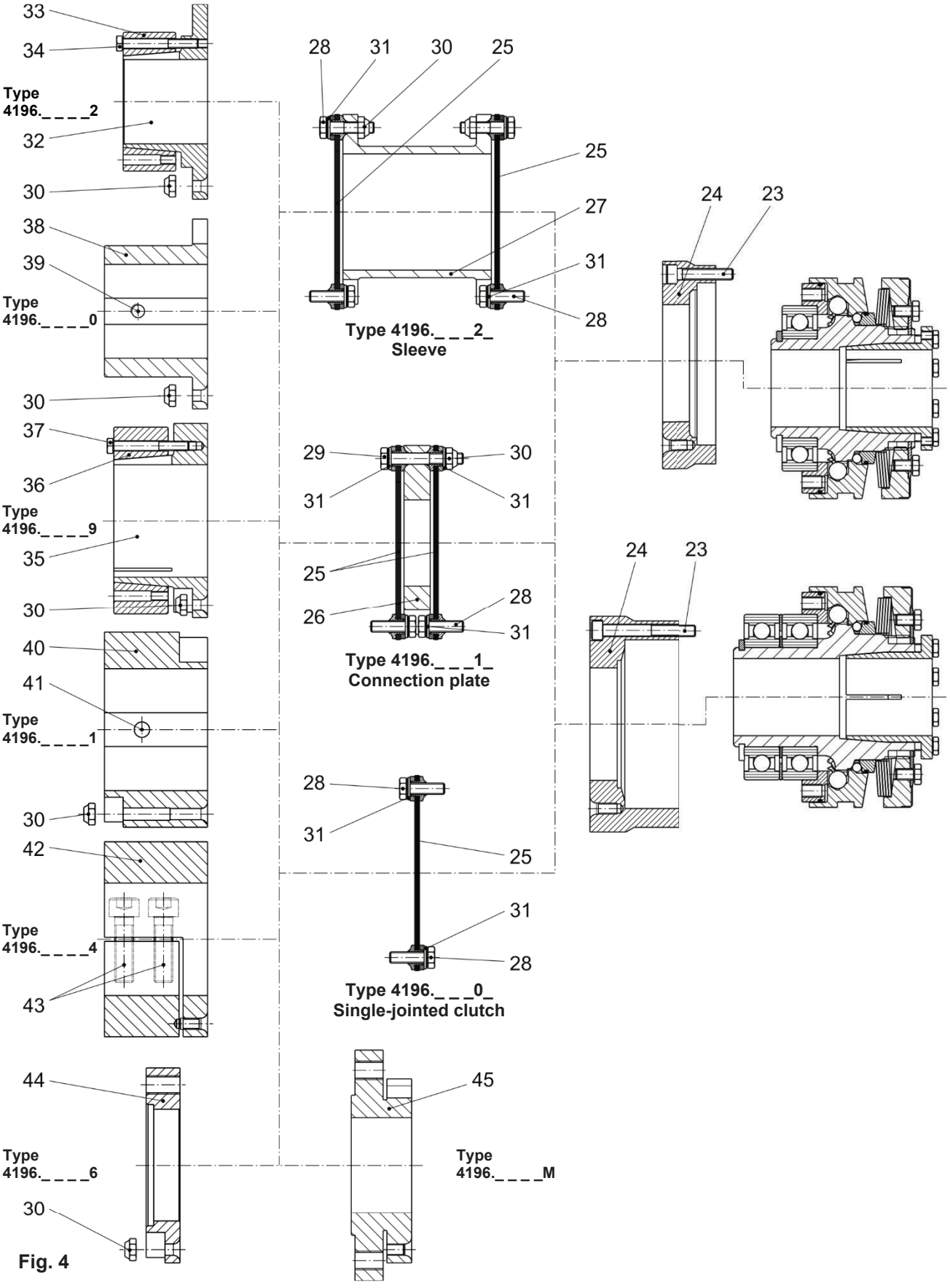



Fig. 4



Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## 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 colors (hardness): red (98 Sh A), yellow (92 Sh A), green (64 Sh D)


Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## General Technical Data

### Table 1

| Size | Limit torques for overload $M_G$ Type 419_.5_ _ _ _ [Nm] | Type 419_.6_ _ _ _ [Nm] | Type 419_.7_ _ _ _ [Nm] | Type 419_.8_ _ _ _ [Nm] | Max. speed [rpm] |
|---|---|---|---|---|---|
| 01 | 5 – 12.5 | 10 – 25 | 20 – 50 | for ATEX not permitted | 3000 |
| 0 | 10 – 25 | 20 – 50 | 40 – 100 | | 3000 |
| 1 | 20 – 50 | 40 – 100 | 80 – 200 | | 3000 |
| 2 | 40 – 100 | 80 – 200 | 160 – 400 | | 3000 |
| 3 | 80 – 200 | 160 – 400 | 320 – 800 | | 3000 |

### Table 2

| Size | Thrust washer stroke (Fig. 1; Item 5) on overload [mm] | Bore from – to hub (1) with keyway Ø $d_p$ [mm] | Bore from – to hub (1) with cone bushing (2) Ø d [mm] | min. bore of the hub (1) with cone bushing (2) for compliance with a transmission reliability > 2 to the maximum adjustment torque (see Guideline on page 23) Ø d [mm] |
|---|---|---|---|---|
| 01 | 2.0 | 12 – 20 | 10 – 20 | 12 |
| 0 | 2.6 | 15 – 25 | 15 – 25 | 18 |
| 1 | 3.2 | 22 – 30 | 22 – 35 | 26 |
| 2 | 3.8 | 28 – 40 | 32 – 45 | 32 |
| 3 | 4.5 | 32 – 50 | 35 – 55 | 45 |

### Table 3

| Size | Type 419_.5_ _ _ _ Maximum torque $M_G$ [Nm] | Type 419_.5_ _ _ _ Inspection dimension "a" [4] (Fig. 14) at approx. 70 % $M_G$ [mm] | Type 419_.6_ _ _ _ Maximum torque $M_G$ [Nm] | Type 419_.6_ _ _ _ Inspection dimension "a" [4] (Fig. 14) at approx. 70 % $M_G$ [mm] | Type 419_.7_ _ _ _ Maximum torque $M_G$ [Nm] | Type 419_.7_ _ _ _ Inspection dimension "a" [4] (Fig. 14) at approx. 70 % $M_G$ [mm] | Type 419_.8_ _ _ _ Maximum torque $M_G$ [Nm] | Type 419_.8_ _ _ _ Inspection dimension "a" [4] (Fig. 14) at approx. 70 % $M_G$ [mm] |
|---|---|---|---|---|---|---|---|---|
| 01 | 12.5 | 2.7 | 25 | 1.8 | 50 | 2.2 | not permitted for ATEX | |
| 0 | 25 | 3.2 | 50 | 2.2 | 100 | 3.2 | | |
| 1 | 50 | 3.7 | 100 | 2.5 | 200 | 3.3 | | |
| 2 | 100 | 5.3 | 200 | 3.9 | 400 | 4.6 | | |
| 3 | 200 | 5.9 | 400 | 4.1 | 800 | 5.4 | | |

[4] The inspection dimension “a” can show deviations due to construction tolerances or to clutch wear.

