



## Guidelines on the Declaration of Conformity

A conformity evaluation has been carried out for the product in terms of the EU Low Voltage Directive 2014/35/EU, the Electromagnetic Compatibility (EMC) Directive 2014/30/EU and RoHS 2011 / 65 / EU with 2015 / 863 EU.

The Declaration of Conformity is laid out in writing in a separate document and can be requested if required.

## Guidelines on the EMC Directive (2014/30/EU)

The product cannot be operated independently according to the EMC directive.

Only after integration of the product into an overall system can this be evaluated in terms of the EMC.

For electronic equipment, the evaluation has been verified for the individual product in laboratory conditions, but not in the overall system.

**Guidelines on the EU Directive 2011 / 65 / EU (RoHS II) with 2015 / 863 EU (RoHS III - from 22 July 2019)**, which restrict the use of certain hazardous substances in electrical and electronic devices as well as in products / components (category 11), the proper operation of which is dependent on electric currents and electromagnetic fields.

## Guidelines on the Machinery Directive (2006/42/EC)

The product is a component for installation into machines according to the Machinery Directive 2006/42/EC.

The product can fulfil the specifications for safety-related applications in coordination with other elements.

The type and scope of the required measures result from the machine risk analysis.

The product then becomes a machine component and the machine manufacturer assesses the conformity of the safety device to the directive. It is forbidden to start use of the product until you have ensured that the machine accords with the regulations stated in the directive.

## Guidelines on the ATEX Directive

Without a conformity evaluation, this product is not suitable for use in areas where there is a high danger of explosion. For application of this product in areas where there is a high danger of explosion, it must be classified and marked according to Directive 2014/34/EU.

## Guidelines on the REACH Regulation (EC No. 1907/2006)

of the European Parliament and of the Council Concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals. This regulates the manufacture, placing on the market and use of chemical substances in preparations, under certain conditions also pertaining to substances in products. *mayr*® power transmission exclusively manufactures products articles: clutches/couplings, electric motors, brakes and the appropriate rectifiers) in accordance with the definition in Article 3 Section 3 of the REACH Regulation.

## 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.



Guidelines on important points

## General Safety Guidelines



Only carry out installation, maintenance and repairs in a de-energised, disengaged state and secure the system against inadvertent switch-on.

## General Safety Guidelines

### DANGER



Danger of death! Do not touch voltage-carrying lines and components.

### DANGER



Danger of burns when touching hot surfaces.

### CAUTION



- Danger of device failures caused by short-circuits and earth short-circuits at the terminals
- Electronic devices cannot be guaranteed

During the risk assessment required when designing the machine or system, the dangers involved must be evaluated and removed by taking appropriate protective measures.

To prevent injury or damage, only professionals and specialists are allowed to work on the devices. They must be familiar with the dimensioning, transport, installation, initial operation, maintenance and disposal according to the relevant standards and regulations.



Before product installation and initial operation, please read the Installation and Operational Instructions carefully and observe the Safety Regulations. Incorrect operation can cause injury or damage.

# Installation and Operational Instructions for ROBA®-brake-checker AC Type 059.500.2

(B.0595002.EN)

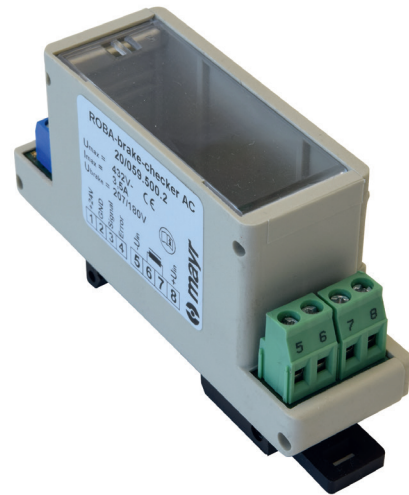
## Application

ROBA®-brake-checker plus AC monitoring modules are used to supply permitted ROBA®-stop safety brakes. Motion monitoring of the armature disk for released ROBA-stop® safety brakes is possible.



