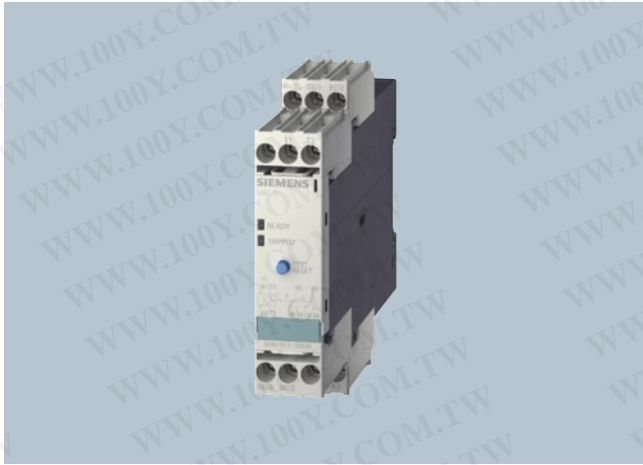


# Monitoring Relays

## 3RN1 Thermistor Motor Protection

For PTC sensors

### Overview



Thermistor motor protection devices are used for direct monitoring of the motor winding temperature. For this purpose, the motors are equipped with temperature-dependent resistors (PTC) that are directly installed in the motor winding and abruptly change their resistance at their limit temperature.

### Benefits

- Thanks to direct motor protection, overdimensioning of the motors is not necessary
- No settings on the device are necessary
- Solid-state compatible output thanks to versions with hard gold-plated contacts
- Rapid error diagnosis thanks to versions that indicate open and short-circuit in the sensor circuit
- All versions with removable terminals
- All versions with screw terminals or alternatively with innovative spring-type terminals

### Application

Direct motor protection through temperature monitoring of the motor winding offers 100 % motor protection even under the most difficult ambient conditions, without the need to make adjustments on the device. Versions with hard gold-plated contacts ensure, in addition, a high switching reliability that is even higher than an electronic control.

Motor protection:

- At increased ambient temperatures
- For high switching frequency
- For long start-up and braking procedures
- Used together with frequency converters (low speeds)

### ATEX approval for operation in areas subject to explosion hazard

The SIRIUS 3RN1 thermistor motor protection relay for PTC sensors is certified according to ATEX Ex II (2) G and GD for gases and dust.

See "Appendix" --> "Standards and approvals" --> "Type overview of approved devices for explosion-protected areas (ATEX Explosion Protection)".

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 Http://www.100y.com.tw

### Motor protection using current- and temperature-dependent protective devices

EN 60204 and IEC 60204 stipulate that motors must be protected from overheating at a rating of 0.5 kW and higher. The protection can take the form of overload protection, overtemperature protection or current limiting.

For motors with frequent starting and braking and in environments where cooling may be impaired (e. g. by dust), it is recommended to use the overtemperature protection option in the form of a protective device coordinated with this mode of operation. A good choice in this case is the use of 3RN1 thermistor motor protection devices.

On rotor-critical motors, overtemperature detection in the stator windings can lead to delayed and hence inadequate protection. In this case the standards stipulate additional protection, e. g. by means of an overload relay.

This combination of thermistor motor protection and an overload relay is recommended for full motor protection in case of frequent starting and braking of motors, irregular intermittent duty or excessive switching frequency. To prevent premature tripping of the overload relay in such operating conditions, a higher setting than that normally required for the operational current is chosen. The overload relay then performs the stall protection, and the 3RN1 thermistor motor protection device monitors the temperature of the motor windings.

Application	Motor protection		
	Only current-dependent, e. g. with overload relay	Only temperature-dependent, e. g. with thermistor motor protection relay	Current- and temperature-dependent
Motor protection in case of			
Overloading in uninterrupted duty	✓	✓	✓
Long start-up and braking operations	○	✓	✓
Irregular intermittent duty	○	✓	✓
Excessively high switching frequency	○	✓	✓
Single-phase operation and current unbalance	✓	✓	✓
Voltage and frequency fluctuations	✓	✓	✓
Stalling of the rotor	✓	✓	✓
Switching on a stalled rotor of a stator-critical motor	✓	✓	✓
Switching on a stalled rotor of a rotor-critical motor	✓	○	✓
Elevated ambient temperature	--	✓	✓
Impeded cooling	--	✓	✓

