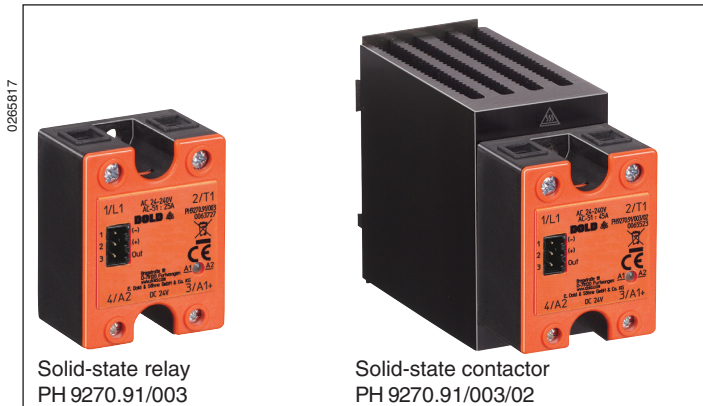


**POWERSWITCH**  
**Solid-State Relay / - Contactor**  
**With Load Current Measurement PH 9270/003**

Translation  
of the original instructions



0265817

Solid-state relay  
PH 9270.91/003

Solid-state contactor  
PH 9270.91/003/02

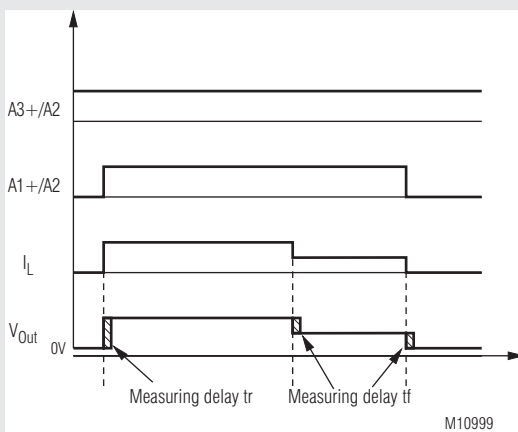
**Your Advantages**

- Free from wearing, noiseless, economic
- High productivity by integrated monitoring functions
- Accurate AC / DC measurement up to 45 A
- Analogue output for easy working with signals to PLC or displays
- Excellent EMC- performance, because of switching at zero crossing
- As option protection against thermal overload

**Features**

- AC solid-state relay /-contactor with load current measurement (runs value)
- Analogue output DC 0 ... 10 V
- According to IEC/EN 60947-4-3
- Nominal voltage up to AC 480 V
- Load current up to 45 A, AC-51
- Switching at zero crossing
- DCB technology (direct bonding method) for excellent heat transmission properties
- LED indicator for control
- As option with optimized heat sink, for DIN rail mounting
- Width: 45 mm

**Function Diagram**



**Approvals and Markings**

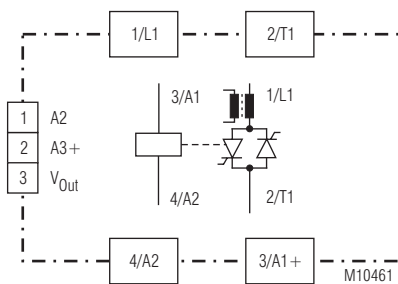


\*) The installation must only be done by a qualified electrician!

**Applications**

The solid-state relay switches at zero crossing and with its analogue output 0 ... 10 V. It is suitable for heating applications where failures must be detected as early as possible. It allows a continuous monitoring of the load circuit and offers many solutions where fast and silent switching actions are required e.g. in plastic molding and rubber processing machines as well as in thermal forming and packaging machines and also in food industry.

**Circuit Diagram**



PH 9270.91/003 DC 0 ... 10 V

**Function**

When voltage is applied to A3+/A2 the solid-state relay PH 9270 monitors continuously the load current and transmits it to a proportional analogue output signal of either 0 ... 10 V. This signal can be easily monitored by a PLC or display module with analogue input.

The PH 9270 with 2 antiparallel connected thyristors switches at zero crossing. When connecting the control voltage the solid-state is switched on with the next zero crossing of the sinusoidal voltage. After disconnecting the control voltage the solid-state switches off with the next zero crossing of the load current.

As option the PH 9270 is available with heat sink for DIN rail mounting and immediately "ready to use". In addition the heat dissipation is optimised.

**Connection Terminal**

Terminal designation	Signal designation
A1+, A2	Control input
A3+, A2	Auxiliary supply, load current measurement
V <sub>Out</sub>	Analogue output
L1	Network
T1	Load output

**Indication**

The LED „A1/A2“ shows the state of the control input  
Yellow: Controlled solid-state relays  
Off: Not controlled solid-state relays

## Notes

### Overtemperature protection

As option, the solid-state relay has an overtemperature protection to monitor the temperature of the heat sink. For this purpose, a thermal switch (NC contact) can be inserted into the respective pocket at the bottom of the semiconductor relay. As soon as the temperature of the heat sink exceeds for example 100°C, the thermal switch opens. For thermal protection of the solid-state relay, a thermal switch of *UCHIYA* type UP62 – 100 can be installed.