### 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 [5] [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 |

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


Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

**Table 5**

| Size | 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 | 5.1 | 2.6 | 6 | 10 | 4.5 | 8.5 | 8.5 | 8.5 | 6 | - | 33 |
| 0 | 4 | 2.6 | 5.1 | 6 | 25 | 8.9 | 8.5 | 8.5 | 8.5 | 6 | - | 33 |
| 1 | 4 | 5.1 | 9 | 10 | 25 | 15.5 | 8.5 | 8.5 | 8.5 | 6 | 6.5 | 17.4 |
| 2 | 8 | 9 | 15.5 | 30 | 70 | 15.5 | 14 | 14 | 14 | 8.5 | 8.5 | 83 |
| 3 | 13 | 9 | 37 | 52 | 120 | 37 | 35 | 35 | 35 | 10 | 14 | 122 |

## Technical Data Type 4194._ _ _ _ _

**Table 6**

| Size | 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**

| Size | 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**

| Size | Shaft misalignments, flexible coupling Type 4194._ _ _ _ _ | | | | | | | Dimension "E" (Fig. 10) [mm] | Locking set screw (22) for hub (Item 21 / Fig. 2) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Axial $\Delta K_a$ | Radial $\Delta K_r$ | | | Angular $\Delta K_w$ | | | | 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 |



Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

**Table 9**

| Size | Transmittable torques $T_R$ [Nm] on clamping hubs frictional locking (Item 19 / Type 4194._ _ _ _0) - dependent on bore - suitable for tolerance constellation F7/k6 (recommended shaft tolerance) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 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 | - | - | - | - | - | - | - | - | - | - |

| Size | 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**

| Size | 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 (recommended shaft tolerance) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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 | - | - | - | - | - | - | - | 215 | 285 | 330 | 450 |
| 3 | - | - | - | - | - | - | - | - | - | - | 475 |

| Size | 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 | 570 | 655 | 745 | 875 | 1010 | 1105 | - | - | - | - |
| 3 | 620 | 720 | 820 | 980 | 1150 | 1265 | 1350 | 1530 | 1720 | 1840 |



Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## Technical Data Type 4196._ _ _ _ _

### Table 11

| Size | 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 [6] $\Delta K_a$ [mm] | Radial [7] $\Delta K_r$ [mm] | Radial [8] $\Delta K_r$ [mm] | Angular [9] $\Delta K_w$ [°] |
| **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 |

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

### Table 12

| Size | 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 |


Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

### Table 13

| | 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 (recommended shaft tolerance) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Size** | **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 14

| | 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 (recommended shaft tolerance) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Size** | **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** |
| **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

| | 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 | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Size** | **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** | 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) | |
|---|---|---|---|---|
| **Size** | **Thread** | **Tightening torque [Nm]** | **Thread** | **Tightening torque [Nm]** |
| **1** | M5 ($Ød_p \leq 22$) - M6 ($Ød_p > 22$) | 2 / 4.1 | M8 | 8.5 |
| **2** | M6 | 4.1 | M10 | 14 |
| **3** | M8 | 8.5 | M10 | 14 |



Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## Design

The EAS®-compact®-F 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®-F 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 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 slow down freely.**

**CAUTION**

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



Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## Re-engagement

Please observe the information on the dangers of re-engagement in areas where there is a danger of explosion on page 25.

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

EAS®-compact®-F 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.

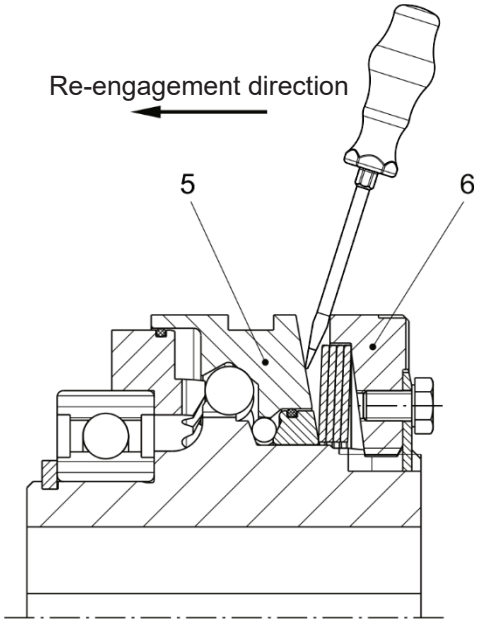



**Fig. 5**

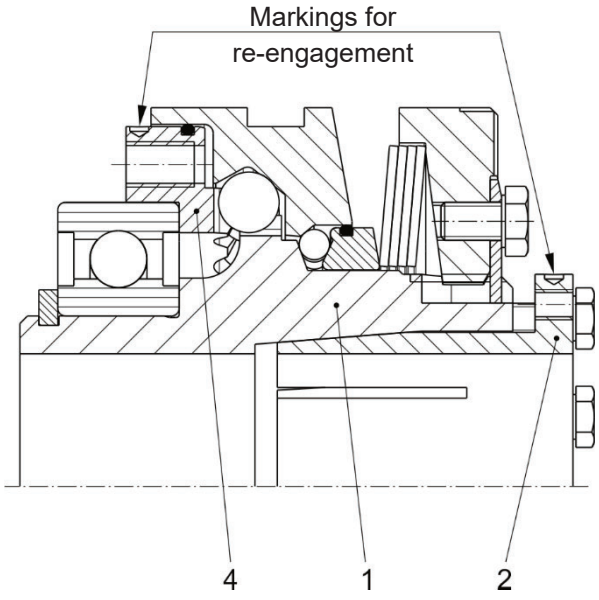



**Fig. 6**


Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## Output Elements Installation

