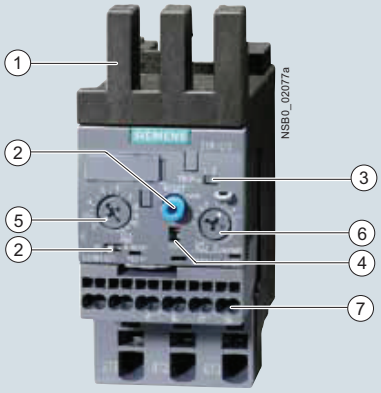
Overview



(1) Connection for mounting onto contactors:
Optimally adapted in electrical, mechanical and design terms to the contactors and soft starters. The overload relay can be connected directly using these connection pins. Stand-alone installation is possible as an alternative (in conjunction with a terminal bracket for stand-alone installation).

(2) Selector switch for manual/automatic RESET and RESET button:
With the slide switch you can choose between manual and automatic RESET. A device set to manual RESET can be reset locally by pressing the RESET button. On the 3RB31 an electrical remote RESET is integrated.

(3) Switch position indicator and TEST function of the wiring:
Indicates a trip and enables the wiring test.

(4) Solid-state test (device test):
Enables a test of all important device components and functions.

(5) Motor current setting:
Setting the device to the rated motor current is easy with the large rotary knob.

(6) Trip class setting/internal ground-fault detection (only 3RB31):
Using the rotary switch you can set the required trip class and activate the internal ground-fault detection dependent on the start-up conditions.

(7) Connecting terminals (removable joint block for auxiliary circuits):
Depending on the device version, the terminals for screw and spring-type connection are configured for the main and auxiliary circuit.

A sealable transparent cover can be optionally mounted (accessory). It secures the motor current setting against adjustment.

SIRIUS 3RB31 23-4VE00 solid-state overload relay

The 3RB30 and 3RB31 solid-state overload relays up to 40 A with internal power supply have been designed for inverse-time delayed protection of loads with normal and heavy starting 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 rated motor current. This current rise is detected by the current transformers integrated into the devices and evaluated by corresponding solid-state circuits which then output a pulse 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 current setting I_e and is stored in the form of a long-term stable tripping characteristic.

In addition to inverse-time delayed protection of loads against excessive temperature rises due to overload, phase unbalance and phase failure, the 3RB31 solid-state overload relays also allow internal ground-fault detection (not possible in conjunction with contactor assemblies for wye-delta starting). This provides protection of loads against high-resistance short-circuits due to damage to the insulation material, moisture, condensed water etc.

The "tripped" status is signaled by means of a switch position indicator. Resetting takes place either manually or automatically after the recovery time has elapsed.

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.

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

The 3RB30/3RB31 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 areas subject to explosion hazards – Increased safety "e").

EC type test certificate for Group II, Category (2) G/D exists. It has the number PTB 09 ATEX 3001.

Order No. scheme

Digit of the Order No.	1st - 3rd	4th	5th	6th	7th		8th	9th	10th	11th
	□□□	□	□	□	–	□	□	□	□	□
Solid-state overload relays	3 R B									
SIRIUS Innovation		3								
Device series			□							
Size, rated operational current and power				□						
Version of the automatic RESET, electrical remote RESET					□					
Trip class (CLASS)							□			
Setting range of the overload release								□		
Connection methods									□	
Installation type										□
Example	3 R B	3	0	1	6	–	1	R	B	0

Note:

The Order No. scheme is presented here merely for information purposes and for better understanding of the logic behind the order numbers.

For your orders, please use the order numbers quote in the catalog in the Selection and ordering data.

SIRIUS 3RB3 Solid-State Overload Relays

3RB30, 3RB31 up to 40 A for standard applications

Application

Industries

The 3RB30/3RB31 solid-state overload relays are suitable for customers from all industries who want to guarantee optimum inverse-time delayed protection of their electrical loads (e.g. motors) under normal and heavy starting conditions (CLASS 5 to 30), minimize project completion times, inventories and power consumption, and optimize plant availability and maintenance management.

Application

The 3RB30/3RB31 solid-state overload relays have been designed for the protection of induction motors in sinusoidal 50/60 Hz voltage networks. The relays are not suitable for the protection of single-phase AC or DC loads.

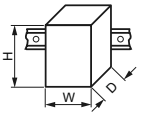
The 3RU21 thermal overload relay or the 3RB22/3RB23 solid-state overload relay can be used for single-phase AC loads. For DC loads we recommend the 3RU21 thermal overload relay.

Ambient conditions

The devices are insensitive to external influences such as shocks, corrosive ambient conditions, ageing and temperature fluctuations.

For the temperature range from –25 °C to +60 °C, the 3RB30/3RB31 solid-state overload relays compensate the temperature in accordance with IEC 60947-4-1.

Technical specifications

Type			**3RB30 1., 3RB31 1.**	**3RB30 2., 3RB31 2.**
Size			S00	S0
Dimensions (W x H x D) (overload relay with stand-alone installation support)		mm	45 x 89 x 80	45 x 97 x 94
• Screw terminals		mm	45 x 102 x 80	45 x 116 x 95
• Spring-type terminals				
General data				
Trips in the event of			Overload, phase failure, and phase unbalance + ground fault (for 3RB31 only)	
Trip class acc. to IEC 60947-4-1		CLASS	3RB30: 10, 20; 3RB31: 5, 10, 20 and 30 adjustable	
Phase failure sensitivity			Yes	
Overload warning			No	
Reset and recovery				
• Reset options after tripping			Manual, automatic and remote RESET (depending on the version)	
• Recovery time				
- For automatic RESET			Approx. 3 min	
- For manual RESET			Immediately	
- For remote RESET			Immediately	
Features				
• Display of operating state on device			Yes, by means of switch position indicator slide	
• TEST function			Yes, test of electronics by pressing the TEST button /test of auxiliary contacts and wiring of control circuit by actuating the switch position indicator slide/self-monitoring	
• RESET button			Yes	
• STOP button			No	
Explosion protection – safe operation of motors with"increased safety" type of protection				
EC type test certificate number acc. to directive 94/9/EC (ATEX)			PTB 09 ATEX 3001 Ex II (2) GD	
Ambient temperatures				
• Storage/transport		°C	-40 ... +80	
• Operation		°C	-25 ... +60	
• Temperature compensation		°C	+60	
• Permissible rated current at				
- Temperature inside control cabinet 60 °C		%	100	100[1]
- Temperature inside control cabinet 70 °C		%	On request	
Repeat terminals				
• Coil repeat terminals			Yes	Not required
• Auxiliary contact repeat terminal			Yes	Not required
Degree of protection acc. to IEC 60529			IP20	
Touch protection acc. to IEC 61140			Finger-safe	
Shock resistance with sine acc. to IEC 60068-2-27		*g*/ms	15/12 (signaling contact 97/98 in position "tripped": 4/11 *g*/ms)	
Electromagnetic compatibility (EMC) – Interference immunity				
• Conductor-related interference				
- Burst acc. to IEC 61000-4-4 (corresponds to degree of severity 3)		kV	2 (power ports), 1 (signal ports)	
- Surge acc. to IEC 61000-4-5 (corresponds to degree of severity 3)		kV	2 (line to earth), 1 (line to line)	
• Electrostatic discharge acc. to IEC 61000-4-2 (corresponds to degree of severity 3)		kV	8 (air discharge), 6 (contact discharge)	
• Field-related interference acc. to IEC 61000-4-3 (corresponds to degree of severity 3)		V/m	10	
Electromagnetic compatibility (EMC) – Emitted interference			Degree of severity B according to EN 55011 (CISPR 11) and EN 55022 (CISPR 22)	
Resistance to extreme climates – air humidity		%	95	
Dimensions			See "Dimensional drawings"	
Installation altitude above sea level		m	Up to 2 000	
Mounting position			Any	
Type of mounting			Direct mounting/stand-alone installation with terminal bracket	

1) Permissible rated current in case of heavy starting
Size S0 at 10 A up to 40 A:
- CLASS 20, $I_{e\,max}$ = 32 A,
- CLASS 30, $I_{e\,max}$ = 25 A.

SIRIUS 3RB3 Solid-State Overload Relays

3RB30, 3RB31 up to 40 A for standard applications

Type		**3RB30 1., 3RB31 1.**	**3RB30 2., 3RB31 2.**
Size		S00	S0
Main circuit			
Rated insulation voltage U_i (pollution degree 3)	V	690	
Rated impulse withstand voltage U_{imp}	kV	6	
Rated operational voltage U_e	V	690	
Type of current			
• Direct current		No	
• Alternating current		Yes, 50/60 Hz ±5 %	
Current setting	A A	0.1 ... 0.4 to 4 ... 16	0.1 ... 0.4 to 10 ... 40
Power loss per unit (max.)	W	0.05 ... 0.2	
Short-circuit protection			
• With fuse without contactor		See "Selection and ordering data"	
• With fuse and contactor		See "Technical specifications" —> "Short-circuit protection with fuses/ Motor Protection Circuit Breakers for motor feeders"	
Protective separation between main and auxiliary conducting path acc. to IEC 60947-1 (pollution degree 2)	V	690 for grounded networks, otherwise 600 V	
Conductor cross-sections of main circuit			
Connection type		**Screw terminals**	
Terminal screw		M3, Pozidriv size 2	M4, Pozidriv size 2
Operating device	mm	ø 5 ... 6	ø 5 ... 6
Prescribed tightening torque	Nm	0.8 ... 1.2	2 ... 2.5
Conductor cross-sections (min./max.), 1 or 2 conductors can be connected			
• Solid	mm^2	2 x (0.5 ... 1.5)[1], 2 x (0.75 ... 2.5)[1], 2 x (0.5 ... 4)[1]	2 x (1 ... 2.5)[1], 2 x (2.5 ... 10)[1]
• Finely stranded with end sleeves	mm^2	2 x (0.5 ... 1.5)[1], 2 x (0.75 ... 2.5)[1]	2 x (1 ... 2.5)[1], 2 x (2.5 ... 6)[1]; max. 1 x 10
• AWG cables, solid or stranded	AWG	2 x (20 ... 16)[1], 2 x (18 ... 14)[1], 2 x 12	2 x (16 ... 12)[1], 2 x (14 ... 8)[1]
Connection type		**Spring-type terminals**	
Operating device	mm	3.0 x 0.5 and 3.5 x 0.5	
Conductor cross-sections (min./max.)			
• Solid	mm^2	1 x (0.5 ... 4)	1 x (1 ... 10)
• Finely stranded without end sleeve	mm^2	1 x (0.5 ... 2.5)	1 x (1 ... 6)
• Finely stranded with end sleeves	mm^2	1 x (0.5 ... 2.5)	1 x (1 ... 6)
• AWG cables, solid or stranded	AWG	1 x (20 ... 12)	1 x (18 ... 8)

1) If two different conductor cross-sections are connected to one clamping point, both cross-sections must lie in the range specified. If identical cross-sections are used, this restriction does not apply.