## Technical Data

### Output

Load voltage AC [V]:	24 ... 240, 48 ... 480
Frequency range [Hz]:	47 ... 63
Load current measuring range [A], (AC-51):	25            45
Min. load current [A]:	0.02
Load limit integral I <sup>2</sup> t [A <sup>2</sup> s]:	1800; 6600*)
Max. overload current [A] t = 10 ms:	600; 1150*)
Period. overload current [A] t = 1 s:	120; 150*)
Forward-voltage [V] at nominal current:	1.2            1.4
Peak reverse voltage [V]:	800 (24 ... 240 VAC), 1200 (48 ... 480 VAC)
Off-state voltage [V/μs]:	500
Rate of rise of current [A/μs]:	100
Residual current at off state at nominal voltage and nominal frequency [mA]:	≤ 1
<b>Temperature Data</b>	
Thermal resistance junction - housing [K/W]:	0.6            0.5
Thermal resistance housing - ambient [K/W]:	12
Junction temperature [°C]:	≤ 125

\*) variant /1\_ \_

### Control Circuit

Control voltage A1+/A2:	20 ... 32 V DC
Max. input current [mA]:	10 at 24 V DC
<b>Analogue output 0 ... 10 V</b>	
Operation voltage A3+/A2:	18 ... 32 V DC
Min. input current [mA]:	5
	(dependent to load on analogue output)
Output voltage V <sub>out</sub> :	10 V
	equivalent of measuring range (e.g. 25 A)
Min. load resistance [Ω]:	300
Min. measuring current:	1 % of measuring range
Delay of measurement t <sub>r</sub> [ms]:	< 120
Delay of measurement t <sub>f</sub> [ms]:	< 300
Measuring accuracy:	± 5 % of measuring range (nominal current)
Max. cable length [m]:	10 (twisted and shielded)

### General Data

<b>Operating mode:</b>	Continuous operation	
<b>Temperature range</b>		
Operation:	- 20 ... 40 °C	
Storage:	- 20 ... 80 °C	
<b>Clearance and creepage distances:</b>		
Rated impulse voltage / pollution degree:	6 kV / 3	IEC/EN 60664-1
<b>EMC:</b>	IEC/EN 61000-6-4,	IEC/EN 61000-4-1
Electrostatic discharge (ESD):	8 kV air / 6 kV contact	IEC/EN 61000-4-2
HF irradiation:	10 V / m	IEC/EN 61000-4-3
Fast transients:	2 kV	IEC/EN 61000-4-4
Surge voltages between		
Wires for power supply L1, T1:	1 kV	IEC/EN 61000-4-5
Wires A1, A2 and ground:	1 kV	IEC/EN 61000-4-5
Measuring output and ground:	1 kV	IEC/EN 61000-4-5
Wires L1, T1 and ground:	2 kV	IEC/EN 61000-4-5
HF-wire guided:	10 V	IEC/EN 61000-4-6

## Technical Data

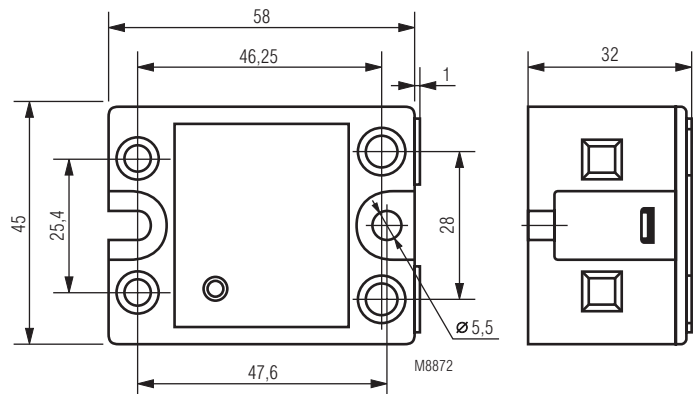
Interference suppression:	Limit value class A*)	
	*) The device is designed for the usage under industrial conditions (Class A, EN 55011)	
	When connected to a low voltage public system (Class B, EN 55011) radio interference can be generated. To avoid this, appropriate measures have to be taken.	
<b>Degree of protection</b>		
Housing:	IP 40	IEC/EN 60529
Terminals:	IP 20	IEC/EN 60529
<b>Vibration resistance:</b>	Amplitude 0.35 mm	
	Frequency 10 ... 55 Hz, IEC/EN 60-068-2-6	
<b>Housing material</b>		
<b>Base plate:</b>	Aluminum, copper nickle-plated	
<b>Potting compound:</b>	Polyurethane	
<b>Mounting screws:</b>	M5 x 8 mm	
<b>Fixing torque:</b>	2.5 Nm	
<b>Connections control circuit:</b>	Mounting screws M3 Pozidriv 1 PT	
Fixing torque:	0.5 Nm	
Wire cross section:	1.5 mm <sup>2</sup> solid	
<b>Connections load circuit:</b>	Mounting screws M4 Pozidriv 2 PT	
Fixing torque:	1.2 Nm	
Wire cross section:	10 mm <sup>2</sup> solid	
<b>Connections monitoring circuit:</b>		
	Weidmüller - Omnimate Range connecting pair BL 3.50/03 (included in delivery)	
<b>Nominal insulation voltage</b>		
Control circuit – load circuit:	4 kV <sub>eff.</sub>	
Load circuit – base plate:	4 kV <sub>eff.</sub>	
Overvoltage category:	II	
<b>Weight</b>		
Without heat sink:	Approx. 110 g	
PH 9270.91/_ _ _ /01:	Approx. 540 g	
PH 9270.91/_ _ _ /02:	Approx. 650 g	

