Installation and Operational Instructions for EAS®-HTL housed overload clutch, Type 4190._5400 Sizes 4 and 5

(B.4.15.8.EN)

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

Contents:

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Safety and Guideline Signs

CAUTION

Danger of injury to personnel and damage to machines.

Please Observe!
Guidelines on important points.

Safety Regulations

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

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

CAUTION

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

User-implemented Protective Measures

- ❒ Cover all moving parts to protect against seizure, dust impacts or foreign body impact.
- ❒ The clutches may not be put into operation without a limit switch unless *mayr*® has been contacted and has agreed otherwise.

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

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

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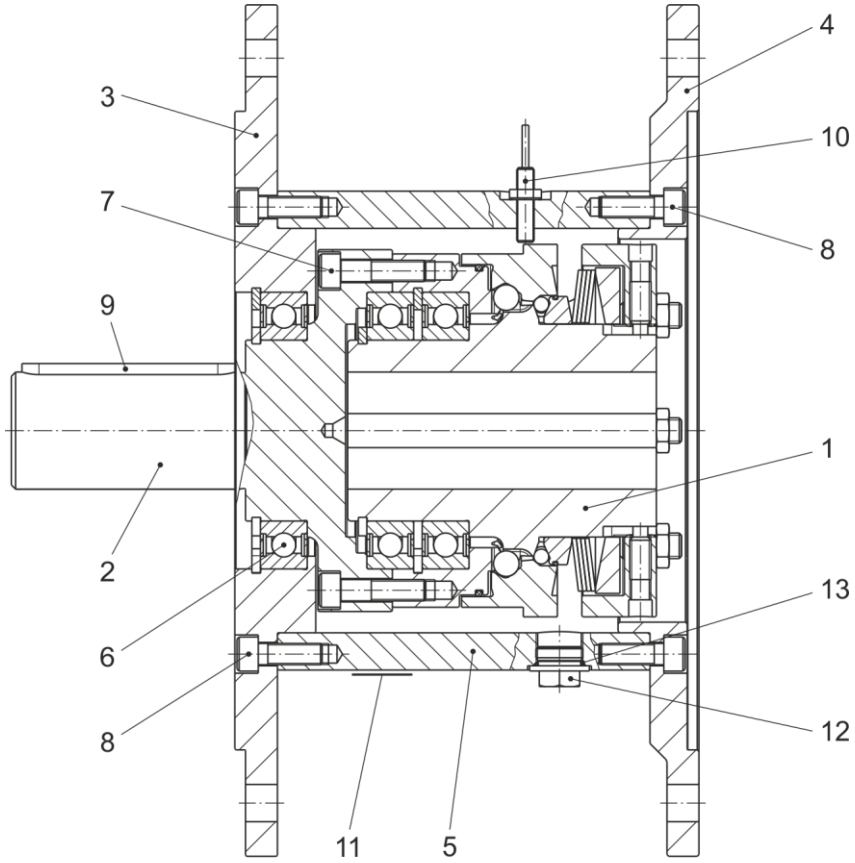

Fig. 1

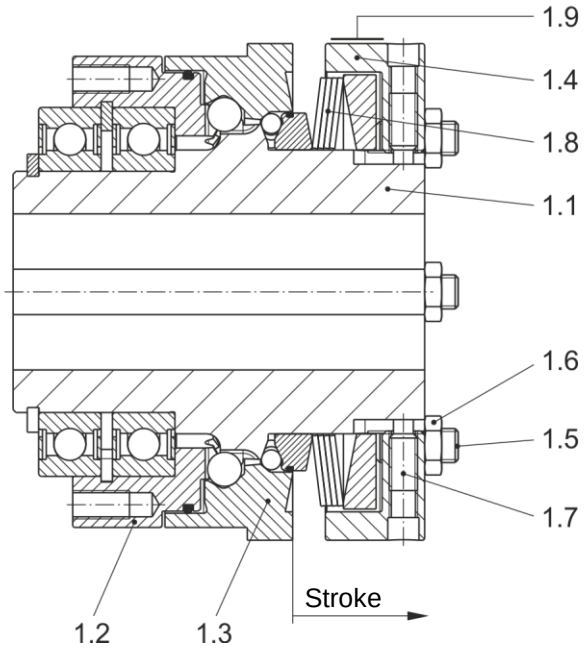

Fig. 2

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

Item	Name
1	EAS®-Compact® overload clutch
1.1	Hub
1.2	Pressure flange
1.3	Thrust washer
1.4	Adjusting nut
1.5	Set screw
1.6	Hexagon nut
1.7	Set screw
1.8	Cup spring
1.9	Adjustment table
2	Output shaft
3	Output-side flange
4	Drive-side flange
5	Distance ring
6	Deep groove ball bearing
7	Cap screw
8	Cap screw
9	Key DIN 6885/1
10	Limit switch
11	Type tag
12	Screw plug (for re-engagement bore)
13	O-ring

