

Manufacturer's Declaration

This product is intended for installation in a machine or system, based on the machine directive 2006/42/EC. It is forbidden to start use of the product until the machine or system into which it should be built is operating in accordance with the EC directives.

The product corresponds to the low voltage directive 2006/95/EC.

The product corresponds to the EMC directive 2004/108/EC.



Safety Regulations Danger!

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 before installation and initial operation of the device.

- Danger of death on touching voltage-carrying cables and components
- Before opening the device, switch off the input voltage and wait for 15 minutes
- Electronic devices cannot be guaranteed fail-safe
- Only work on this device when it is de-energised. Protect against inadvertent switch-on



Warning:

Without a conformity inspection, this product is not suitable for use in areas where there is a high danger of explosion. This statement is based on directive 94/9 EC (ATEX directive).

Application

This unit is used to switch, control, monitor and to indicate overload for adjustable EAS[®]-Sm synchronous clutches and EAS[®]-Zr overload clutches.

Function

The EAS[®]-Sm/Zr control unit works according to the principle of cycled switching controllers with a frequency of 18 kHz. It switches, controls and monitors the clutch and emits an overload signal when the set torque is exceeded.

Switched with

- potential-free contacts
- SPS control with 10 – 30 VDC

Controlled by

- coil current

Monitored with

- potential-free contacts
- magnetic field-resistant proximity switches up to +100 °C

Temperature monitors

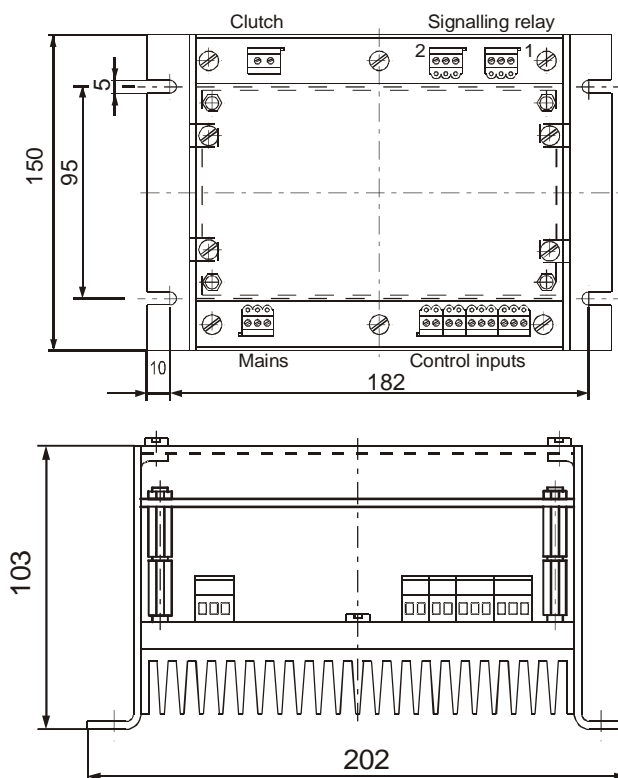
- coil-clutch > +130 °C
- control unit > +80 °C

Electrical Connections

PE, L1, N	connection input voltage
Ku / Ku2	coil connection for clutch
14 – 11 – 12	contact signalling relay 1 (overload)
24 – 21 – 22	contact signalling relay 2 (excessive temperatures)
ON	connection „Start“ button
OFF	connection „Stop“ button
Gnd1	(-) connection with SPS control
End	limit switch signal
Gnd2	(-) connection for limit switch
12V	(+) connection for ON-button, OFF-button and limit switch
Gnd3	(-) connection with analogue torque adjustment
M	(+) connection with analogue torque adjustment
P1, P2	connection for coil thermistor (or bridge)