## Monitoring module ROBA®-brake-checker AC

- Sensorless and contactless detection of switching statuses
- Preventative function monitoring (wear recognition and error recognition, functional reserve)
- Brake condition recognition (release and drop-out recognition of the armature disk)
- Continuous drop-out recognition
- Simple installation or retrofitting
- Electrical isolation on the output channels
- Maximum current  $I_{\max} = 3.5 \text{ A}$



## Function

The ROBA®-brake-checker AC monitoring module is designed for the connection to half-wave or bridge rectifiers or to fast acting rectifiers based on half-wave or bridge rectification which are supplied with alternating voltage (50/60 Hz).

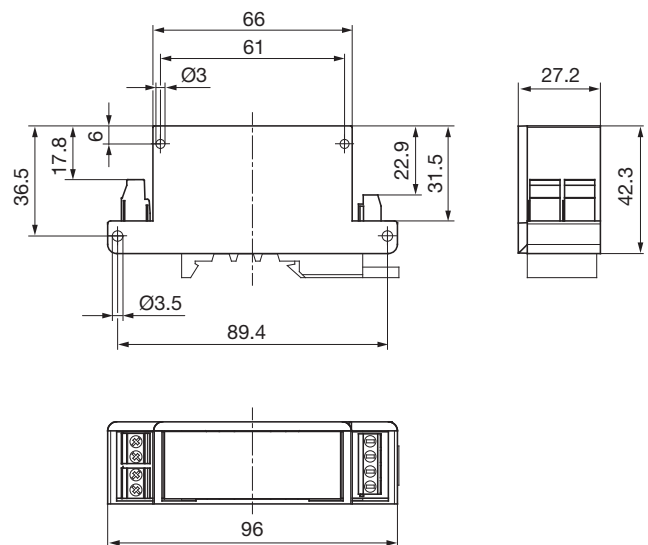
The module is switched between the rectifier and the brake and it monitors the movement of the armature disk. The determined switching condition is emitted via control terminal 3 (output signal). Critical conditions (line breakages, wear) can be recognised and the respective signal can be emitted via control terminal 4 (output error).

The movement detection feature of the armature disk is based on the detection of electromagnetic changes in the brake. If, due to unfavourable external influences, the secured detection cannot be ensured, it is possible that the signal and error outputs do not correspond to the expected state (plausibility).









The UL information applies only when the UL mark is printed onto the product label.

## Dimensions (mm)



The use of the ROBA®-brake-checker in combination with brakes of other manufacturers is not intended and expressly not approved by mayr® power transmission.

**In these cases, operation is at your own risk**, the guarantee and service and support provided by mayr® power transmission no longer apply.

Technical Data			Size 20
Supply voltage control terminal	SELV/PELV ripple content $\leq 5\%$	$U_1$ [VDC]	24 (7 - 30)
Coil current	max.	$I_{max}$ [A]	3.5
	at $\leq 45\text{ °C}$	$I_{RMS}$ [A]	3.5
	at $\leq 60\text{ °C}$	$I_{RMS}$ [A]	3 
	at $\leq 70\text{ °C}$	$I_{RMS}$ [A]	3 
Device fuses	Control terminal		Fuse 315 mA, slow acting
	Power terminal		Max. 4 A circuit breaker, characteristic K/Z (rated brake current)
Protection			IP20
Terminals	Control terminal		Nominal cross-section 0.34 – 2.5 mm <sup>2</sup> (22 – 14 AWG) Tightening torque, screws: 0.5 – 0.6 Nm/3.6 lb-in
	Power terminal		Nominal cross-section 0.14 – 2.5 mm <sup>2</sup> (30 – 12 AWG) Tightening torque, screws: 0.5 – 0.6 Nm/5 - 7 lb-in
Device ambient temperature		[°C]	 -25 to +70 / -25 to +60 
Storage temperature		[°C]	-40 to +105
Conformity markings			 
Protection			IP20
Installation conditions			The installation position can be user-defined. Please ensure sufficient heat dissipation and air convection! Do not install near to sources of intense heat!