Technical Data

Table 1

Size	Limit torque for overload M_G				Max. speed [rpm]
	Type 4190.55400 [Nm]	Type 4190.65400 [Nm]	Type 4190.75400 [Nm]	Type 4190.85400 [Nm]	
4	120 – 300	240 – 600	480 – 1200	600 – 1500	3500
5	240 – 600	480 – 1200	960 – 2400	1200 – 3000	3000

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Table 2

Clutch size	Motor size	Tightening torque Item 7 [Nm]	Tightening torque Item 8 [Nm]	Thrust washer stroke (Fig. 2; Item 1.3) on overload [mm]	Bore from – to [mm]
4	200	75	56	5.5	40 – 65
	225	75	56	5.5	40 – 65
	250	75	56	5.5	40 – 65
5	280	122	122	6.5	45 – 80
	315	122	122	6.5	45 – 80

Table 3 (for Dimensions see Fig. 3 on page 7)

Clutch size	Motor size	Dimension h [mm]	Dimension h_2 [mm]	Dimension h_1 [mm]	Weight [kg]
4	200	110	110	169	73.0
	225	140	140	169	83.3
	250	140	140	169	111.8
5	280	140	140	207	145.5
	315	170	165	204	237.0

Table 4 Screws for Customer-side Attachment onto the Flange “Y” and Flange “Z” with Respective Tightening Torque

Clutch size	Motor size	Screws with a strength class of 8.8 (number of pieces per flange)	Tightening torque
4	200	4 x M16	183 Nm
	225	8 x M16	183 Nm
	250	8 x M16	183 Nm
5	280	8 x M16	183 Nm
	315	8 x M20	360 Nm

Table 5 Max. Permitted Bearing Loads

Clutch size	Motor size	Axial forces [N]	Radial forces [N]	Transverse force torque B [1] (Fig. 3) referring to the clutch flange [Nm]	Transverse force torque C [2] (Fig. 3) referring to the housing [Nm]
4	200	800	1600	50	2000
	225	800	1600	50	2500
	250	800	1600	50	3000
5	280	800	1600	50	5000
	315	1100	2200	70	8000

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

[2] Value C refers to purely static loads. In case of oscillation or vibration occurrence, please use a safety factor of 2.5.

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Design

The EAS®-HTL overload clutch is designed as a mechanically disengaging overload clutch, based on the ball detent principle. It is designed as a housed clutch (Protection IP 53) for attachment to an IEC B5 flange according to DIN EN 50347.
The connection dimensions are designed according to the motor sizes 200, 225, 250, 280 and 315.
EAS®-HTL clutches as a complete unit provide overload protection between the motor and the gearbox.

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 adjusting nut (6) is marked with dimension “a” (70% of the maximum torque, see Figs. 2 and 5).
- ❑ The limit switch has been adjusted as capable of function manufacturer-side.

Please check the scope of delivery according to the Parts List as well as the state of delivery immediately after receiving the goods. *mayr*® will take no responsibility for belated complaints.
Please report transport damage immediately to the deliverer.
Please report incomplete delivery and obvious defects immediately to the manufacturer.

Function

The clutch protects the drive line from excessively high, unpermitted torque impacts which can occur due to unintentional blockages.
After overload has taken place, the transmitting mechanism is completely disconnected. Only the bearing friction continues to have an effect.
This means that no re-engagement impacts or metallic sliding movements occur on the clutch torque transmission geometries when using this clutch variant.
In order to make the clutch ready for operation again after an overload occurrence, the clutch must be re-engaged.
When in operation, the set torque is transmitted backlash-free onto the output from the motor shaft via the EAS®-Compact® overload clutch (pressure flange (1.2)).
If the set limit torque is exceeded (overload), the clutch disengages and remains disengaged.

The input and output are separated residual torque-free.
A signal is emitted via the limit switch (10) which can be used to shut down the entire system or machine.
After-acting masses can slow down freely.

