

Overload Relays

3RB2 Solid-State Overload Relays

3RB20, 3RB21 for standard applications

Technical specifications

Type		3RB20 16, 3RB21 13	3RB20 26, 3RB21 23	3RB20 36, 3RB21 33	3RB20 46, 3RB21 43	3RB20 56, 3RB21 53	3RB20 66, 3RB21 63
Size		S00	S0	S2	S3	S6	S10/S12
Width		45 mm	45 mm	55 mm	70 mm	120 mm	145 mm
General data							
Trips in the event of		Overload, phase failure, and phase unbalance + ground fault (for 3RB21 only)					
Trip class according to IEC 60947-4-1	CLASS	10 / 20 / 5, 10, 20 and 30 adjustable (depending on the version)					
Phase failure sensitivity		Yes					
Overload warning		No					
Reset and recovery		Manual, automatic and remote RESET (depending on the version)					
- Reset options after tripping - Recovery time - For automatic RESET - For manual RESET - For remote RESET		Approx. 3 min					
	min.	Immediately					
	min.	Immediately					
	min.	Immediately					
Features		- Display of operating state on device - TEST function					
- RESET button - STOP button		Yes					
		No					
Safe operation of motors with "increased safety" type of protection		EU type test certificate number according to directive 94/9/EU PTB 06 ATEX 3001  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 ²⁾	100	100	100	100 or 90 ³⁾
- Temperature inside control cabinet 60°C, mounted on contactor	%	100	100 ²⁾	100	100	70	70
- Temperature inside control cabinet 70°C	%	1)					
Repeat terminals							
Coil repeat terminal		Yes		Not required			
Auxiliary contact repeat terminal		Yes		Not required			
Degree of protection according to IEC 60529		IP20		IP20 ⁴⁾			
Touch protection according to IEC 61140		Finger-safe				Finger-safe, for busbar connection with cover	Finger-safe with cover
Shock resistance with sine according to IEC 60068-2-27		15/11 ⁵⁾ g/ms					
Electromagnetic compatibility (EMC) – Interference immunity							
Conductor-related interference							
- Burst according to IEC 61000-4-4 (corresponds to degree of severity 3)	kV	2 (power ports), 1 (signal ports)					
- Surge according to IEC 61000-4-5 (corresponds to degree of severity 3)	kV	2 (line to earth), 1 (line to line)					
Electrostatic discharge according to IEC 61000-4-2 (corresponds to degree of severity 3)	kV	8 (air discharge), 6 (contact discharge)					
Field-related interference according 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		Up to 2000					
Mounting position		Any					
Type of mounting		Direct mounting / stand-alone installation with terminal bracket		Direct mounting / stand-alone installation			

1) On request.

2) S0 for 6 ... 25 A, CLASS 20, $I_{\text{emax}} = 19 \text{ A}$;
S0 for 6 ... 25 A, CLASS 30, $I_{\text{emax}} = 16 \text{ A}$.

3) 90 % for relay with current setting range 160 ... 630 A.

4) Terminal compartment: degree of protection IP00.

5) Signaling contact 97/98 in position "tripped": 4/11 g/ms.

