

## POWERSWITCH

### Semiconductor Relay / - Contactor With Analogue Input For Pulse Package Control PH 9260/042



Semiconductor relay  
PH 9260.91/\_42

Semiconductor contactor  
PH 9260.91/\_42/0\_

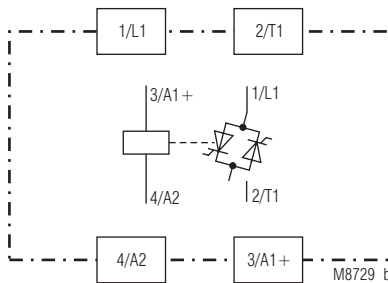
#### Your advantages

- Self-optimized impulse distribution with minimized cycle times
- Allows for precise temperature regulation
- Switching at zero crossing, providing outstanding EMC properties
- Protection from thermal overload with optional excess temperature protection

#### Features

- AC semiconductor relay / -contactor for pulse package control of heating systems
- Control input DC 4 ... 20 mA
- According to IEC/EN 60947-4-2
- Nominal voltage AC 48 ... 480 V
- Load current 25A, 50 A, AC-51
- LED status indicator for control and failure
- Box terminals
- Degree of protection IP20
- As option with heat sink, for DIN rail mounting
- Width: 45 mm

#### Circuit Diagram



PH 9260.91/\_42

#### Approvals and Markings



#### Applications

The zero crossing semiconductor relay switches with 4 ... 20 mA analogue input for pulse package control is ideal for the control of heating elements and infrared lamps. It allows for precise temperature regulation, and offers a wide variety of potential applications with fast and noiseless switching, e.g. extrusion machines for plastic and rubber, at thermoforming machines, packaging machines or machines in food industry.

#### Functions

The semiconductor relay PH 9260/042 is designed with 2 anti-parallel connected thyristors switching at zero crossing. The output of the semiconductor relay is activated at the next zero crossing of the sinusoidal voltage. When disconnecting the control signal the output is switched off at the next zero crossing of the load current.

The on/off switching ratio of the output is set proportional to the control current. The control voltage range of 4 to 20 mA is converted into an on/off switching ratio of 0 to 100%. Two LEDs indicate the device status.

As option the semiconductor relay is available with heatsink to be mounted on DIN rail. This provides optimum heat transmission.

#### Indication

yellow LED „A1-A2“: Operating voltage and control current available. The flashing cycle corresponds to the on/off switching ratio specified by the control current. At a control current < 4 mA or > 25 mA, activation does not occur and the LED does not illuminate.

red LED „Alarm“:  
- flashes slowly: at control current < 4 mA  
- flashes fast: at control current > 21 mA

#### Notes

##### Overtemperature protection

Optionally, the semiconductor relay has an overtemperature protection to monitor the temperature of the heat sink. To this end, a thermal release 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 release switch. For thermal protection of the semiconductor relay, a thermal release switch of UCHIYA type UP62 – 100 can be installed.

## Technical Data

### Control Input

|                                 |                             |
|---------------------------------|-----------------------------|
| <b>Operation voltage A1/A2:</b> | max. 35 V DC                |
| <b>Burden voltage:</b>          | max. 8 V (< 400 Ω at 20 mA) |
| <b>Current range:</b>           | DC 4 ... 20 mA              |
| <b>Overcurrent protection:</b>  | limit to 35 mA              |
| <b>Resolution:</b>              | 5 %                         |

### Output

|  |                           |                            |
|--|---------------------------|----------------------------|
| Load voltage AC [V]                                      | 48 ... 480                |                            |
| Frequency range [Hz]:                                    | 47 ... 63                 |                            |
| Load current [A], AC-51:                                 | 25                        | 50                         |
| Load limit integral I <sup>2</sup> t [A <sup>2</sup> s]: | 800<br>6600 <sup>1)</sup> | 1800<br>6600 <sup>1)</sup> |
| Max. overload current [A]                                | 400                       | 600                        |
| t = 10 ms:   | 1150 <sup>1)</sup>        | 1150 <sup>1)</sup>         |
| Periodic overload current                                | 40                        | 120                        |
| t = 1 s [A]:   | 150 <sup>1)</sup>         | 150 <sup>1)</sup>          |
| Min. current [mA]  | 20                        |                            |
| On-state voltage at nominal current [V]:                 | 1.2                       | 1.4                        |
| Peak reverse voltage [V]:                                | 1200                      |                            |
| On-state voltage [V/μs]:                                 | 500                       |                            |
| Rate of rise of current [A/μs]:                          | 100                       |                            |
| <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                     |                            |