Size	Type	Input voltage $\pm 10\%$ [VDC]	Brake nominal voltage [VDC]	Article number
20	059.500.2	max. 207	104	8259978
	059.500.2	max. 432 / 320 <sup>1)</sup>	207 / 180	8260167
	059.500.2 SO <sup>2)</sup>	max. 207		8261306

1) CSA-C22.2 No. 14

2) Customer specific designs

## Preventative function monitoring

Through the monitoring of different parameters, the ROBA®-brake-checker recognises safety critical operating conditions of the brake in advance, as well as acute faults (e.g. line breakage). These are determined as they occur and are notified to the user as a warning before the brake can no longer be operated.

Only the mechanical switching function is checked. Conclusions on the braking torque are not possible (e.g. reduced friction value due to oiling of the brake lining)

Possible causes for the warning:

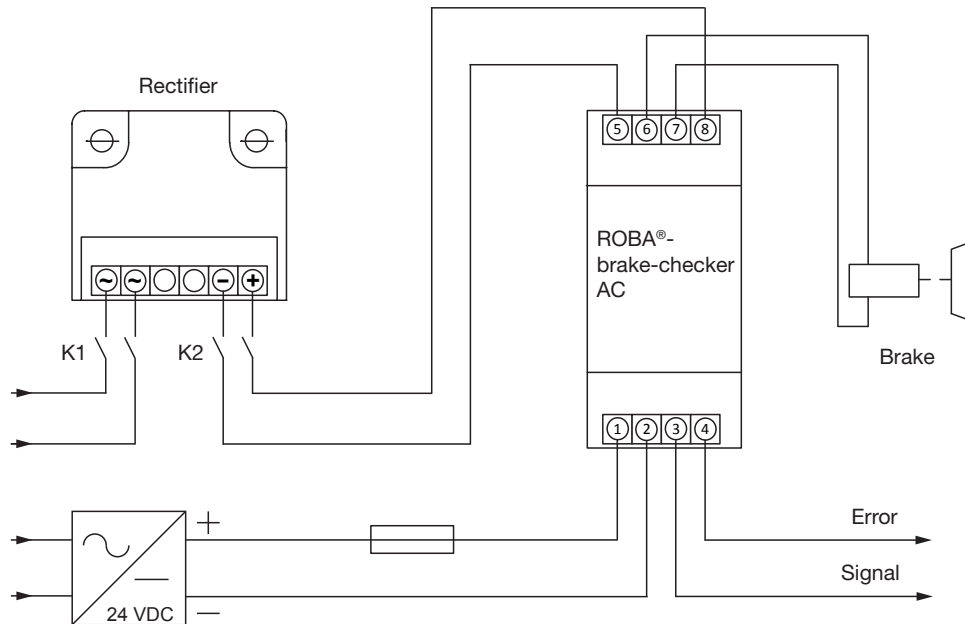
- Increasing wear
- Rising coil temperature
- Falling supply voltage
- Line voltage drop on feed lines to the brake

## Electrical Connection

Control terminal	
1	Supply voltage +24 VDC
2	Supply voltage 0 VDC
3	Signal (output) max. 100 mA
4	Error (output) max. 100 mA

Power terminal	
5	Input voltage - (0 VDC)
6	Output voltage -
7	Output voltage +
8	Input voltage + (104 – 432 VDC)

## Wiring Example



Outputs			
Signal	3	0 VDC (low)	Brake is not energised, movement of the armature disk for closing the brake.
		24 VDC (high) <sup>2)</sup>	Brake energised, movement of the armature disk for opening the brake.
Error	4	24 VDC (high) <sup>2)</sup>	no errors
		0 VDC (low)	Brake does not open or close, line interruption, false detection
Warning <sup>1)</sup>			Preventative function monitoring (wear recognition and error recognition, functional reserve)

1) Rectangular signal 10 Hz / 24 Vpp

2) Voltage corresponds to input voltage of control terminal

## Functional Guidelines

### Start process

During each individual start process, all outputs (signal, error, warning) are reset.

The outputs must be assessed for the plausibility of signal conditions, signal changes and their correct temporal sequence.

### Inching Mode

During inching mode (fast sequence of switching on and off), no reliable detection is possible.

After the end of inching mode, restart the monitoring function:

- De-energise the brake
- Switch on (energise) the brake again

Repeated switch-on (energisation) before the brake is closed generates a fault when the maximum current is reached.

### Reset

Interruption of the voltage at control terminal 1 Supply voltage +24 VDC:

All outputs (signal, error, warning) are reset.