Type		**3RB30 1., 3RB31 1.**	**3RB30 2., 3RB31 2.**
Size		S00	S0
Auxiliary circuit			
Number of NO contacts		1	
Number of NC contacts		1	
Auxiliary contacts – assignment		1 NO for the signal "tripped"; 1 NC for disconnecting the contactor	
Rated insulation voltage U_i (pollution degree 3)	V	300	
Rated impulse withstand voltage U_{imp}	kV	4	
Auxiliary contacts – contact rating			
• NC contact with alternating current AC-14/AC-15, rated operational current I_e at U_e:			
- 24 V	A	4	
- 120 V	A	4	
- 125 V	A	4	
- 250 V	A	3	
• NO contact with alternating current AC-14/AC-15, rated operational current I_e at U_e:			
- 24 V	A	4	
- 120 V	A	4	
- 125 V	A	4	
- 250 V	A	3	
• NC contact, NO contact with direct current DC-13, rated operational current I_e at U_e:			
- 24 V	A	2	
- 60 V	A	0.55	
- 110 V	A	0.3	
- 125 V	A	0.3	
- 250 V	A	0.11	
• Conventional thermal current I_{th}	A	5	
• Contact reliability (suitability for PLC control; 17 V, 5 mA)		Yes	
Short-circuit protection			
• With fuse, operational class gG	A	6	
Ground-fault protection (only 3RB31)		The information refers to sinusoidal residual currents at 50/60 Hz.	
• Tripping value I_D		> 0.75 × I_{motor}	
• Operating range I		Lower current setting value < I_{motor} < 3.5 × upper set current value	
• Response time t_{trip} (in steady-state condition)	s	< 1	
Integrated electrical remote RESET (only 3RB31)			
Connecting terminals A3, A4		24 V DC, max. 200 mA for approx. 20 ms, then < 10 mA	
Protective separation between auxiliary conducting paths acc. to IEC 60947-1	V	300	
CSA, UL, UR rated data			
Auxiliary circuit – switching capacity		3RB30: B600, R300; 3RB31: B300, R300	
Conductor cross-sections for auxiliary circuit			
Connection type		**Screw terminals**	
Terminal screw		M3, Pozidriv size 2	
Operating device	mm	ø 5 ... 6	
Prescribed tightening torque	Nm	0.8 ... 1.2	
Conductor cross-sections (min./max.), 1 or 2 conductors can be connected			
• Solid	mm²	1 × (0.5 ... 4), 2 × (0.5 ... 2.5)	
• Finely stranded with end sleeve	mm²	1 × (0.5 ... 2.5), 2 × (0.5 ... 1.5)	
• AWG cables, solid or stranded	AWG	2 × (20 ... 14)	
Connection type		**Spring-type terminals**	
Operating device	mm	3.0 x 0.5	
Conductor cross-sections (min./max.), 1 or 2 conductors can be connected			
• Solid	mm²	2 × (0.25 ... 1.5)	
• Finely stranded without end sleeve	mm²	2 × (0.25 ... 1.5)	
• Finely stranded with end sleeve	mm²	2 × (0.25 ... 1.5)	
• AWG cables, solid or stranded	AWG	2 × (24 ... 16)	

SIRIUS 3RB3 Solid-State Overload Relays

3RB30, 3RB31 up to 40 A for standard applications

Selection and ordering data

3RB30 solid-state overload relays for mounting onto contactor[1], CLASS 10

Features and technical specifications:

- Screw and spring-type terminals
- Overload protection, phase failure protection and unbalance protection
- Internal power supply
- Auxiliary contacts 1 NO + 1 NC
- Manual and automatic RESET
- Switch position indicator
- TEST function and self-monitoring
- Sealable covers (optional accessory)

3RB30 16-1TB0

3RB30 16-1TE0

3RB30 26-1VB0

3RB30 26-1VE0

Size contactor[2]	Rating for induction motor Rated value[3]	Current setting of the inverse-time delayed overload release	Short-circuit protection with fuse, type of coordination "2", operational class gG[4]	Screw terminals	Spring-type terminals
				Order No.	Order No.
	kW	A	A		
Size S00[1]					
S00	0.04 ... 0.09	0.1 ... 0.4	4	**3RB30 16-1RB0**	**3RB30 16-1RE0**
	0.12 ... 0.37	0.32 ... 1.25	6	**3RB30 16-1NB0**	**3RB30 16-1NE0**
	0.55 ... 1.5	1 ... 4	20	**3RB30 16-1PB0**	**3RB30 16-1PE0**
	1.1 ... 5.5	3 ... 12	25	**3RB30 16-1SB0**	**3RB30 16-1SE0**
	2.2 ... 7.5	4 ... 16	25	**3RB30 16-1TB0**	**3RB30 16-1TE0**
Size S0[1]					
S0	0.04 ... 0.09	0.1 ... 0.4	4	**3RB30 26-1RB0**	**3RB30 26-1RE0**
	0.12 ... 0.37	0.32 ... 1.25	6	**3RB30 26-1NB0**	**3RB30 26-1NE0**
	0.55 ... 1.5	1 ... 4	20	**3RB30 26-1PB0**	**3RB30 26-1PE0**
	1.1 ... 5.5	3 ... 12	25	**3RB30 26-1SB0**	**3RB30 26-1SE0**
	3 ... 11	6 ... 25	50	**3RB30 26-1QB0**	**3RB30 26-1QE0**
	5.5 ... 18.5	10 ... 40	50	**3RB30 26-1VB0**	**3RB30 26-1VE0**

1) With the suitable terminal brackets, these overload relays can also be installed as stand-alone units.

2) Observe maximum rated operational current of the devices.

3) Guide value for 4-pole standard motors at 50 Hz 400 V AC. The actual starting and rated data of the motor to be protected must be considered when selecting the units.

4) Maximum protection by fuse for overload relay, type of coordination "2".

3RB30 solid-state overload relays for mounting onto contactor[1], CLASS 20

Features and technical specifications:

- Screw and spring-type terminals
- Overload protection, phase failure protection and unbalance protection
- Internal power supply
- Auxiliary contacts 1 NO + 1 NC
- Manual and automatic RESET
- Switch position indicator
- TEST function and self-monitoring
- Sealable covers (optional accessory)

3RB30 16-2TB0

3RB30 16-2TE0

3RB30 26-2VB0

3RB30 26-2VE0

Size contactor[2]	Rating for induction motor Rated value[3]	Current setting of the inverse-time delayed overload release	Short-circuit protection with fuse, type of coordination "2", operational class gG[4]	Screw terminals	Spring-type terminals
				Order No.	Order No.
	kW	A	A		
Size S00[1]					
S00	0.04 ... 0.09	0.1 ... 0.4	4	**3RB30 16-2RB0**	**3RB30 16-2RE0**
	0.12 ... 0.37	0.32 ... 1.25	6	**3RB30 16-2NB0**	**3RB30 16-2NE0**
	0.55 ... 1.5	1 ... 4	20	**3RB30 16-2PB0**	**3RB30 16-2PE0**
	1.1 ... 5.5	3 ... 12	25	**3RB30 16-2SB0**	**3RB30 16-2SE0**
	2.2 ... 7.5	4 ... 16	25	**3RB30 16-2TB0**	**3RB30 16-2TE0**
Size S0[1]					
S0	0.04 ... 0.09	0.1 ... 0.4	4	**3RB30 26-2RB0**	**3RB30 26-2RE0**
	0.12 ... 0.37	0.32 ... 1.25	6	**3RB30 26-2NB0**	**3RB30 26-2NE0**
	0.55 ... 1.5	1 ... 4	20	**3RB30 26-2PB0**	**3RB30 26-2PE0**
	1.1 ... 5.5	3 ... 12	25	**3RB30 26-2SB0**	**3RB30 26-2SE0**
	3 ... 11	6 ... 25	50	**3RB30 26-2QB0**	**3RB30 26-2QE0**
	5.5 ... 18.5	10 ... 40	50	**3RB30 26-2VB0**	**3RB30 26-2VE0**

1) With the suitable terminal brackets, these overload relays can also be installed as stand-alone units.
2) Observe maximum rated operational current of the devices.
3) Guide value for 4-pole standard motors at 50 Hz 400 V AC. The actual starting and rated data of the motor to be protected must be considered when selecting the units.
4) Maximum protection by fuse for overload relay, type of coordination "2".

SIRIUS 3RB3 Solid-State Overload Relays

3RB30, 3RB31 up to 40 A for standard applications

3RB31 solid-state overload relays for mounting onto contactor[1], CLASS 5, 10, 20 and 30 adjustable

Features and technical specifications:

- Screw and spring-type terminals
- Overload protection, phase failure protection and unbalance protection
- Internal ground-fault detection (activatable)
- Internal power supply
- Auxiliary contacts 1 NO + 1 NC
- Manual and automatic RESET
- Electrical remote RESET integrated
- Switch position indicator
- TEST function and self-monitoring
- Sealable covers (optional accessory)

3RB31 13-4TB0

3RB31 13-4TE0

3RB31 23-4VB0

3RB31 23-4VE0

Size contactor[2]	Rating for induction motor Rated value[3]	Current setting of the inverse-time delayed overload release	Short-circuit protection with fuse, type of coordination "2", operational class gG[4]	Screw terminals	Spring-type terminals
				Order No.	Order No.
	kW	A	A		
Size S00[1]					
S00	0.04 ... 0.09	0.1 ... 0.4	4	**3RB31 13-4RB0**	**3RB31 13-4RE0**
	0.12 ... 0.37	0.32 ... 1.25	6	**3RB31 13-4NB0**	**3RB31 13-4NE0**
	0.55 ... 1.5	1 ... 4	20	**3RB31 13-4PB0**	**3RB31 13-4PE0**
	1.1 ... 5.5	3 ... 12	25	**3RB31 13-4SB0**	**3RB31 13-4SE0**
	2.2 ... 7.5	4 ... 16	25	**3RB31 13-4TB0**	**3RB31 13-4TE0**
Size S0[1]					
S0	0.04 ... 0.09	0.1 ... 0.4	4	**3RB31 23-4RB0**	**3RB31 23-4RE0**
	0.12 ... 0.37	0.32 ... 1.25	6	**3RB31 23-4NB0**	**3RB31 23-4NE0**
	0.55 ... 1.5	1 ... 4	20	**3RB31 23-4PB0**	**3RB31 23-4PE0**
	1.1 ... 5.5	3 ... 12	25	**3RB31 23-4SB0**	**3RB31 23-4SE0**
	3 ... 11	6 ... 25	50	**3RB31 23-4QB0**	**3RB31 23-4QE0**
	5.5 ... 18.5	10 ... 40	50	**3RB31 23-4VB0**	**3RB31 23-4VE0**

1) With the suitable terminal brackets, these overload relays can also be installed as stand-alone units.

2) Observe maximum rated operational current of the devices.