<sup>1)</sup> Variant PH 9260.91/142

## 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 60 664-1   |                   |
| <b>EMC:</b>                                    | IEC/EN 61 000-6-4, IEC/EN 61 000-4-1                             |                   |
| Electrostatic discharge (ESD):                 | 8 kV air / 4 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 |
| <b>Degree of protection</b>                    |  |                   |
| Housing:                                       | IP 40  | IEC/EN 60 529     |
| Terminals:                                     | IP 20  | IEC/EN 60 529     |
| <b>Vibration resistance:</b>                   | Amplitude 0.35 mm frequency 10 ... 55 Hz, IEC/EN 60-068-2-6      |                   |
| <b>Housing material:</b>                       | Fiberglass reinforced polycarbonate<br>Flame resistant: UL 94 V0 |                   |
| <b>Base plate:</b>                             | Aluminum, copper nickel-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 Pozidrive 2 PT                                |                   |
| Fixing torque:                                 | 0.5 Nm   |                   |
| Wire cross section:                            | 1.5 mm <sup>2</sup> wire   |                   |
| <b>Connections load circuit:</b>               | Mounting screws M4 Pozidrive 1 PT                                |                   |
| Fixing torque:                                 | 1.2 Nm   |                   |
| Wire cross section:                            | 10 mm <sup>2</sup> wire  |                   |
| <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   |                   |

## Technical Data

### Weight

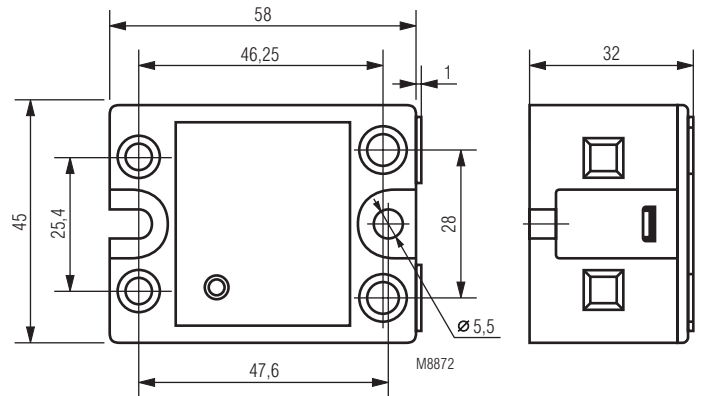
|                    |               |
|--------------------|---------------|
| without heat sink: | approx. 100 g |
| PH 9260.91/___/01: | approx. 530 g |
| PH 9260.91/___/02: | approx. 650 g |

### Dimensions

#### Width x height x depth

|                    |                   |
|--------------------|-------------------|
| without heat sink: | 45 x 59 x 32 mm   |
| PH 9260.91/___/01: | 45 x 80 x 124 mm  |
| PH 9260.91/___/02: | 45 x 100 x 124 mm |

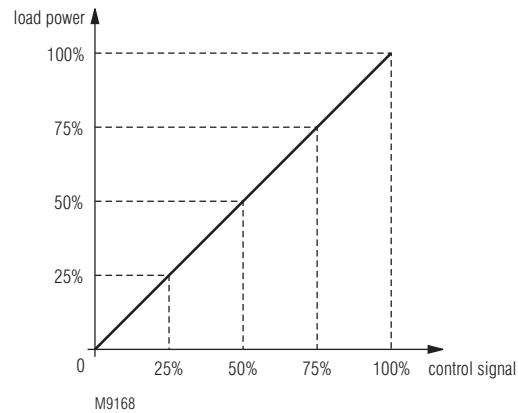
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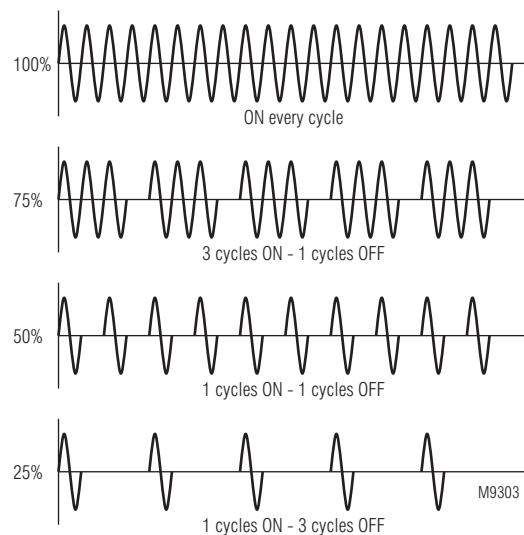
## Accessories

|               |  |
|---------------|--|
| 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<br>Article number: 0058395 |
|---------------|--|

## Characteristics



### Control characteristic



Cycle diagram with selfoptimizing puls packaging

### Standard Type

PH 9260.91/042 AC 48 ... 480 V 50 A DC 4 ... 20 mA  
 Article number: 0062777  
 • Load voltage: AC 48 ... 480 V  
 • Load current: 50 A  
 • Control current: DC 4 ... 20 mA  
 • Width: 45 mm

### Variants

PH 9260 .91 / \_ 42 / 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 height I<sup>2</sup>t-value  
 Type

### Ordering example for variants

PH 9260.91 /142 / 02 AC 48 ...480 V 50 A DC 4 ... 20 mA  
 Control voltage  
 Load current  
 Load voltage  
 With heat sink 0.95 K / W  
 With height I<sup>2</sup>t-value  
 Type

### 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 should be applied before installation to the base plate of the heat sink between semiconductor relay and heat sink.

From the tables 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 9260 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 9260 50 A             |      |      |      |     |     |
|------------------|--------------------------|------|------|------|-----|-----|
|                  | Thermal resistance (K/W) |      |      |      |     |     |
| 50               | 0.9                      | 0.7  | 0.6  | 0.4  | 0.3 | -   |
| 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) |      |      |      |     |     |

### Application Example

