

Overload Relays

SIRIUS 3RB2 Electronic Overload Relays

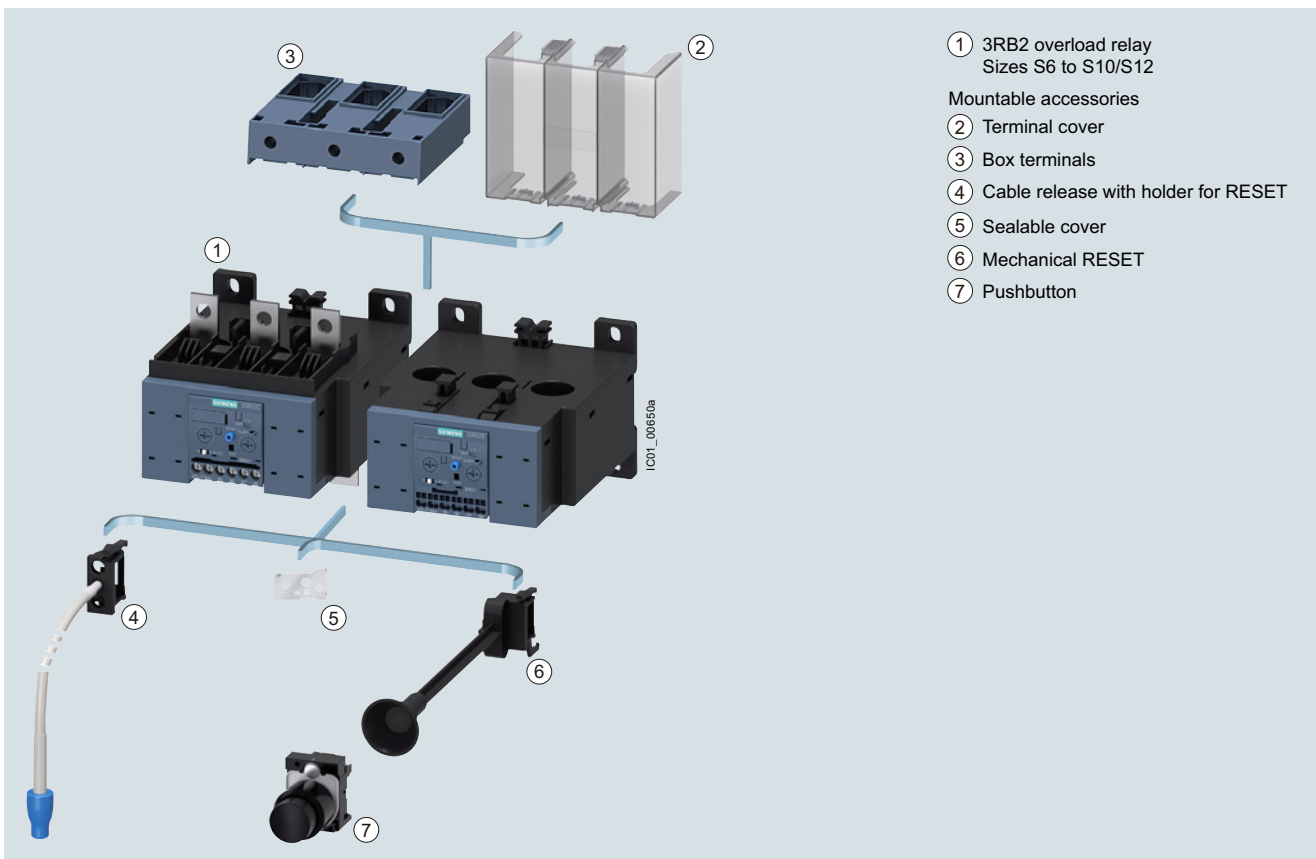
3RB20, 3RB21 for standard applications

Overview

More information

Homepage, see www.siemens.com/sirius-overloadrelays
 Industry Mall, see www.siemens.com/product?3RB2

Application Manual "SIRIUS Controls with IE3/IE4 motors", see <https://support.industry.siemens.com/cs/ww/en/view/94770820>
 Manual, see <https://support.industry.siemens.com/cs/ww/en/view/60298164>
 Characteristics and certificates, see <https://support.industry.siemens.com/cs/ww/en/ps/16278>