CAUTION

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

General Installation Guidelines

- ❒ **Important!**
  EAS®-HTL clutches do not compensate for shaft misalignments.
- ❒ Do not introduce radial / axial forces onto the clutch bearing due to component distortion.
- ❒ Minimum screw quality 8.8 for customer-side attachment.
- ❒ Please observe the max. permitted bearing loads acc. Table 5.

The determination of the max. permitted bearing load is based on a nominal lifetime estimation of 32000 h according to the usual specifications provided by the bearing manufacturers.
Possible bearing distortion must be ruled out via temperature measurement on the housing in the deep groove ball bearing (6) area during initial operation: **ΔT ≤ 40 °C**
The steady-state temperature must be evaluated.

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Installation Preparations (Customer-side)

- ❑ Bore and shaft surface quality: Ra = 1.6 µm acc. DIN 4287.
- ❑ Shaft material: Yield point at least 400 N/mm², e. g. St 60, St 70, C 45, C 60.
- ❑ Bore tolerance: F7
- ❑ Shaft tolerance: k6.
- ❑ Shape and position tolerances (flange geometry): Manufactured for clutch transmission part acc. Fig. 3.

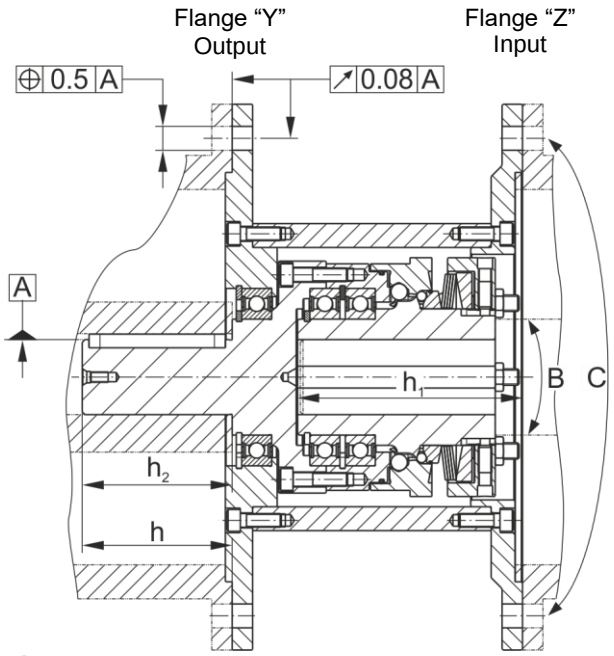

Fig. 3

Installation (Figs. 1 to 3)

- ❒ Join the manufacturer-assembled and adjusted clutch on the output side, turn it to the correct position (flange bores must align with the fixing threads) and bolt it together with the mounting part (flange “Y”).
  Please observe the attachment specifications indicated in Tables 4 and 5.

Please observe clutch dimensions h and h_2 (see Table 3 and Fig. 3).

- ❒ Insert flange “Z” with the shaft into the clutch hub bore (Item 1.1) or in the flange inner centring (Item 4), turn it to the correct position (flange bores must align with the fixing holes) and bolt it together with the mounting part (flange “Z”).
  Please observe the attachment specifications indicated in Tables 4 and 5.

Please observe the dimension h_1 (see Table 3 and Fig. 3).
The maximum permitted shaft length is: h_1 -2 mm.

Re-engagement (Fig. 4)

Re-engagement must only take place when the device is not running.

There are two bores (180° offset to one another) for manual clutch re-engagement. They are locked with screw plugs (12). In order to re-engage the clutch, at least one of the two screw plugs (12), including its O-ring (13), must be loosened and removed.
EAS®-Compact® overload clutch re-engagement is carried out by applying axial pressure to the thrust washer (1.3) in the direction of the output (flange Y) using a suitable lever tool (Fig. 4). It may be necessary to turn slightly between the pressure flange (1.2) and the thrust washer (1.3).

Please make sure that the bore threads (for screw plugs Item 12) in the distance ring (5) are not damaged by the lever tool.

In the very high and maximum torque ranges (Types 4190.75400 and 4190.85400), engagement using a lever tool is no longer easily possible.
Alternatively, re-engagement can take place by evenly screwing three screws M8 (not included in the standard scope of delivery) into the adjusting nut (Item 1.4 / Fig. 4). On this variant, it may be necessary to turn slightly between the pressure flange (1.2) and the thrust washer (1.3).

