POWERSWITCH
Semiconductor Contactor With Current Monitoring
BH 9251

0238194

BH 9251 up to 10 A

BH 9251 up to 20 A

BH 9251 up to 40 A

- According to IEC/EN 60 947-1, IEC/EN 60 947-4-2
- Switching at zero crossing
- To switch single-phase AC load up to 400 V
- Compensates voltage fluctuations of ± 20 %
- Load current up to 40 A
- Monitors:
  - Undercurrent
  - Overcurrent
  - Interrupted load circuit
  - monitors temperature to protect the power semiconductor
- De-energized on fault
- One relay output with changeover contact
- LED Indicators
- No auxiliary supply
- Galvanically separated control input X1-X2 with wide voltage range
- Adjustable current response value
- With integrated heat sink
- DIN-rail mounting
- 45 mm, 67.5 mm and 112.5 mm width

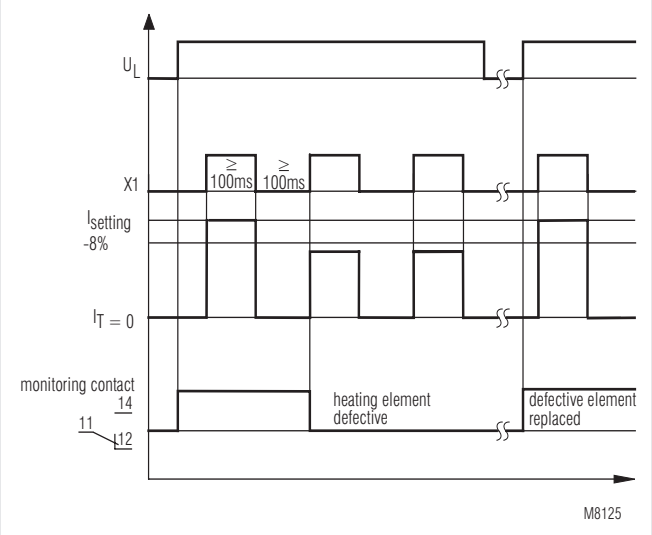
Additional Information About This Topic

- Data sheet BF 9250, Semiconductor contactor

Approvals and Markings

CE

Function Diagram



Applications

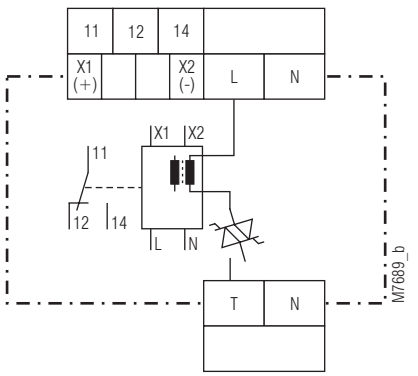
To monitor max. 12 parallel connected heating elements in packaging machines, plastic moulding machines, blister packaging machines etc.

Number-/load of heating elements to be connected to BH 9251, at load voltage AC 230 V

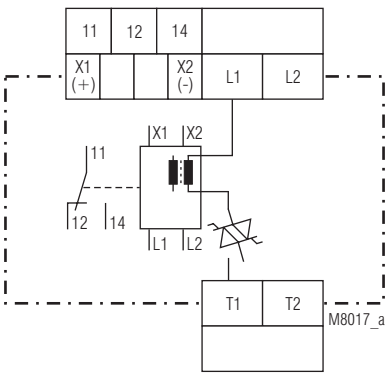
BH 9251				
Load current up to:	5 A	10 A	20 A	40 A
Max. total load of heating elements:	1150 W	2300 W	4600 W	9200 W
Max. no. of heating elements: Load of one element:	12 95 W	12 190 W	12 380 W	12 760 W

Monitors:
- Failure of a heating element ≥ 190 W / 380 W / 760 W
- Broken wire detection
- Short circuits between windings of a heating element

Circuit Diagrams



for AC 230 V



for AC 400 V
Star-connection

Connection Terminals

Terminal designation	Signal description
L, N or L1, L2	Mains connections
T, N or T1, T2	Load output
X1(+), X2	Control input
11, 12, 14	Changeover contact

Function

Voltage compensation:
The unit includes voltage compensation of ± 20 %. Only fault caused by defective heating elements are detected. Current changes caused by voltage fluctuations are ignored.