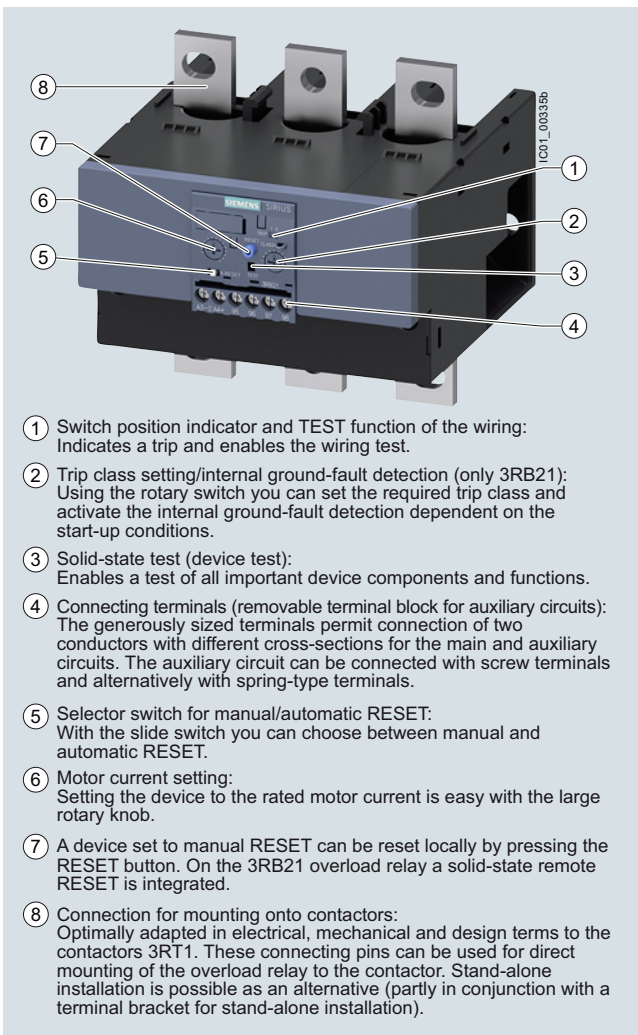
- ① 3RB2 overload relay
 Sizes S6 to S10/S12
- Mountable accessories
- ② Terminal cover
- ③ Box terminals
- ④ Cable release with holder for RESET
- ⑤ Sealable cover
- ⑥ Mechanical RESET
- ⑦ Pushbutton

Mountable accessories for 3RB2 electronic overload relays (sizes S6 to S10/S12)

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- ① Switch position indicator and TEST function of the wiring:
Indicates a trip and enables the wiring test.
- ② 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.
- ③ Solid-state test (device test):
Enables a test of all important device components and functions.
- ④ 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.
- ⑤ Selector switch for manual/automatic RESET:
With the slide switch you can choose between manual and automatic RESET.
- ⑥ Motor current setting:
Setting the device to the rated motor current is easy with the large rotary knob.
- ⑦ A device set to manual RESET can be reset locally by pressing the RESET button. On the 3RB21 overload relay a solid-state remote RESET is integrated.
- ⑧ Connection for mounting onto contactors:
Optimally adapted in electrical, mechanical and design terms to the contactors 3RT1. 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).

SIRIUS 3RB2153-4FW2 electronic overload relay

The 3RB20 and 3RB21 electronic overload relays up to 630 A with internal power supply have been designed for current-dependent protection of loads with normal and heavy starting (see [Manual](#)) 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 electronic 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 the current setting I_n and is stored in the form of a long-term stable tripping characteristic curve, see [Characteristics](#).

In addition to inverse-time delayed protection of loads against excessive temperature rises due to overload, phase unbalance and phase failure, the 3RB21 electronic overload relays also allow internal ground-fault detection (not possible in conjunction with contactor assemblies for star-delta (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. The relay is reset manually or automatically after the recovery time has elapsed.

The 3RB2 electronic overload relays are suitable for operation with frequency converters, see [Manual](#).

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.

For 3RB30 and 3RB31 overload relay sizes S00 to S3, see [page 7/105 onwards](#).