CAUTION

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

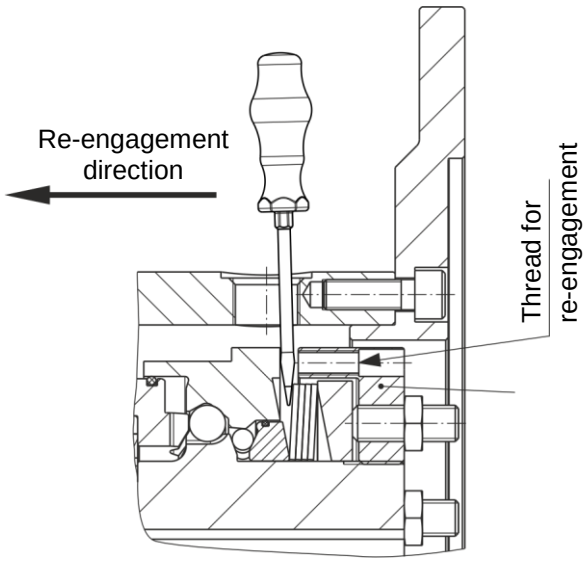

Fig. 4

After re-engagement has been completed successfully, the access bore must be re-closed using the screw plug (12) and the O-ring (13) placed under it.

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Torque Adjustment

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** to approx. 70 % of the maximum torque. The adjusting nut (1.4) is marked with dimension “a” (70 % of the maximum torque).
Adjustment is carried out via dimension “a” by turning the set screws (Item 1.5, Fig. 2 and Fig. 5).
The adjusting nut (1.4) remains turned in flush position with the hub (1.1).
The installed cup springs (1.8) are operated in the negative range of the characteristic curve (see Fig. 6); this means that a stronger pre-tensioning of the cup spring results in a decrease of the spring force.

Turning the set screws (1.5) clockwise causes a reduction in torque (Fig. 6, dimension "a -" acc. Adjustment Table (1.9) and Fig. 7). Turning it anti-clockwise causes an increase in torque (Fig. 6, dimension "a +" acc. adjustment table (1.9) and Fig. 7).
You should be facing the adjusting nut (1.4) as shown in Fig. 5.

Changing the Torque

The torque is changed exclusively via the set screws (1.5) and not via the adjusting nut (1.4).

a) Loosen all hexagon nuts (6 pieces, Item 1.6).
b) For dimension "a", see the adjustment table (Item 1.9, Fig. 7) (The adjustment table (1.9) is glued onto the outer diameter of the adjusting nut (1.4), see Fig. 5).
c) Adjust all set screws (6 pieces, Item 1.5) evenly to the required dimension “a” using a hexagon socket wrench, wrench opening 6.
d) Counter (secure) the set screws (6 pieces, Item 1.5) again with hexagon nuts (1.6).

Adjusting the adjusting nut (1.4) or distorting the cup spring (1.8) outside of the cup spring characteristic curve (see Fig. 6) stops the clutch functioning.
The inspection dimension “a” (markings on adjusting nut) 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” (acc. markings on the adjusting nut and the adjustment table).

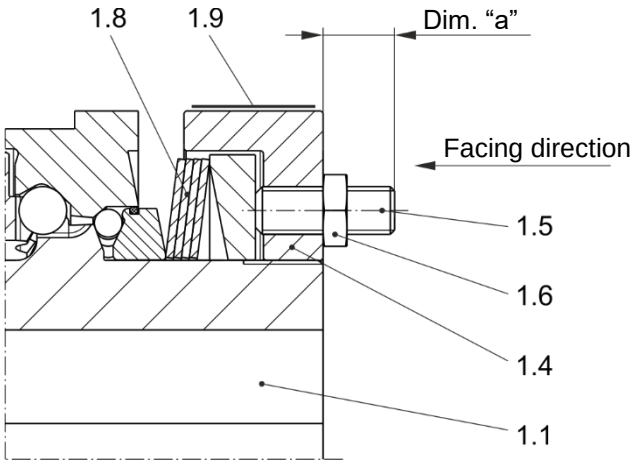

Fig. 5

The adjusting nut (1.4) is marked with dimension “a” (70 % of the maximum torque). The adjusting nut (1.4) is turned in flush position with the hub (1.1).