3) Guide value for 4-pole standard motors at 50 Hz 400 V AC. The actual starting and rated data of the motor to be protected must be considered when selecting the units.

4) Maximum protection by fuse for overload relay, type of coordination "2".

Overview

Overload relays for standard applications

The following optional accessories are available for the 3RB30/3RB31 solid-state overload relays:

- Terminal bracket for stand-alone installation with screw or spring-type terminals for every size
- Mechanical RESET (for all sizes)
- Cable release for resetting devices which are difficult to access (for all sizes)
- Sealable cover (for all sizes)

Selection and ordering data

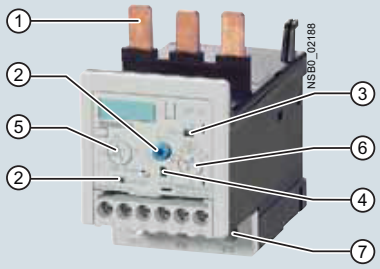
	Version	Size	Order No.
Terminal brackets for stand-alone installation			
 3RU29 16-3AA01	**Terminal brackets for overload relays with screw terminals**		**Screw terminals**
	For separate mounting of the overload relays; screw and snap-on mounting onto TH 35 standard mounting rail	S00 S0	**3RU29 16-3AA01** **3RU29 26-3AA01**
 3RU29 26-3AA01			
 3RU29 16-3AC01	**Terminal brackets for overload relays with spring-type terminals**		**Spring-type terminals**
	For separate mounting of the overload relays; screw and snap-on mounting onto TH 35 standard mounting rail	S00 S0	**3RU29 16-3AC01** **3RU29 26-3AC01**
 3RU29 26-3AC01			
Mechanical RESET			
 3RB39 80-0A with pushbutton and extension plunger	**Resetting plungers, holders and formers**	S00, S0	**3RB39 80-0A**
	Pushbuttons with extended stroke (12 mm), IP65, ø 22 mm	S00, S0	**3SB30 00-0EA11**
	Extension plungers For compensation of the distance between a pushbutton and the unlatching button of the relay	S00, S0	**3SX1 335**
Cable releases with holder for RESET			
 3RB39 80-0.	For ø 6.5 mm holes in the control panel; max. control panel thickness 8 mm		
	• Length 400 mm	S00, S0	**3RB39 80-0B**
	• Length 600 mm	S00, S0	**3RB39 80-0C**
Sealable covers			
 3RB39 84-0	For covering the setting knobs	S00, S0	**3RB39 84-0**

4

SIRIUS 3RB2 Solid-State Overload Relays

3RB20, 3RB21 up to 630 A for standard applications

Overview



(1) Connection for mounting onto contactors:
Optimally adapted in electrical, mechanical and design terms to the contactors and soft starters. These connecting pins can be used for direct mounting of the overload relay to the contactor. Stand-alone installation is possible as an alternative (partly in conjunction with a terminal bracket for stand-alone installation).

(2) Selector switch for manual/automatic RESET and RESET button:
With the slide switch you can choose between manual and automatic RESET. A device set to manual RESET can be reset locally by pressing the RESET button. On the 3RB21 a solid-state remote RESET is integrated.

(3) Switch position indicator and TEST function of the wiring:
Indicates a trip and enables the wiring test.

(4) Solid-state test (device test):
Enables a test of all important device components and functions.

(5) Motor current setting:
Setting the device to the rated motor current is easy with the large rotary knob.

(6) Trip class setting/internal ground-fault detection (only 3RB21):
Using the rotary switch you can set the required trip class and activate the internal ground-fault detection dependent on the start-up conditions.

(7) Connecting terminals (removable terminal block for auxiliary circuits):
The generously sized terminals permit connection of two conductors with different cross-sections for the main and auxiliary circuits. The auxiliary circuit can be connected with screw terminals and alternatively with spring-type terminals.

SIRIUS 3RB21 33-4UB0 solid-state overload relay

The 3RB20 and 3RB21 solid-state overload relays up to 630 A with internal power supply have been designed for inverse-time delayed protection of loads with normal and heavy starting 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 rated motor current. This current rise is detected by the current transformers integrated into the devices and evaluated by corresponding solidstate circuits which then output a pulse 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 current setting I_e and is stored in the form of a long-term stable tripping characteristic.

In addition to inverse-time delayed protection of loads against excessive temperature rises due to overload, phase unbalance and phase failure, the 3RB21 solid-state overload relays also allow internal ground-fault detection (not possible in conjunction with contactor assemblies for wye-delta starting). This provides protection of loads against high-resistance short-circuits due to damage to the insulation material, moisture, condensed water etc.

The "tripped" status is signaled by means of a switch position indicator. Resetting takes place either manually or automatically after the recovery time has elapsed.

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.

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

The 3RB20/3RB21 solid-state overload relays are suitable for the overload protection of explosion-proof motors with "increased safety" type of protection EExe. The relays meet the requirements of EN 60079-7 (Electrical apparatus for areas subject to explosion hazards – Increased safety "e");

EC type test certificate for Group II, Category (2) G/D exists. It has the number PTB 06 ATEX 3001.

Order No. scheme

Digit of the Order No.	1st - 3rd	4th	5th	6th	7th		8th	9th	10th	11th
	□□□	□	□	□	□	–	□	□	□	□
Solid-state overload relays	3 R B									
SIRIUS 2nd generation		2								
Device series			□							
Size, rated operational current and power				□						
Version of the automatic RESET, electrical remote RESET					□					
Trip class (CLASS)							□			
Setting range of the overload release								□		
Connection methods									□	
Installation type										□
Example	3 R B	2	0	3	6	–	1	Q	B	0

Note:

The Order No. scheme is presented here merely for information purposes and for better understanding of the logic behind the order numbers.

For your orders, please use the order numbers quote in the catalog in the Selection and ordering data.

Application

Industries

The 3RB20 and 3RB21 solid-state overload relays are suitable for customers from all industries who want to guarantee optimum inverse-time delayed protection of their electrical loads (e.g. motors) under normal and heavy starting conditions (CLASS 5 to 30), minimize project completion times, inventories and power consumption, and optimize plant availability and maintenance management.

Application

The 3RB20 and 3RB21 solid-state overload relays have been designed for the protection of induction motors in sinusoidal 50/60 Hz voltage networks. The relays are not suitable for the protection of single-phase AC or DC loads.

The 3RU11 thermal overload relays or the 3RB22 to 3RB24 solidstate overload relays can be used for single-phase AC loads. For DC loads we recommend the 3RU11 thermal overload relay.

Ambient conditions

The devices are insensitive to external influences such as shocks, corrosive ambient conditions, ageing and temperature fluctuations.

For the temperature range from –25 °C to +60 °C, the 3RB20 and 3RB21 solid-state overload relays compensate the temperature in accordance with IEC 60947-4-1.

For the 3RB20 and 3RB21 solid-state overload relays with the sizes S6, S10 and S12, the upper set value of the setting range must be reduced for ambient temperatures > 50 °C by a certain factor.

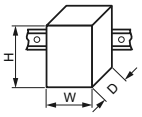
Type	Setting range	Derating factor for the upper set value for **stand-alone installation** at ambient temperature	
		+50 °C	+60 °C
3RB20 56, 3RB21 56	50 ... 200 A	100 %	100 %
3RB20 66, 3RB21 66	55 ... 250 A	100 %	100 %
3RB20 66, 3RB21 66	160 ... 630 A	100 %	90 %

Type	Setting range	Derating factor for the upper set value for **mounting onto contactor** at ambient temperature	
		+50 °C	+60 °C
3RB20 56, 3RB21 56	50 ... 200 A	100 %	70 %
3RB20 66, 3RB21 66	55 ... 250 A	100 %	70 %
3RB20 66, 3RB21 66	160 ... 630 A	100 %	70 %

SIRIUS 3RB2 Solid-State Overload Relays

3RB20, 3RB21 up to 630 A for standard applications

Technical specifications

Type			**3RB20 36, 3RB21 33**	**3RB20 46, 3RB21 43**	**3RB20 56, 3RB21 53**	**3RB20 66, 3RB21 63**
Size			S2	S3	S6	S10/S12
Dimensions (W x H x D) (overload relay with stand-alone installation support)		mm	55 x 74 x 109	70 x 86 x 124	120 x 119 x 155	145 x 147 x 156
General data						
Trips in the event of			Overload, phase failure, and phase unbalance + ground fault (for 3RB21 only)			
Trip class acc. to IEC 60947-4-1		CLASS	3RB20: 10 or 20; 3RB21: 5, 10, 20 and 30 adjustable			
Phase failure sensitivity			Yes			
Overload warning			No			
Reset and recovery						
• Reset options after tripping			3RB20: Manual and automatic RESET; 3RB21: Manual, automatic and remote RESET			
• Recovery time						
- For automatic RESET			Approx. 3 min			
- For manual RESET			Immediately			
- For remote RESET			Immediately			
Features						
• Display of operating state on device			Yes, by means of switch position indicator slide			
• TEST function			Yes, test of electronics by pressing the TEST button / test of auxiliary contacts and wiring of control circuit by actuating the switch position indicator slide/self-monitoring			
• RESET button			Yes			
• STOP button			No			
Explosion protection – Safe operation of motors with "increased safety" type of protection						
EC type test certificate number according to directive 94/9/EC (ATEX)			PTB 06 ATEX 3001 Ex II (2) GD			
Ambient temperatures						
• Storage/transport		°C	-40 ... +80			
• Operation		°C	-25 ... +60			
• Temperature compensation		°C	+60			
• Permissible rated current at						
- Temperature inside control cabinet 60 °C, stand-alone installation		%	100	100	100	100 or 90[1]
- Temperature inside control cabinet 60 °C, mounted on contactor		%	100	100	70	70
- Temperature inside control cabinet 70 °C		%	On request			
Repeat terminals						
• Coil repeat terminals			Yes	Not required		
• Auxiliary contact repeat terminal			Yes	Not required		
Degree of protection acc. to IEC 60529			IP20		IP20 (terminal compartment: IP00 degree of protection)	
Touch protection acc. to IEC 61140			Finger-safe		Finger-safe; for busbar connection with cover	Finger-safe with cover
Shock resistance with sine acc. to IEC 60068-2-27		g/ms	15/11 (signaling contact 97/98 in position "tripped": 4/11 g/ms)			
Electromagnetic compatibility (EMC) – Interference immunity						
• Conductor-related interference						
- Burst acc. to IEC 61000-4-4 (corresponds to degree of severity 3)		kV	2 (power ports), 1 (signal ports)			
- Surge acc. to IEC 61000-4-5 (corresponds to degree of severity 3)		kV	2 (line to earth), 1 (line to line)			
• Electrostatic discharge acc. to IEC 61000-4-2 (corresponds to degree of severity 3)		kV	8 (air discharge), 6 (contact discharge)			
• Field-related interference acc. to IEC 61000-4-3 (corresponds to degree of severity 3)		V/m	10			
Electromagnetic compatibility (EMC) – Emitted interference			Degree of severity B according to EN 55011 (CISPR 11) and EN 55022 (CISPR 22)			
Resistance to extreme climates – air humidity		%	100			
Dimensions			See "Dimensional drawings"			
Installation altitude above sea level		m	Up to 2000			
Mounting position			Any			
Type of mounting			Direct mounting/stand-alone installation with terminal bracket		Direct mounting/stand-alone installation	

1) 90 % for relay with current setting range 160 A to 630 A.

