

## Introduction

### Overview



Type **3RV20** **3RV21** **3RV23** **3RV24** **3RV27** **3RV28**  
**SIRIUS 3RV2 motor starter protectors and circuit breakers up to 40 A**

Uses		3RV20	3RV21	3RV23	3RV24	3RV27	3RV28
System protection		✓ <sup>1)</sup>	✓ <sup>1)</sup>	--	--	✓	✓
Motor protection		✓	--	--	--	--	--
Motor protection with overload relay function		--	✓	--	--	--	--
Starter combinations		--	--	✓	--	--	--
Transformer protection		--	--	--	✓	✓	✓
<b>Size</b>		S00, S0	S00, S0	S00, S0	S00, S0	S00	S00
<b>Rated current <math>I_n</math></b>							
Size S00	A	Up to 16	Up to 16	Up to 16	Up to 16	Up to 15	Up to 15
Size S0	A	Up to 40	Up to 32	Up to 40	Up to 25	--	--
<b>Rated operational voltage <math>U_e</math> acc. to IEC</b>	V	690 AC <sup>2)</sup>	690 AC <sup>2)</sup>	690 AC <sup>2)</sup>	690 AC <sup>2)</sup>	690 AC	690 AC
<b>Rated frequency</b>	Hz	50/60	50/60	50/60	50/60	50/60	50/60
<b>Trip class</b>		CLASS 10	CLASS 10	--	CLASS 10	--	--
<b>Thermal overload release</b>	A	0.11 ... 0.16 to 34 ... 40	0.11 ... 0.16 to 27 ... 32	None <sup>3)</sup>	0.11 ... 0.16 to 20 ... 25	0.16 ... 15 non-adjustable	0.16 ... 15 non-adjustable
<b>Electronic releases</b>							
A multiple of the rated current		13 times	13 times	13 times	20 times	13 times	20 times
<b>Short-circuit breaking capacity <math>I_{cu}</math> at 480 V AC</b>	kA	12/50/65	50/65	12/50/65	55/100	4)	4)
<b>Pages</b>		5/10, 5/11	5/12	5/13	5/14	5/15	5/16

Accessories		3RV20	3RV21	3RV23	3RV24	3RV27	3RV28
<b>For sizes</b>		S00 S0	S00 S0	S00 S0	S00 S0	S00	S00
Auxiliary switches		✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓	✓
Signaling switches		✓ ✓	✓ ✓	✓ ✓	✓ ✓	--	--
Undervoltage releases		✓ ✓	-- --	✓ ✓	✓ ✓	✓	✓
Shunt releases		✓ ✓	-- --	✓ ✓	✓ ✓	✓	✓
Isolator modules		✓ ✓	✓ ✓	✓ ✓	✓ ✓	--	--
Insulated three-phase busbar system		✓ ✓	-- --	✓ ✓	✓ ✓	--	--
Busbar adapters		✓ ✓	✓ ✓	✓ ✓	✓ ✓	--	--
Door-coupling rotary operating mechanisms		✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓	✓
Link modules		✓ ✓	✓ ✓	✓ ✓	✓ ✓	--	--
Enclosures for surface mounting		✓ ✓	✓ ✓	✓ ✓	✓ ✓	--	--
Enclosures for flush mounting		✓ ✓	✓ ✓	✓ ✓	✓ ✓	--	--
Front plates		✓ ✓	✓ ✓	✓ ✓	✓ ✓	--	--
Infeed system		✓ ✓	-- --	✓ ✓	✓ ✓	--	--
Terminal covers for ring lug terminal connections		-- <sup>5)</sup> -- <sup>5)</sup>	-- --	-- --	-- --	--	--
Sealable scale covers for setting knobs		✓ ✓	✓ ✓	-- --	✓ ✓	--	--
<b>Pages</b>		5/17 ... 5/33					

- ✓ Has this function or can use this accessory
- Does not have this function or cannot use this accessory
- 1) For symmetrical loading of the three phases.
- 2) With molded-plastic enclosure 500 V AC.