The output element is centered 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 center 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®-F 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

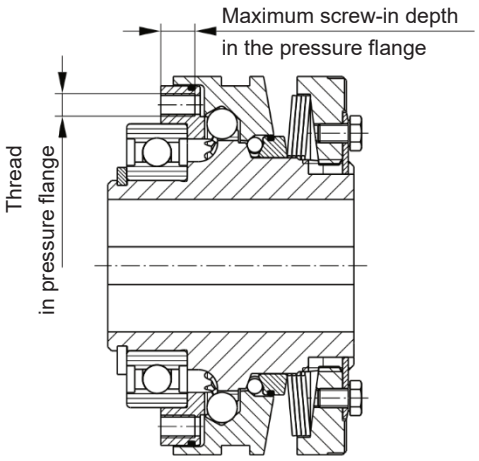



**Fig. 7**

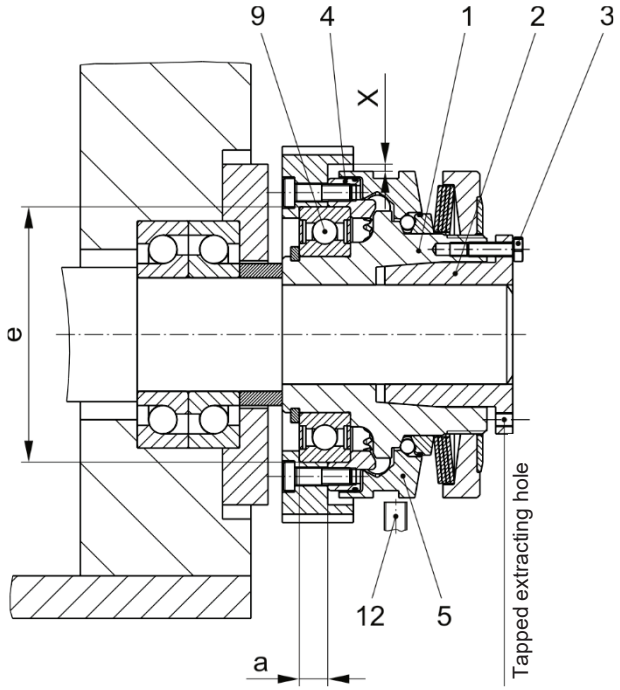



**Fig. 8**

### Table 17

| Size | Thread in 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) | |
|---|---|---|---|---|
| | | | $a^{+0.1}$ | $e_{h5}^{H7}$ |
| **01** | 8 x M4 / 12.9 / 4.5 Nm | 6 | 5 | 47 |
| **0** | 8 x M5 / 12.9 / 8.9 Nm | 7 | 7 | 62 |
| **1** | 8 x M6 / 12.9 / 15.5 Nm | 9 | 9 | 75 |
| **2** | 8 x M6 / 12.9 / 15.5 Nm | 10 | 10 | 90 |
| **3** | 8 x M8 / 12.9 / 37 Nm | 12 | 10 | 100 |


Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## Mounting onto the Shaft

EAS®-compact®-F 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®-F 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.

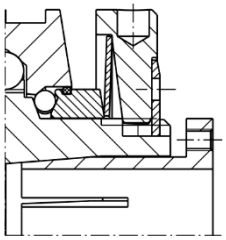
Torque range “medium”:
**one** cup spring and **wide** thrust ring (Type 419_.**5**_ _ _ _)

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**_ _ _ _)

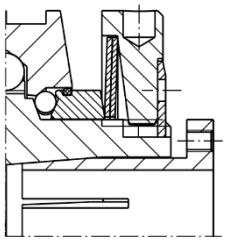
Torque range “maximum”:
**five** cup springs and **narrow** thrust ring (Type 419_.**8**_ _ _ _) is **not** permitted for ATEX.

**1x layered**



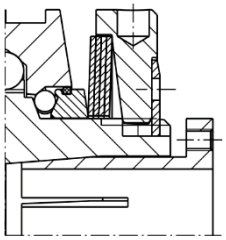
Type 419_.**5**_ _ _ _

**2x layered**



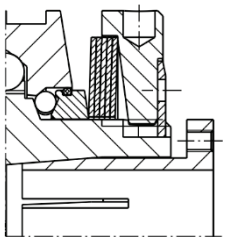
Type 419_.**6**_ _ _ _

**4x layered**



Type 419_.**7**_ _ _ _

**5x layered**



Type 419_.**8**_ _ _ _

**Attention!**
**Not permitted for ATEX**

**Fig. 9**



Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## Clutch Installation via Key Connection

On the EAS®-compact®-F 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 center hole
- ❒ for Types 4194. and 4196.
  on the EAS®-side with a press cover and a screw, screwed into the shaft threaded center 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 $mm^2/s$).
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!**
Please see guideline under ATEX!

## 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.**

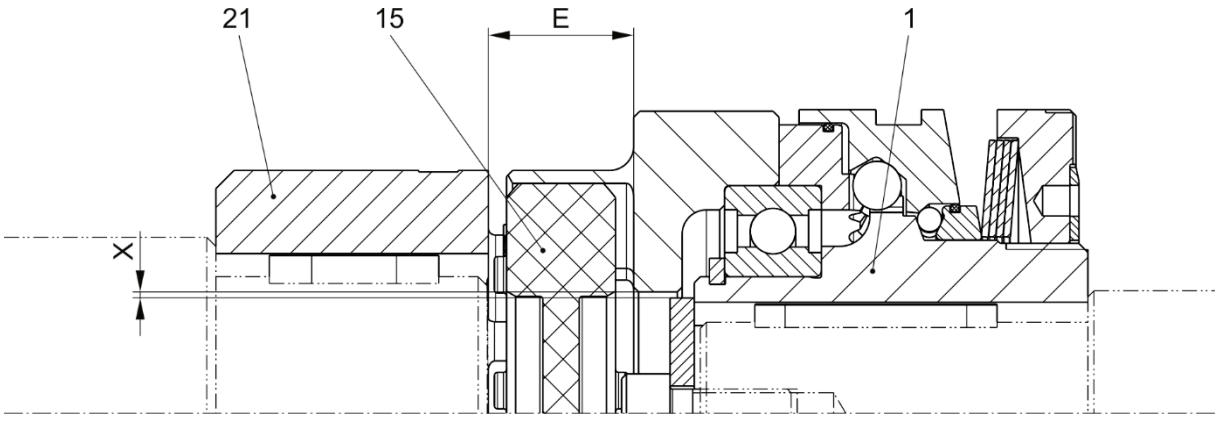



**Fig. 10**


Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## Permitted Shaft Misalignments