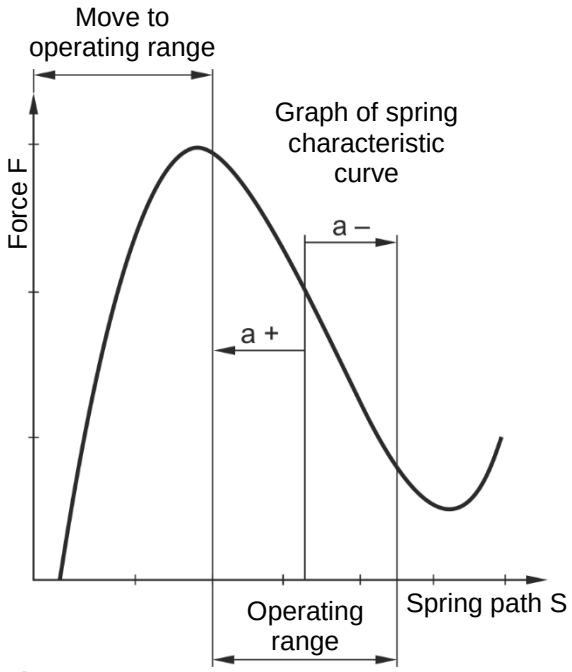

Fig. 6

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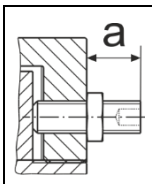
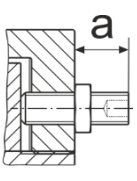
Adjustment Tables (Item 1.9)



Größe / Size 4 FRSH	Tellerfeder Cup springs	M-Bereich Torque range	"a" [mm] 100 %	90 %	80 %	70 %	60 %	50 %	40 %
419_.5_ _ _ _	1x1 /	120-300 Nm	a + 1.0	a + 0.6	a + 0.3	a	a – 0.2	a – 0.5	a – 0.8
419_.6_ _ _ _	1x2 //	240-600 Nm							
419_.7_ _ _ _	1x4 ////	480-1200 Nm							
419_.8_ _ _ _	1x5 /////	600-1500 Nm							



Größe / Size 5 FRSH	Cup spring Cup springs	M-Bereich Torque range	"a" [mm] 100 %	90 %	80 %	70 %	60 %	50 %	40 %
419_.5_ _ _ _	1x1 /	240-600 Nm	a + 1.5	a + 0.9	a + 0.4	a	a – 0.4	a – 0.8	a – 1.2
419_.6_ _ _ _	1x2 //	480-1200 Nm							
419_.7_ _ _ _	1x4 ////	960-2400 Nm							
419_.8_ _ _ _	1x5 /////	1200-3000 Nm							

Fig. 7

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Limit Switch (Item 10, Fig. 1)

General Characteristics

Approvals / Conformity:	CE cULus EAC
Basic standard:	IEC 60947-5-2
Protection acc. IEC 60529:	IP68 acc. BWN Pr 20
Operating indication:	yes
Protected against reverse polarity:	yes
Operating voltage indication:	no
Protection class:	II
Short-circuit protection:	yes
MTTF:	830 a

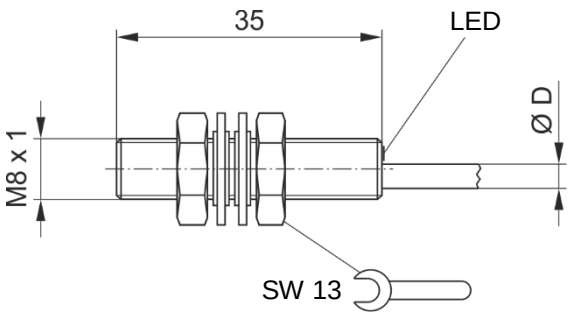
Electrical Characteristics

Rated operating voltage U_e:	24 VDC
Rated insulation voltage U_i:	250 VDC
Rated operating current I_E:	200 mA
Rated short-circuit current:	100 A
Operating voltage UB max.:	30 VDC
Operating voltage UB min.:	10 VDC
Electrical design:	DC, direct voltage
Smallest operating current I_m:	0 mA
Load capacitance (at U_E) max.:	≤ 0.5 µF
No-load current I_0, damped, max.:	≤ 9 mA
No-load current I_0, undamped, max.:	≤ 3 mA
Residual ripple content max.:	≤ 15 % of U_e
Switching output:	PNP
Switching frequency f (at U_E) max.:	≤ 3000 Hz
Switching function:	NO contact
Voltage drop static max:	2.5 V