- Signal (output) is set to 0 VDC (low)
- Error (output) is set to 24 VDC (high)

### Frequency Change (50/60 Hz)

After a frequency change in the input voltage, the switching-on process (energisation) is not detected, or an error is indicated.

- Switch on (energise) the brake again
- After this "initialisation switching", the ROBA®-brake-checker can be operated as normal.

### Fast switch-off



Undertake a fast switch-off such as in the wiring example with a DC-side contact K2. (DC-side contact K2 between the output terminal of the rectifier (supply module) and the input terminal of the ROBA®-brake-checker).

## Reliability Nominal Values

MTTF	140 years at 60 °C
	200 years at 40 °C
Duration of use	20 years

The basis of the MTTF calculation forms (if available) the information of the component manufacturer supplemented by the information from the Siemens standard SN 29500. The simplified Parts Count procedure ISO 13849-1 has been used for the calculation.

## Time Delays

Recovery Time	20 ms
Reset	>20 ms
Signal delay	approx. 40 ms
overexcitation	$2 \times t_2 + 200 \text{ ms}$

## EMC-compatible Installation

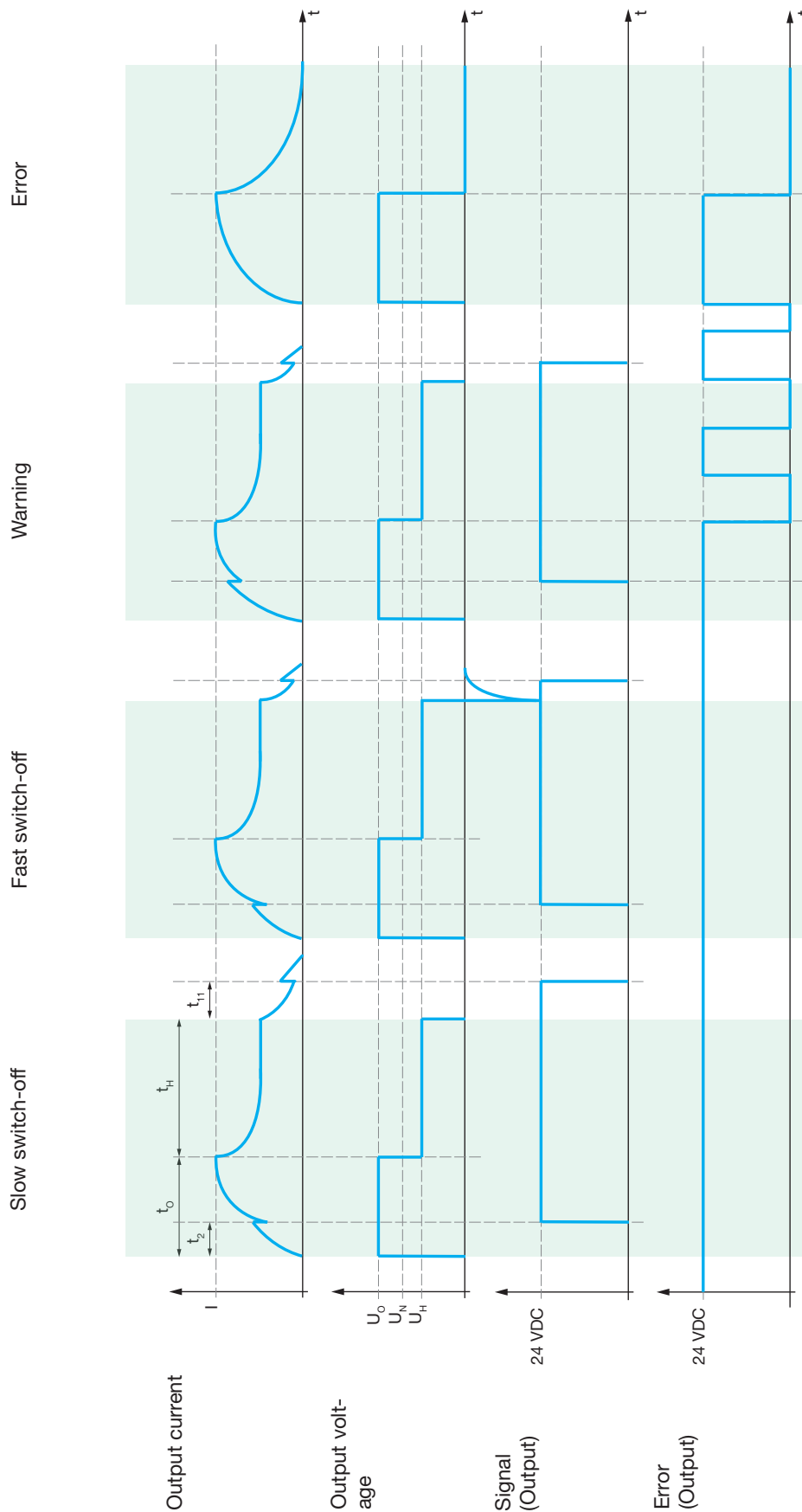


- Avoid antennae effects: Keep the supply cables as short as possible; do not form rings or loops with the cables!
- Mount good earth connections onto the metal body of the brake.
- Lay control cables (total length <30 m) separately from power cables or from strongly pulsating supply cables!

## Intended Use

ROBA®-brake-checker products have been developed, manufactured and tested as electronic equipment in compliance with the DIN EN 50178 standard and in accordance with the EU Low Voltage Directive. During installation, operation and maintenance of the product, the requirements for the standard must be observed. ROBA®-brake-checker products are for use in machines, systems and devices and must only be used in the situations for which they are ordered and confirmed. The products are designed for installation into electrical control cabinets and terminal boxes. Using them for any other purpose is not allowed.

## Functional sequence diagram



## Standards

### Product Standard

VDE 0160/DIN EN 50178:1998-04  
Electronic equipment for  
use in power installations

### Insulation Coordination

acc. VDE 0110 / EN 60664:2008-01  
Installation space (e. g. control cabinet) IP54  
Rated insulation voltage 300 VAC<sub>RMS</sub> acc. DIN 50178

