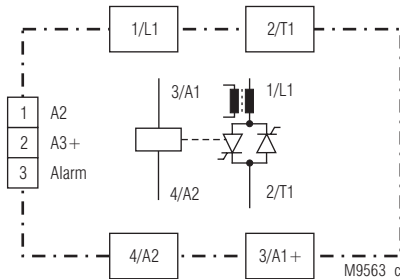


POWERSWITCH Semiconductor Relay / - Contactor With Load Circuit Monitoring PH 9270



- AC semiconductor relay /-contactor
- With integrated load circuit monitoring
- Settable load limit value
- According to IEC/EN 60947-4-3
- Load current 40 A, AC 51
- Switching at zero crossing
- 2 anti-parallel thyristors
- DCB technology (direct bonding method) for excellent heat transmission properties
- Two-colours LED status indicator
- Touch protection IP20
- PLC compatible alarm output (PNP; NPN on request)
- As option closed circuit operation or open circuit operation
- As option with optimized heat sink, for DIN rail mounting
- Width 45 mm

Circuit Diagram



PH 9270.91

Indication

The LED „A1/A2“ shows the state of the control input
 yellow: controlled semiconductor relays
 off: not controlled semiconductor relays

The LED „Alarm“ shows the state of the unit
 green: no failure
 red: failure (thyristor defective with open or short circuit,
 open load, current value too high or too low or
 supply voltage < 100 V AC)
 off: no auxiliary voltage (A3+/A2)

Notes

Overtemperature protection

Optionally, the semiconductor 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 semiconductor relay, a thermal switch of UCHIYA type UP62 – 100 can be installed.

Approvals and Marking



Applications

For high frequency wear free and noiseless switching of
 - heating systems
 - motors
 - valves*
 - lighting systems

The semiconductor switches at zero crossing. The integrated load monitoring provides fast fault finding e.g. broken load elements (part load failure), broken load circuit, overcurrent, missing load voltage, blown fuse and thyristor faults.

The PH 9270 is suitable for many applications e. g. extrusion machines for plastic and rubber, packaging machines, solder lines, machines in food industry.

* On overcurrent monitoring a start up delay must be integrated in the control.

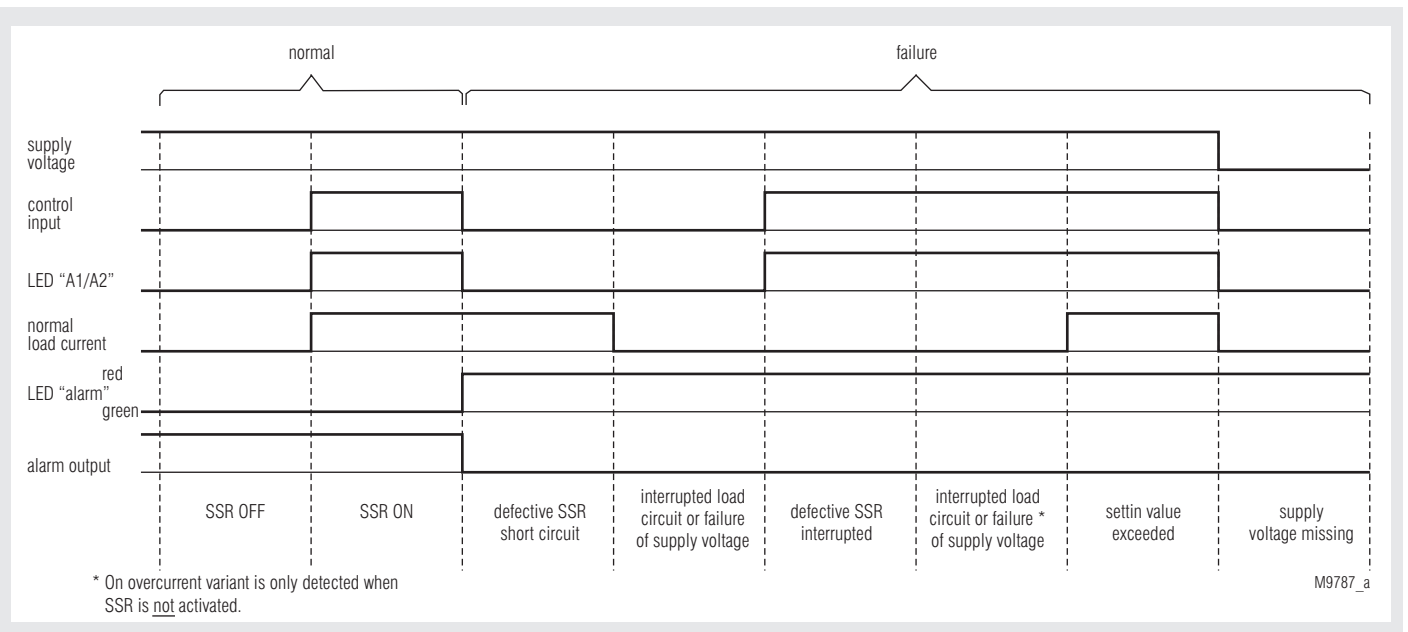
Function

The semiconductor relay PH 9270 monitors with applied auxiliary voltage (A3+/A2) the load voltage and the load current. On broken load circuit, deviations of the load current from setting value or defective semiconductor an alarm output is controlled. The failure state is indicated on an 2-color LED (see Function Diagrams).