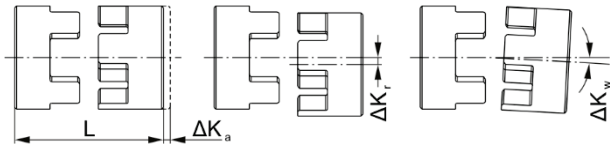
The EAS®-compact®-F clutches Types 4194._ _ _ _ _ (lastic backlash-free) and 4196._ _ _ _ (torsionally rigid backlash-free / 2 disk packs) compensate for radial, axial and angular shaft misalignments (Fig. 11) without losing their backlash-free function.
The EAS®-compact®-F clutches Type 4196._ _ _0_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

**CAUTION**

The EAS®-compact®-F clutches Type 4196._ _ _0_ (torsionally rigid backlash-free / 1 disk pack) do **not** compensate for radial shaft misalignments.
Danger of ignition!

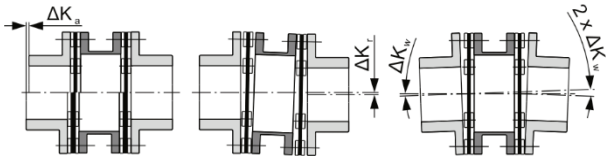
However, the Type-specific permitted shaft misalignments indicated in Tables 8 and 11 must not simultaneously reach their maximum value.
If more than one kind of misalignment takes place simultaneously, they influence each other. This means that the permitted misalignment values are dependent on one 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 $\Delta K_a$ = 0.44 mm equals 40 % of the permitted maximum value $\Delta K_a$ = 1.1 mm.
Radial misalignment occurrence $\Delta K_r$ = 0.06 mm equals 30 % of the permitted maximum value $\Delta K_r$ = 0.2 mm.
=> permitted angular misalignment $K_w$ = 30 % of the maximum value $\Delta K_w$ = 2.0° => $\Delta K_w$ = 0.6°

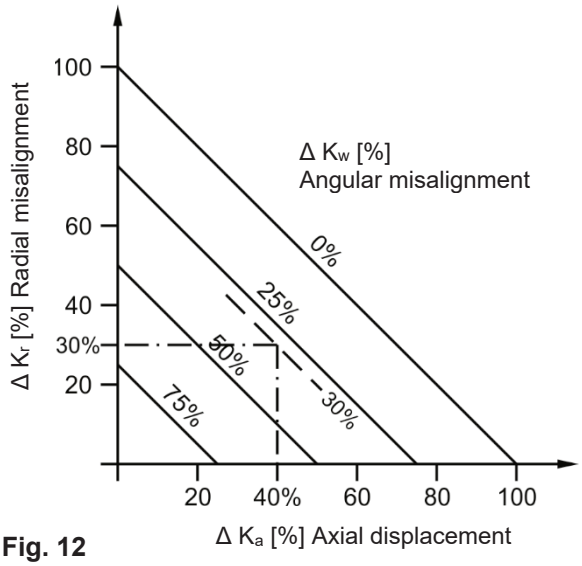



**Fig. 12**

## 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.


Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## 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.
In case of 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), the clutch must be re-adjusted and calibrated using dimension "a" (see Table 3 and Fig. 14).

**CAUTION**

If the locking screws (8) are not screwed back in again, the lock washer is not secured and the torque adjustment is not consistent. A loose lock washer means danger of ignition!

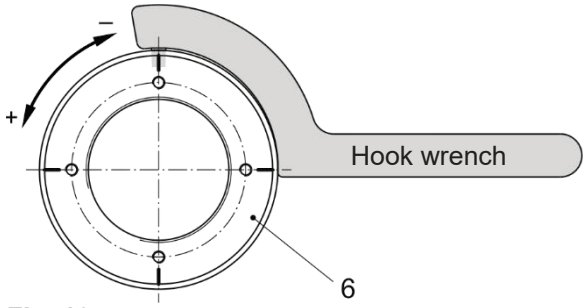



**Fig. 13**

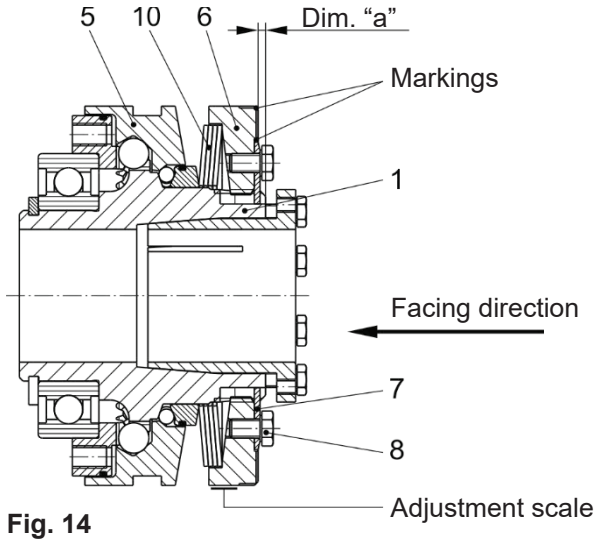



**Fig. 14**

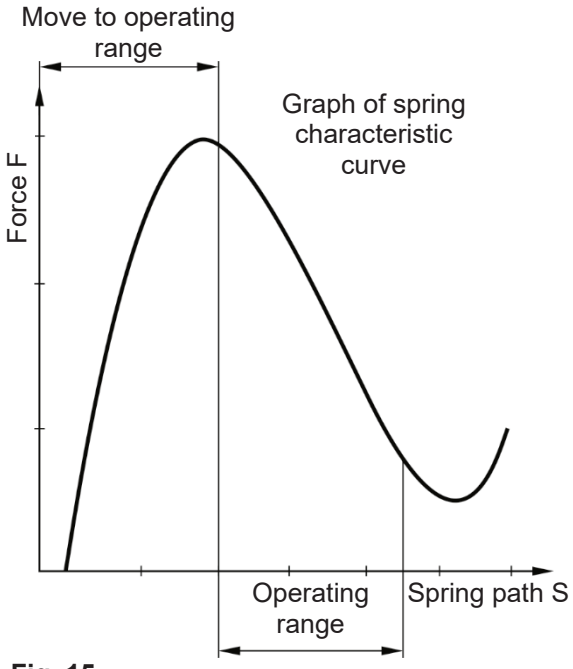



**Fig. 15**


Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## 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 Ex-limit switch acc. Fig. 16.
- ❒ Please ensure that the Ex-limit switch is functioning correctly.