- ✓ Full protection
- Conditional protection
- No protection

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### Selection and ordering data








- Thermistor motor protection relays monitor the motor winding temperature using temperature-dependent resistors (PTCs, type A) that are directly installed in the motor winding by the manufacturer.
- Monostable versions with closed-circuit principle, i. e. relays respond in the event of control supply voltage failure
- 3RN10 13-BW01: Bistable version, does not trigger in the event of control supply voltage failure
- All devices have PTB01 ATEX approval for dust or gas  
 See "Appendix" --> "Standards and approvals" --> "Type overview of approved devices for potentially explosive areas (ATEX explosion protection)".
- All devices except for 24 V AC/DC feature electrical isolation
- Versions with safe isolation up to 300 V according to EN 61140
- Non-volatile versions
- Versions with short-circuit and open-circuit detection in sensor circuit
- Versions with solid-state compatible contacts with hard gold-plating
- Versions for up to 6 sensor circuits
- Versions with manual, remote, autoreset and test button
- Terminal labeling according to DIN 50005
- All terminals are removable
- Width 22.5 mm (45 mm on version for several sensor circuits)

RESET	Contacts	Rated control supply voltage $U_s$ 50/60 Hz	DT	Screw terminals 	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
		V		Order No.	Price per PU			kg

### Compact signal evaluation units, width 22.5 mm, 1 LED

Terminal A1 is jumpered with the root of the CO contact								
Auto	1 CO	24 AC/DC	A	<b>3RN10 00-1AB00</b>	1	1 unit	101	0.114
		110 AC	A	<b>3RN10 00-1AG00</b>	1	1 unit	101	0.157
		230 AC	A	<b>3RN10 00-1AM00</b>	1	1 unit	101	0.156

### Standard evaluation units, width 22.5 mm, 2 LEDs

	Auto	1 NO + 1 NC	24 AC/DC	A	<b>3RN10 10-1CB00</b>	1	1 unit	101	0.134
			110 AC	A	<b>3RN10 10-1CG00</b>	1	1 unit	101	0.174
			230 AC	A	<b>3RN10 10-1CM00</b>	1	1 unit	101	0.175
			24 ... 240 AC/DC	A	<b>3RN10 10-1CW00</b>	1	1 unit	101	0.146
		2 CO	24 AC/DC	A	<b>3RN10 10-1BB00</b>	1	1 unit	101	0.162
			110 AC	A	<b>3RN10 10-1BG00</b>	1	1 unit	101	0.213
			230 AC	A	<b>3RN10 10-1BM00</b>	1	1 unit	101	0.213
		2 CO, gold-plated	24 AC/DC	A	<b>3RN10 10-1GB00</b>	1	1 unit	101	0.154
	Manual/Remote <sup>1)</sup>	1 NO + 1 NC	24 AC/DC	A	<b>3RN10 11-1CB00</b>	1	1 unit	101	0.147
			110/230 AC	A	<b>3RN10 11-1CK00</b>	1	1 unit	101	0.188
		Short-circuit detection in sensor circuit							
	Manual/Remote <sup>1)</sup>	2 CO	24 AC/DC	A	<b>3RN10 11-1BB00</b>	1	1 unit	101	0.163
			110 AC	A	<b>3RN10 11-1BG00</b>	1	1 unit	101	0.214
			230 AC	A	<b>3RN10 11-1BM00</b>	1	1 unit	101	0.212
		2 CO, gold-plated	24 AC/DC	A	<b>3RN10 11-1GB00</b>	1	1 unit	101	0.165
	Non-volatile <sup>2)</sup>								
	Manual/Remote	1 NO + 1 NC	24 AC/DC	A	<b>3RN10 12-1CB00</b>	1	1 unit	101	0.148
	Auto/Remote		110/230 AC	A	<b>3RN10 12-1CK00</b>	1	1 unit	101	0.188
		Non-volatile <sup>2)</sup> , short-circuit detection in sensor circuit							
	Manual/Remote	2 CO	24 AC/DC	A	<b>3RN10 12-1BB00</b>	1	1 unit	101	0.164
	Auto/Remote		110 AC	A	<b>3RN10 12-1BG00</b>	1	1 unit	101	0.214
	Remote		230 AC	A	<b>3RN10 12-1BM00</b>	1	1 unit	101	0.216
		2 CO, gold-plated	24 AC/DC	A	<b>3RN10 12-1GB00</b>	1	1 unit	101	0.155
		Non-volatile <sup>2)</sup> , short-circuit and open-circuit detection and indication in sensor circuit; wide-range voltage with screw terminal with safe isolation							
	Manual/Remote	2 CO	24 AC/DC	A	<b>3RN10 13-1BB00</b>	1	1 unit	101	0.160
	Auto/Remote		24 ... 240 AC/DC	A	<b>3RN10 13-1BW10</b>	1	1 unit	101	0.172
	Remote	2 CO, gold-plated	24 ... 240 AC/DC	A	<b>3RN10 13-1GW10</b>	1	1 unit	101	0.168