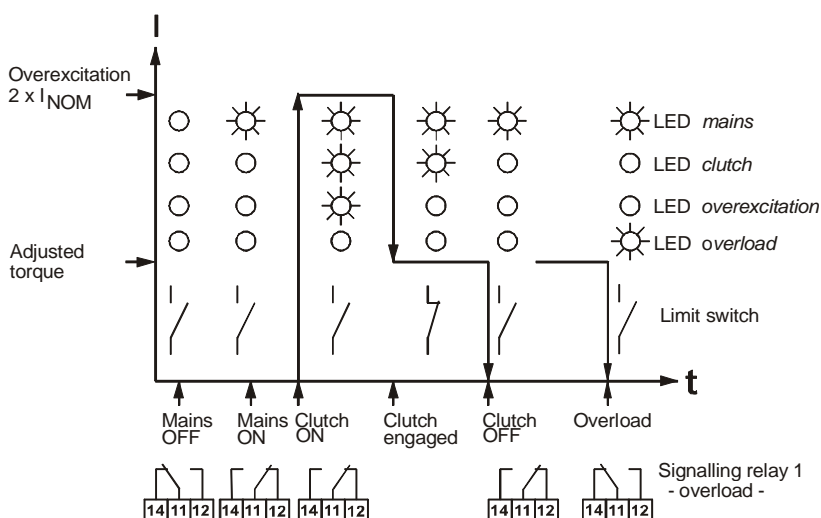
Dimensions (mm)



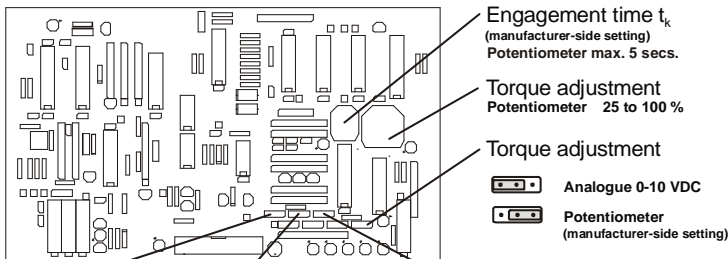
Functional Description

	Function	Functional sequence
1	Input voltage switch-on	<ul style="list-style-type: none"> • LED mains lights up green • Signalling relay 1 overload is energised, contacts 11 – 12 are closed
2	Start ON – contact closes After clutch engagement	<ul style="list-style-type: none"> • LED clutch lights up green • LED overexcitation lights up yellow • Clutch is energised with $2x I_{NOM}$ (max. 5 seconds) • LED overexcitation lamp goes out • Clutch is energised with the adjusted torque • Signalling relay 1 overload is energised, contacts 11 – 12 are closed • Signalling relay 2 excess temperature is de-energised, contacts 21 – 24 are closed
3	Stop OFF – contact opens	<ul style="list-style-type: none"> • LED clutch lamp goes out • Clutch is de-energised and disengages • Signalling relay 1 overload remains energised, contacts 11 – 12 are closed
4	Overload Clutch disengages	<ul style="list-style-type: none"> • Limit switch is actuated • LED overload lights up red • Signalling relay 1 overload is de-energised, contacts 11 – 14 are closed
5	Reset overload a.) by start or b.) by stop and start	<ul style="list-style-type: none"> • Clear the overload in advance • LED overload lamp goes out • Signalling relay 1 overload is energised, contacts 11 – 12 are closed
6	Excess temperature $>80\text{ °C}$ in the EAS [®] -Sm/Zr control unit	<ul style="list-style-type: none"> • Coil voltage is switched off • Clutch disengages • LED excess temperature control unit lights up red • Signalling relay 2 excess temperature is energised, contacts 21 – 22 are closed
7	Excess temperature $>130\text{ °C}$ in the coil Monitoring only possible using coils with fitted PTC thermistor	<ul style="list-style-type: none"> • Signal at $>130\text{ °C}$ • Switch-off at $>135\text{ °C}$ • Clutch disengages • LED excess temperature lights up red • Signalling relay 2 excess temperature is energised, contacts 21 – 22 are closed
8	Reset excess temperature a.) by start or b.) by stop and start	<ul style="list-style-type: none"> • Let temperature cool down to below the switch-off temperature • LED excess temperature coil (or) • LED excess temperature control unit lamp goes out • Signalling relay 2 excess temperature is de-energised, contacts 21 – 24 are closed
9	Short circuit at the coil connection (malfunction)	<ul style="list-style-type: none"> • LED malfunction lights up red