**Contactless limit switch (mounting example)**

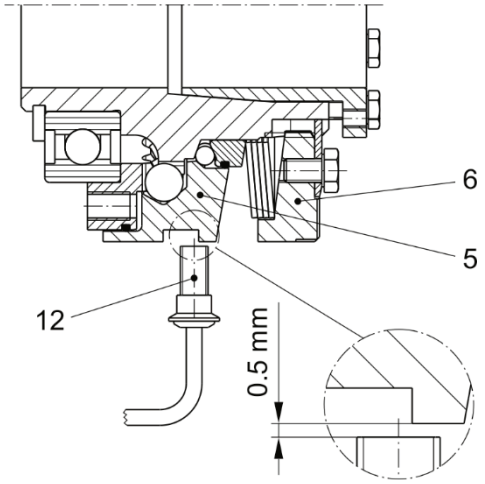



**Fig. 16**


Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## Clutch Dimensioning for ROBA®-DS Mounted Couplings

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

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 18 |
| n [rpm] | Drive machine nominal speed |

### Table 18

| Service Factor $f_B$ | | Work Machine Load Class | | |
|---|---|---|---|---|
| | | I | II | III |
| Drive machine | **Electromotor, turbine, hydraulic motor** | 1.1 | 1.4 | 1.9 |
| | **Piston machine** with more than 3 cylinders | 1.4 | 1.7 | 2.2 |
| | **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 .

In ATEX applications, no temperature factor must be taken into consideration as the maximum permitted ambient temperature is 80°C.

### Table 19

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


Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## 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:

$$T_{KW} = 0.25 \times T_{KN} \text{ (for aluminum hubs)}$$

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

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

### 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).

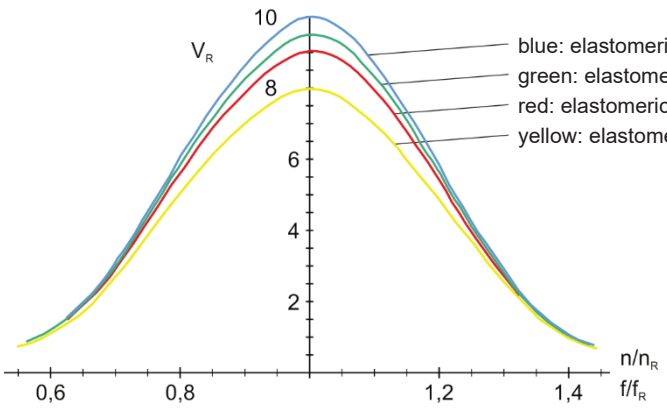
5.5. $S_f$ takes the frequency dependency of lifetime into account. The frequency dependency is first taken into account above 5 Hz.

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.


Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## Service Factors for Coupling Dimensioning

### $V_R$ = Resonance factor



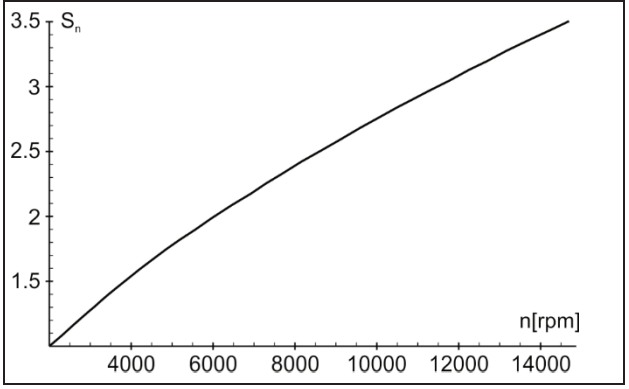

**$n_R$ = Resonance speed**

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

**$f_R$ = Resonance frequency**

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

### $S_n$ = 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 |

### $S_\delta$ = Safety factor for temperature

| T | -30 °C / +30 °C | +60 °C | +90 °C |
|---|---|---|---|
| $S_\delta$ | 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 |
| $\Delta K_a$ | [mm] | Permitted axial displacement |
| $\Delta K_r$ | [mm] | Permitted radial misalignment |
| $\Delta K_w$ | [°] | Permitted angular misalignment |
| $\Delta W_a$ | [mm] | Axial shaft misalignment |
| $\Delta W_r$ | [mm] | Radial shaft misalignment |
| $\Delta W_w$ | [°] | 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 |
| $S_\delta$ | [ - ] | Temperature factor |
| $S_f$ | [ - ] | Frequency factor |
| $V_R$ | [ - ] | Resonance factor |
| f | [1/s]=[Hz] | Load factor |
| $f_F$ | [Hz] | Resonance frequency |


Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## 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 behavior

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 behavior

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 behavior

**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._ _ _ _ _):**

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. 16).

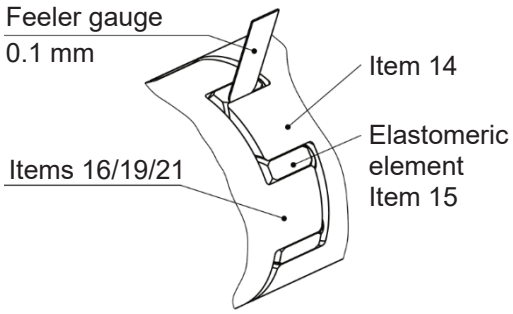



**Fig. 17**

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 behavior, 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

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 aluminum components:**
Non-ferrous metals (Code No. 160118)

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


Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## 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 clutch operation, it is necessary to keep to the clutch characteristic values (Technical Data) indicated in Tables 1 to 17.

#### 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 recognizing a clutch overload occurrence (usually with an inductive proximity switch for Ex-areas). Max. permitted run-out time: 3 min referring to the maximum permitted speed acc. Table 1. 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 clutch destruction and of ignition.

#### Torque Adjustment

The clutch must only be adjusted within the specified torque range. The torque range is defined via the graduation on the outer diameter of the adjusting nut (6) 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 aluminum 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 (5) in case of overload, even if re-engagement is actuated. Interfering contours which prevent the thrust washer (5) 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!



Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

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

**EAS®-compact®-F overload clutch without mounted coupling Type 4190._ _ _ _ _ and EAS®-compact®-F overload clutch with ROBA®-DS mounted coupling Type 4196._ _ _ _ _**

### Classification of Ex Areas Where There is a Danger of Explosion and Permitted Types According to the Directive 2014/34/EU

For the implementation of the Directive, the ignition protection type “c” (constructional safety) has been applied in accordance with DIN EN ISO 80079-36/37 and the letter "h" has been recorded in the classification.

**Key designs and flange designs:**

Dimensioning according to the requirements shaft diameter, transmittable torque and operating conditions must be carried out. To do this, the corresponding user data must be known or the user must carry out the dimensioning in accordance with the valid calculation basis (e.g. DIN 6892) for key connections and the permitted voltage values common in mechanical engineering.
For the calculation, please take the yield point $Rp_{0.2}$ = 200 N/mm² for aluminum and the yield strength $R_e$ = 350 N/mm² for steel.
During initial operation, please make sure that the key is inserted correctly and that the clutch and the key are 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®-F overload clutch is suitable for use in areas where there is a danger of explosion according to the category:

CE Ex II 2G Ex h IIC T5 -15°C≤Ta≤+80°C Gb
II 2D Ex h IIIC T110°C -15°C≤Ta≤+80°C Db

Permitted Types:
4190.53_00 / 4190.63_00 / 4190.73_00 /
4190.54_00 / 4190.64_00 / 4190.74_00 /
4190.55_00 / 4190.65_00 / 4190.75_00 /
4196.53_00 / 4196.63_00 / 4196.73_00 /
4196.53_10 / 4196.63_10 / 4196.73_10 /
4196.53_20 / 4196.63_20 / 4196.73_20 /
4196.53_01 / 4196.63_01 / 4196.73_01 /
4196.53_11 / 4196.63_11 / 4196.73_11 /
4196.53_21 / 4196.63_21 / 4196.73_21 /
4196.53_06 / 4196.63_06 / 4196.73_06 /
4196.53_16 / 4196.63_16 / 4196.73_16 /
4196.53_26 / 4196.63_26 / 4196.73_26 /
4196.53_0M / 4196.63_0M / 4196.73_0M /
4196.53_1M / 4196.63_1M / 4196.73_1M /
4196.53_2M / 4196.63_2M / 4196.73_2M

If the frictionally-locking hub types listed on the right are designed with additional key connections, they also accord with the category described here.

**Designs with frictionally-locking shafts-hub connection:**

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, **keeping to a calculatory transmission reliability of at least S = 2** (see Table 2), for application in areas in which there is a danger of explosion, category:

CE Ex II 3G Ex h IIC T5 -15°C≤Ta≤+80°C Gc
II 3D Ex h IIIC T110°C -15°C≤Ta≤+80°C Dc

Permitted Types:
4190.50_00 / 4190.60_00 / 4190.70_00 /
4190.51_00 / 4190.61_00 / 4190.71_00 /
4190.52_00 / 4190.62_00 / 4190.72_00 /
4196.50_02 / 4196.60_02 / 4196.70_02 /
4196.50_12 / 4196.60_12 / 4196.70_12 /
4196.50_22 / 4196.60_22 / 4196.70_22 /
4196.50_04 / 4196.60_04 / 4196.70_04 /
4196.50_14 / 4196.60_14 / 4196.70_14 /
4196.50_24 / 4196.60_24 / 4196.70_24 /
4196.50_09 / 4196.60_09 / 4196.70_09 /
4196.50_19 / 4196.60_19 / 4196.70_19 /
4196.50_29 / 4196.60_29 / 4196.70_29

The values specified in Tables 2, 13,14 and 15 for transmittable torques for cone bushings, clamping hubs and shrink disk hubs must be observed.
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).
In these conditions, clutch application is possible in the following areas:

CE Ex II 2G Ex h IIC T5 -15°C≤Ta≤+80°C Gb X
II 2D Ex h IIIC T110°C -15°C≤Ta≤+80°C Db X

The X at the end of the classification refers to the operating conditions for an inspection of the transmission reliability of the frictionally-locking shaft-hub connection.
Without this inspection, this classification is rendered invalid.




Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

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

### Conditions to Observe in Areas Ex Where There is a Danger of Explosion for Type 4196._ _ _ _ _ (ROBA®-DS Mounted Coupling)

For malfunction-free clutch operation, it is necessary to keep to the clutch characteristic values indicated in the Technical Data.

**CAUTION**

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

**Clutch Dimensioning**

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 Table 4)
f.) Service factors (see page 21)

Clutch dimensioning according to the guidelines on page 21 is necessary for each application case.
Changed operating parameters in the system require an inspection of the clutch dimensioning.
Despite technical clutch dimensioning, system-dependent vibration excitations may occur during operation, which might lead to resonances and therefore to destructions of the ROBA®-DS coupling. On critical applications, the total load profile of the application must be run through during initial operation in order to confirm the suitability of the clutch in the application.
Operation in an overcritical speed range and in the resonance range is not permitted.

**CAUTION**

No transverse forces may be introduced into the clutch which the clutch cannot compensate through flexible compensation. Permitted misalignments are to be observed. Type 4196._ _ _0_ clutches (single-jointed clutches) cannot compensate for radial shaft misalignments. If these clutches are installed in an arrangement with radial misalignment, enormously high restoring forces are generated which affect the clutch and the clutch mounted parts, including the bearings. Danger of component destruction and danger of ignition.

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 clutch are not permitted.

You can find further information in the currently valid ATEX Installation and Operational Instructions for the ROBA®-DS coupling.



Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

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

**EAS®-compact®-F overload clutch with ROBA®-ES mounted coupling Type 4194._ _ _ _ _**

### Classification of Ex Areas Where There is a Danger of Explosion and Permitted Types According to the Directive 2014/34/EU

For the implementation of the Directive, the ignition protection type “c” (constructional safety) has been applied in accordance with DIN EN ISO 80079-36/37 and the letter "h" has been recorded in the classification.

