Installation and Operational Instructions for EAS®-HTL housed overload clutch, Sizes 4 and 5 Type 490._24.2

(B.4.15.6.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:

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 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 professionals and specialists should work on the devices, following the relevant standards and directives. 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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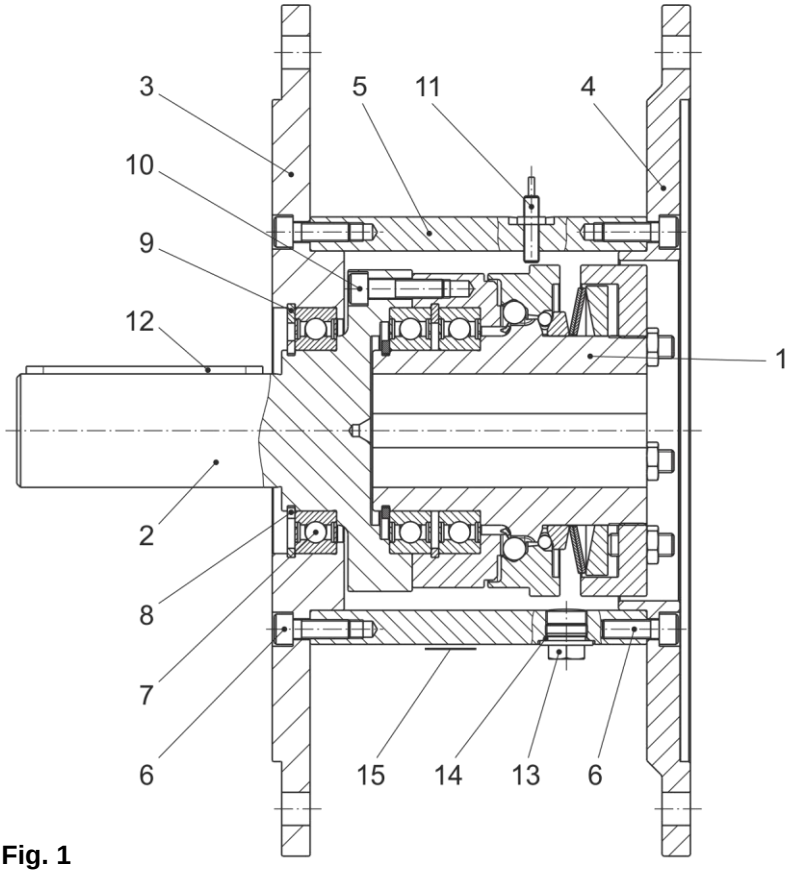

