

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.



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 devices.

- Danger of death on touching voltage-carrying cables and components
- Danger of device failure caused by short circuits or earth short circuits at the terminals
- Electronic devices cannot be guaranteed fail-safe
- Danger of burns when touching hot surfaces



Warning:

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



Application

ROBA[®]-switch fast acting rectifiers are used to connect DC consumers to alternating voltage supplies, for example electromagnetic brakes and couplings (ROBA-stop[®], ROBA[®]-quick, ROBATIC[®]) as well as electromagnets and electrovalves etc.

Fast acting rectifier ROBA[®]-switch 017._00.2

- Consumer operation with overexcitation or power reduction
- Input voltage: 100 - 500 VAC
- Maximum output current: I_{RMS} : 3 A at 250 VAC
- UL-approved



Function

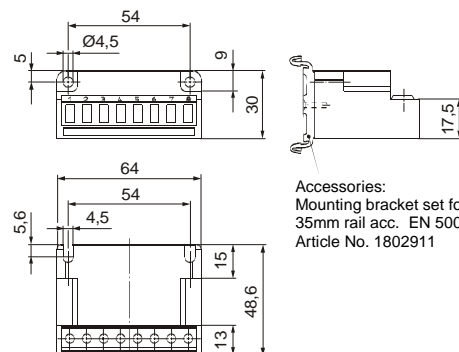
The ROBA[®]-switch units are used for operation at an input voltage of between 100 and 500 VAC, dependent on Type. They can switch internally from bridge rectification output voltage to half-wave rectification output voltage. The bridge rectification time can be modified from 0,05 to 2 seconds by exchanging the external resistor.

Electrical Connection (Terminals)

- 1 + 2 Input voltage (built-in protective varistor)
- 3 + 4 Connection for external contact for DC-side switch-off (with an installed bridge, switch-off only takes place Aside with a longer brake engagement time)
- 5 + 6 Output voltage (built-in protective varistor)
- 7 + 8 R_{RMS} for bridge rectifier timing adjustment

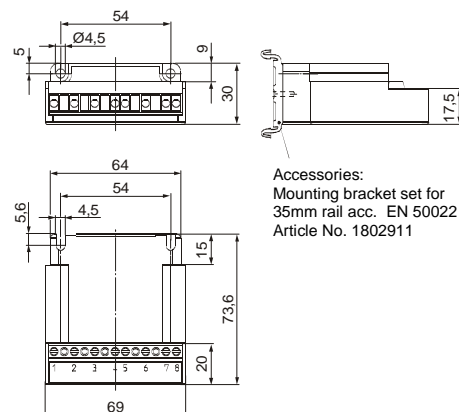
Dimensions (mm)

Type 017.000.2



Accessories:
Mounting bracket set for
35mm rail acc. EN 50022
Article No. 1802911

Type 017.100.2



Accessories:
Mounting bracket set for
35mm rail acc. EN 50022
Article No. 1802911

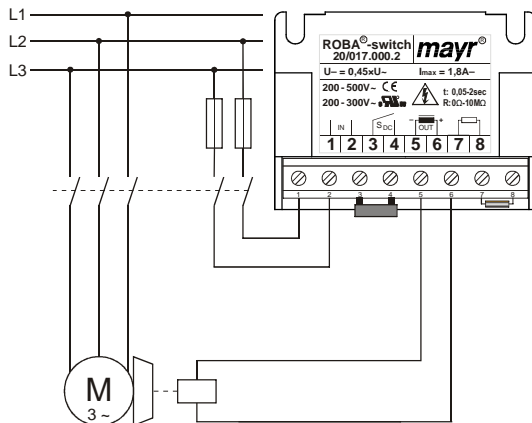
Installation and Operational Instructions for ROBA[®] -switch Type 017._00.2

(B.017+002.GB)

Technical Data

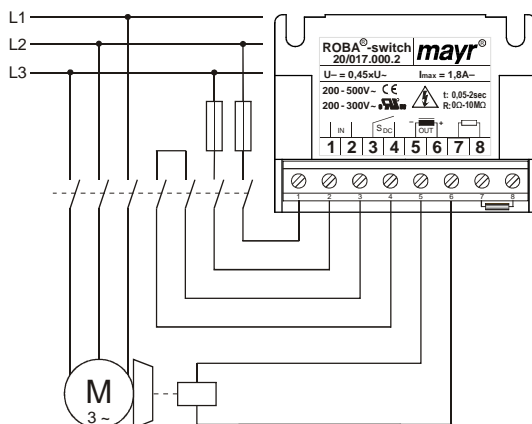
Type Size	017.000.2		017.100.2	
	10	20	10	20
Input voltage	100 - 250 VAC ±10 % 50/60 Hz	200 - 500 VAC ±10 % 50/60 Hz	100 - 250 VAC ±10 % 50/60 Hz	200 - 500 VAC ±10 % 50/60 Hz
Output voltage (0,9 x U _{AC}) U _{bridge}	90 - 225 VDC	180 - 450 VDC	90 - 225 VDC	180 - 450 VDC
Output voltage (0,45 x U _{AC}) U _{half-wave}	45 - 113 VDC	90 - 225 VDC	45 - 113 VDC	90 - 225 VDC
Output current at ≤ 45 °C I _{RMS}	2,0 A	1,8 A	3,0 A	2,0 A
Output current at max. 70 °C I _{RMS}	1,0 A	0,9 A	1,5 A	1,0 A
Built-in protective varistors U _{RMS}	275 V	550 V	275 V	550 V
Conformity markings	UL, CE	UL up to 300V, CE	UL, CE	UL, CE
Device fuses	FF 5 A (H) 5 x 20 mm	FF 4 A (H) 6,3 x 32 mm	FF 6,3 A (H) 5 x 20 mm	FF 5 A (H) 6,3 x 32 mm
Protection	IP65 components, IP20 terminals, IP10 R _{ext}			
Terminals	Nominal cross-section 1,5 mm ² (AWG 22-14), screws M3, max. tightening torque 0,5 Nm			
Ambient temperature	-25 °C up to +70 °C			
Storage temperature	-40 °C up to +105 °C			
Installation conditions	The installation position can be user-defined. Please ensure sufficient heat dissipation and air convection! Installation near to sources of intense heat is not allowed!			