**Key designs:**

Dimensioning according to the requirements shaft diameter, transmittable torque and operating conditions must be carried out. To do this, the corresponding user data must be known or the user must carry out the dimensioning in accordance with the valid calculation basis (e.g. DIN 6892) for key connections and the permitted voltage values common in mechanical engineering. For the calculation, please take the yield point $Rp_{0.2}$ = 200 N/mm² for aluminum and the yield strength $R_e$ = 350 N/mm² for steel. During initial operation, please make sure that the key is inserted correctly and that the clutch and the key are 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®-F overload clutch with a mounted ROBA®-ES elastomer coupling is suitable for use in areas where there is a danger of explosion according to the category:

CE Ex II 2G Ex h IIC T4/T5
-15°C ≤ Ta ≤ +80/60°C Gb
Ex II 2D Ex h IIIC T110°C
-15°C ≤ Ta ≤ +80/60°C Db

Permitted Types:
4194.53_32 / 4194.63_32 / 4194.73_32 /
4194.53_42 / 4194.63_42 / 4194.73_42 /
4194.53_62 / 4194.63_62 / 4194.73_62

**Clutches with a frictionally-locking shaft-hub connection:**

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 Ex h IIC T4/T5
-15°C ≤ Ta ≤ +80/60°C Gc
Ex II 3D Ex h IIIC T110°C
-15°C ≤ Ta ≤ +80/60°C Dc

Permitted Types:
4194.50_30 / 4194.60_30 / 4194.70_30 /
4194.50_31 / 4194.60_31 / 4194.70_31 /
4194.50_40 / 4194.60_40 / 4194.70_40 /
4194.50_41 / 4194.60_41 / 4194.70_41 /
4194.50_60 / 4194.60_60 / 4194.70_60 /
4194.50_61 / 4194.60_61 / 4194.70_61

The values stated in Tables 9 and 10 regarding transmittable torques for shrink disk hubs are to be observed.
A keyway as well as a safe torque transmission can be incorporated in these designs for the bore diameter of the Lastic hubs specified in Table 18.
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).
In these conditions, clutch application is possible in the following areas:

CE Ex II 2G Ex h IIC T4/T5
-15°C ≤ Ta ≤ +80/60°C Gb X
Ex II 2D Ex h IIIC T110°C
-15°C ≤ Ta ≤ +80/60°C Db X

The X at the end of the classification refers to the operating conditions for an inspection of the transmission reliability of the frictionally-locking shaft-hub connection.
Without this inspection, this classification is rendered invalid.

**Table 18**

| Type | Bore [mm] | Size 01 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|
| 4194._ _ _ _0 | $d_{min}$ | 15 | 19 | 20 | 28 | 35 |
| | $d_{max}$ | 28 | 35 | 45 | 45 | 55 |
| 4194._ _ _ _1 | $d_{min}$ | 15 | 19 | 20 | 28 | 35 |
| | $d_{max}$ | 28 | 38 | 45 | 50 | 60 |




Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

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

### Conditions to Observe in Areas Ex Where There is a Danger of Explosion for Type 4194._ _ _ _ _ (ROBA®-ES Mounted Coupling)

For malfunction-free clutch operation, it is necessary to keep to the clutch characteristic values indicated in the Technical Data.

**CAUTION**

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

#### Clutch Dimensioning

Suitable clutch dimensioning 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 on pages 22/23), please observe the following points:

a.) Coupling nominal torque
b.) Coupling peak torque
c.) Max. speed
d.) Max. shaft misalignments
e.) Ambient conditions (see Table 4)
f.) Service factors (see pages 22/23)

You can find more information in the currently valid ATEX Installation and Operational Instructions for the ROBA®-ES coupling.

The number and type of start-up impacts must be taken into account according to the clutch dimensioning guidelines (pages 22/23). Furthermore, elastomer heating may occur due to speed resonance. This must also be taken into account during clutch 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 clutch changes in dependence of the ambient temperature, see clutch marking.

Exceeding the permitted ambient temperature means a danger of elastomer destruction, or the maximum permitted surface temperature of the clutch 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!

Electrical potential equalization on the clutch 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 clutch. 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 clutch 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 clutch are not permitted.

### Maintenance and Inspection Intervals for Clutches in Ex Areas Where There is a Danger of Explosion

Please observe section Maintenance on page 21.

The maintenance and inspection intervals stated on page 21 must be maintained:

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.




Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

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

### Initial Operation

If no stipulations regarding coating or other surface treatments have been made customer-side on order, the surfaces of clutch parts made of steel are protected by a phosphate coating. All other mounted and connection parts are left untreated.
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 stick together as a result of paint or other sticky media, and electrostatic charges must not be caused (see DIN EN ISO 80079-36 6.7). 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 (4) when output elements (toothed belt wheel, sprocket wheels, flanges) are mounted onto the pressure flange (4).**
**Please observe the permitted thread screw-in depths (Table 17, page 15). If the screws inserted into the pressure flange (4) are too long, there is a danger of component destruction and therefore of ignition.**
Overload clutches are rotating parts which can generate a risk of injury if touched or a risk of ignition due to impacts from foreign bodies should they not be properly secured by a cover.
The rotating clutch components must be protected against contact and against foreign body impacts. Please mount a suitable cover onto the clutch. The distance from the cover to the rotating components must be at least 5 mm. The cover must be electrically conductible.
Covers made of aluminum are not permitted.
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 4 / page 8).**

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

Designs with ROBA®-DS or ROBA®-ES mounted couplings must be axially secured onto the input and output shaft.
Correct securement must be checked before initial operation.
The shafts and keys must be positioned in the clutches so that the neighboring clutch parts do not contact each other (Fig. 18/19).
It is essential that the distance dimension "E" for Type 4194._ _ _ _ _ acc. Fig. 10 and Table 8 is adhered to.
If the two clutch parts touch, there is a risk of ignition caused through friction.
In the key designs, please secure the locking set screw with sealing lacquer, e.g. Loctite 243.