Type		**3RB20 36, 3RB21 33**	**3RB20 46, 3RB21 43**
Size		S2	S3
Main circuit			
Rated insulation voltage U_i (pollution degree 3)	V	690/1000[1]	1000
Rated impulse withstand voltage U_{imp}	kV	6/8[2]	8
Rated operational voltage U_e	V	690/1000[1]	1000
Type of current			
• Direct current		No	
• Alternating current		Yes, 50/60 Hz ±5 %	
Current setting	A	6 ... 25, 12.5 ... 50	12.5 ... 50, 25 ... 100
Power loss per unit (max.)	W	0.05	
Short-circuit protection			
• With fuse without contactor		See "Selection and ordering data"	
• With fuse and contactor		See "Technical specifications" --> "Short-circuit protection with fuses for motor feeders"	
Protective separation between main and auxiliary conducting path Acc. to IEC 60947-1 (pollution degree 2)	V	690 for grounded networks, otherwise 600 V	
Conductor cross-sections of the main circuit			
Connection type		**Screw terminals with box terminal**	
Terminal screw		M6, Pozidriv size 2	M8, 4 mm Allen screw
Operating devices	mm	ø 5 ... 6	4 mm Allen screw
Prescribed tightening torque	Nm	3 ... 4.5	4 ... 6
Conductor cross-sections (min./max.), 1 or 2 conductors can be connected			
• Solid	mm^2	2 × (1 ... 16)	2 × (2.5 ... 16)
• Finely stranded without end sleeve	mm^2	--	--
• Finely stranded with end sleeve	mm^2	2 × (1 ... 16), 1 × (1 ... 25)	2 × (2.5 ... 35), 1 × (2.5 ... 50)
• Stranded	mm^2	2 × (max. 25), 1 × (1 ... 35)	2 × (10 ... 50), 1 × (10 ... 70)
• AWG cables, solid or stranded	AWG	2 × (max. 4), 1 × (18 ... 2)	2 × (10 ... 1/0), 1 × (10 ... 2/0)
• Ribbon cables (number x width x thickness)	mm	2 × (6 × 9 × 0.8)	2 × (6 × 9 × 0.8)
Connection type		**Busbar connections**	
Terminal screw		--	M6 × 20
Prescribed tightening torque	Nm	--	4 ... 6
Conductor cross-sections (min./max.)			
• Finely stranded with cable lug	mm^2	--	2 × 70
• Stranded with cable lug	mm^2	--	3 × 70
• AWG cable, solid or stranded, with cable lug	AWG	--	2/0
• With connecting bar (max. width)	mm	--	12
Connection type		**Straight-through transformers**	
Diameter of opening	mm	15	18

1) For version with straight-through transformer up to 1 000 V AC.

2) For version with straight-through transformer up to 8 kV.

3RB20, 3RB21 up to 630 A for standard applications

Type		3RB20 56, 3RB21 53	3RB20 66, 3RB21 63
Size		S6	S10/S12
Main circuit			
Rated insulation voltage U_i (pollution degree 3)	V	1000	
Rated impulse withstand voltage U_{imp}	kV	8	
Rated operational voltage U_e	V	1000	
Type of current			
• Direct current		No	
• Alternating current		Yes, 50/60 Hz ±5 %	
Current setting	A	50 ... 200	55 ... 250, 160 ... 630
Power loss per unit (max.)	W	0.05	
Short-circuit protection			
• With fuse without contactor		See "Selection and ordering data"	
• With fuse and contactor		See "Technical specifications" --> "Short-circuit protection with fuses for motor feeders"	
Protective separation between main and auxiliary conducting path Acc. to IEC 60947-1 (pollution degree 2)	V	690 for grounded networks, otherwise 600 V	
Conductor cross-sections of the main circuit			
Connection type		**Screw terminals with box terminal**	
Terminal screw	mm	4 mm Allen screw	5 mm Allen screw
Operating devices	mm	4 mm Allen screw	5 mm Allen screw
Prescribed tightening torque	Nm	1 ... 12	20 ... 22
Conductor cross-sections (min./max.), 1 or 2 conductors can be connected			
• Solid	mm^2	--	--
• Finely stranded without end sleeve	mm^2	With 3RT19 55-4G box terminal: 2 × (1 × max. 50, 1 × max. 70), 1 × (10 ... 70)	2 × (50 ... 185), rear clamping point only: 1 × (70 ... 240)
		With 3RT19 56-4G box terminal: 2 × (1 × max. 95, 1 × max. 120), 1 × (10 ... 120)	Rear clamping point only: 1 × (120 ... 185)
• Finely stranded with end sleeve	mm^2	With 3RT19 55-4G box terminal: 2 × (1 × max. 50, 1 × max. 70), 1 × (10 ... 70)	2 × (50 ... 185), rear clamping point only: 1 × (70 ... 240)
		With 3RT19 56-4G box terminal: 2 × (1 × max. 95, 1 × max. 120), 1 × (10 ... 120)	Rear clamping point only: 1 × (120 ... 185)
• Stranded	mm^2	With 3RT19 55-4G box terminal: 2 × (max. 70), 1 × (16 ... 70)	2 × (70 ... 240), rear clamping point only: 1 × (95 ... 300)
		With 3RT19 56-4G box terminal: 2 × (max. 120), 1 × (16 ... 120)	Rear clamping point only: 1 × (120 ... 240)
• AWG cables, solid or stranded	AWG	With 3RT19 55-4G box terminal: 2 × (max. 1/0), 1 × (6 ... 2/0)	2 × (2/0 ... 500 kcmil), rear clamping point only: 1 × (3/0 ... 600 kcmil)
		With 3RT19 56-4G box terminal: 2 × (max. 3/0), 1 × (6 ... 250 kcmil)	Rear clamping point only: 1 × (250 kcmil ... 500 kcmil)
• Ribbon cables (number x width x thickness)	mm	With 3RT19 55-4G box terminal: 2 × (6 × 15.5 × 0.8), 1 × (3 × 9 × 0.8 ... 6 × 15.5 × 0.8)	2 × (20 × 24 × 0.5), 1 × (6 × 9 × 0.8 ... 20 × 24 × 0.5)
		With 3RT19 56-4G box terminal: 2 × (10 × 15.5 × 0.8), 1 × (3 × 9 × 0.8 ... 10 × 15.5 × 0.8)	
Connection type		**Busbar connections**	
Terminal screw		M8 × 25	M10 × 30
Prescribed tightening torque	Nm	10 ... 14	14 ... 24
Conductor cross-section (min./max.)			
• Finely stranded with cable lug	mm^2	16 ... 95[1)]	50 ... 240[2)]
• Stranded with cable lug	mm^2	25 ... 120[1)]	70 ... 240[2)]
• AWG cable, solid or stranded, with cable lug	AWG	4 ... 250 kcmil	2/0 ... 500 kcmil
• With connecting bar (max. width)	mm	15	25
Connection type		**Straight-through transformers**	
Diameter of opening	mm	24.5	--

1) When connecting cable lugs according to DIN 46235 with conductor cross-sections of 95 mm^2 and more, the 3RT19 56-4EA1 terminal cover must be used to ensure phase spacing.

2) When connecting cable lugs according to DIN 46234 with conductor cross-sections of 240 mm^2 and more as well as to DIN 46235 with conductor cross-sections of 185 mm^2 and more, the 3RT19 56-4EA1 terminal cover must be used for to keep the phase clearance.

Type		3RB20 36, 3RB21 33	3RB20 46, 3RB21 43	3RB20 56, 3RB21 53	3RB20 66, 3RB21 63
Size		S2	S3	S6	S10/S12
Auxiliary circuit					
Number of NO contacts		1			
Number of NC contacts		1			
Auxiliary contacts – assignment		1 NO for the signal "tripped"; 1 NC for disconnecting the contactor			
Rated insulation voltage U_i (pollution degree 3)	V	300			
Rated impulse withstand voltage U_{imp}	kV	4			
Auxiliary contacts – contact rating					
• NC contact with alternating current AC-14/AC-15, rated operational current I_e at U_e:					
- 24 V	A	4			
- 120 V	A	4			
- 125 V	A	4			
- 250 V	A	3			
• NO contact with alternating current AC-14/AC-15, rated operational current I_e at U_e:					
- 24 V	A	4			
- 120 V	A	4			
- 125 V	A	4			
- 250 V	A	3			
• NC contact, NO contact with direct current DC-13, rated operational current I_e at U_e:					
- 24 V	A	2			
- 60 V	A	0.55			
- 110 V	A	0.3			
- 125 V	A	0.3			
- 250 V	A	0.11			
• Conventional thermal current I_{th}	A	5			
• Contact reliability (suitability for PLC control; 17 V, 5 mA)		Yes			
Short-circuit protection					
• With fuse, operational class gG	A	6			
Ground-fault protection (only 3RB21)		The information refers to sinusoidal residual currents at 50/60 Hz.			
• Tripping value I_Δ		> 0.75 × I_{motor}			
• Operating range I		Lower current setting value < I_{motor} < 3.5 × upper current setting value			
• Response time t_{trip} (in steady-state condition)	s	< 1			
Integrated electrical remote RESET (only 3RB21)					
Connecting terminals A3, A4		24 V DC, 100 mA, 2.4 W short-term			
Protective separation between auxiliary conducting paths acc. to IEC 60947-1	V	300			
CSA, UL, UR rated data					
Auxiliary circuit – switching capacity		B300, R300			
Conductor cross-sections of the auxiliary circuit					
Connection type		**Screw terminals**			
Terminal screw		M3, Pozidriv size 2			
Operating devices	mm	ø 5 ... 6			
Prescribed tightening torque	Nm	0.8 ... 1.2			
Conductor cross-sections (min./max.), 1 or 2 conductors can be connected					
• Solid	mm^2	1 × (0.5 ... 4), 2 × (0.5 ... 2.5)			
• Finely stranded without end sleeve	mm^2	--			
• Finely stranded with end sleeve	mm^2	1 × (0.5 ... 2.5), 2 × (0.5 ... 1.5)			
• Stranded	mm^2	--			
• AWG cables, solid or stranded	AWG	2 × (20 ... 14)			
Connection type		**Spring-type terminals**			
Operating devices	mm	3.0 x 0.5			
Conductor cross-sections (min./max.), 1 or 2 conductors can be connected					
• Solid	mm^2	2 × (0.25 ... 1.5)			
• Finely stranded without end sleeve	mm^2	--			
• Finely stranded with end sleeve	mm^2	2 × (0.25 ... 1.5)			
• Stranded	mm^2	2 × (0.25 ... 1.5)			
• AWG cables, solid or stranded	AWG	2 × (24 ... 16)			