Functional sequence



Adjustments



Mode of operation	Delay (overexcitation)	Start - operation
2	0 sec.	Multi-start
1 (manufacturer-side setting)	0.7 sec. (manufacturer-side setting)	Single-start (manufacturer-side setting)

Engagement time t_k (= overexcitation time)

The engagement time t_k is set (manufacturer-side) to the max. time of 5 secs. The engagement time is determined by:

- Op. mode 1** The engagement time is stopped during engagement of the clutch and actuation of the limit switch, therefore switched over from overexcitation to torque current
- Op. mode 2** When the set time has passed (independently from the switching condition of the clutch) it is switched over from overexcitation to torque current.

Adjustment of the engagement time t_k

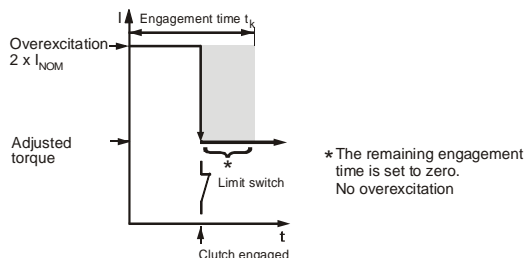
The potentiometer is accessible for engagement time adjustment by taking off the plastic cover. The required time can be set using a screwdriver.

- Right-hand contact – max. time (5 secs.)
- Left-hand contact – min. time (approx. 50 ms)

Operation mode 1 (manufacturer-side setting)

The coil current is switched over from overexcitation to the set torque-current if the clutch engages and the limit switch is "actuated". Residual engagement time t_k is set to zero

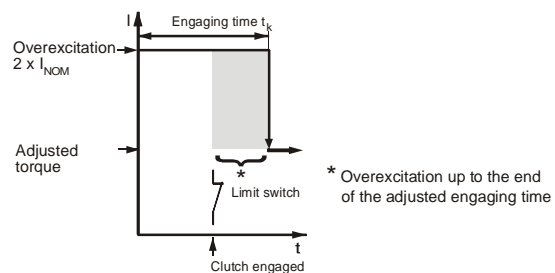
Please Observe! Overexcitation needs 0.7 secs. overtravel time. The overexcitation $2 \times I_{NOM}$ is switched off approx. 0.7 secs. after the limit switch has been actuated. This guarantees better clutch engagement. The 0.7 second overtravel time can be set to "zero" by changing the coding.



Operation Mode 2 (Observe coding!)

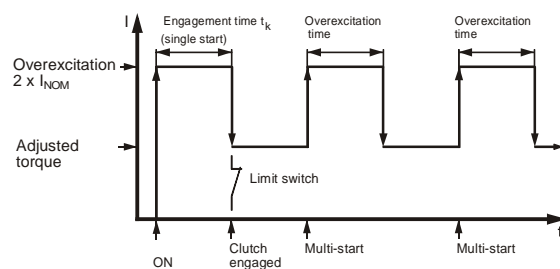
Application: Used for the acceleration of large masses. Switches the coil current from overexcitation to the set torque-current, when the engagement time t_k has passed. Repetitive switching ON and OFF within the engagement time t_k does not cause an overload signal. Before the time t_k has passed, the clutch must remain engaged and the limit switch must be actuated.

Warning! Potentiometer and code bridges coated with lacquer are manufacturer-side settings and must not be altered. To avoid malfunctions or faults, the operational functions are to be observed before modifying the codes.



Please Observe! Danger due to coil overheating. There is a risk of coil-overheating if starts in "Tipp" operation with overexcitation are carried out frequently. They can lead to coil failure. To prevent this, please set the engagement time t_k to the minimum time.

Multi-Start (please observe coding!)