Use in hazardous areas

The 3RB20/3RB21 electronic overload relays are suitable for the overload protection of motors with the following types of protection:

- II (2) G [Ex e] [Ex d] [Ex px]
- II (2) D [Ex t] [Ex p]

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

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Article No. scheme

Product versions	Article number
Electronic overload relays	3RB2 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Device type	e.g. 0 = standard device, with internal supply, for three-phase loads <input type="checkbox"/>
Size, rated operational current and power	e.g. 5 = 200 A (90 kW) for size S6 <input type="checkbox"/>
Version of the automatic RESET, electrical remote RESET	e.g. 6 = switchable between manual/auto RE-SET <input type="checkbox"/>
Trip class (CLASS)	e.g. 1 = CLASS 10E <input type="checkbox"/>
Setting range of the overload release	e.g. F = 5 ... 200 A <input type="checkbox"/>
Connection methods	e.g. C = busbar connections main circuit; screw terminals auxiliary circuit <input type="checkbox"/>
Installation type	e.g. 2 = mounting on contactor and stand-alone installation <input type="checkbox"/>
Example	3RB2 0 5 6 - 1 F C 2

Note:

The Article No. scheme shows an overview of product versions for better understanding of the logic behind the article numbers.

For your orders please use the article numbers quoted in the selection and ordering data.

Benefits

The most important features and benefits of the 3RB20/3RB21 electronic overload relays are listed in the overview table (see "General data", page 7/79 onwards).

Application

Industries

The 3RB20 and 3RB21 electronic 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 5E to 30E), minimize project completion times, inventories and energy consumption, and optimize plant availability and maintenance management.

Application

The 3RB20 and 3RB21 electronic overload relays have been designed for the protection of three-phase 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 relays or the 3RB22 to 3RB24 electronic overload relays 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 3RB20 and 3RB21 electronic overload relays compensate the temperature in accordance with IEC 60947-4-1.

For the 3RB20 and 3RB21 electronic 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.

Use of SIRIUS protection devices in conjunction with IE3/IE4 motors

Note:

For the use of 3RB20 and 3RB21 electronic overload relays in conjunction with highly energy-efficient IE3/IE4 motors, please observe the information on dimensioning and configuring, see [Application Manual](#).

For more information, see [page 1/7](#).

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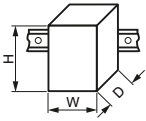
Technical specifications

More information

Configuration Manual "Load Feeders – SIRIUS Modular System", see <https://support.industry.siemens.com/cs/ww/en/view/39714188>
Manual, see <https://support.industry.siemens.com/cs/ww/en/view/60298164>

Technical specifications, see <https://support.industry.siemens.com/cs/ww/en/ps/16278>

The following technical information is intended to provide an initial overview of the various types of device and functions.

Type		3RB2056, 3RB2153	3RB2066, 3RB2163
Size		S6	S10/S12
Dimensions (W x H x D) (overload relay with stand-alone installation support)		mm 120 x 119 x 155	145 x 147 x 156
General data			
Tripping 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: 10E or 20E; 3RB21: 5E, 10E, 20E and 30E adjustable	
Phase failure sensitivity		Yes	
Overload warning		No	
Reset and recovery		3RB20: Manual and automatic RESET; 3RB21: Manual, automatic and remote RESET	
• Reset options after tripping		Approx. 3 min Immediately Immediately	
• Recovery time			
- For automatic RESET			
- For manual RESET			
- For remote RESET			
Features		Yes, by means of switch position indicator slide	
• Display of operating state on device		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	
• TEST function		Yes	
• RESET button		No	
• STOP button			
Protection and operation of explosion-proof motors		PTB 06 ATEX 3001 ⚠ II (2) G [Ex e] [Ex d] [Ex px] ⚠ II (2) G [Ex t] [Ex p] see https://support.industry.siemens.com/cs/ww/en/view/23814648	
EC type-examination certificate number according to directive 2014/34/EU (ATEX)			
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 or 90 ¹⁾
- Temperature inside control cabinet 60 °C, mounted on contactor	%	70	70
- Temperature inside control cabinet 70 °C	%	On request	
Degree of protection acc. to IEC 60529		- IP20 (front side) - Terminal IP00 (use additional terminal covers for higher degree of protection)	
• Screw terminals/busbar connections		IP20	--
• Straight-through transformers			

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

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3RB20, 3RB21 for standard applications