### EMC Testing Standards

EN 61000-6-2:2006-03 Interference immunity  
EN 61000-6-4:2007-09 Interference emission

### Reliability Nominal Values

SN 29500 Failure rates, components  
EN ISO 13849-1 Safety of machinery –  
Safety related parts of  
control systems

## Disposal

### Electronic Components

Products which have not been disassembled can be disposed of under Code No. 160214 (mixed materials) or components under Code No. 160216 (Code No. acc. 200/532/EC), or can be disposed of by a certified disposal firm.

### Guidelines on the WEEE Directive 2012 / 96 / EU

Avoidance of waste from electrical and electronic devices and the reduction of such waste through recycling.

Our electromagnetic products (ROBA-stop® / ROBA-quick® / ROBATIC®clutches) as well as the components required for control and monitoring (rectifier / brake-checker) and the DC motors (tendo®-PM) are frequently used in electrical and electronic devices within the appropriate area of application of WEEE, independent of the applicable product categories. The stated products do not fall within the area of application of this Directive.

They have been classified as electromagnetic / electronic components (VDE 0580) or as electronic equipment (EN 50178), and have been determined for installation in devices for "use in accordance with the intended purpose". Only products which are to be viewed as devices in terms of the Directive and not as parts or components are subject to registration obligations.

## Malfunctions / Breakdowns

Malfunction	Possible Causes	Measures
Brake does not release	No supply voltage available	Check voltage on input terminal
	Brake line interrupted	Check brake supply line (check passage)
	Line voltage drop on long line	Check the brake voltage
No signal	Brake is not permitted	Use released brake
	Brake is worn	Open and clean the brake, check the air gap; Replace the brake if necessary
	Correct input voltage polarity	Check input voltage and rotate if necessary
Error (continuous signal)	Brake release is not recognised	Brake is not permitted Incorrect RBC-module (brake nominal voltage)
	Brake drop-out is not detected	Brake is not permitted Check the supply module function
	Break voltage drop (supply voltage)	Check network stability and reinstate it
Warning	Wear limit reached	Check the brake and replace if necessary.
	Supply voltage too low	Check or increase supply/output voltage on the supply module
	Coil temperature of the brake too high	RMS coil capacity