Application: change of loads during an operational process. The Multi-Start allows repeated switch-on of the overexcitation during an operational process and can only be used with operation mode 2.

Please Observe! Danger due to coil overheating if the resistor is not used or if it is defective. There is a risk of coil overheating if the cycle sequences are too large, which can lead to coil failure. The cycle sequence is therefore to be limited and the overexcitation time (=engagement time t_k) is to be set to the minimum time.

Overexcitation $2 \times I_{NOM}$

The overexcitation of the coil amounts to $2 \times I_{NOM}$ of the max. coil current. Switching over from overexcitation to the torque current is carried out dependent on the engagement time t_k .

Adjustments (continued)

Torque Adjustment

The torque can be set between 25 % and 100 % of the max. torque of the respective clutch size. A current control guarantees a constant torque with a cold or warm coil.



Please Observe! To be able to keep to the indicated torques, the size indications for the clutch and control unit must match. Sizes which do not fit together can cause malfunctions (see **connection of EAS®-Sm/Zr clutches**).

The torque is kept constant via the coil current. The coil voltage is not constant, i.e. the coil voltage increases with increasing coil temperature. If the temperature increases further, the coil current and therefore the torque decrease.

Cold coil: low coil voltage
Warm coil: higher coil voltage, max. 96 VDC

Analogue Torque Adjustment (observe coding!)

Adjustment of the torque using an externally-smoothed DC voltage of 0-10V DC. Adjustment voltage: 0 V = 25 % torque, 10 V = 100 % torque.

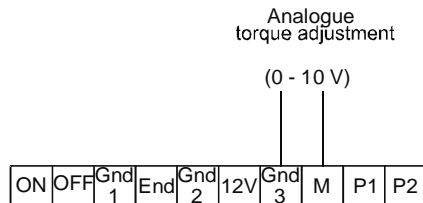
Installation / Connection Examples



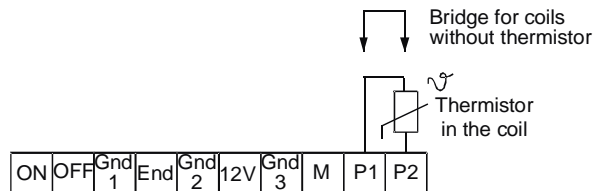
Please Observe! Do not apply external voltage to the 12 V terminal. Ensure **well-conducting connections** between the control unit housing and the metallic screw-on surfaces. Use tooth lock or spring washers under the fixing screws.

Ensure that the cable connections are laid problem-free! The control cables (ON / OFF / Gnd1 / End / Gnd2 / 12V / Gnd3 / M / P1 / P2) are to be separated and laid at a sufficient distance from high voltage current-carrying or pulsating cables (PE/L1/N/Ku1/Ku2).
Ensure **EMC-compatible installation!**

Analogue Torque Adjustment (observe coding!)

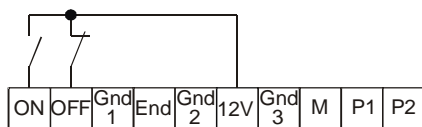


Connection Example for PTC Thermistor or Bridge



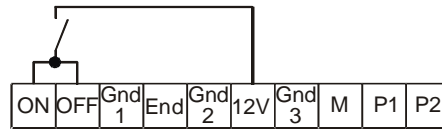
Start/Stop (2 – contacts)

Start: close ON-contact
Stop: open OFF-contact



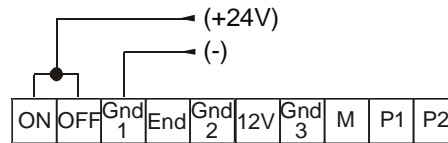
Start/Stop (1 – contact)

Start: close ON-contact
Stop: open OFF-contact



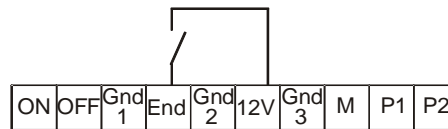
Start/Stop SPS – control (SPS - control 10 – 30 Volt)