SIRIUS 3RB2 Solid-State Overload Relays

3RB20, 3RB21 up to 630 A for standard applications

Selection and ordering data

3RB20 solid-state overload relays for mounting onto contactor[1)2)] and stand-alone installation[2)3)], CLASS 10

Features and technical specifications:

- Overload protection, phase failure protection and unbalance protection
- Internal power supply
- Auxiliary contacts 1 NO + 1 NC
- Manual and automatic RESET
- Switch position indicator
- TEST function and self-monitoring

3RB20 36-1UB0

3RB20 56-1FW2

Size contactor[4)]	Rating for induction motor Rated value[5)]	Current setting of the inverse-time delayed overload release	Short-circuit protection with fuse, type of coordination "2", operational class gG[6)]	**Screw terminals** (on auxiliary current side) Order No.
	kW	A	A	
Size S2[1)3)7)]				
S2	3 ... 11	6 ... 25	63	**3RB20 36-1QB0**
				3RB20 36-1QW1
	7.5 ... 22	12.5 ... 50	80	**3RB20 36-1UB0**
				3RB20 36-1UW1
Size S3[1)3)7)]				
S3	7.5 ... 22	12.5 ... 50	160	**3RB20 46-1UB0**
	11 ... 45	25 ... 100	315	**3RB20 46-1EB0**
				3RB20 46-1EW1
Size S6[2)7)]				
S6 with busbar connections	22 ... 90	50 ... 200	315	**3RB20 56-1FC2**
S6 with box terminals				**3RB20 56-1FW2**
Size S10/S12[2)]				
S10/S12 and size 14 (3TF68/3TF69)	22 ... 110	55 ... 250	400	**3RB20 66-1GC2**
	90 ... 450	160 ... 630	800	**3RB20 66-1MC2**

1) The relays with an Order No. ending with **"0"** are designed for mounting onto contactor.
2) The relays with an Order No. ending with **"2"** are designed for mounting onto contactor and stand-alone installation. For 3TF68/3TF69 contactors, direct mounting is not possible.
3) The relays with an Order No. ending with **"1"** are designed for stand-alone installation.
4) Observe maximum rated operational current of the devices.
5) Guide value for 4-pole standard motors at 50 Hz 400 V AC. The actual starting and rated data of the motor to be protected must be considered when selecting the units.
6) Maximum protection by fuse for overload relay, type of coordination "2". For fuse values in connection with contactors see "Technical specifications" --> "Short-circuit protection with fuses for motor feeders".
7) The relays with an Order No. with **"W"** or **"X"** in penultimate position are equipped with a straight-through transformer.

3RB20 solid-state overload relays for mounting onto contactor[1)2)] and stand-alone installation[2)3)], CLASS 20

Features and technical specifications:

- Overload protection, phase failure protection and unbalance protection
- Internal power supply
- Auxiliary contacts 1 NO + 1 NC
- Manual and automatic RESET
- Switch position indicator
- TEST function and self-monitoring

3RB20 36-2UB0

3RB20 56-2FW2

Size of contactor[4)]	Rating for induction motor Rated value[5)]	Current setting of the inverse-time delayed overload release	Short-circuit protection with fuse, type of coordination "2", operational class gG[6)]	**Screw terminals** (on auxiliary current side) Order No.
	kW	A	A	
Size S2[1)3)7)]				
S2	3 ... 11	6 ... 25	63	**3RB20 36-2QB0**
				3RB20 36-2QW1
	7.5 ... 22	12.5 ... 50	80	**3RB20 36-2UB0**
				3RB20 36-2UW1
Size S3[1)3)7)]				
S3	7.5 ... 22	12.5 ... 50	160	**3RB20 46-2UB0**
	11 ... 45	25 ... 100	315	**3RB20 46-2EB0**
				3RB20 46-2EW1
Size S6[2)7)]				
S6 with busbar connections	22 ... 90	50 ... 200	315	**3RB20 56-2FC2**
S6 with box terminals				**3RB20 56-2FW2**
Size S10/S12[2)]				
S10/S12 and size 14 (3TF68/3TF69)	22 ... 110	55 ... 250	400	**3RB20 66-2GC2**
	90 ... 450	160 ... 630	800	**3RB20 66-2MC2**

1) The relays with an Order No. ending with **"0"** are designed for mounting onto contactor.
2) The relays with an Order No. ending with **"2"** are designed for mounting onto contactor and stand-alone installation. For 3TF68/3TF69 contactors, direct mounting is not possible.
3) The relays with an Order No. ending with **"1"** are designed for stand-alone installation.
4) Observe maximum rated operational current of the devices.
5) Guide value for 4-pole standard motors at 50 Hz 400 V AC. The actual starting and rated data of the motor to be protected must be considered when selecting the units.
6) Maximum protection by fuse for overload relay, type of coordination "2". For fuse values in connection with contactors see "Technical specifications" --> "Short-circuit protection with fuses for motor feeders".
7) The relays with an Order No. with **"W"** or **"X"** in penultimate position are equipped with a straight-through transformer.

SIRIUS 3RB2 Solid-State Overload Relays

3RB20, 3RB21 up to 630 A for standard applications

3RB21 solid-state overload relays for mounting onto contactor[1)2)] and stand-alone installation[2)3)], CLASS 5, 10, 20 and 30 adjustable

Features and technical specifications:

- Overload protection, phase failure protection and unbalance protection
- Internal ground-fault detection (activatable)
- Internal power supply
- Auxiliary contacts 1 NO + 1 NC
- Manual and automatic RESET
- Electrical remote RESET integrated
- Switch position indicator
- TEST function and self-monitoring

3RB21 33-4UB0

3RB21 53-4FX2

Size of contactor[4)]	Rating for induction motor Rated value[5)]	Current setting of the inverse-time delayed overload release	Short-circuit protection with fuse, type of coordination "2", operational class gG[6)]	**Screw terminals** (on auxiliary current side) Order No.
	kW	A	A	
Size S2[1)3)7)]				
S2	3 ... 11	6 ... 25	63	**3RB21 33-4QB0**
				3RB21 33-4QW1
	7.5 ... 22	12.5 ... 50	80	**3RB21 33-4UB0**
				3RB21 33-4UW1
Size S3[1)3)7)]				
S3	7.5 ... 22	12.5 ... 50	160	**3RB21 43-4UB0**
	11 ... 45	25 ... 100	315	**3RB21 43-4EB0**
				3RB21 43-4EW1
Size S6[2)7)]				
S6 with busbar connection	22 ... 90	50 ... 200	315	**3RB21 53-4FC2**
S6 with box terminals				**3RB21 53-4FW2**
Size S10/S12[2)]				
S10/S12 and size 14 (3TF68/3TF69)	22 ... 110	55 ... 250	400	**3RB21 63-4GC2**
	90 ... 450	160 ... 630	800	**3RB21 63-4MC2**

1) The relays with an Order No. ending with **"0"** are designed for mounting onto contactor.
2) The relays with an Order No. ending with **"2"** are designed for mounting onto contactor and stand-alone installation. For 3TF68/3TF69 contactors, direct mounting is not possible.
3) The relays with an Order No. ending with **"1"** are designed for stand-alone installation.
4) Observe maximum rated operational current of the devices.
5) Guide value for 4-pole standard motors at 50 Hz 400 V AC. The actual starting and rated data of the motor to be protected must be considered when selecting the units.
6) Maximum protection by fuse for overload relay, type of coordination "2". For fuse values in connection with contactors see "Technical specifications" --> "Short-circuit protection with fuses for motor feeders".
7) The relays with an Order No. with **"W"** or **"X"** in penultimate position are equipped with a straight-through transformer.

Overview

Overload relays for standard applications

The following optional accessories are available for the 3RB20 and 3RB21 solid-state overload relays:

- Mechanical RESET (for all sizes)
- Cable release for resetting devices which are difficult to access (for all sizes)
- Sealable cover (for all sizes)
- Terminal covers for sizes S2 to S10/S12
- Box terminal blocks for sizes S6 and S10/S12

Selection and ordering data

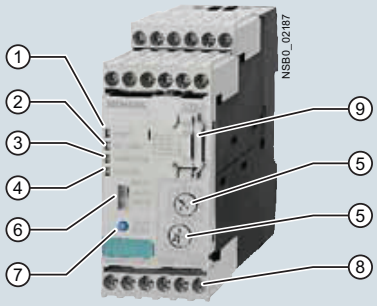
	Version	Size	Order No.
Mechanical RESET			
 3RU19 00-1A with pushbutton and extension plunger	**Resetting plungers, holders and formers**	S2 ... S10/S12	**3RU19 00-1A**
	Pushbuttons with extended stroke (12 mm), IP65, ø 22 mm	S2 ... S10/S12	**3SB30 00-0EA11**
	Extension plungers For compensation of the distance between a pushbutton and the unlatching button of the relay	S2 ... S10/S12	**3SX1 335**
Cable releases with holder for RESET			
 3RU19 00-1.	For ø 6.5 mm holes in the control panel; max. control panel thickness 8 mm	S2 ... S10/S12	
	• Length 400 mm		**3RU19 00-1B**
	• Length 600 mm		**3RU19 00-1C**
Sealable covers			
 3RB29 86-0	For covering the setting knobs	S2 ... S10/S12	**3RB29 84-0**
Terminal covers			
 3RT19 46-4EA1	**Covers for cable lugs and busbar connections**		
	• Length 55 mm[1]	S3	**3RT19 46-4EA1**
	• Length 100 mm	S6	**3RT19 56-4EA1**
	• Length 120 mm	S10/S12	**3RT19 66-4EA1**
 3RT19 36-4EA2 The figures show mounting on the contactor.	**Covers for box terminals**		
	• Length 20.6 mm[1]	S2	**3RT19 36-4EA2**
	• Length 20.8 mm[1]	S3	**3RT19 46-4EA2**
	• Length 25 mm	S6	**3RT19 56-4EA2**
	• Length 30 mm	S10/S12	**3RT19 66-4EA2**
	Covers for screw terminals between contactor and overload relay, without box terminals (1 unit required per combination)	S6	**3RT19 56-4EA3**
		S10/S12	**3RT19 66-4EA3**
Box terminal blocks			
 3RT19 5.-4G	For round and ribbon cables		
	• Up to 70 mm²	S6[2]	**3RT19 55-4G**
	• Up to 120 mm²	S6	**3RT19 56-4G**
	• Up to 240 mm²	S10/S12	**3RT19 66-4G**
	For technical specifications for conductor cross-sections see note on Technical Information on page 4/1.		

1) In the scope of supply for 3RT10 54-1 contactors (55 kW).

SIRIUS 3RB2 Solid-State Overload Relays

3RB22, 3RB23, 3RB24 up to 630 A for High-Feature applications

Overview



1 3RB22, 3RB23
Green LED "READY": A continuous green light signals that the device is working correctly.