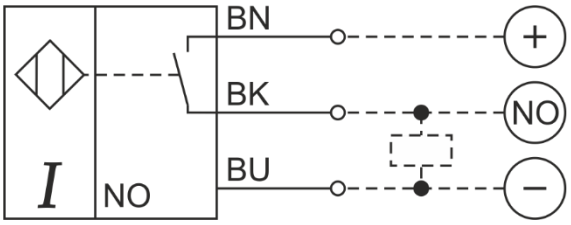
Mechanical Characteristics

Number of conductors:	3
Tightening torque:	8 Nm
Fixing length:	34 mm
Rated switching distance S_n:	1.5 mm
Diameter d1:	M8 x 1
Assured switching distance S_a:	1.2 mm
Cable diameter D max.:	3.2 mm
Cable length:	3 m
Conductor cross-section:	0.14 mm²
Mechanical installation condition:	flush
Real switching distance S_r:	1.5 mm
Depth:	35 mm
Ambient temperature Ta max.:	70 °C
Ambient temperature Ta min.:	-25 °C
Active surface material:	PBT
Housing material:	stainless steel
Cable sheath material:	PUR

Detail Drawing



Wiring Diagram



Adjustment

The limit switch (PNP NO contact; Item 10) for the EAS®-HTL clutch has been adjusted and countered manufacturer-side. However, as the final clutch position is defined via the customer-side attachment, re-adjustment may be necessary.

This is carried out as follows:

- ❒ Loosen the counter nut on the limit switch. Screw in the limit switch up to its limit (limit switch damped).
- ❒ Unscrew the limit switch until it switches (limit switch undamped).
- ❒ Screw in the limit switch again carefully until it switches (limit switch is damped again), then continue for another 90°.
- ❒ Counter the limit switch.
- ❒ The correct switch adjustment must be checked and guaranteed by manually disengaging the overload clutch.

In order to secure limit switch function, please keep it free from oil, grease and other dirt particles.

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Maintenance and Maintenance Intervals

The following maintenance and inspection intervals are to be maintained:

1.) **Before initial operation:**
- Visual inspection. Inspection of the installation parameters (misalignment and tightening torques (see Table 2)) and the clutch running behaviour
- Inspection for possible bearing distortions (see the Installation Guidelines on page 6 and Table 5)

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 2/4) must be maintained.
- Inspection of the misalignment and the clutch running behaviour
- Inspection of the bearing or bearing pre-tension (temperature inspection/temperature monitoring)

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 2/4) must be maintained.
- Inspection of the set torque
- Clutch release inspection
- Inspection of the bearing or bearing pre-tension (temperature inspection/temperature monitoring)
- Inspection of the misalignment and the clutch running behaviour

We recommend that this maintenance work is carried out at the site of manufacture:
- Re-greasing of the transmission geometries, balls, recesses and sealing elements.

Clutch re-greasing must only be carried out at the place of manufacture or by specially trained personnel.
For greasing, please use NLGI Class 1.5 grease with a basic oil viscosity of 460 mm^2/s at 40 °C, e.g. Mobilith SHC460.
When re-installing the clutch, please secure all screws with Loctite 243 (medium hard).
If large amounts of dirt or dust are present or in extreme ambient conditions, it may well be necessary to carry out inspections at shorter maintenance intervals.

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 clutch manifest themselves as:

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

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

Disposal

Electronic components (Limit switch):
Products which have not been disassembled can be disposed of under Code No. 160214 (mixed materials) or components under Code No. 160216, or can be disposed of by a certified disposal firm.

Steel components:
Steel scrap (Code No. 160117)

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

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

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Malfunctions / Breakdowns

Malfunction	Possible Causes	Solutions
Premature clutch release	Incorrect torque adjustment Adjusting nut has changed position Worn clutch	1) Set the system out of operation 2) Check the torque adjustment 3) Secure the adjusting nut 4) If the cause of malfunction cannot be found, the clutch must be inspected at the place of manufacture
Clutch does not release on overload	Incorrect torque adjustment Adjusting nut has changed position Disengagement mechanism blocked by a foreign body Worn clutch	1) Set the system out of operation 2) Check whether foreign bodies influence the disengagement mechanism function 3) Check the torque adjustment 4) Secure the adjusting nut 5) If the cause of malfunction cannot be found, the clutch must be inspected at the place of manufacture
Running noises on overload occurrence as clutch slows down	Bearing on output flange is worn or has been previously damaged Housing bearing is worn or has been previously damaged Worn disengagement mechanism	1) Set the system out of operation 2) Inspect the clutch at the place of manufacture
Running noises in normal operation	Insufficient clutch securement Loosened screws Loosened adjusting nut	1) Set the system out of operation 2) Check the clutch securement 3) Check the screw tightening torques 4) Check the torque adjustment and that the adjusting nut sits securely

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

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