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Size		S00	S0	S2	S3	
Width		45 mm	45 mm	55 mm	70 mm	
Main circuit						
Rated insulation voltage U_i (degree of pollution 3)	V	690			1000	
Rated impulse withstand voltage U_{imp}	kV	6			8	
Rated operational voltage U_e	V	690				
Type of current • Direct current • Alternating current		No Yes, 50/60 Hz ± 5%				
Set current	A	0.1 ... 0.4 to 3 ... 12	3 ... 12 and 6 ... 25	6 ... 25 and 12, 5 ... 50	12, 5 ... 50 and 25 ... 100	
Power loss per unit (max.)	W	0.05				
Short-circuit protection - With fuse without contactor - With fuse and contactor		See Catalog LV1, Selection and Ordering Data See Technical Specifications (short-circuit protection with fuses for motor feeders)				
Safe isolation between main and auxiliary conducting path according to IEC 60947-1 (degree of pollution 2)	V	690 ¹⁾				
Connection for main circuit						
Connection type		Screw terminals		Screw terminals with box terminal / straight-through transformer	Screw terminals with box terminal / bus connection / straight- through transformer	
Screw terminals • Terminal screw • Tightening torque • Conductor cross-sections (min./max.), 1 or 2 conductors - Solid - Finely stranded without end sleeve - Finely stranded with end sleeve - Stranded - AWG conductors, solid or stranded - Ribbon cable conductors (number x width x circumference)	Nm	Pozidriv size 2 0.8 ... 1.2		2 ... 2.5	3 ... 4.5	Allen screw 4 mm 4 ... 6
	mm ²	2 × (0.5 ... 1.5) ³⁾ 2 × (0.75 ... 2.5) ³⁾		2 × (1 ... 2.5) ³⁾ 2 × (2.5 ... 6) ³⁾	2 × (1 ... 16)	2 × (2.5 ... 16)
	mm ²	--				
	mm ²	2 × (0.5 ... 1.5) ³⁾ 2 × (0.75 ... 2.5) ³⁾		2 × (1 ... 2.5) ³⁾ 2 × (2.5 ... 6) ³⁾	2 × (1 ... 16) ³⁾ 1 × (1 ... 25) ³⁾	2 × (2.5 ... 35), 1 × (2.5 ... 50)
	mm ²	--			2 × (max. 25), 1 × (1 ... 35)	2 × (10 ... 50), 1 × (10 ... 70)
	AWG	2 × (18 ... 14)		2 × (14 ... 10)	2 × (max. 3), 1 × (18 ... 2)	2 × (10 ... 1/0), 1 × (10 ... 2/0)
	mm	--			2 × (6 × 9 × 0.8)	2 × (6 × 9 × 0.8)
Busbar connection						
• Terminal screw	Nm	--			M 6 × 20	
• Tightening torque		--			4 ... 6	
• Conductor cross-section (min./max.)						
- Finely stranded with cable lug	mm ²	--			2 × 70	
- Stranded with cable lug	mm ²	--			3 × 70	
- AWG conductor, solid or stranded, with cable lug	AWG	--			2/0	
- With connecting bar (max. width)	mm	--			12	
Straight-through transformers						
• Diameter of opening	mm	--		15	18	
• Conductor cross-section (max.)						
- NYY	mm ²	--		2)	2)	
- H07RN-F	mm ²	--		2)	2)	

1) For grounded networks, otherwise 600 V.

2) On request.

3) 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.

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Type		3RB20 56, 3RB21 53	3RB20 66, 3RB21 63
Size		S6	S10/S12
Width		120 mm	145 mm
Main circuit			
Rated insulation voltage U_i (degree of pollution 3)	V	1000	
Rated impulse withstand voltage U_{imp}	kV	8	
Rated operational voltage U_e	V	690	
Type of current		No	
• Direct current		Yes, 50/60 Hz $\pm$ 5%	
• Alternating current			
Set current	A	50 ... 200	55 ... 250 to 160 ... 630
Power loss per unit (max.)	W	0.05	
Short-circuit protection		See Catalog LV1, Selection and Ordering Data	
- With fuse without contactor		See Technical Specifications (short-circuit protection with fuses for motor feeders)	
- With fuse and contactor			
Safe isolation between main and auxiliary conducting path according to IEC 60947-1 (degree of pollution 2)	V	690 ¹⁾	
Connection for main circuit			
Connection type		Screw terminals with box terminal / bus connection / straight-through transformer	Screw terminals with box terminal / bus connection
Screw terminals			
• Terminal screw		4 mm Allen screw	5 mm Allen screw
• Tightening torque	Nm	10 ... 12	20 ... 22
• Conductor cross-sections (min./max.), 1 or 2 conductors			
- Solid	mm ²	--	
- Finely stranded without end sleeve	mm ²	With 3RT19 55-4G box terminal: 2 $\times$ (1 $\times$ max. 50, 1 $\times$ max. 70), 1 $\times$ (10 ... 70) With 3RT19 56-4G box terminal: 2 $\times$ (1 $\times$ max. 95, 1 $\times$ max. 120), 1 $\times$ (10 ... 120)	2 $\times$ (50 ... 185), Front clamping point only: 1 $\times$ (70 ... 240) Rear clamping point only: 1 $\times$ (120 ... 185)
- Finely stranded with end sleeve	mm ²	With 3RT19 55-4G box terminal: 2 $\times$ (1 $\times$ max. 50, 1 $\times$ max. 70), 1 $\times$ (10 ... 70) With 3RT19 56-4G box terminal: 2 $\times$ (1 $\times$ max. 95, 1 $\times$ max. 120), 1 $\times$ (10 ... 120)	2 $\times$ (50 ... 185), Front clamping point only: 1 $\times$ (70 ... 240) Rear clamping point only: 1 $\times$ (120 ... 185)
- Stranded	mm ²	With 3RT19 55-4G box terminal: 2 $\times$ (max. 70), 1 $\times$ (16 ... 70) With 3RT19 56-4G box terminal: 2 $\times$ (max. 120), 1 $\times$ (16 ... 120)	2 $\times$ (70 ... 240), Front clamping point only: 1 $\times$ (95 ... 300) Rear clamping point only: 1 $\times$ (120 ... 240)
- AWG conductors, solid or stranded	AWG	With 3RT19 55-4G box terminal: 2 $\times$ (max. 1/0), 1 $\times$ (6 ... 2/0) With 3RT19 56-4G box terminal: 2 $\times$ (max. 3/0), 1 $\times$ (6 ... 250 kcmil)	2 $\times$ (2/0 ... 500 kcmil), Front clamping point only: 1 $\times$ (3/0 ... 600 kcmil) Rear clamping point only: 1 $\times$ (250 kcmil ... 500 kcmil)
- Ribbon cable conductors (number x width x circumference)	mm	With 3RT19 55-4G box terminal: 2 $\times$ (6 $\times$ 15.5 $\times$ 0.8), 1 $\times$ (3 $\times$ 9 $\times$ 0.8 ... 6 $\times$ 15.5 $\times$ 0.8) With 3RT19 56-4G box terminal: 2 $\times$ (10 $\times$ 15.5 $\times$ 0.8), 1 $\times$ (3 $\times$ 9 $\times$ 0.8 ... 10 $\times$ 15.5 $\times$ 0.8)	2 $\times$ (20 $\times$ 24 $\times$ 0.5), 1 $\times$ (6 $\times$ 9 $\times$ 0.8 ... 20 $\times$ 24 $\times$ 0.5)
Busbar connection			
• Terminal screw		M 8 $\times$ 25	M 10 $\times$ 30
• Tightening torque	Nm	10 ... 14	14 ... 24
• Conductor cross-section (min./max.)			
- Finely stranded with cable lug	mm ²	16 ... 95 ²⁾	50 ... 240 ³⁾
- Stranded with cable lug	mm ²	25 ... 120 ²⁾	70 ... 240 ³⁾
- AWG conductors, solid or stranded, with cable lug	AWG	4 ... 250 kcmil	2/0 ... 500 kcmil
- With connecting bar (max. width)	mm	15	25
Straight-through transformers			
• Diameter of opening	mm	24.5	--
• Conductor cross-section (max.)			
- NYY	mm ²	120	--
- H07RN-F	mm ²	70	--