- 3) For overload protection of the motors, appropriate overload relays must be used.
- 4) According to UL 489 at 480 Y/277 V AC: 65 kA.
- 5) Terminal covers are available for 3RV20 motor starter protectors with ring lug terminal connection for motor protection.

# SIRIUS 3RV2 Motor Starter Protectors/Circuit Breakers up to 40 A

## General data

### General technical specifications

Type			3RV2. 1	3RV27 11, 3RV28 11	3RV2. 2
Size			S00	S00	S0
Dimensions (W x H x D)			45 x 97 x 91	45 x 144 x 92	45 x 97 x 91
• Screw terminals			45 x 109 x 91	--	45 x 119 x 91
• Spring-type terminals					
<b>Standards</b>			Yes	Yes	Yes
• IEC 60947-1, EN 60947-1 (VDE 0660 Part 100)			Yes	Yes	Yes
• IEC 60947-2, EN 60947-2 (VDE 0660 Part 101)			Yes	Yes	Yes
• IEC 60947-4-1, EN 60947-4-1 (VDE 0660 Part 102)			Yes	Yes	Yes
• UL 489, CSA C22.2-No.5-02			Yes	Yes	Yes
<b>Number of poles</b>			3		
<b>Max. rated current <math>I_n</math> max</b> (= max. rated operational current $I_e$ )	A		16		40
<b>Permissible ambient temperature</b>					
• Storage/transport		°C	-50 ... +80		
• Operation	$I_n$ : 0.16 ... 32 A	°C	-20 ... +70 <sup>1)</sup>		
	$I_n$ : 36 ... 40 A	°C	-20 ... +40 <sup>2)</sup>		
<b>Permissible rated current at inside temperature of control cabinet</b>					
• +60 °C		%	100		
• +70 °C		%	87		
<b>Permissible rated current at ambient temperature of enclosure</b> (applies to motor starter protectors inside enclosure ≤ 32 A)					
• +35 °C		%	100		
• +60 °C		%	87		
<b>Rated operational voltage <math>U_e</math></b>					
• Acc. to IEC		V AC	690 <sup>3)</sup>		
• Acc. to UL/CSA		V AC	600		
<b>Rated frequency</b>		Hz	50/60		
<b>Rated insulation voltage <math>U_i</math></b>		V	690		
<b>Rated impulse withstand voltage <math>U_{imp}</math></b>		kV	6		
<b>Utilization category</b>					
• IEC 60947-2 (motor starter protector/circuit breaker)			A		
• IEC 60947-4-1 (motor starter)			AC-3		
<b>Trip class CLASS</b>	Acc. to IEC 60947-4-1		10		
<b>DC short-circuit breaking capacity</b> (time constant $t = 5$ ms)					
• 1 conducting path 150 V DC		kA	10		
• 2 conducting paths in series 300 V DC		kA	10		
• 3 conducting paths in series 450 V DC		kA	10		
<b>Power loss <math>P_v</math> for each motor starter protector</b>					
Dependent on the rated current $I_n$ (upper setting range)	$I_n$ : 0.16 ... 0.63 A	W	5		
	$I_n$ : 0.8 ... 6.3 A	W	6		
	$I_n$ : 8 ... 16 A	W	7		
	$I_n$ : 16 A	W	--	7	
	$I_n$ : 20 ... 25 A	W	--	8	
	$I_n$ : 28 ... 32 A	W	--	11	
	$I_n$ : 36 ... 40 A	W	--	14	
$R_{percurrentpath} = \frac{P}{I^2 \times 3}$					
<b>Shock resistance</b>	Acc. to IEC 60068-2-27	g/ms	25/11 (square and sine pulse)		
<b>Degree of protection</b>	Acc. to IEC 60529		IP20 <sup>4)</sup>		
<b>Touch protection</b>	Acc. to EN 50274		Finger-safe		
<b>Temperature compensation</b>	Acc. to IEC 60947-4-1	°C	-20 ... +60		
<b>Phase failure sensitivity</b>	Acc. to IEC 60947-4-1		Yes		
<b>Explosion protection – safe operation of motors with "increased safety" type of protection</b>			Yes for 3RV20		
EC type test certificate number according to directive 94/9/EC (ATEX)			On request		
<b>Isolating function</b>	Acc. to IEC 60947-2		Yes		
<b>Main and EMERGENCY-STOP switch characteristics<sup>5)</sup></b>	Acc. to IEC 60204-1 (VDE 0113)		Yes		
<b>Protective separation between main and auxiliary circuits, required for PELV applications</b>	Acc. to EN 60947-1		Yes		
• Up to 400 V + 10 %			Yes		
• Up to 415 V + 5 % (higher voltage on request)			Yes		
<b>Permissible mounting position</b>			Any, acc. to IEC 60447 start command "I" right-hand side or top		
<b>Mechanical endurance</b>	Operating cycles		100 000		
<b>Electrical endurance</b>	Operating cycles		100 000		
<b>Max. switching frequency per hour (motor starts)</b>	1/h		15		