Failure of one heating element:
If the current decreases from the adjusted value by 8 % of the total value the monitoring output switches off. The failure of one heating element ≥ 190 W will be detected. The control input X1-X2 has to be closed at least 100 ms to allow current sensing.

Broken wire detection in the load circuit:
A broken line in the load circuit is monitored. The output relay switches off.

Overcurrent in the load circuit:
If the current increases from the adjusted value by 10 % of the total value the monitoring output switches off. The semiconductor remains active. If the overcurrent decreases to normal current the output relay switches on again. With this function shorts between windings inside the heating elements are detected.
At an overcurrent ≥ 30% of the total value the output relay switches off together with the semiconductor. This state will be stored. By switching the voltage off and on at L the semiconductor comes on again if there is no overcurrent. The monitoring output closes. This function is used to protect the device agains overload.

Temperature monitoring:
The temperature detection gets active when the temperature on the semiconductor is to high. The output relay switches off together with the power semiconductor. It the temperature goes back to normal monitoring output and the semiconductor are switched on again. The time disconnection depends on the ambient temperature.

Indicators

green LED, continuous light:		Voltage connected, load current and setting value are identical
green LED, flashing:		Voltage connected, load current and setting value are not identical
yellow LED	X1, continuous light:	Control input X1, X2 active
red LED	> ϑ, flashing:	Temperature detection active.
	> I, continuous light:	Overcurrent ≥ 10 %
red LED	< I, continuous light:	Failure of one heating element or broken wire in load circuit

Technical Data

Input

Nominal voltage U_N:

L - N:	AC 230 V / 48 V
L1 - L2:	AC 400 V on request
Voltage range:	0.8 ... 1.2 U_N
Nominal consumption:	0.8 W / 3.2 VA
Nominal frequency:	50 / 60 Hz
Control input X1-X2:	galvanically separated
Input voltage:	AC/DC 9,6 ... 270 V
Input current:	approx. 1 mA
Impulse length:	≥ 100 ms

Current Sensing

Measuring range:	1 ... 10 A / 2 ... 20 A / 4 ... 40 A
Measuring accuracy:	1 % of end scale value
Setting accuracy:	± 2.5 % of end scale value
Repeat accuracy:	< ± 1 %
Adjustment of current value:	infinite within measuring range
Response value for overcurrent:	≥ 10 % of end scale value, fixed
Response value for undercurrent:	- 8 % of end scale value, fixed
Voltage compensation:	± 20 %
Sample time:	≤ 100 ms

Output

Load output I_T

Load current	Width		
	45 mm	67.5 mm	112.5 mm
AC-51:	10 A	20 A	40 A

Values at Tu = 40 °C und 100 % ED

Current reduction 40°C	0.2 A / °C	0.4 A / °C	0.6 A / °C

Load voltage:	230 V ± 20 %
Cut-off voltage:	1200 Vp
Leakage current:	< 1 mA
Switching delay:	< 100 ms
Semiconductor fuse	
BH 9251, 10 A + 20 A:	800 A^2 s
BH 9251, 40 A:	1800 A^2 s

Monitoring output

Contacts:		
BH 9251.11	1 changeover contact	
Thermal continuous current I_{th}:	4 A	
Switching capacity		
to AC 15		
NO:	3 A / AC 230 V	IEC/EN 60 947-5-1
NC:	1 A / AC 230 V	IEC/EN 60 947-5-1
Electrical life:		
to AC 15 at 3 A, AC 230 V:	2 x 10^5 switching cycles	IEC/EN 60 947-5-1
Short circuit strength		
max. fuse rating:	4 A gG / gL	IEC/EN 60 947-5-1
Mechanical life:	≥ 10^6 switching cycles	

General Data

Operating mode:	Continuous operation
Temperature range:	0 ... + 40°C
Max. temperature:	60 °C (with current reduction)
Storage temperature:	- 20 ... + 80°C
Altitude:	< 2000 m
Clearance and creepage distances	
rated impulse voltage / Pollution degree	
L, N - X1, X2	
L, N - 11, 12, 14:	4 kV / 2 IEC 60 664-1
X1, X2 - 11, 12, 14:	4 kV / 2 IEC 60 664-1