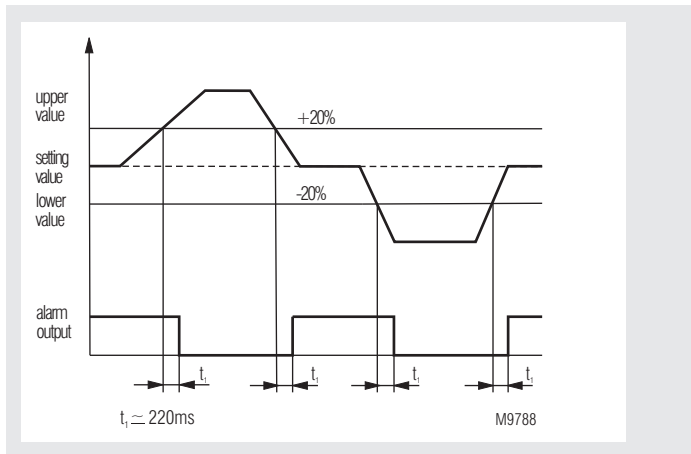
The PH 9270 with 2 antiparallel connected thyristors switches at zero crossing. When connecting the control voltage the semiconductor is switched on with the next zero crossing of the sinusoidal voltage. After disconnecting the control voltage the semiconductor switches off with the next zero crossing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

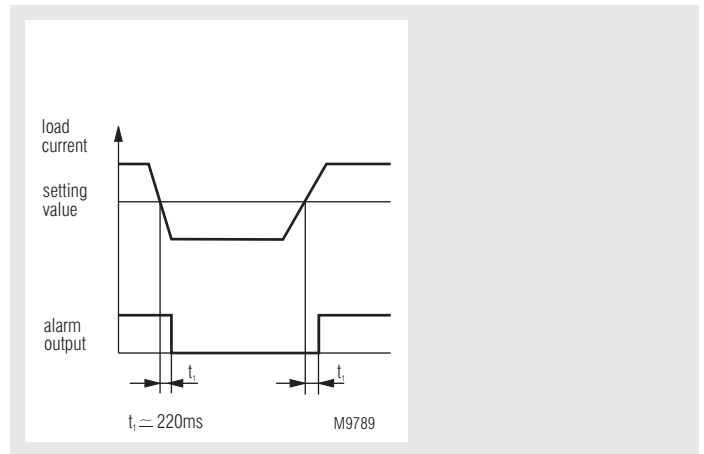
Function Diagram



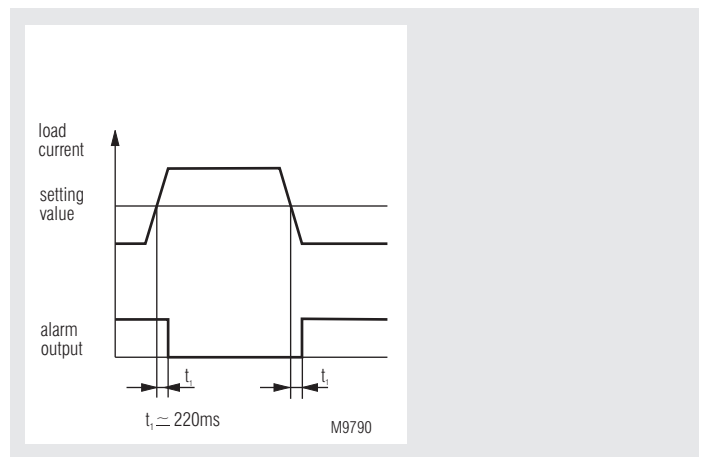
Normal operation and failure status



Over- / Undercurrent detection variant /000



Undercurrent detection variant /001



Overcurrent detection variant /002

Technical Data

Output

Load voltage AC [V]:	200 ... 480
Frequency range [Hz]:	47 ... 63
Load current [A], (AC 51):	40
Load limit integral I^2t [A ² s]:	1800; 6600 ^{*)}
Max. overload current [A] t = 10 ms:	600; 1150 ^{*)}
period. underload current [A] t = 1 s:	120; 150 ^{*)}
Forward-voltage [V]	
at nominal current:	1.4
Off-state voltage [V/μs]:	500
Rate of rise of current [A/μs]:	100
Measuring range:	0,5 ... 40 A
Response value:	continuously variable
Hysteresis:	2 % of response value