Wiring Example (400 VAC, AC-side switching)



AC-side switching means **low-noise switching**; however, the brake engagement time is longer (c. 6-10 times longer than with DC-side switch-off). Use for non-critical braking times.

Wiring Example (400 VAC, DC-side switching)



DC-side switching means **short brake engagement times (e.g. for EMERGENCY STOP operation)**. However, this produces louder switching noises.

Protective Circuit



When using DC-side switching, the coil must be protected by a suitable protective circuit according to VDE 0580, which is already integrated in *mayr*[®] rectifiers. Nevertheless, the high voltage induced on circuit interruption produces switching sparks, which lead to contact consumption. Therefore, only use the main contacts of a contactor suitable for inductive loads with a minimum contact opening of 3mm for switching the DC-side contact S_{DC}. Connecting the main contacts in series reduces wear.

Switch-ON

Switch-on always takes place AC-side. Only then is the overexcitation activated.

Switch-OFF



If short switching times are required, please switch DC-side. The AC-side always has to be switched as well in order to activate overexcitation.

If a longer brake engagement time or a quieter switching noise is required, please switch AC-side. For this, a bridge must be inserted between terminals 3 and 4.

Device fuses

To protect against damage from short circuits or earth short circuits, please add suitable device fuses to the mains cable.

Short circuits or earth short circuits during the overexcitation time period can lead to ROBA[®]-switch failures. After fuse elements have reacted to a malfunction, the ROBA[®]-switch must be checked for functional and operational safety (overexcitation voltage, switch-off voltage, response delay time, holding voltage). The same procedure is to be carried out after coil failure.

Overexcitation

On overexcitation, the brake is initially energised with a voltage higher than the nominal voltage. This decreases the disconnection time t_2 .



Increased wear (enlarged air gap) as well as coil heat lengthen the brake disconnection time t_2 . Therefore, when dimensioning the overexcitation time t_{over} , please select at least double the disconnection time t_2 on each brake Type and size (catalogue values).

Different external resistances between terminals 7 and 8 allow the adjustment of different overexcitation times. The overexcitation time has a standard adjustment of 0,45 s \pm 20 %.

Overexcitation times

Overexcitation times t_{over} (s)	R_{ext} on terminals 7 and 8 (Ohm)
0,05	0 (bridge)
0,10	22 K
0,20	82 K
0,45	221 K (standard)
0,69	390 K
0,76	470 K
0,95	680 K
1,15	1 M
1,53	2,20 M (included)
2,00	10 M
2,15	open

The times printed in bold can be adjusted for delivery. For the other times, please select the respective resistances.

Recovery time 100 ms

The recovery time is the time the ROBA[®]-switch requires in order to reach its starting position after switch-off. Therefore, the input voltage may be switched on again at the earliest after 100 ms. During cycle operation, please take suitable measures to ensure that the recovery time of 100 ms is kept to.

Maximum Coil Capacity P_{RMS}

The values stated in the Table are guideline values for a switching frequency of maximum 1 cycle per minute and for keeping to the permitted current I_{RMS} at ≤ 45 °C.

Danger!

If the switching frequency is larger than 1 cycle per minute or if the overexcitation time t_{over} is longer than double the disconnection time t₂, please observe the following:

$$P_{RMS} \leq P_{nom}$$

The coil capacity P_{RMS} must not be larger than P_{nom} or the nominal current I_{RMS} which flows through the ROBA[®]-switch must not be exceeded. Otherwise, the coil and the ROBA[®]-switch may fail due to thermic overload.

