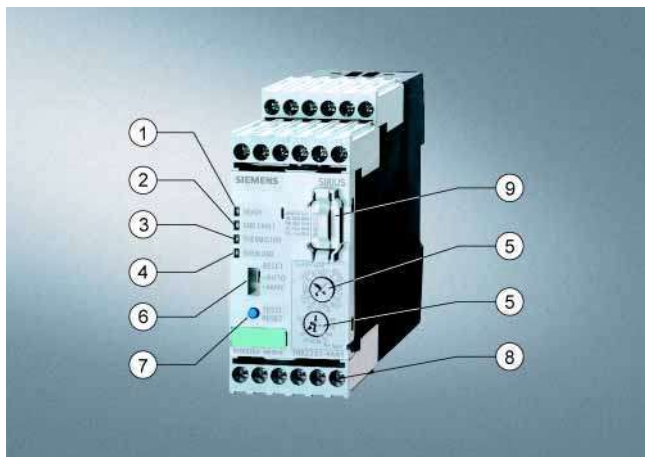


# Overload Relays

## 3RB2 Solid-State Overload Relays

3RB22, 3RB23 for high-feature applications

### Overview



3RB22/3RB23 evaluation module

- (1) Green "READY" LED:  
A continuous green light signals that the device is working correctly.
- (2) Red "GND FAULT" LED:  
A continuous red light signals a ground-fault tripping.
- (3) Red "THERMISTOR" LED:  
A continuous red light signals an active thermistor trip.
- (4) Red "OVERLOAD" LED:  
A continuous red light signals an active overload trip; a flickering red light signals an imminent trip (overload warning).
- (5) Motor current and trip class adjustment:  
Setting the device to the motor current and to the required trip class dependent on the start-up conditions is easy with the two rotary switches.
- (6) Selector switch for manual/automatic RESET:  
With this switch you can choose between manual and automatic RESET.
- (7) Test/RESET button:  
Enables testing of all important device components and functions, plus resetting of the device after a trip when manual RESET is selected.
- (8) Connecting terminals (removable terminal block):  
The generously sized terminals permit connection of two conductors with different cross-sections for the auxiliary, control and sensor circuits. Connection is possible with screw connection and alternatively with spring-type connection.
- (9) 3RB29 85 function expansion module:  
Enables more functions to be added, e.g. internal ground fault detection and/or an analog output with corresponding signals.



3RB29 06 current measuring module

The modular, solid-state overload relays with external power supply type 3RB22 (with monostable auxiliary contacts) and type 3RB23 (with bistable auxiliary contacts) up to 630 A (up to 820 A possible with a series transformer) have been designed for inverse-time delayed protection of loads with normal and heavy starting (see LV 1 T, Function) against excessive temperature rises due to overload, phase unbalance or phase failure. An overload, phase unbalance or phase failure result in an increase of the motor current beyond the set motor rated current. This current rise is detected by means of a current measuring module and electronically evaluated by a special evaluation module which is connected to it. The evaluation electronics sends a signal to the auxiliary contacts. The auxiliary contacts then switch off the load by means of a contactor. The break time depends on the ratio between the tripping current and set current  $I_e$  and is stored in the form of a long-term stable tripping characteristic (see LV 1 T, Characteristic Curves). The "tripped" status is signaled by means of a continuous red "OVERLOAD" LED.

The LED indicates imminent tripping of the relay due to overload, phase unbalance or phase failure by flickering when the limit current has been violated. This warning can also be issued as a signal through auxiliary contacts.

In addition to the described inverse-time delayed protection of loads against excessive temperature rises, the 3RB22/3RB23 solid-state overload relays also allow direct temperature monitoring of the motor windings (full motor protection) by connection with short-circuit and open-circuit detection of a PTC sensor circuit. With this temperature-dependent protection, the loads can be protected against overheating caused indirectly by reduced coolant flow, for example, which cannot be detected by means of the current alone. In the event of overheating, the devices switch off the contactor, and thus the load, by means of the auxiliary contacts. The "tripped" status is signaled by means of a continuously illuminated "THERMISTOR" LED.

To also protect the loads against high-resistance short-circuits due to damage to the insulation, humidity, condensed water, etc., the 3RB22/3RB23 solid-state overload relays offer the possibility of internal ground fault monitoring in conjunction with a function expansion module (for details see Selection and Ordering Data, not possible in conjunction with contactor assembly for Wye-Delta starting). In the event of a ground fault the 3RB22/3RB23 relays trip instantaneously. The "tripped" status is signaled by means of a continuous red "GND Fault" LED. Signaling through auxiliary contacts is also possible.

After tripping due to overload, phase unbalance, phase failure, thermistor tripping or ground fault, the relay is reset manually or automatically after the recovery time has elapsed (see, LV 1 T Function).

In conjunction with a function expansion module the motor current measured by the microprocessor can be output in the form of an analog signal 4 ... 20 mA DC for operating rotary coil instruments or for feeding into analog inputs of programmable logic controllers. With an additional AS-Interface analog module the current values can also be transferred over the AS-i bus system.