Fig. 1

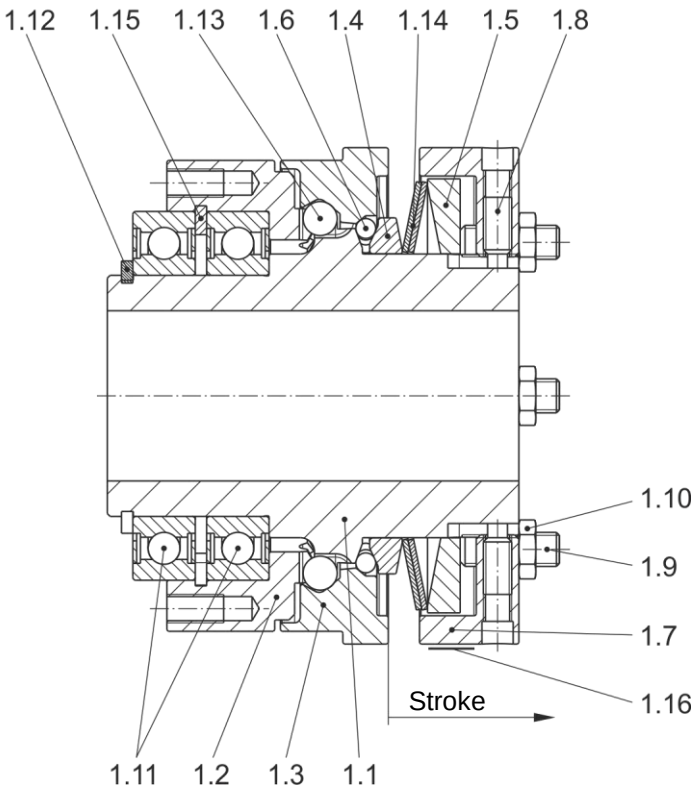

Fig. 2

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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	Thrust ring FRSH
1.5	Thrust ring
1.6	Steel ball DIN 5401
1.7	Adjusting nut
1.8	Set screw
1.9	Set screw DIN EN ISO 4026
1.10	Hexagon nut DIN EN ISO 4035
1.11	Deep groove ball bearing DIN 625
1.12	Locking ring DIN 471
1.13	Steel ball DIN 5401
1.14	Cup spring
1.15	Locking ring DIN 472
1.16	Adjustment table
2	Output shaft
3	Output-side flange
4	Input-side flange
5	Distance ring
6	Cap screw DIN EN ISO 4762
7	Deep groove ball bearing DIN 625
8	Locking ring DIN 471
9	Locking ring DIN 472
10	Cap screw DIN EN ISO 4762
11	Limit switch
12	Key DIN 6885/1
13	Screw plug DIN 7604 (for re-engagement bore)
14	O-ring
15	Type tag

Technical Data

Table 1

Sizes	Limit torques for overload M_G				Max. speed [rpm]
	Type 490.524.2 [Nm]	Type 490.624.2 [Nm]	Type 490.724.2 [Nm]	Type 490.824.2 [Nm]	
4	120 – 300	240 – 600	480 – 1200	600 – 1500	3000
5	240 – 600	480 – 1200	960 – 2400	1200 – 3000	3000

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Technical Data

Table 2

Clutch size	Motor size	Tightening torque Item 6 [Nm]	Tightening torque Item 10 [Nm]	Thrust washer stroke (Fig. 2; Item 1.3) on overload [mm]	Bore from – to [mm]
4	200	56	75	5.5	40 – 65
	225	56	75	5.5	40 – 65
	250	56	75	5.5	40 – 65
5	280	122	122	6.5	45 – 80
	315	310	122	6.5	45 – 80

Table 3

Clutch size	Motor size	Dimension h [mm]	Dimension h_2 [mm]	Maximum shaft length h_1 [mm]	Weight [kg]
4	200	110	110	166	78.7
	225	140	140	169	88.4
	250	140	140	168	108.4
5	280	140	140	207	145.7
	315	170	165	204	235.9

Table 4 (Max. permitted bearing loads)

Clutch size	Motor size	Axial forces [N]	Radial forces [N]	Transverse force torque B [2] (Fig. 4) referring to the clutch flange [Nm]	Transverse force torque C [3] (Fig. 4) referring to the housing [Nm]
4	200	5000	7500	50	2000
	225	5000	7500	50	2500
	250	5000	7500	50	3000
5	280	7700	11500	70	5000
	315	7700	11500	70	8000

[2] 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 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.

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

Table 5 (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

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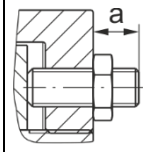
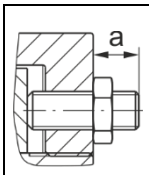
Adjustment Tables (Item 1.16)



Größe / Size 4 FRSH	Tellerfeder Cup springs	M-Bereich Torque range	"a" [mm] 100 %	90 %	80 %	70 %	60 %	50 %	40 %
49-.5-4._	1x1 /	120-300 Nm	a + 1.0	a + 0.6	a + 0.3	a	a – 0.2	a – 0.5	a – 0.8
49-.6-4._	1x2 //	240-600 Nm							
49-.7-4._	1x4 ////	480-1200 Nm							
49-.8-4._	1x5 /////	600-1500 Nm							