3RB24
Green LED "DEVICE/IO-Link": A continuous green light signals that the device is working correctly, a green flickering light signals the communication through IO-Link.

2 Red LED "GND FAULT":
A continuous red light signals an active ground-fault trip.

3 Red LED "THERMISTOR":
A continuous red light signals an active thermistor trip.

4 Red LED "OVERLOAD":
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 setting:
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 3RB22, 3RB23
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.

3RB24
Plug-in point for operator panel:
enables connection of the 3RA69 35-0A operator panel.

SIRIUS 3RB22 to 3RB24 evaluation modules

SIRIUS 3RB29 06 current measuring module

The 3RB22 to 3RB24 solid-state overload relays up to 630 A (up to 820 A possible in combination with a series transformer) are from a modular system. The 3RB22 overload relays (with monostable auxiliary contacts) and the 3RB23 overload relays (with bistable auxiliary contacts) are supplied from an external voltage, the 3RB24 overload relays (with monostable auxiliary contacts) are supplied through IO-Link.

These devices have been designed for inverse-time delayed protection of loads with normal starting and heavy starting against excessive temperature rises due to overload or phase failure. An overload, phase unbalance or phase failure result in an increase of the motor current beyond the set rated motor current. Depending on the configuration in IO-Link, the 3RB24 overload relays can also be used as direct-on-line or reversing starters (wye-delta starting also possible).

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 current setting I_e and is stored in the form of a long-term stable tripping characteristic. 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. In the case of the 3RB22 and 3RB23 overload relays this warning can also be issued through auxiliary contacts, in the case of the 3RB24 overload relays it can also be issued through IO-Link.

In addition to the described inverse-time delayed protection of loads against excessive temperature rises, the 3RB22 to 3RB24 solid-state overload relays also allow direct temperature monitoring of the motor windings (full motor protection) by connection with broken-wire interlock 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 and 3RB23 solid-state overload relays in conjunction with a function expansion module and the 3RB24 solidstate overload relays offer the possibility of internal ground-fault detection (not possible in conjunction with contactor assembly for wye-delta starting). In the event of a ground fault the 3RB22 to 3RB24 relays trip instantaneously.

In the case of the 3RB22 and 3RB23 overload relays the "tripped" status can also be signaled through auxiliary contacts, in the case of the 3RB24 overload relays it can also be signaled through IO-Link.

After tripping due to overload, phase unbalance, phase failure, thermistor or ground-fault tripping, the relay is reset manually or automatically after the recovery time has elapsed. In the case of the 3RB22 and 3RB23 evaluation modules in conjunction with a corresponding function expansion module, the motor current measured by the microprocessor can be output in the form of an analog signal DC 4 mA to 20 mA 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 of the 3RB22 and 3RB23 overload relays can also be transferred over the AS-i bus system. In the case of the 3RB24 overload relays the current values are transmitted to the higher-level control system directly through IO-Link.

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.

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

The 3RB22 and 3RB24 (monostable) solid-state overload relays are suitable for the overload protection of explosion-proof motors with "increased safety" type of protection EExe.

The relays meet the requirements of EN 60079-7 (Electrical apparatus for areas subject to explosion hazards – Increased safety "e").

3RB22

EC prototype test certificate for Group II, Category (2) G/D exists. It has the number PTB 05 ATEX 3022.

3RB24

EC prototype test certificate for Group II, Category (2) G/D has been submitted. On request.

Order No. scheme

Digit of the Order No.	1st - 3rd	4th	5th	6th	7th		8th	9th	10th	11th
	□□□	□	□	□	□	–	□	□	□	□
Solid-state overload relays	3 R B									
Innovations		2								
Device series			□							
Size, rated operational current and power				□						
Version of the automatic RESET, electrical remote RESET					□					
Trip class (CLASS)							□			
Setting range of the overload release								□		
Connection methods									□	
Installation type										□
Example	3 R B	2	2	8	3	–	4	A	A	1

Note:

The Order No. scheme is presented here merely for information purposes and for better understanding of the logic behind the order numbers.

For your orders, please use the order numbers quote in the catalog in the Selection and ordering data.

Application

Industries

The 3RB22 to 3RB24 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 30), minimize project completion times, inventories and power consumption, and optimize plant availability and maintenance management.

Application

The 3RB22 to 3RB24 solid-state overload relays have been designed for the protection of three-phase asynchronous and single-phase AC motors.

In addition the 3RB24 overload relays can be used as direct-online or reversing starters (wye-delta starting also possible) which are controlled through IO-Link. It is thus possible to control operating mechanisms directly through IO-Link from a higher-level control system and also to signal e.g. current values directly through IO-Link.

If single-phase AC motors are to be protected by the 3RB22 to 3RB24 solid-state overload relays, the main current paths of the current measuring modules must be series-connected.

Ambient conditions

The devices are insensitive to external influences such as shocks, corrosive ambient conditions, ageing and temperature fluctuations.

For the temperature range from –25 °C to +60 °C, the 3RB22 to 3RB24 solid-state overload relays compensate the temperature in accordance with IEC 60947-4-1.

Configuration notes for use of the devices below –25 °C or above +60 °C on request.

SIRIUS 3RB2 Solid-State Overload Relays

3RB22, 3RB23, 3RB24 up to 630 A for High-Feature applications

Technical specifications

Type – Overload relay: complete system Size of contactor		3RB22, 3RB23, 3RB24 S00 ... S10/S12
General data		
Trips in the event of		Overload, phase failure and phase unbalance (> 40 % according to NEMA), + ground fault (with corresponding function expansion module) and activation of the thermistor motor protection (with closed PTC sensor circuit)
Trip class acc. to IEC 60947-4-1	CLASS	5, 10, 20 and 30 adjustable
Phase failure sensitivity		Yes
Overload warning		Yes, from 1.125 x I_e for symmetrical loads and from 0.85 x I_e for unsymmetrical loads
Reset and recovery		
• Reset options after tripping		Manual, automatic and remote RESET
• Recovery time		
- For automatic RESET	min	- For tripping due to overcurrent: 3 (stored permanently) - For tripping by thermistor: time until the motor temperature has fallen 5 K below the response temperature - For tripping due to a ground fault: no automatic RESET
- For manual RESET	min	- For tripping due to overcurrent: 3 (stored permanently) - For tripping by thermistor: time until the motor temperature has fallen 5 K below the response temperature - For tripping due to a ground fault: Immediately
- For remote RESET	min	- For tripping due to overcurrent: 3 (stored permanently) - For tripping by thermistor: time until the motor temperature has fallen 5 K below the response temperature - For tripping due to a ground fault: Immediately
Features		
• Display of operating state on device		Yes, with 4 LEDs - Green LED: "Ready" (3RB22, 3RB23), "DEVICE/IO-Link" (3RB24) - Red "Ground Fault" LED - Red "Thermistor" LED - Red "Overload" LED
• TEST function		Yes, test of LEDs, electronics, auxiliary contacts and wiring of control circuit by pressing the button TEST/RESET / self-monitoring
• RESET button		Yes, with the TEST/RESET button
• STOP button		No
Explosion protection – Safe operation of motors with "increased safety" type of protection EC type test certificate number according to directive 94/9/EC (ATEX)		3RB22: PTB 05 ATEX 3022 Ex II (2) GD 3RB23: -- 3RB24: On request
Ambient temperatures		
• Storage/transport	°C	-40 ... +80
• Operation	°C	-25 ... +60
• Temperature compensation	°C	+60
• Permissible rated current		
- Temperature inside control cabinet 60 °C	%	100
- Temperature inside control cabinet 70 °C	%	On request
Repeat terminals		
• Coil repeat terminals		Not required
• Auxiliary contact repeat terminal		Not required
Degree of protection acc. to IEC 60529		IP20 for the current measuring module sizes S6 and S10/S12 with busbar connection in conjunction with cover
Touch protection acc. to IEC 61140		The current measuring module sizes S6 and S10/S12 with busbar connection in conjunction with cover are finger-safe.
Shock resistance with sine acc. to IEC 60068-2-27	g/ms	15/11
Electromagnetic compatibility (EMC) – Interference immunity		
• Conductor-related interference		
- Burst acc. to IEC 61000-4-4 (corresponds to degree of severity 3)	kV	2 (power ports), 1 (signal ports)
- Surge acc. to IEC 61000-4-5 (corresponds to degree of severity 3)	kV	2 (line to earth), 1 (line to line)
• Electrostatic discharge acc. to IEC 61000-4-2 (corresponds to degree of severity 3)	kV	8 (air discharge), 6 (contact discharge)
• Field-related interference acc. to IEC 61000-4-3 (corresponds to degree of severity 3)	V/m	10
Electromagnetic compatibility (EMC) – Emitted interference		Degree of severity A acc. to EN 55011 (CISPR 11) and EN 55022 (CISPR 22)
Resistance to extreme climates – air humidity	%	100
Dimensions		See "Dimensional drawings"
Installation altitude above sea level	m	Up to 2000
Mounting position		Any
Type of mounting		
• Evaluation modules		Stand-alone installation
• Current measuring module	Size	S00 to S3: Stand-alone installation, S6 and S10/S12: stand-alone installation or mounting onto contactors