The devices are manufactured in accordance with environmental guidelines and contain environmentally friendly and reusable materials.

They comply with all important worldwide standards and approvals.

# Overload Relays

## 3RB2 Solid-State Overload Relays

### 3RB22, 3RB23 for high-feature applications

#### Benefits

The most important features and benefits of the 3RB22/3RB23 solid-state overload relays are listed in the overview table (see [Overload Relays, General Data](#)).

#### Application

##### Industries

The 3RB22/3RB23 solid-state overload relays are suitable for customers from all industries who want to guarantee optimum inverse-time delayed and temperature-dependent protection of their electrical loads (e.g. motors) under normal and heavy starting conditions (CLASS 5 to CLASS 30), minimize project completion times, inventories and power consumption, and optimize plant availability and maintenance management.

##### Application

The 3RB22/3RB23 solid-state overload relays have been designed for the protection of three-phase asynchronous and single-phase AC motors.

If single-phase AC motors are to be protected by the 3RB22/3RB23 solid-state overload relays, the main current paths of the current measuring modules must be series-connected (see [LV 1 T, Schematics](#)).

##### Ambient conditions

The devices are insensitive to external influences such as shocks, corrosive environments, ageing and temperature fluctuation.

For the temperature range from  $-25\text{ °C}$  to  $+60\text{ °C}$ , the 3RB22/3RB23 solid-state overload relays compensate the temperature according to IEC 60947-4-1.

Configuration notes for use of the devices below  $-25\text{ °C}$  or above  $+60\text{ °C}$  on request.

#### "Increased safety" type of protection EEx e according to ATEX directive 94/9/EC

The 3RB22 (monostable) solid-state overload relays are suitable for the overload protection of explosion-proof motors with "increased safety" type of protection EEx e. The relays meet the requirements of EN 60079-7 (Electrical apparatus for potentially explosive atmospheres – Increased safety "e").

The basic safety and health requirements of ATEX directive 94/9/EC are fulfilled by compliance with

- EN 60947-1
- EN 60947-4-1
- EN 60947-5-1
- EN 60079-14

EU type test certificate for Group II, Category (2) G/D exists.

#### Accessories

The following accessories are available for the 3RB22/3RB23 solid-state overload relays:

- A sealable cover for the evaluation module
- Box terminal blocks for the current measuring modules size S6 and S10/S12
- Terminal covers for the current measuring modules size S6 and S10/S12
- Push-in lugs for screw mounting the size S00 to S3 current measuring modules

# Overload Relays

## 3RB2 Solid-State Overload Relays

3RB22, 3RB23 for high-feature applications

### Selection and ordering data

Conversion aid 3RB12 → 3RB22/3RB23

Size	Previous type		Replacement type		Evaluation module	Function expansion module	
	Overload relays (complete units)		Current measuring module				
	3RB12	Setting range in A	3RB29	Setting range in A	3RB22/3RB23	3RB29	
S00/S0	3RB12 46-1P□□□	1.25 ... 6.3	3RB29 06-2BG1 <sup>1)</sup>	0.3 ... 3	3RB2□ 83-4AA1	3RB29 85-2□□□	
	3RB12 46-1Q□□□	6.3 ... 25	3RB29 06-2DG1 <sup>1)</sup>	2.4 ... 25			
S2/S3	3RB12 46-1E□□□	25 ... 100	3RB29 06-2JG1 <sup>1)</sup>	10 ... 100			
S6	3RB12 53-1F□□□	50 ... 205	3RB29 56-2TG2 <sup>2)</sup>	20 ... 200			
			3RB29 56-2TH2 <sup>2)</sup>				
S10/S12	3RB12 57-0K□□□	125 ... 500	3RB29 66-2WH2 <sup>2)</sup>	63 ... 630 (820) <sup>3)</sup>			
	3RB12 62-0L□□□	200 ... 820					
110 ... 120 V AC	G				Integrated	Integrated	
220 ... 240 V AC	M				Integrated	Integrated	
24 V DC	B				Integrated	Integrated	
Standard version with ground fault signaling	00				Not available	--	
Standard version with overload warning	10				2	Not required	
Version with internal ground fault detection and ground fault signal	20				2	CB1	
Version with internal ground fault detection and overload warning	30				2	CA1	
Version with analog output	40				2	AA0	
Bistable version with ground fault signaling	01				Not available	--	
Bistable version with overload warning	11				3	Not required	

<sup>1)</sup> Use 3RB29 87-2B connecting cable.

<sup>2)</sup> Use 3RB29 87-2D connecting cable.

<sup>3)</sup> Motor currents up to 820 A can be recorded and evaluated by a current measuring module, e.g. 3RB29 06-2BG1 (0.3 ... 3 A), in combination with a 3UF18 68-3GA00 (820 A / 1 A) series transformer.