Start: +24V
Stop: 0V



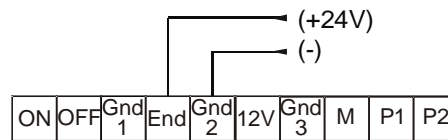
Limit switch (1 – contact)

Clutch engaged: contact closed
Clutch disengaged: contact open



Limit switch SPS-control (PLC drive 10 – 30 Volt)

Engaged: +24V
Disengaged: 0V

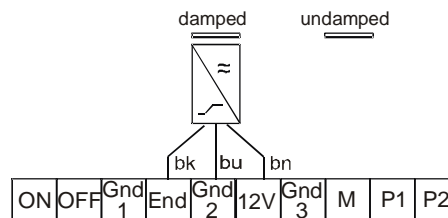


Limit switch PNP – NC contact

PNP – NC contact: 3-wire, magn. field resistant proximity switch, 10 – 30 VDC, operating temperature 100 °C.

Warning: No overload signal if the limit switch is fitted incorrectly.

Clutch engaged: undamped – LED off
Clutch disengaged: damped – LED on



Installation / Connection Examples (continuation)

Installation of a smoothing choke

Installation of a smoothing choke in the coil circuit is necessary if the standard clutch cable is lengthened.

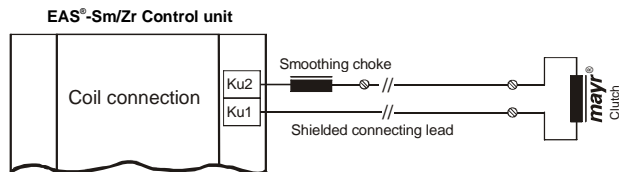
Reason: it is possible that the max. adjustable torque may not be achieved due to this cable lengthening.

The device is to be connected directly next to the control unit and at the terminal Ku2.

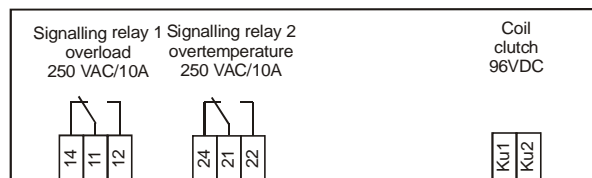
For standard devices, the smoothing choke is included in the delivery range and can be used for all sizes.

Technical data: 135 mH, 2 Amp. LxBxH 85x90x95 mm

Re-order under: Art. No. 0802841.



Connection signalling relay and clutch



Connection of EAS®-Sm/Zr-clutches



Please observe! The EAS®-Sm/Zr-control unit is adjusted to the respective size of the clutch **manufacturer-side**. If other sizes are connected, malfunctions can be caused. Therefore, please compare the sizes of the control unit and clutch.

Comparison Table:

EAS®-Sm/Zr-control unit	connected with	EAS®-Sm/Zr-clutch
Size/Type/Power		Size/Type/Power
0/010.000.2/36 Watt		0/400.03x.x/36 Watt
1/010.000.2/46 Watt		1/400.03x.x/46 Watt
2/010.000.2/57 Watt		2/400.03x.x/57 Watt
3/010.000.2/73 Watt		3/400.03x.x/73 Watt
4/010.000.2/105 Watt		4/400.03x.x/105 Watt
0/010.000.2/30 Watt		0/400.00x.x/30 Watt
1/010.000.2/40 Watt		1/400.00x.x/40 Watt
2/010.000.2/45 Watt		2/400.00x.x/45 Watt
3/010.000.2/65 Watt		3/400.00x.x/65 Watt
4/010.000.2/120 Watt		4/400.00x.x/120 Watt
5/010.000.2/155 Watt		5/400.00x.x/155 Watt
0/010.000.2/55 Watt		0/400.01x.x/55 Watt
1/010.000.2/60 Watt		1/400.01x.x/60 Watt
2/010.000.2/80 Watt		2/400.01x.x/80 Watt
3/010.000.2/105 Watt		3/400.01x.x/105 Watt
4/010.000.2/145 Watt		4/400.01x.x/145 Watt
5/010.000.2/256 Watt		5/400.01x.x/256 Watt

Please Observe:

Adjustment of the EAS®-Sm/Zr-control unit to a different clutch size can only be carried out by the manufacturer!!