### Evaluation units for 2 sensor circuits, warning and disconnection, width 22.5 mm, 3 LEDs

Test/RESET button, non-volatile <sup>2)</sup>								
Manual/Remote	1 NO + 1 CO	24 ... 240 AC/DC	A	<b>3RN10 22-1DW00</b>	1	1 unit	101	0.173

### Evaluation units for 6 sensor circuits, multiple motor protection, width 45 mm, 8 LEDs

Test/RESET button, non-volatile <sup>2)</sup>								
Manual/Remote	1 NO + 1 NC	24 ... 240 AC/DC	A	<b>3RN10 62-1CW00</b>	1	1 unit	101	0.296

### Bistable evaluation units, width 22.5 mm

Test / RESET button, non-volatile <sup>2)</sup> , short-circuit and open-circuit detection and indication in sensor circuit								
Manual/Remote	2 CO	24 ... 240 AC/DC	A	<b>3RN10 13-1BW01</b>	1	1 unit	101	0.169

<sup>1)</sup> The unit can be reset with the RESET button or by disconnecting the control supply voltage.

<sup>2)</sup> For more information on protection against voltage failure see Technical Information LV 1 T.


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- Thermistor motor protection relays monitor the motor winding temperature using temperature-dependent resistors (PTCs, type A) that are directly installed in the motor winding by the manufacturer.
- Monostable versions with closed-circuit principle, i. e. relays respond in the event of control supply voltage failure
- 3RN10 13-.BW01: Bistable version, does not trigger in the event of control supply voltage failure
- All devices have PTB01 ATEX approval for dust or gas  
 See "Appendix" --> "Standards and approvals" --> "Type overview of approved devices for potentially explosive areas (ATEX explosion protection)".
- All devices except for 24 V AC/DC feature electrical isolation
- Versions with safe isolation up to 300 V according to EN 61149
- Non-volatile versions
- Versions with short-circuit and open-circuit detection in sensor circuit
- Versions with solid-state compatible contacts with hard gold-plating
- Versions for up to 6 sensor circuits
- Versions with manual, remote, autoreset and test button
- Terminal labeling according to DIN EN 50005
- All terminals are removable
- Width 22.5 mm (45 mm on version for several sensor circuits)


RESET	Contacts	Rated control supply voltage $U_s$ 50/60 Hz	DT	Spring-type terminals		PU (UNIT, SET, M)	PS*	PG	Weight per PU approx.
		V		Order No.	Price per PU				kg

### Compact signal evaluation units, width 22.5 mm, 1 LED

Terminal A1 is jumpered with the root of the changeover contact

Auto	1 CO	24 AC/DC 110 AC 230 AC	A B B	3RN10 00-2AB00 3RN10 00-2AG00 3RN10 00-2AM00	1 1 1	1 unit 1 unit 1 unit	101 101 101	0.104 0.153 0.153
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### Standard evaluation units, width 22.5 mm, 2 LEDs