Größe / Size 5 FRSH	Tellerfeder Cup springs	M-Bereich Torque range	"a" [mm] 100 %	90 %	80 %	70 %	60 %	50 %	40 %
49-.5-4.2	1x1 /	240-600 Nm	a + 1.5	a + 0.9	a + 0.4	a	a – 0.4	a – 0.8	a – 1.2
49-.6-4.2	1x2 //	480-1200 Nm							
49-.7-4.2	1x4 ////	960-2400 Nm							
49-.8-4.2	1x5 /////	1200-3000 Nm							

Fig. 3

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 IP53) 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 (1.7) is marked with dimension “a” (70 % of the maximum torque).
- ❑ 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.
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)).

In order to make the clutch ready for operation again after an overload occurrence, the clutch must be re-engaged.
If the set limit torque is exceeded (overload), the clutch disengages and remains disengaged.
The input and the output are separated residual torque-free.
A signal is emitted via the limit switch (11) which can be used to shut down the entire system or machine.
After-acting masses can run free.

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 4 on page 4.

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 (7) 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. 4.

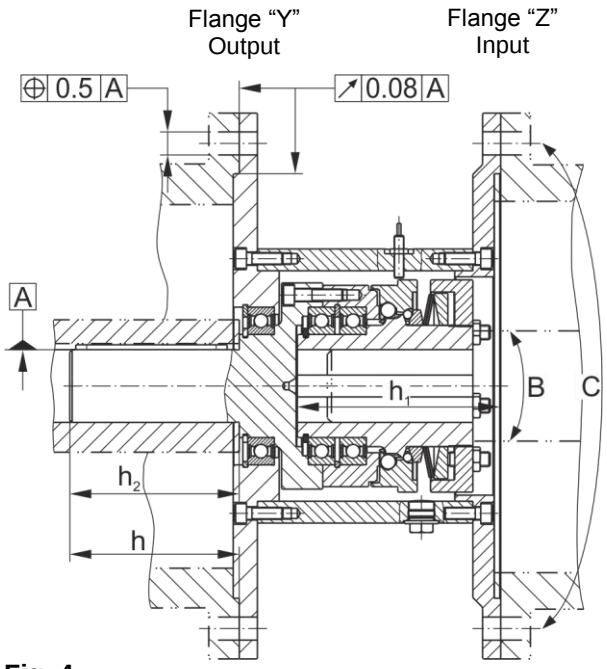

Fig. 4

Installation (Figs. 1, 2 and 4)

- ❒ 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 Table 5.

Please observe clutch dimensions h and h_2 (see Table 3 and Fig. 4).

- ❒ 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 Table 5.

Please observe the maximum shaft length h_1 (see Table 3 and Fig. 4).

Re-engagement (Fig. 5)

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

There are two bores (180° offset to one another) for manual clutch re-engagement. They are locked with screw plugs (13). In order to re-engage the clutch, at least one of the two screw plugs (13), including its O-ring (14), 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. 5). 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 13) in the distance ring (5) are not damaged by the lever tool.

For high torque ranges (Types 490.7_ _._ and 490.8_ _._), 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 1.7 / Fig. 5).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).

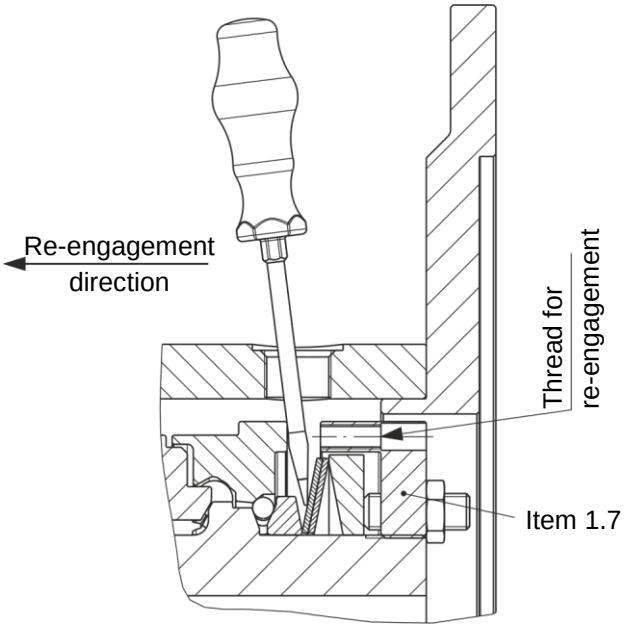

Fig. 5

After re-engagement has been completed successfully, the access bore must be re-closed using the screw plug (13) and the O-ring (14) placed under it.