Technical Data

Input voltage	230 VAC, ±10 %, 50-60 Hz
Current consumption	max. 4 Amp./100 % duty cycle
No-load supply power	< 4 Watt
Coil _{NOM} -voltage	96 VDC
Coil _{NOM} -power	max. 256 Watt
Coil _{NOM} -current	factory setting accordingly to mayr®-EAS®-Sm/Zr-clutch size
Coil overexcitation	2x I _{NOM} , current limitation is adapted to the respective coil size.
Torque adjustment	25 % up to 100 % of the coil current (current stabilization)
Engaging time t _k	5 seconds ±30 %
Protection	IP 20
Ambient temperature	0 °C up to +50 °C
Storage temperature	-20 °C up to +70 °C
Conductor cross section	2,5 mm ² / AWG 30-12
Weight	1,5 kg / 3,31 lb
Fuse protection	
Mains fuse	F1/F2, (4 A MT, 5x20 mm)
Load fuse	F3, the current is adapted to the mayr®-clutch size. Always use the same spare fuses.

Overvoltage category

Overvoltage protection

two; one for connection to PELV/SELV (control wires), EN 50178 - 04/1998
For the installation overvoltage category III, the overvoltage protection included in the delivery is required between the input voltage and the EAS®-Sm/Zr control unit.

Control unit temperature monitoring

A fitted temperature switch prevents the control unit from overheating.

Switch-off

The coil voltage is switched off at an operating temperature of > 80 °C

New start

can only take place after the unit temperature has cooled to below 40 °C.

Reset

Switching the input voltage off and on again.

Clutch coil temperature monitoring

The coil temperature monitoring can only be used with a fitted thermistor. The thermistor should be connected to terminals P1/P2.

Advance warning at > +130 °C operating temperature

The coil voltage is not yet switched off.

Switch-off

at > +135 °C operating temperature
The coil voltage is switched off.

New start

can only take place after the coil temperature has cooled to below +120 °C.

Reset

is energised by clutch „start“.

Short-circuit-resistant coil connection

If short-circuiting occurs between the coil connections Ku1 and Ku2, the coil voltage is switched off. The short circuit monitoring is reset by switching off the input voltage and removing the short circuit.



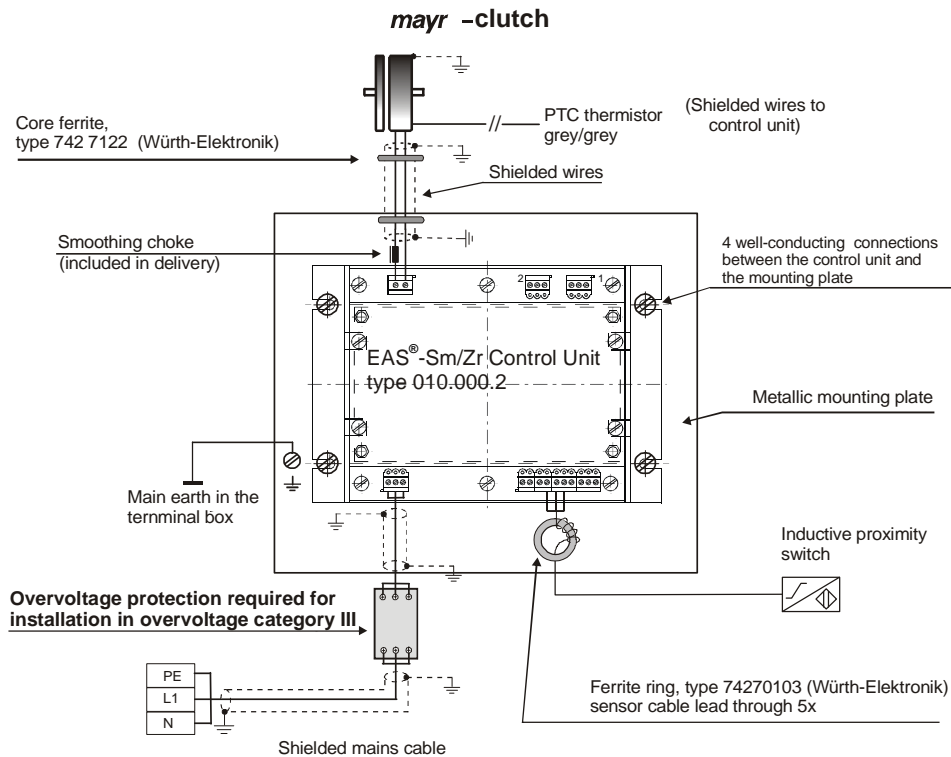
Warning! Not protected against earth short circuits!