Temperature Data

Thermal resistance junction - housing [K/W]:	0.5
Thermal resistance housing - ambient [K/W]:	12
Junction temperature [°C]:	≤ 125

*) variant /1__

Alarm Output

Auxiliary supply A3+/A2 [V]:	20 ... 32 (DC)
max. input current [mA]:	15 bei 24 V DC
PNP semiconductor outputs	
max. output current [mA]:	100
Output voltage (open) [V]:	0 (DC)
(closed) [V]:	Auxiliary supply -2 V DC (max.)
Time delay [ms]:	220

Control Circuit

Control voltage A1+/A2 [V]:	20 ... 32 (DC)
Switch off voltage [V]:	0 ... 5 (DC)
max. input current [mA]:	10 at 24 V DC
Turn-on delay [ms]:	5 + 1/2 Periode
Turn-off delay [ms]:	20 + 1/2 Periode

General Data

Operating mode:	Continuous operation
Temperature range	
operation:	- 20 ... 40° C
storage:	- 20 ... 80° C
Clearance and creepage distances:	
rated impuls voltage / pollution degree:	6 kV / 3 IEC/EN 60 664-1
EMC:	IEC/EN 61 000-6-4, IEC/EN 61 000-4-1
Electrostatic discharge (ESD):	8 kV air / 6 kV contact IEC/EN 61 000-4-2
HF irradiation:	10 V / m IEC/EN 61 000-4-3
Fast transients:	2 kV IEC/EN 61 000-4-4
Surge voltages between	
wires for power supply:	1 kV IEC/EN 61 000-4-5
between wire and ground:	2 kV IEC/EN 61 000-4-5
HF-wire guided:	10 V IEC/EN 61 000-4-6
Interference suppression:	Limit value class A IEC/EN 60 947-4-3
Degree of protection	
Housing:	IP 40 IEC/EN 60 529
Terminals:	IP 20 IEC/EN 60 529
Vibration resistance:	Amplitude 0.35 mm Frequency 10 ... 55 Hz, IEC/EN 60-068-2-6
Housing material	Fiberglass reinforced polycarbonate Flame resistant: UL 94 V0
Base plate:	Aluminum, copper nickle-plated
Potting compound:	Polyurethane
Mounting screws:	M 5 x 8 mm
Mounting torque:	2.5 Nm

Technical Data

Connections control input:	Mounting screws M3 Pozidriv 2 PT
Mounting torque:	0.5 Nm
Wire cross section:	1.5 mm ² Litze
Connections load circuit:	Mounting screws M4 Pozidriv 1 PT
Mounting torque:	1.2 Nm
Wire cross section:	10 mm ² wire
Connections monitoring circuit:	Weidmüller - Omnimate Range connecting pair BL 3.50/03

Nominal insulation voltage

Control circuit – load circuit:	4 kV _{eff.}
Load circuit – base plate:	4 kV _{eff.}
Overvoltage category:	II

Weight

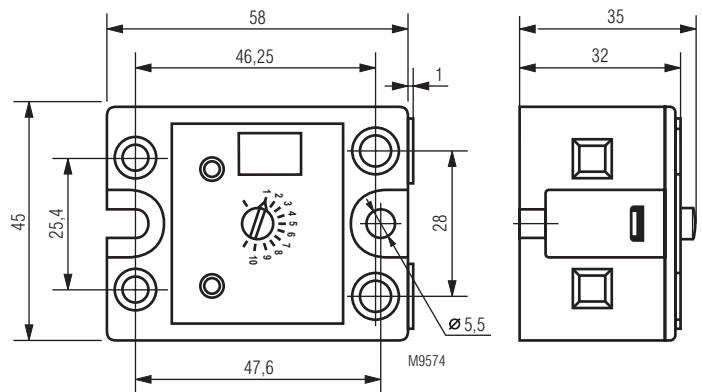
without heat sink:	approx. 100 g
PH 9270.91/___/01:	approx. 530 g
PH 9270.91/___/02:	approx. 650 g

Dimensions

Width x height x depth

without heat sink:	45 x 58 x 35 mm
PH 9270.91/___/01:	45 x 80 x 127 mm
PH 9270.91/___/02:	45 x 100 x 127 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
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Standard Type

PH 9270.91 AC 200 ... 480 V	40 A DC 20 ... 32 V
Article number:	0060425
• Load voltage:	AC 200 ... 480 V
• Load current:	40 A
• Auxiliary voltage:	DC 20 ... 32 V
• Alarm output:	PNP, closed circuit operation
• Monitoring:	Under- and overcurrent
• 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 semiconductor 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 40 A Thermal resistance (K/W)					
	20	30	40	50	60	70
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	1.7	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)					

Application Example