Calculations:

P_{RMS} (W) Effective coil capacity, dependent on the switching frequency, overexcitation, power reduction and switch-on time duration.

$$P_{RMS} = \frac{P_{over} \times t_{over} + P_{hold} \times t_{hold}}{t_{tot}}$$

P_{nom} (W) Coil nominal capacity (catalogue values or Type tag)

P_{over} (W) Coil capacity on overexcitation

$$P_{over} = \left(\frac{U_{over}}{U_{nom}}\right)^2 \times P_{nom}$$

P_{hold} (W) Coil capacity on power reduction

$$P_{hold} = \left(\frac{U_{hold}}{U_{nom}}\right)^2 \times P_{nom}$$

t_{over} (s) Overexcitation time

t_{hold} (s) Time of operation with power reduction

t_{off} (s) Time without voltage

t_{tot} (s) Total time (t_{over} + t_{hold} + t_{off})

U_{over} (V) Overexcitation voltage (bridge voltage)

U_{hold} (V) Holding voltage (half-wave voltage)

U_{nom} (V) Coil nominal voltage

I_{RMS} (A) Effective current, dependent on switching frequency, overexcitation time and switch-on duration

$$I_{RMS} = \sqrt{\frac{P_{RMS} \times P_{nom}}{U_{nom}^2}}$$

Table: Maximum Coil Capacity (in Watt)

Size 10 / U _{AC} 115 VAC					
Coil nominal voltage	017.000.2		017.100.2		Index
	≤45 °C	70 °C	≤45 °C	70 °C	
104 VDC	416	208	624	312	2

Size 10 / U _{AC} 230 VAC					
Coil nominal voltage	017.000.2		017.100.2		Index
	≤45 °C	70 °C	≤45 °C	70 °C	
104 VDC	208	104	312	156	1
180 VDC	623	312	935	437	3
207 VDC	824	412	1236	618	2

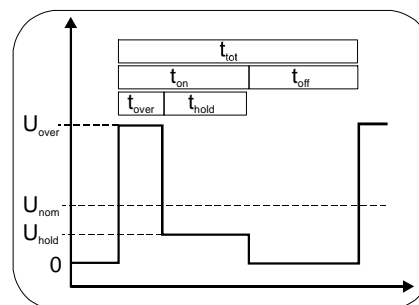
Size 20 / U _{AC} 230 VAC					
Coil nominal voltage	017.000.2		017.100.2		Index
	≤45 °C	70 °C	≤45 °C	70 °C	
104 VDC	187	94	208	104	1
180 VDC	561	280	623	312	3
207 VDC	742	371	824	412	2

Size 20 / U _{AC} 400 VAC					
Coil nominal voltage	017.000.2		017.100.2		Index
	≤45 °C	70 °C	≤45 °C	70 °C	
180 VDC	324	162	360	180	1
207 VDC	428	214	476	238	3
225 VDC	506	253	563	281	3

Size 20 / U _{AC} 500 VAC					
Coil nominal voltage	017.000.2		017.100.2		Index
	≤45 °C	70 °C	≤45 °C	70 °C	
225 VDC	405	203	450	225	1

Index 1) Operation with overexcitation
2) Operation with power reduction
3) Operation with overexcitation and power reduction

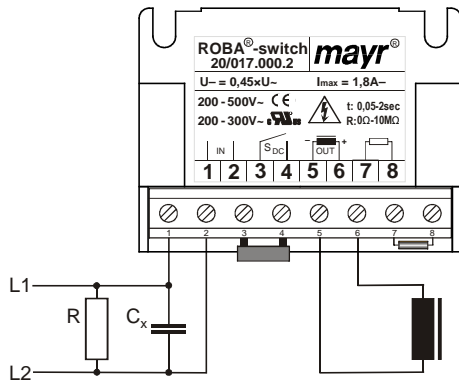
Time Diagram



EMC-compatible Installation

The ROBA[®]-switch itself does not produce any interference emissions. However, in connection with other components (e.g. electromagnetic brakes) interference emissions over the allowed limit values are possible. Therefore, EMC-compatible installation must be ensured!

The described measure for keeping to the EMC directive is inspected under laboratory conditions and cannot always be automatically transferred to the state of a machine or system in case of deviations. The inspection includes the individual components *mayr*[®]-ROBA[®]-switch and *mayr*[®]-brake and is valid for an input voltage of up to 500 VAC.



Installation of a C_x-capacitor in the AC supply line:

$C_x = 330 \text{ nF} / 660 \text{ V}$ The voltage resistance of the capacitor must be at least that of the U_{AC} mains voltage!
 $R = 0,5 \text{ M}\Omega$ Discharge resistor

Danger!

- Mount the C_x-capacitor directly onto the ROBA[®]-switch (connecting terminal)!
- Avoid antennae effects: Keep the supply cables as short as possible, do not form ring or bow shapes with the cables!
- Mount good bonding connections onto the metal body of the brake!
- Lay control cables separately from power cables or strongly pulsating cables!

Standards

EMC Inspections

DIN EN 61000-6-2:2006-03 Interference immunity
DIN EN 61000-6-4:2002-08 Interference emission
VDE 0160 / DIN EN 50178:1998-04 Equipment of high-voltage current plants with electronic machinery materials

Insulation Co-ordination acc. VDE 0110 / DIN EN 60664:2003-11

Excess voltage category III
Pollution degree 2 for Type 017.000.2
Pollution degree 3 for Type 017.100.2
Rated insulation voltage 500 V_{RMS}

Appointed Use:

Acc. DIN EN 50178:1998-04