Type		3RB2056, 3RB2153	3RB2066, 3RB2163
Size		S6	S10/S12
Dimensions (W x H x D) (overload relay with stand-alone installation support)		120 x 119 x 155	145 x 147 x 156
General data (continued)			
Touch protection acc. to IEC 60529		Finger-safe with terminal covers for vertical contact from the front	
• Screw terminals/busbar connections		Finger-safe	--
• Straight-through transformers			
Shock resistance with sine acc. to IEC 60068-2-27	g/ms	15/11 (signaling contact 97/98 in position "tripped": 4 g/ 11 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 port)	
- 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 acc. to EN 55011 (CISPR 11) and EN 55022 (CISPR 22)	
Resistance to extreme climates – Air humidity	%	100	
Installation altitude above sea level	m	Up to 2 000	
Mounting position		Any	
Type of mounting		Direct mounting/stand-alone installation	

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Type		3RB2056, 3RB2153	3RB2066, 3RB2163
Size		S6	S10/S12
Main circuit			
Rated insulation voltage U_i (pollution degree 3)	V	1 000	
Rated impulse withstand voltage U_{imp}	kV	8	
Rated operational voltage U_e	V	1 000	
Type of current			
• Direct current		No	
• Alternating current		Yes, 50/60 Hz \pm 5%	
Current setting	A	50 ... 200	55 ... 250, 160 ... 630
Power loss per unit (max.)	W	0.05	
Short-circuit protection		See "Selection and ordering data", pages 7/117 ... 7/119 "Short-Circuit Protection with Fuses/Motor Starter Protectors for Motor Feeders", see Configuration Manual.	
• With fuse without contactor			
• With fuse and contactor			
Protective separation between main and auxiliary current paths Acc. to IEC 60947-1 (pollution degree 2)			
• For systems with grounded neutral point	V	690	
• For systems with ungrounded neutral point	V	600	
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	10 ... 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 3RT1955-4G box terminal: 2 x (1 x max. 50, 1 x max. 70), 1 x (10 ... 70); With 3RT1956-4G box terminal: 2 x (1 x max. 95, 1 x max. 120), 1 x (10 ... 120)	2 x (50 ... 185), Front clamping point only: 1 x (70 ... 240); Rear clamping point only: 1 x (120 ... 185)
• Finely stranded with end sleeve (DIN 46228-1)	mm ²	With 3RT1955-4G box terminal: 2 x (1 x max. 50, 1 x max. 70), 1 x (10 ... 70); With 3RT1956-4G box terminal: 2 x (1 x max. 95, 1 x max. 120), 1 x (10 ... 120)	2 x (50 ... 185), Front clamping point only: 1 x (70 ... 240); Rear clamping point only: 1 x (120 ... 185)
• Stranded	mm ²	With 3RT1955-4G box terminal: 2 x (max. 70), 1 x (16 ... 70); With 3RT1956-4G box terminal: 2 x (max. 120), 1 x (16 ... 120)	2 x (70 ... 240), Front clamping point only: 1 x (95 ... 300); Rear clamping point only: 1 x (120 ... 240)
• AWG cables, solid or stranded	AWG	With 3RT1955-4G box terminal: 2 x (max. 1/0), 1 x (6 ... 2/0); With 3RT1956-4G box terminal: 2 x (max. 3/0), 1 x (6 ... 250 kcmil)	2 x (2/0 ... 500 kcmil), Front clamping point only: 1 x (3/0 ... 600 kcmil); Rear clamping point only: 1 x (250 kcmil ... 500 kcmil)
• Ribbon cables (Number x Width x Thickness)	mm	With 3RT1955-4G box terminal: 2 x (6 x 15.5 x 0.8), 1 x (3 x 9 x 0.8 ... 6 x 15.5 x 0.8); With 3RT1956-4G box terminal: 2 x (10 x 15.5 x 0.8), 1 x (3 x 9 x 0.8 ... 10 x 15.5 x 0.8)	2 x (20 x 24 x 0.5), 1 x (6 x 9 x 0.8 ... 20 x 24 x 0.5)
Connection type			
		 Busbar connections	
Terminal screw		M8 x 25	M10 x 30
Prescribed tightening torque	Nm	10 ... 14	14 ... 24
Conductor cross-sections (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 cables, solid or stranded, with cable lug	AWG	4 ... 250 kcmil	2/0 ... 500 kcmil
• With connecting bars (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 mm² and more, the 3RT1956-4EA1 terminal cover must be used to ensure phase clearance, see page 7/120.

²⁾ When connecting cable lugs according to DIN 46234 for conductor cross-sections from 240 mm², as well as DIN 46235 for cable cross-sections from 185 mm², the 3RT1956-4EA1 terminal cover must be used to ensure phase clearance, see page 7/120.