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Torque Adjustment (Figs. 6 and 7)

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 (1.7) is marked with dimension “a” (70 % of the maximum torque).
Adjustment is carried out via dimension “a” by turning the set screws (Item 1.9, Fig. 2 and Fig. 6).
The adjusting nut (1.7) remains turned in flush position with the hub (1.1).
The installed cup springs (1.14) are operated in the negative range of the characteristic curve (see Fig. 7); this means that a stronger pre-tensioning of the cup spring results in a decrease of the spring force.

Turning the set screws (1.9) clockwise causes a reduction in torque (Fig. 7, dimension "a -" acc. Adjustment Table (Item 1.16) and Fig. 3 / page 5).
Turning it anti-clockwise causes an increase in torque (Fig. 7, dimension "a +" acc. Adjustment Table (Item 1.16) and Fig. 3 / page 5).
You should be facing the adjusting nut (1.7) as shown in Fig. 6.

Changing the Torque (For this, the clutch must be removed from the housing.)

The torque is changed exclusively via the set screws (1.9) and not via the adjusting nut (1.7).

a) Loosen all hexagon nuts (6 pieces, Item 1.10).
b) Find dimension “a” in the Adjustment Table (Item 1.16, Fig. 3). (The Adjustment Table (1.16) is glued onto the outer diameter of the adjusting nut (1.7), see Fig. 6).
c) Adjust all set screws (6 pieces, Item 1.9) evenly to the required dimension “a” using a hexagon socket wrench, wrench opening 6.
d) Counter (secure) the set screws (6 pieces, Item 1.9) again with hexagon nuts (1.10).

Adjusting the adjusting nut (1.7) or distorting the cup spring (1.14) outside of the cup spring characteristic curve (see Fig. 7) 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 or changes to the cup spring layering), the clutch must be re-adjusted and calibrated using dimension “a” (acc. markings on the adjusting nut and the adjustment table).

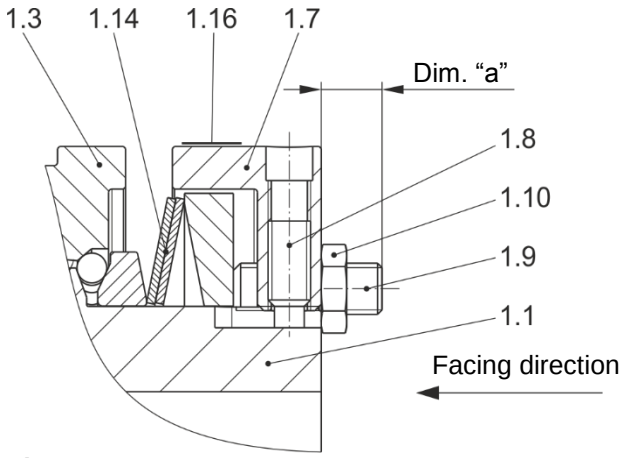

Fig. 6

The adjusting nut (Item 1.7) is marked with dimension “a” (70 % of the maximum torque). The adjusting nut (1.7) is turned in flush position with the hub (1).