¹⁾ For grounded networks, otherwise 600 V.

²⁾ When connecting cable lugs according to DIN 46235, use the 3RT19 56-4EA1 terminal cover for conductor cross-sections from 95 mm² to ensure phase spacing.

³⁾ When connecting cable lugs according to DIN 46234 for conductor cross-sections from 240 mm² as well as DIN 46235 for conductor cross-sections from 185 mm², use the 3RT19 56-4EA1 terminal cover to ensure phase spacing.

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Size		S00	S0	S2	S3	S6	S10/S12
Width		45 mm	45 mm	55 mm	70 mm	120 mm	145 mm
Auxiliary circuit							
Number of NO contacts		1					
Number of NC contacts		1					
Auxiliary contacts – assignment		1 NO for the signal "tripped", 1 NC for switching off the contactor					
Rated insulation voltage U_i (degree of pollution 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, 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					
• Continuous thermal current I_{th}	A	5					
• Contact reliability (suitability for PLC control; 17 V, 5 mA)		Yes					
Short-circuit protection							
• With fuse, gL/gG operational class	A	6					
Ground-fault protection (only 3RB21)							
• Tripping value I_{Δ}		$> 0.75 \times I_{motor}$					
• Operating range I		Lower set current value ... 3.5 × upper set current value					
• Response time t_{trip} (in steady-state condition)	s	< 1					
Safe isolation between main and auxiliary conducting path according to IEC 60947-1	V	300					
CSA, UL, and UR rated data							
Auxiliary circuit – switching capacity		B300, R300					
Connection of the auxiliary circuit							
Connection type		Screw terminals					
• Terminal screw		Pozidriv size 2					
• Tightening torque	Nm	0.8 ... 1.2					
• Conductor cross-sections (min./max.), 1 or 2 conductors							
- 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 conductors, solid or stranded	AWG	2 × (20 ... 14)					
Connection type		Spring-loaded terminals					
• Conductor cross-sections (min./max.), 1 or 2 conductors							
- 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 conductors, solid or stranded	AWG	2 × (24 ... 16)					

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Short-circuit protection with fuses for motor feeders