Connecting the coil connections Ku1 or Ku2 against earthed metal components causes earth short circuits and therefore unit failures. It may be necessary to equip the system with an earth leakage circuit breaker (ELCB), to protect against injury or damage. However, this does not protect against control unit failure.

EMC-standardized Installation for the EAS®-Sm/Zr Control Unit



Warning! The measures described for compliance with the EMC directive for the functional components *EAS®-Sm/Zr control unit* and *EAS®-Sm/Zr clutch* are examined under laboratory conditions at an approved establishment and cannot necessarily be transferred directly to the condition of a machine or equipment due to deviations. The Installation and Operational Instructions exclusively refer to the use of *mayr®-clutches*. If other clutches are used, the EMC directive standardisation cannot be guaranteed.



What must be done if...?

LED mains (green) does not light up	<input type="checkbox"/> Check supply voltage <input type="checkbox"/> Check microfuses F1/F2
LED fault (red) lights up red	<input type="checkbox"/> Check coil and coil connection for short circuit or earth short circuit
LED clutch does not light up	<input type="checkbox"/> Check ON-contact for NO contact function
LED overexcitation does not light up	<input type="checkbox"/> Limit switch contact must be open for disengaged clutch condition <input type="checkbox"/> Proximity switch must be damped for disengaged clutch condition
LED overload lights up red	<input type="checkbox"/> Overload on the clutch
LED overtemperature coil lights up red	<input type="checkbox"/> Excess temperature >130 °C in the coil. <input type="checkbox"/> 100 % duty cycle exceeded (overexcitation) <input type="checkbox"/> Ambient temperature too high <input type="checkbox"/> Build-up of heat in the equipment <input type="checkbox"/> PTC thermistor is not connected or a bridge is missing at the terminals P1/P2
LED overtemperature control unit lights up red	<input type="checkbox"/> Excess temperature >80 °C in the control unit
Coil is not energised	<input type="checkbox"/> Check ON-contact for NO contact function <input type="checkbox"/> Check microfuse F3 <input type="checkbox"/> Check coil for interruption
Clutch does not engage	<input type="checkbox"/> Is overexcitation present? <input type="checkbox"/> Limit switch installation mistake <input type="checkbox"/> Size of the clutch and the adjusted control unit must be compatible <input type="checkbox"/> Engagement time t_k too short; re-adjust it <input type="checkbox"/> Residual torque of the unit too low <input type="checkbox"/> Coupling speed too high <input type="checkbox"/> Starting torque too high
Max. torque is not achieved	<input type="checkbox"/> Size of the clutch and the adjusted control unit must be compatible
Clutch is not switched off	<input type="checkbox"/> Check OFF contact for NC contact function
Clutch is not switched off on overload	<input type="checkbox"/> Check limit switch contact for NC contact function <input type="checkbox"/> Check proximity switch for damping
Clutch disengages after overexcitation	<input type="checkbox"/> Check limit switch as to correct installation, connection and operating distance <input type="checkbox"/> Engagement time too short; re-adjust it <input type="checkbox"/> Adjusted torque too low