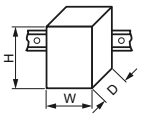
Type – Overload relay: current measuring modules		**3RB29 06**	**3RB29 06**	**3RB29 56**	**3RB29 66**
Size of contactor		S00/S0	S2/S3	S6	S10/S12
Dimensions of current measuring modules (W x H x D)	mm	45 x 84 x 45	55 x 94 x 72	120 x 119 x 145	145 x 147 x 148
Main circuit					
Rated insulation voltage *Ui* (pollution degree 3)	V	1000			
Rated impulse withstand voltage *Uimp*	kV	6		8	
Rated operational voltage *Ue*	V	1000			
Type of current					
• Direct current		No			
• Alternating current		Yes, 50/60 Hz ±5 %			
Current setting	A	0.3 ... 3; 2.4 ... 25	10 ... 100	20 ... 200	63 ... 630
Power loss per unit (max.)	W	0.5			
Short-circuit protection					
• With fuse without contactor		See "Selection and ordering data"			
• With fuse and contactor		See "Technical specifications" --> "Short-circuit protection with fuses for motor feeders",			
Protective separation between main and auxiliary conducting path acc. to IEC 60947-1 (pollution degree 2)	V	690 for grounded networks, otherwise 600 V			
Conductor cross-sections of the main circuit					
Connection type		**Screw terminals with box terminal**			
Terminal screw		--		4 mm Allen screw	5 mm Allen screw
Operating devices	mm	--		4 mm Allen screw	5 mm Allen screw
Prescribed tightening torque	Nm	--		10 ... 12	20 ... 22
Cond. cross-sections (min./max.), 1 or 2 cond. can be connected					
• Solid	mm^2	--		--	--
• Finely stranded without end sleeve	mm^2	--		With 3RT19 55-4G box terminal: 2 × (1 × max. 50, 1 × max. 70), 1 × (10 ... 70)	2 × (50 ... 185), rear clamping point only: 1 × (70 ... 240)
				With 3RT19 56-4G box terminal: 2 × (1 × max. 95, 1 × max. 120), 1 × (10 ... 120)	Rear clamping point only: 1 × (120 ... 185)
• Finely stranded with end sleeve	mm^2	--		With 3RT19 55-4G box terminal: 2 × (1 × max. 50, 1 × max. 70), 1 × (10 ... 70)	2 × (50 ... 185), rear clamping point only: 1 × (70 ... 240)
				With 3RT19 56-4G box terminal: 2 × (1 × max. 95, 1 × max. 120), 1 × (10 ... 120)	Rear clamping point only: 1 × (120 ... 185)
• Stranded	mm^2	--		With 3RT19 55-4G box terminal: 2 × (max. 70), 1 × (16 ... 70)	2 × (70 ... 240), rear clamping point only: 1 × (95 ... 300)
				With 3RT19 56-4G box terminal: 2 × (max. 120), 1 × (16 ... 120)	Rear clamping point only: 1 × (120 ... 240)
• AWG cables, solid or stranded	AWG	--		With 3RT19 55-4G box terminal: 2 × (max. 1/0), 1 × (6 ... 2/0)	2 × (2/0 ... 500 kcmil), rear clamping point only: 1 × (3/0 ... 600 kcmil)
				With 3RT19 56-4G box terminal: 2 × (max. 3/0), 1 × (6 ... 250 kcmil)	Rear clamping point only: 1 × (250 kcmil ... 500 kcmil)
• Ribbon cables (number x width x thickness)	mm	--		With 3RT19 55-4G box terminal: 2 × (6 × 15.5 × 0.8), 1 × (3 × 9 × 0.8 ... 6 × 15.5 × 0.8)	2 × (20 × 24 × 0.5), 1 × (6 × 9 × 0.8 ... 20 × 24 × 0.5)
				With 3RT19 56-4G box terminal: 2 × (10 × 15.5 × 0.8), 1 × (3 × 9 × 0.8 ... 10 × 15.5 × 0.8)	
Connection type		**Busbar connections**			
Terminal screw		--		M8 × 25	M10 x 30
Prescribed tightening torque	Nm	--		10 ... 14	14 ... 24
Cond. cross-sections (min./max.), 1 or 2 cond. can be connected					
• Solid with cable lug	mm^2	--		16 ... 95[1]	50 ... 240[2]
• Stranded with cable lug	mm^2	--		25 ... 120[1]	70 ... 240[2]
• AWG cable, solid or stranded, with cable lug	AWG	--		4 ... 250 kcmil	2/0 ... 500 kcmil
• With connecting bar (max. width)	mm	--		17	25
Connection type		**Straight-through transformers**			
Diameter of opening	mm	7.5	14	25	--

1) When connecting cable lugs according to DIN 46235 with conductor cross-sections of 95 mm^2 and more, the 3RT19 56-4EA1 terminal cover must be used to ensure phase spacing.

2) When connecting cable lugs according to DIN 46234 with conductor cross-sections of 240 mm^2 and more as well as to DIN 46235 with conductor cross-sections of 185 mm^2 and more, the 3RT19 56-4EA1 terminal cover must be used for to keep the phase clearance.

SIRIUS 3RB2 Solid-State Overload Relays

3RB22, 3RB23, 3RB24 up to 630 A for High-Feature applications

Type – Overload relay: evaluation modules			**3RB22 83, 3RB23 83**	**3RB24 83**
Size of contactor			S00 ... S10/S12	
Dimensions of evaluation modules (W x H x D)		mm	45 x 111 x 95	
Auxiliary circuit				
Number of NO contacts			2	--
Number of NC contacts			2	--
Number of CO contacts			--	1
Auxiliary contacts – assignment			• Alternative 1 - 1 NO for the signal "tripped by overload and/or thermistor" - 1 NC for disconnecting the contactor - 1 NO for the signal "tripped by ground fault" - 1 NC for disconnecting the contactor or[1)] • Alternative 2 - 1 NO for the signal "tripped by overload and/or thermistor and/or ground fault" - 1 NC for disconnecting the contactor - 1 NO for overload warning - 1 NC for disconnecting the contactor	Changeover contact: direction of rotation left, direction of rotation right
Rated insulation voltage U_i (pollution degree 3)		V	300	
Rated impulse withstand voltage U_{imp}		kV	4	
Auxiliary contacts – contact rating				
• NC contact with alternating current AC-14/AC-15, rated operational current I_e at U_e				
- 24 V		A	6	
- 120 V		A	6	
- 125 V		A	6	
- 250 V		A	3	
• NO contact with alternating current AC-14/AC-15, rated operational current I_e at U_e				
- 24 V		A	6	
- 120 V		A	6	
- 125 V		A	6	
- 250 V		A	3	
• NC contact, NO contact with direct current DC-13, rated operational current I_e at U_e				
- 24 V		A	2	
- 60 V		A	0.55	
- 110 V		A	0.3	
- 125 V		A	0.3	
- 250 V		A	0.2	
• Conventional thermal current I_{th}		A	5	
• Contact reliability (suitability for PLC control; 17 V, 5 mA)			Yes	
Short-circuit protection				
• With fuse, operational class gG		A	6	
• With miniature circuit breaker, C characteristic		A	1.6	
Protective separation between auxil. conducting paths acc. to IEC 60947-1		V	300	
CSA, UL, UR rated data				
Auxiliary circuit – switching capacity			B300, R300	
Conductor cross-sections of the auxiliary circuit				
Connection type			**Screw terminals**	
Terminal screw			M3, Pozidriv size 2	
Operating devices		mm	3.0 x 0.5	
Prescribed tightening torque		Nm	0.8 ... 1.2	
Conductor cross-sections (min./max.), 1 or 2 conductors can be connected				
• Solid		mm^2	1 × (0.5 ... 4), 2 × (0.5 ... 2.5)	
• Finely stranded without end sleeve		mm^2	--	
• Finely stranded with end sleeve		mm^2	1 × (0.5 ... 2.5), 2 × (0.5 ... 1.5)	
• Stranded		mm^2	--	
• AWG cables, solid or stranded		AWG	2 × (20 ... 14)	
Connection type			**Spring-type terminals**	
Operating devices		mm	3.0 x 0.5	
Conductor cross-sections (min./max.), 1 or 2 conductors can be connected				
• Solid		mm^2	2 × (0.25 ... 1.5)	
• Finely stranded without end sleeve		mm^2	–	
• Finely stranded with end sleeve		mm^2	2 × (0.25 ... 1.5)	
• Stranded		mm^2	2 × (0.25 ... 1.5)	
• AWG cables, solid or stranded		AWG	2 × (24 ... 16)	

1) The assignment of auxiliary contacts may be influenced by function expansion modules.

Type – Overload relay of evaluation modules		3RB22 83, 3RB23 83	3RB24 83
Size of contactor		S00 ... S10/S12	
Control and sensor circuit as well as the analog output			
Rated insulation voltage U_i (pollution degree 3)[1]	V	300	
Rated impulse withstand voltage U_{imp}[1]	kV	4	
Rated control supply voltage U_s[1]			
• AC 50/60 Hz	V	24 ... 240	--
• DC	V	24 ... 240	24 through IO-Link
Operating range[1]			
• AC 50/60 Hz		0.85 × $U_{s\,min}$ ≤ U_s ≤ 1.1 × $U_{s\,max}$	
• DC		0.85 × $U_{s\,min}$ ≤ U_s ≤ 1.1 × $U_{s\,max}$	
Rated power[1]			
• AC 50/60 Hz	W	0.5	--
• DC	W	0.5	0.5
Mains buffering time[1]	ms	200	
Thermistor motor protection (PTC thermistor detector)[2]			
• Summation cold resistance	kΩ	≤ 1.5	
• Response value	kΩ	3.4 ... 3.8	
• Return value	kΩ	1.5 ... 1.65	
Ground-fault detection		The information refers to sinusoidal residual currents at 50/60 Hz.	
• Tripping value I_Δ[3]			
- For 0.3 × I_e < I_{motor} < 2.0 × I_e		> 0.3 × I_e	
- For 2.0 × I_e < I_{motor} < 8.0 × I_e		> 0.15 × I_{motor}	
• Response time t_{trip}	ms	500 ... 1000	
Analog output[3][4]			
• Output signal	mA	4 ... 20	
• Measuring range		0 ... 1.25 × I_e 4 mA corresponds to 0 × I_e 16.8 mA corresponds to 1.0 × I_e 20 mA corresponds to 1.25 × I_e	
• Load, max.	Ω	100	
Conductor cross-sections for the control and sensor circuit as well as the analog output			
Connection type		**Screw terminals**	
Terminal screw		M3, Pozidriv size 2	
Operating devices	mm	3.0 x 0.5	
Prescribed tightening torque	Nm	0.8 ... 1.2	
Conductor cross-sections (min./max.), 1 or 2 conductors can be connected			
• Solid	mm^2	1 × (0.5 ... 4), 2 × (0.5 ... 2.5)	
• Finely stranded without end sleeve	mm^2	--	
• Finely stranded with end sleeve	mm^2	1 × (0.5 ... 2.5), 2 × (0.5 ... 1.5)	
• Stranded	mm^2	--	
• AWG cables, solid or stranded	AWG	2 × (20 ... 14)	

1) Control circuit.

2) Sensor circuit.

3) For the 3RB22 and 3RB23 overload relays in combination with a corresponding function expansion module.

4) Analog input modules, e.g. SM 331, must be configured for 4-wire measuring transducers. In this case the analog input module must not supply current to the analog output of the 3RB22 to 3RB24 relay.