	Auto	1 NO + 1 NC	24 AC/DC 110 AC 230 AC 24 ... 240 AC/DC	A A A A	3RN10 10-2CB00 3RN10 10-2CG00 3RN10 10-2CM00 3RN10 10-2CW00	1 1 1 1	1 unit 1 unit 1 unit 1 unit	101 101 101 101	0.116 0.153 0.159 0.127	
		2 CO	24 AC/DC 110 AC 230 AC	A C A	3RN10 10-2BB00 3RN10 10-2BG00 3RN10 10-2BM00	1 1 1	1 unit 1 unit 1 unit	101 101 101	0.137 0.139 0.190	
		2 CO, gold-plated	24 AC/DC	C	3RN10 10-2GB00	1	1 unit	101	0.139	
		Manual/Remote <sup>1)</sup>	1 NO + 1 NC	24 AC/DC 110/230 AC	A A	3RN10 11-2CB00 3RN10 11-2CK00	1 1	1 unit 1 unit	101 101	0.125 0.164
		Short-circuit detection in sensor circuit Manual/Remote <sup>1)</sup>	2 CO	24 AC/DC 110 AC 230 AC	A C A	3RN10 11-2BB00 3RN10 11-2BG00 3RN10 11-2BM00	1 1 1	1 unit 1 unit 1 unit	101 101 101	0.138 0.190 0.192
			2 CO, gold-plated	24 AC/DC	A	3RN10 11-2GB00	1	1 unit	101	0.154
			Non-volatile <sup>2)</sup> Manual/ Auto/Remote	1 NO + 1 NC	24 AC/DC 110/230 AC	A A	3RN10 12-2CB00 3RN10 12-2CK00	1 1	1 unit 1 unit	101 101
		Non-volatile <sup>2)</sup> , short-circuit detection in sensor circuit Manual/ Auto/ Remote	2 CO	24 AC/DC 110 AC 230 AC	C C C	3RN10 12-2BB00 3RN10 12-2BG00 3RN10 12-2BM00	1 1 1	1 unit 1 unit 1 unit	101 101 101	0.130 0.130 0.181
			2 CO, gold-plated	24 AC/DC	C	3RN10 12-2GB00	1	1 unit	101	0.140
			Non-volatile <sup>2)</sup> , short-circuit and open-circuit detection and indication in sensor circuit Manual/ Auto/Remote	2 CO	24 AC/DC 24 ... 240 AC/DC	A A	3RN10 13-2BB00 3RN10 13-2BW00	1 1	1 unit 1 unit	101 101
		2 CO, gold-plated		24 ... 240 AC/DC	C	3RN10 13-2GW00	1	1 unit	101	0.143

### Evaluation units for 2 sensor circuits, warning and disconnection, width 22.5 mm, 3 LEDs

Test/RESET button, non-volatile <sup>2)</sup> Manual/ Auto/Remote	1 NO + 1 CO	24 ... 240 AC/DC	A	3RN10 22-2DW00	1	1 unit	101	0.147
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### Evaluation units for 6 sensor circuits, multiple motor protection, width 45 mm, 8 LEDs

Test/RESET button, non-volatile <sup>2)</sup> Manual/ Auto/Remote	1 NO + 1 NC	24 ... 240 AC/DC	A	3RN10 62-2CW00	1	1 unit	101	0.251
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### Bistable evaluation units, width 22.5 mm

Test / RESET button, non-volatile <sup>2)</sup> , short-circuit and open-circuit detection and indication in sensor circuit Manual/ Auto/Remote	2 CO	24 ... 240 AC/DC	A	3RN10 13-2BW01	1	1 unit	101	0.139
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<sup>1)</sup> The unit can be reset with the RESET button or by disconnecting the control supply voltage.

<sup>2)</sup> For more information on protection against voltage failure see Technical Information LV 1 T.

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## Monitoring Relays 3RN1 Thermistor Motor Protection

Use	Version	DT	Order No.	Price per PU	PU (UNIT, SET, M)	PS*	PG	Weight per PU approx. kg
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### Blank labels

Blank labels, 20 mm x 7 mm, pastel turquoise<sup>1)</sup>

C

3RT19 00-1SB20

100 340 units

101

0.200

### Push-in lugs



3RP19 03

For devices with 1 or 2 CO contacts **Push-in lugs**  
 For screw fixing, 2 units are required for each device

3RP19 03

1 10 units

101

0.002