Technical Data

EMC

Electrostatic discharge:	8 kV (air)	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 votages 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 B	EN 55 011
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
Climate resistance:	0 / 060 / 04	IEC/EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection		
Load terminals:	1 x 10 mm² solid, or 1 x 6 mm² stranded ferruled	
Stripping length:	11 mm	
Fixing torque:	max. 1.2 Nm	
Wire fixing:	Box terminals with self-lifting wire protection and Plus-minus terminal screws M4	
Control terminals:	1 x 4 mm² solid, or 2 x 1.5 mm² stranded ferruled or 1 x 2.5 mm² stranded ferruled DIN 46 228-1/-2/-3/-4	
Stripping length:	10 mm	
Fixing torque:	max. 0.8 Nm	
Wire fixing**:**	Box terminals with self-lifting wire protection and Plus-minus terminal screws M3.5	
Mounting:	DIN rail	IEC/60 715
Weight:		
Width:		
45 mm	400 g	

Dimensions

Width x height x depth:	45 x 84 x 121 mm	(10 A)
	67.5 x 84 x 121 mm	(20 A)
	112.5 x 84 x 121 mm	(40 A)

Standard Type

BH 9251.11 AC 230 V 50/60 Hz 10 A

Article number:	0052267
• Nominal voltage:	AC 230 V
• Load current:	10 A
• Width:	45 mm

Ordering Example

BH 9251 .11 AC 230 V 50 / 60 HZ 10 A

- 10 A — Load current
- 50 / 60 HZ — Nominal frequency
- AC 230 V — Nominal voltage
- .11 — Contacts
- BH 9251 — Type

Notes for Installation

Suggested distance:
between relay and cable duct: 20 mm
to neighbour device: 10 mm; at max. load current and 100 duty cycle

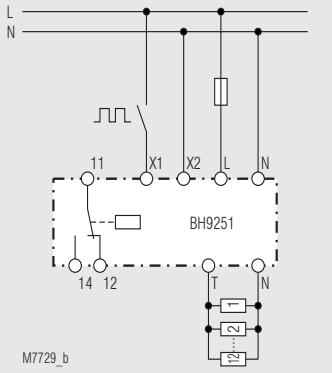
Set-up Procedure

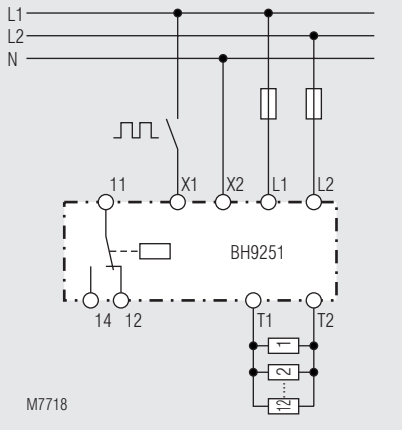
1.) Switch on heating elements by activating control input X1.
2.) When the potentiometer is in left hand position the red LED >I must be on because the unit detects an overcurrent. At the same time the green LED is flashing. Turning the potentiometer slowly clockwise the red LED >I goes of and contact 11-14 closes. The green LED is still flashing. When the potentiometer is turned further clockwise the LED will change from flashing to continuous light. At this point the window indicating the correct current is reached. Turning further clockwise will make the LED flash again. The width of the window is ± 2.5 % of the setting range. To adjust the unit to the optimum setting the potentiometer should be set in the middle between the 2 points where the green LED starts flashing. At this point the actual current flowing and the setting value are identical. Current changes of > ± 2.5 % will make the green LED flash again. An undercurrent of 8 % will make the red LED <I light up and an overcurrent of 10 % will turn the red LED >I on.
The settings can be done also while the voltage is fluctuating within 20 % from the nominal voltage as changes in these limits are compensated.
3.) Simulating the failure of one heating element by disconnecting the element. The output relay switches off and the LED <I goes on.

Safety Notes

- Failures in the circuit must only be removed when the unit is disconnected.
- The user has to make sure, that the units and the corresponding components are connected and operated according to the local, legal and technical standards (e.g. TÜV, BG, VDE).
- Adjustment must only be done by educated personnel according to the appropriate safety standards. For work in the circuit and on the product the unit must be disconnected form the mains.

Application Examples





Application examples