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Type	3RB2056, 3RB2153	3RB2066, 3RB2163
Size	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		
<ul style="list-style-type: none"> NC contact with alternating current AC-14/AC-15, rated operational current I_e at U_e: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - 24 V A 4 - 120 V A 4 - 125 V A 4 - 250 V A 3 NC, NO contacts with direct current DC-13, rated operational current I_e at U_e: <ul style="list-style-type: none"> - 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		
<ul style="list-style-type: none"> With fuse, operational class gG 	A	6
Ground-fault protection (only 3RB21)		
<ul style="list-style-type: none"> Tripping value I_{Δ} Operating range I Response time t_{trip} (in steady-state condition) 	s	The information refers to sinusoidal residual currents at 50/60 Hz. $> 0.75 \times I_{motor}$ Lower current setting $< I_{motor} < 3.5 \times$ upper current setting < 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 current 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		
<ul style="list-style-type: none"> Solid and stranded 	mm ²	1 × (0.5 ... 4) ¹⁾ , 2 × (0.5 ... 2.5) ¹⁾
<ul style="list-style-type: none"> Finely stranded without end sleeve 	mm ²	--
<ul style="list-style-type: none"> Finely stranded with end sleeve (DIN 46228-1) 	mm ²	1 × (0.5 ... 2.5) ¹⁾ , 2 × (0.5 ... 1.5) ¹⁾
<ul style="list-style-type: none"> AWG cables, solid or stranded 	AWG	2 × (20 ... 14)
Connection type	 Spring-type terminals	
Operating devices	mm	3.0 × 0.5
Conductor cross-sections (min./max.), 1 or 2 conductors can be connected		
<ul style="list-style-type: none"> Solid and stranded 	mm ²	2 × (0.25 ... 1.5)
<ul style="list-style-type: none"> Finely stranded without end sleeve 	mm ²	--
<ul style="list-style-type: none"> Finely stranded with end sleeve (DIN 46228-1) 	mm ²	2 × (0.25 ... 1.5)
<ul style="list-style-type: none"> AWG cables, solid or stranded 	AWG	2 × (24 ... 16)

¹⁾ If two different conductor cross-sections are connected to one clamping point, both cross-sections must be in the range specified.

Selection and ordering data

3RB20 electronic overload relays for mounting onto contactors and stand-alone installation, CLASS 10E

Features and technical specifications:

- Connection methods
 - Size S6
Main circuit: With busbar connection or as straight-through transformer (an appropriate connection kit with screws, spring washers and nuts is enclosed with the devices with busbar connection)
Auxiliary circuit: Either screw or spring-type terminals
 - Sizes S10/S12:
Main circuit: With busbar connection (an appropriate connection kit with screws, spring washers and nuts is enclosed)
Auxiliary circuit: Either screw or 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

PU (UNIT, SET, M) = 1
PS* = 1 unit
PG = 41G



3RB2056-1FW2



3RB2066-1MF2

Size contactor	Rated power for three-phase motors, rated value ¹⁾	Current setting value of the inverse-time delayed overload release	Short-circuit protection with fuse, type of coordination "2", operational class gG ²⁾	SD	Screw terminals (on auxiliary current side)	SD	Spring-type terminals (on auxiliary current side)	
	kW	A	A	d	Article No.	Price per PU	Article No.	Price per PU

Size S6

Devices with busbar connection, for mounting onto contactor and stand-alone installation

S6	30 ... 90	50 ... 200	315	▶	3RB2056-1FC2	2	3RB2056-1FF2
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Devices with straight-through transformer, for mounting onto contactor and stand-alone installation

For mounting onto S6 contactors with box terminals	30 ... 90	50 ... 200	315	▶	3RB2056-1FW2	▶	3RB2056-1FX2
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Size S10/S12

Devices with busbar connection, for mounting onto contactor and stand-alone installation

S10/S12	30 ... 132	55 ... 250	400	▶	3RB2066-1GC2	▶	3RB2066-1GF2
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and size 14 (3TF68/3TF69) ³⁾	90 ... 355	160 ... 630	800	▶	3RB2066-1MC2	▶	3RB2066-1MF2
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¹⁾ 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.

²⁾ Maximum protection by fuse only for overload relays, type of coordination "2". For fuse values in connection with contactors, see [Configuration Manual](#).

³⁾ For 3TF68/3TF69 contactors, direct mounting is not possible.