### Dimensions

#### Width x height x depth

Without heat sink:	45 x 59 x 32 mm
PH 9270.91/_ _ _ /01:	45 x 80 x 124 mm
PH 9270.91/_ _ _ /02:	45 x 100 x 124 mm

### Dimensions



### Accessories

- PH 9260-0-12: Graphite foil 55 x 40 x 0.25 mm to be fitted between device and heat sink, for better heat transmission. Article number: 0058395
- ZB 9260: ZB 9260: Adapter for DIN-rail mounting, for devices without heat sink. Article number: 0068209

### Standard Type

- PH 9270.91/003 AC 24 ... 240 V 25 A DC 0 ... 10 V
- Article number: 0062432
- Load voltage: AC 24 ... 240 V
  - Load current / measuring range: 25 A
  - Analogue output: DC 0 ... 10 V
  - Width: 45 mm

### Notes on Sizing for Selection of a Heat Sink

The heat generated by the load current must be dissipated by a suitable heat sink. It is imperative that the junction temperature of the semiconductor is maintained for all potential environmental temperatures of under 125 °C. For this reason, it is important to keep the thermal resistance between the base plate of the semiconductor relay and the heat sink to a minimum. To protect the solid-state relay effectively from excess heating, a thermally conducting paste or a graphite gasket (see Accessories) should be applied before installation to the base plate of the heat sink between semiconductor relay and heat sink.

From the table below, select a suitable heat sink with the next lowest thermal resistance. Thus, it is ensured that the maximum junction temperature of 125 °C is not exceeded. The load current in relation to the environmental temperature can be seen from the table.

### Selection of a Heat Sink

Load current (A)	PH 9270 25 A					
	Thermal resistance (K/W)					
25.0	2.8	2.5	2.1	1.8	1.5	1.1
22.5	3.2	2.8	2.5	2.1	1.7	1.3
20.0	3.7	3.3	2.8	2.4	2.0	1.6
17.5	4.3	3.8	3.4	2.8	2.4	1.9
15.0	5.1	4.6	4.0	3.5	2.9	2.4
12.5	6.3	5.6	5.0	4.3	3.6	2.8
10.0	8.0	7.2	6.4	5.6	4.7	3.9
7.5	11.0	9.9	8.7	7.6	6.5	5.4
5.0	16.8	15.0	13.5	12.0	10.0	8.5
2.5	-	-	-	-	21.0	17.6
	20	30	40	50	60	70
	Ambient-temperature (°C)					

Load current (A)	PH 9270 45 A					
	Thermal resistance (K/W)					
45	1.0	0.9	0.7	0.5	0.4	0.2
40	1.2	1.0	0.9	0.7	0.5	0.3
35	1.5	1.3	1.0	0.9	0.7	0.5
30	1.9	1.6	1.4	1.1	0.9	0.7
25	2.4	2.0	1.8	1.5	1.2	0.9
20	3.0	2.7	2.4	2.0	1.9	1.3
15	4.4	3.9	3.4	2.9	2.5	2.0
10	6.9	6.0	5.4	4.7	4.0	3.3
5	14.0	12.9	11.5	10.0	8.6	7.2
	20	30	40	50	60	70
	Ambient-temperature (°C)					

### Variants

- PH 9270.91 / \_ 0 3 / 0 \_
- 0 = Without heat sink
  - 1 = With heat sink 1.5 K / W
  - 2 = With heat sink 0.95 K / W
- 0 Standard
  - 1 With high I<sup>2</sup>t-value

### Ordering example for variants

- PH 9270.91 /103/02 AC 24 ...240 V 25 A DC 0 ... 10 V
- Analogue output
  - Load current
  - Load voltage
  - With heat sink 0.95 K / W
  - With high I<sup>2</sup>t-value
  - Type

### Application Example