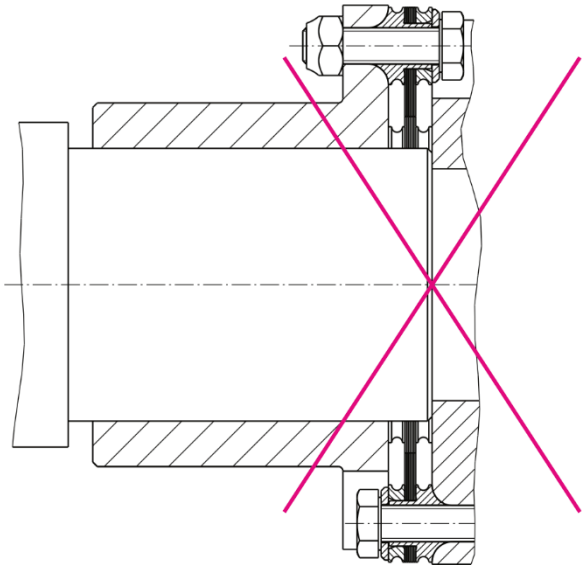


Fig. 18

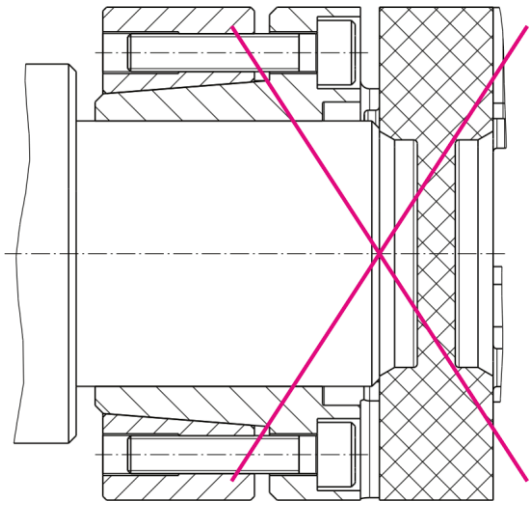


Fig. 19


Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## Malfunctions / Breakdowns Type 4190._ _ _ _ _

| Malfunction | Possible Causes | Danger Guidelines for Ex Areas | Solutions |
|---|---|---|---|
| Premature clutch release | Incorrect torque adjustment<br>Adjusting nut has changed position<br>Worn clutch | None | 1) Set the system out of operation<br>2) Check the torque adjustment<br>3) Secure the adjusting nut<br>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<br>Adjusting nut has changed position<br>Disengagement mechanism blocked by a foreign body<br>Worn clutch | Danger of component destruction and related danger of ignition | 1) Set the system out of operation<br>2) Check whether foreign bodies influence the disengagement mechanism function<br>3) Check the torque adjustment<br>4) Secure the adjusting nut<br>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<br>Worn disengagement mechanism | Bearing heat-up to bearing destruction<br>Danger of ignition | 1) Set the system out of operation<br>2) Inspect the clutch at the place of manufacture |
| Running noises in normal operation | Insufficient clutch securement<br>Loosened screws<br>Loosened adjusting nut | Danger of ignition | 1) Set the system out of operation<br>2) Check the clutch securement<br>3) Check the screw tightening torques<br>4) Check the torque adjustment and that the adjusting nut sits securely |


Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## Malfunctions / Breakdowns Type 4194._ _ _ _ _

| 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<br>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”)<br>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<br>2) Dismantle the clutch and remove the remainders of the elastomeric element<br>3) Check the clutch parts and replace if damaged<br>4) Insert a new elastomeric element, install clutch components<br>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<br>2) Check the clutch alignment<br>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<br>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<br>2) Replace the entire clutch<br>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<br>2) Replace the entire clutch<br>3) Check the alignment<br>4) Find the cause of overload |
| | Operating parameters are not appropriate for the clutch performance | Danger of ignition due to hot surfaces and formation of sparks | 1) Set the system out of operation<br>2) Check the operating parameters and select a suitable clutch (observe installation space)<br>3) Install a new clutch<br>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<br>2) Check clutch dimensioning<br>3) Replace the entire clutch<br>4) Check the alignment<br>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<br>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”)<br>3) Check the clutch for wear |



Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## Malfunctions / Breakdowns Type 4194._ _ _ _ _ (continued)

| 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<br>2) Dismantle the clutch and remove the remainders of the elastomeric element<br>3) Check the clutch parts and replace if damaged<br>4) Insert a new elastomeric element, install clutch components<br>5) Check the alignment and correct if necessary<br>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<br>2) Dismantle the clutch and remove the remainders of the elastomeric element<br>3) Check the clutch parts and replace if damaged<br>4) Insert a new elastomeric element, install clutch components<br>5) Check the alignment and correct if necessary<br>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<br>2) Dismantle the clutch and remove the remainders of the elastomeric element<br>3) Check the clutch parts and replace if damaged<br>4) Insert a new elastomeric element, install clutch components<br>5) Check the alignment and correct if necessary<br>6) Find the cause of vibration (if necessary, use an elastomeric element with a lower or higher shore hardness) |



Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

## Malfunctions / Breakdowns Type 4196._ _ _ _ _

| 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<br>2) Find / resolve the cause of incorrect alignment<br>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<br>2) Check the clutch parts and replace if damaged<br>3) Tighten the connecting screws to the specified torque<br>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 and impact sparks | 1) Set the system out of operation<br>2) Check the clutch alignment<br>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<br>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<br>2) Dismantle the clutch and remove the remainders of the disk packs<br>3) Check the clutch parts and replace if damaged<br>4) Find the cause of overload and remove it |
| | Operating parameters are not appropriate for the clutch performance | Danger of ignition due to impact sparks | 1) Set the system out of operation<br>2) Check the operating parameters and select a suitable clutch (observe installation space)<br>3) Install a new clutch<br>4) Check the alignment |
| | Incorrect operation of the system unit | Danger of ignition due to impact sparks | 1) Set the system out of operation<br>2) Dismantle the clutch and remove the remainders of the disk packs<br>3) Check the clutch parts and replace if damaged<br>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<br>2) Dismantle the clutch and remove the remainders of the disk packs<br>3) Check the clutch parts and replace if damaged<br>4) Check the alignment and correct if necessary<br>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.



Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com

# EU Declaration of Conformity

According to the EU Directive on the harmonization 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:

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

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

**EAS®-compact®-F overload clutch**
**Type 419_._ _ _ _ _X**
**Sizes 01, 0, 1, 2, 3**

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

Deposit Receipt: EX9A 010376 0002

Notified Body number: 0123

## 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 ISO 80079-36: 2016-12
Explosive atmospheres - Part 36: Non-electrical equipment for explosive atmospheres - Basic method and requirements

3 DIN EN ISO 80079-37: 2016-12
Explosive atmospheres - Part 37: Non-electrical equipment for explosive atmospheres
- Non-electrical type of protection constructional safety “c”, control of ignition sources “b”, liquid immersion “k”

Mauerstetten, September 01, 2023
Place / Date

Ferdinand Mayr, M. Sc.
(CEO)



Chr. Mayr GmbH + Co. KG
Eichenstraße 1, D-87665 Mauerstetten, Germany
Phone: +49 8341 804-0, Fax: +49 8341 804-421
www.mayr.com, email: public.mayr@mayr.com