For short-circuit currents up to 50 kA at 400 to 690 V

Overload relay	Contactor	CLASS 5 and 10			CLASS 20			CLASS 30			690 V	
											Fuse links ¹⁾	
											LV HRC	Type 3NA
											DIAZED	Type 3SB
											NEOZED	Type 3SE
											gL/gG operational class	
Setting range	Type	Rated operational current I_e /AC-3 in A at ... V									Type of coordination ²⁾	
A		400	500	690	400	500	690	400	500	690	1	2
Size S00												
0.1 ... 0.4	3RT10 15	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	35	1
0.32 ... 1.25	3RT10 15	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	35	2
1 ... 4	3RT10 15	4	4	4	4	4	4	4	4	4	35	10
	3RT10 16	4	4	4	4	4	4	4	4	4	35	10
	3RT10 17	4	4	4	4	4	4	4	4	4	35	10
3 ... 12	3RT10 16	9	6.5	5.2	9	6.5	5.2	9	6.5	5.2	35	20
	3RT10 17	12	9	6.3	10	9	6.3	9	9	6.3	35	20
Size S0												
3 ... 12	3RT10 23	9	6.5	5.2	9	6.5	5.2	--	--	--	63	25
	3RT10 24	12	12	9	12	12	9	12	12	9	63	25
	3RT10 25	12	12	12	12	12	12	12	12	12	63	25
6 ... 25	3RT10 24	12	12	9	12	12	9	12	12	9	63	25
	3RT10 25	17	17	13	16	16	13	14	14	13	63	25
	3RT10 26	25	18	13	16	16	13	14	14	13	100	35
Size S2												
6 ... 25	3RT10 34	25	25	20	22.3	22.3	20	19.1	19.1	19.1	125	63
	3RT10 35	25	25	24	25	25	24	25	25	24	125	63
12.5 ... 50	3RT10 34	32	32	20	22.3	22.3	20	19.1	19.1	19.1	125	63
	3RT10 35	40	40	24	29.4	29.4	24	26.5	26.5	24	125	63
	3RT10 36	50	50	24	32.7	32.7	24	26.5	26.5	24	160	80
Size S3												
12.5 ... 50	3RT10 44	50	50	47	49	49	47	41.7	41.7	41.7	200	125
	3RT10 45	50	50	50	50	50	50	45	45	45	200	160
25 ... 100	3RT10 44	65	65	47	49	49	47	41.7	41.7	41.7	200	125
	3RT10 45	80	80	58	53	53	53	45	45	45	200	160
	3RT10 46	95	95	58	59	59	58	50	50	50	200	160
	3RT10 54	100	100	100	81.7	81.7	81.7	69	69	69	355	315
	3RT10 55	--	--	--	100	100	100	90	90	90	355	315
Size S6												
50 ... 200	3RT10 54	115	115	115	81.7	81.7	81.7	69	69	69	355	315
	3RT10 55	150	150	150	107	107	107	90	90	90	355	315
	3RT10 56	185	185	170	131	131	131	111	111	111	355	315
Size S10/S12												
55 ... 250	3RT10 64	225	225	225	160	160	160	135	135	135	500	400
	3RT10 65	250	250	250	188	188	188	159	159	159	500	400
	3RT10 66	250	250	250	213	213	213	180	180	180	500	400
160 ... 630	3RT10 64	225	225	225	160	160	160	--	--	--	500	400
	3RT10 65	265	265	265	188	188	188	--	--	--	500	400
	3RT10 66	300	300	280	213	213	213	180	180	180	500	400
	3RT10 75	400	400	400	284	284	284	240	240	240	630	500
	3RT10 76	500	500	450	355	355	355	300	300	300	630	500
	3RT12 64	225	225	225	225	225	225	173	173	173	500	500
	3RT12 65	265	265	265	265	265	265	204	204	204	500	500
	3RT12 66	300	300	300	300	300	300	231	231	231	500	500
	3RT12 75	400	400	400	400	400	400	316	316	316	800	800
	3RT12 76	500	500	500	500	500	500	385	385	385	800	800
	3TF68 ³⁾	630	630	630	440	440	440	376	376	376	800	500 ⁴⁾
	3TF69 ³⁾	630	630	630	572	572	572	500	500	500	800	630 ⁴⁾

¹⁾ Please observe operational voltage.

²⁾ Coordination and short-circuit equipment according to EN 60947-4-1:

Type of coordination 1: the contactor or starter must not endanger persons or the installation in the event of a short-circuit.

They do not need to be suitable for further operation without repair and the renewal of parts.

Type of coordination 2: the contactor or starter must not endanger persons or the installation in the event of a short-circuit.

They must be suitable for further operation. There is a risk of contact welding.

³⁾ Contactor cannot be mounted.

⁴⁾ Please ensure that the maximum AC-3 operational current has sufficient safety clearance from the rated current of the fuses.