SIRIUS 3RB2 Solid-State Overload Relays

3RB22, 3RB23, 3RB24 up to 630 A for High-Feature applications

Functions of the 3RB22 and 3RB23 evaluation modules in combination with the 3RB29 85 function expansion modules

Evaluation modules	With function expansion module	Basic functions	Inputs		
			A1/A2	T1/T2	Y1/Y2
3RB22 83-4AA1 3RB22 83-4AC1 3RB23 83-4AA1 3RB23 83-4AC1	--	Inverse-time delayed protection, temperature-dependent protection, electrical remote RESET, overload warning	Power supply 24 ... 240 V AC/DC	Connection for PTC sensor	Electrical remote RESET
	3RB29 85-2CA1	Inverse-time delayed protection, temperature-dependent protection, internal ground-fault detection, electrical remote RESET, overload warning	Power supply 24 ... 240 V AC/DC	Connection for PTC sensor	Electrical remote RESET
	3RB29 85-2CB1	Inverse-time delayed protection, temperature-dependent protection, internal ground-fault detection, electrical remote RESET, ground-fault signal	Power supply 24 ... 240 V AC/DC	Connection for PTC sensor	Electrical remote RESET
	3RB29 85-2AA0	Inverse-time delayed protection, temperature-dependent protection, electrical remote RESET, overload warning, analog output	Power supply 24 ... 240 V AC/DC	Connection for PTC sensor	Electrical remote RESET
	3RB29 85-2AA1	Inverse-time delayed protection, temperature-dependent protection, internal ground-fault detection, electrical remote RESET, overload warning, analog output	Power supply 24 ... 240 V AC/DC	Connection for PTC sensor	Electrical remote RESET
	3RB29 85-2AB1	Inverse-time delayed protection, temperature-dependent protection, internal ground-fault detection, electrical remote RESET, ground-fault signal, analog output	Power supply 24 ... 240 V AC/DC	Connection for PTC sensor	Electrical remote RESET

Evaluation modules	With function expansion module	Outputs				
		I (–) / I (+)	95/96 NC	97/98 NO	05/06 NC	07/08 NO
3RB22 83-4AA1 3RB22 83-4AC1 3RB23 83-4AA1 3RB23 83-4AC1	--	No	Disconnection of the contactor (inverse-time delayed/temperature-dependent protection)	Signal “tripped”	Overload warning	Overload warning
	3RB29 85-2CA1	No	Disconnection of the contactor (inverse-time delayed/temperature-dependent protection + ground fault)	Signal “tripped”	Overload warning	Overload warning
	3RB29 85-2CB1	No	Disconnection of the contactor (inverse-time delayed/temperature-dependent protection)	Signal “tripped”	Switching off the contactor (ground fault)	Signal “ground-fault tripping”
	3RB29 85-2AA0	Analog signal	Disconnection of the contactor (inverse-time delayed/temperature-dependent protection)	Signal “tripped”	Overload warning	Overload warning
	3RB29 85-2AA1	Analog signal	Disconnection of the contactor (inverse-time delayed/temperature-dependent protection + ground fault)	Signal “tripped”	Overload warning	Overload warning
	3RB29 85-2AB1	Analog signal	Disconnection of the contactor (inverse-time delayed/temperature-dependent protection)	Signal “tripped”	Switching off the contactor (ground fault)	Signal “ground-fault tripping”

Selection and ordering data

3RB22, 3RB23, 3RB24 overload relays (evaluation modules) for full motor protection for stand-alone installation, CLASS 5, 10, 20 and 30 adjustable

Type	3RB22, 3RB23	3RB24
Features and technical specifications		
Overload protection, phase failure protection and unbalance protection	✓	✓
Supplied from an external voltage	✓ 24 ... 240 V AC/DC	✓ 24 V DC through IO-Link
Direct-on-line or reversing starters (wye-delta starting also possible) controllable through IO-Link	--	✓
Auxiliary contacts	✓ 2 NO + 2 NC	✓ 1 CO
Electrical remote RESET integrated	✓	✓
4 LEDs for operating and status displays	✓	✓
TEST function and self-monitoring	✓	✓
Internal ground-fault detection	✓ (with function expansion module)	✓
Screw terminals or spring-type terminals for auxiliary, control and sensor circuits	✓	✓
Input for PTC sensor circuit	✓	✓
Analog output	✓ (with function expansion module)	✓

✓ Available
-- Not available

3RB22 83-4AA1,
3RB23 83-4AA1

3RB24 83-4AA1

3RB22 83-4AC1,
3RB23 83-4AC1

3RB24 83-4AC1

Size of contactor	Version	Screw terminals ⊕
		Order No.
Evaluation modules		
S00 ... S12	Monostable	**3RB22 83-4AA1**
	Bistable	**3RB23 83-4AA1**
	Monostable	**3RB24 83-4AA1**

Function expansion modules for 3RB22 and 3RB23 overload relays (evaluation modules)

	Size of contactor	Version	For overload relays	Order No.
Sizes S00 to S12				
 3RB29 85-2..1	S00 ... S12	For plugging into evaluation module (1 unit)		
		Analog Basic 1[1] modules Analog output DC 4 ... 20 mA, with overload warning	3RB22, 3RB23	**3RB29 85-2AA0**
		Analog Basic 1 GF modules[1)2)] Analog output DC 4 ... 20 mA, with internal ground-fault detection and overload warning	3RB22, 3RB23	**3RB29 85-2AA1**
		Analog Basic 2 GF modules[1)2)] Analog output DC 4 ... 20 mA, with internal ground-fault detection and overload ground-fault signal	3RB22, 3RB23	**3RB29 85-2AB1**
		Basic 1 GF modules[2)] with internal ground-fault detection and overload warning	3RB22, 3RB23	**3RB29 85-2CA1**
		Basic 2 GF modules[2)] with internal ground-fault detection and ground-fault signaling	3RB22, 3RB23	**3RB29 85-2CB1**

Note:

Analog input modules, e.g. SM 331, must be configured for 4-wire measuring transducers. In this case the analog input module must not supply current to the analog output of the 3RB22/3RB23 relay.

1) The analog signal DC 4 mA up to 20 mA can be used for operating rotary coil instruments or for feeding into analog inputs of programmable logic controllers.
2) The following information on ground-fault protection refers to sinusoidal residual currents at 50/60 Hz:
   - With a motor current of between 0.3 and 2 times the current setting I_e the unit will trip at a ground-fault current equal to 30 % of the current setting.
   - With a motor current of between 2 and 8 times the current setting I_e the unit will trip at a ground-fault current equal to 15 % of the current setting.
   - The response delay amounts to between 0.5 s and 1 s.

Operator panel for 3RB24 overload relays (evaluation modules)

	Version	For overload relays	Order No.
Operator panels for communication through IO-Link			
 3RA69 35-0A	**Operator panels (set)** 1 set comprises: • 1 x operator panel • 1 x 3RA69 36-0A enabling module • 1 x 3RA69 33-0B interface cover • 1 x fixing terminal *Note:* *The connecting cable between the evaluation module and the operator panel is not included in the scope of supply; please order separately.*	3RB24	**3RA69 35-0A**
	Connecting cables Length 2 m (round), for connecting the evaluation module to the operator panel	3RB24	**3UF79 33-0BA00-0**
	Enabling modules (replacement)	3RB24	**3RA69 36-0A**
	Interface covers	3RB24	**3RA69 33-0B**

Current measuring modules for mounting onto contactor[1] and stand-alone installation[1)2)] (essential accessories)

	Size of contactor[3]	Rating for induction motor, rated value[4]	Current setting of the inverse-time delayed overload release	Short-circuit protection with fuse, type of coordination "2", operational class gG[5]	For overload relays	Order No.
		kW	A			
Sizes S00/S0[2)6)]						
 3RB29 06-2.G1	S00/S0	0.09 ... 1.1 1.1 ... 11	0.3 ... 3 2.4 ... 25	20 63	3RB22 to 3RB24	**3RB29 06-2BG1** **3RB29 06-2DG1**
Sizes S2/S3[2)6)]						
 3RB29 06-2JG1	S2/S3	5.5 ... 45	10 ... 100	315	3RB22 to 3RB24	**3RB29 06-2JG1**
Size S6[1)6)]						
 3RB29 56-2TG2	S6 with busbar connection	11 ... 90	20 ... 200	315	3RB22 to 3RB24	**3RB29 56-2TH2**
	S6 with box terminals				3RB22 to 3RB24	**3RB29 56-2TG2**
Sizes S10/S12[1)]						
 3RB29 66-2WH2	S10/S12 and size 14 (3TF68/3TF69)	37 ... 450	63 ... 630	800	3RB22 to 3RB24	**3RB29 66-2WH2**

Note:

The connecting cable between the current measuring module and the evaluation module is not included in the scope of supply; please order separately.

1) The current measuring modules with an Order No. ending with **"2"** are designed for mounting onto contactor and stand-alone installation. For 3TF68/3TF69 contactors, direct mounting is not possible.
2) The current measuring modules with an Order No. ending with **"1"** are designed for stand-alone installation.
3) Observe maximum rated operational current of the devices.
4) Guide value for 4-pole standard motors at 50 Hz 400 V AC. The actual starting and rated data of the motor to be protected must be considered when selecting the units.
5) Maximum protection by fuse for overload relay, type of coordination "2". For fuse values in connection with contactors see "Technical specifications" --> "Short-circuit protection with fuses for motor feeders",
6) The modules with an Order No. with **"G"** in penultimate position are equipped with a straight-through transformer.

Accessories

	Size of contactor	Version	For overload relays	Order No.
Connecting cables (essential accessory)				
 3RB29 87-2.		For connection between evaluation module and current measuring module		
	S00 ...S3	• Length 0.1 m (only for mounting of the evaluation module directly onto the current measuring module)	3RB22 to 3RB24, 3RB29	**3RB29 87-2B**
	S00 ... S12	• Length 0.5 m	3RB22 to 3RB24, 3RB29	**3RB29 87-2D**

Accessories for 3RB22, 3RB23, 3RB24

Overview

Overload relays for High-Feature applications

The following optional accessories are available for the 3RB22 to 3RB24 solid-state overload relays:

- Sealable cover for the evaluation modules
- Terminal covers for the current measuring modules size S6 and S10/S12
- Box terminal blocks for the current measuring modules size S6 and S10/S12
- Push-in lugs for screw fixing for 3RB22 to 3RB24 overload relay and 3RB29 06 current measuring modules

Selection and ordering data

	Version	Size	For overload relays	Order No.
Sealable covers				
 3RB29 84-2	For covering the setting knobs	--	3RB22 to 3RB24	**3RB29 84-2**
Terminal covers for current measuring modules				
	Covers for cable lugs and busbar connections			
	• Length 100 mm	S6	3RB29 56	**3RT19 56-4EA1**
	• Length 120 mm	S10/S12	3RB29 66	**3RT19 66-4EA1**
	Covers for box terminals			
	• Length 25 mm	S6	3RB29 56	**3RT19 56-4EA2**
	• Length 30 mm	S10/S12	3RB29 66	**3RT19 66-4EA2**
	Covers for screw terminals between contactor and overload relay, without box terminals (1 unit required per combination)	S6	3RB29 56	**3RT19 56-4EA3**
		S10/S12	3RB29 66	**3RT19 66-4EA3**
Box terminal blocks				
 3RT19 5.-4G	For current measuring modules, for round and ribbon cables			
	• Up to 70 mm²	S6[1)]	3RB29 56	**3RT19 55-4G**
	• Up to 120 mm²	S6	3RB29 56	**3RT19 56-4G**
	• Up to 240 mm²	S10/S12	3RB29 66	**3RT19 66-4G**
	For technical specifications for conductor cross-sections see note on Technical Information on page 4/1.			
Push-in lugs				
 3RP19 03	For screw fixing the overload relays	--	3RB22 to 3RB24	**3RP19 03**
 3RB19 00-0B	For screw fixing the current measuring modules (2 units are required per module)	S00 ... S3	3RB29 06	**3RB19 00-0B**