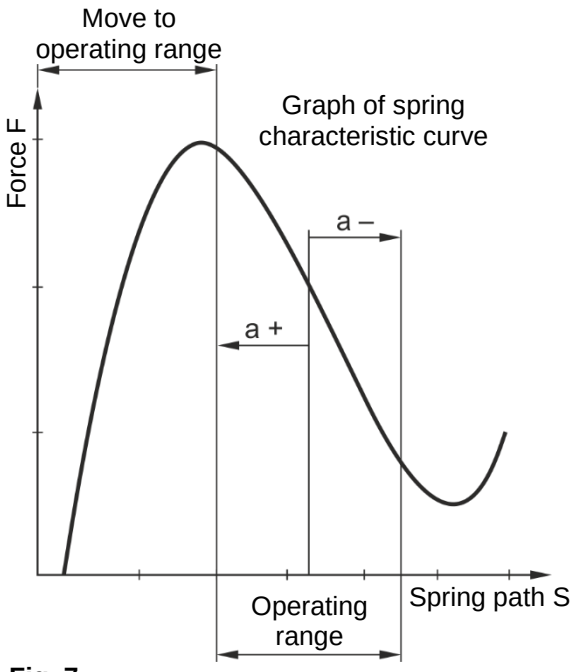

Fig. 7

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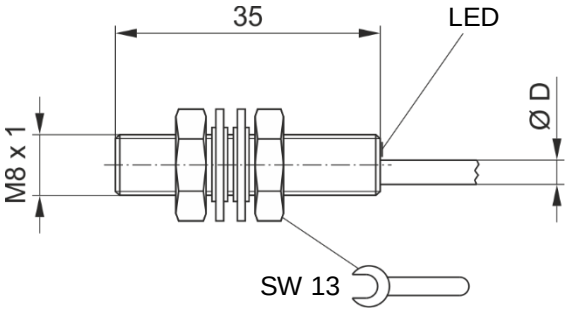
Limit Switch (Item 11, Fig. 1)

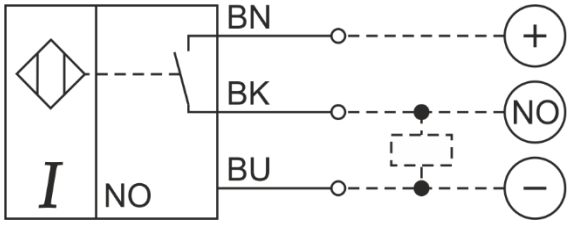
Technical Data

Switching element function:	PNP NO contact
Installation:	flush
Connection type:	cable, PUR, 3 m
Protection acc. IEC 60529:	IP68
Operating indication:	yes
Protected against reverse polarity:	yes
Operating voltage indication:	no
Protection Class:	II
Short-circuit protection:	yes
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 I_E:	100 A
Operating voltage U_b:	10 ... 30 V
Smallest operating current I_m:	0 mA
Load capacitance (at U_E):	≤ 0.5 µF
No-load current I_0, damped:	≤ 9 mA
No-load current I_0, undamped:	≤ 3 mA
Switching frequency f:	0 ... 3000 Hz
Line voltage drop:	≤ 2.5 V
Number of conductors:	3
Tightening torque:	8 Nm
Fixing length:	34 mm
Rated switching distance S_n:	1.5 mm
Diameter:	M8 x 1
Assured switching distance S_a:	0 ... 1.2 mm
Cable diameter D:	≤ 3.2 mm
Cable length:	3 m
Conductor cross-section:	0.14 mm²
Real switching distance S_r:	1.5 mm
Depth:	35 mm
Ambient temperature:	-25 ... 70 °C (248 ... 343 K)
Fixing length:	34 mm
Residual ripple content:	≤ 15 % of U_e
Active surface material:	PBT
Housing material:	stainless steel

Detail drawing



Wiring diagram



Adjustment

The limit switch (PNP NO contact; Item 11) 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.
- ❒ Check the switching function by disengaging the clutch.

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

Maintenance

The EAS®-HTL clutches are mainly maintenance-free. Special maintenance work may be necessary, however, if the device is subject to large amounts of dirt or dust or is operating in extreme ambient conditions.
In this case, please contact the manufacturers.

Disposal

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

All steel components:
Steel scrap (Code No. 160117)

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

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

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Malfunctions / Breakdowns

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

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