1) Over +60 °C current reduction.

5) With appropriate accessories.

2) The devices must not be mounted side-by-side and they must not be assembled with link modules with contactors. A lateral clearance of 9 mm is required.

3) With molded-plastic enclosure 500 V.

4) Terminal compartment IP00 (exception: 3RV20 11-...2, motor starter protectors with spring-type terminals in degree of protection IP20).

# SIRIUS 3RV2 Motor Starter Protectors/Circuit Breakers up to 40 A

## General data

### Auxiliary releases

#### Power consumption

- During pick-up
  - AC voltages
  - DC voltages
- During uninterrupted duty
  - AC voltages
  - DC voltages

		Undervoltage releases	Shunt releases
VA/W	20.2/13	20.2/13	20.2/13
W	20	13 ... 80	
VA/W	7.2/2.4	--	--
W	2.1	--	--

#### Response voltage

- Tripping
- Pickup

V	0.35 ... 0.7 x $U_s$	0.7 ... 1.1 x $U_s$
V	0.85 ... 1.1 x $U_s$	--

#### Maximum opening time

ms	20
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### Short-circuit protection for auxiliary and control circuits

#### Melting fuses gG

A	10
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#### Miniature circuit breaker, C characteristic

A	6 <sup>1)</sup>
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<sup>1)</sup> Prospective short-circuit current < 0.4 kA.

Type	3RV2. 11	3RV2. 21	3RV27 11, 3RV28 11
Size	S00	S0	S00
Width	45 mm	45 mm	45 mm

### Conductor cross-sections of main circuit

#### Connection type screw terminals

#### ⊕ Screw terminals

Terminal screw	M3, Pozidriv size 2	M4, Pozidriv size 2	M4, Pozidriv size 2
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Operating devices	mm	∅ 5 ... 6	∅ 5 ... 6	∅ 5 ... 6
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Prescribed tightening torque	Nm	0.8 ... 1.2	2 ... 2.5	2.5 ... 3
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#### Conductor cross-sections (min./max.),

1 or 2 conductors can be connected

• Solid	mm <sup>2</sup>	2 x (0.75 ... 2.5) <sup>1)</sup> , 2 x 4	2 x (1 ... 2.5) <sup>1)</sup> , 2 x (2.5 ... 10) <sup>1)</sup>	1 ... 10, max. 2 x 10
• Stranded	mm <sup>2</sup>	2 x (0.75 ... 2.5) <sup>1)</sup> , 2 x 4	2 x (1 ... 2.5) <sup>1)</sup> , 2 x (2.5 ... 10) <sup>1)</sup>	1.5 ... 25, max. 10 + 25
• Finely stranded with end sleeves (DIN 46228 T1)	mm <sup>2</sup>	2 x (0.5 ... 1.5) <sup>1)</sup> , 2 x (0.75 ... 2.5) <sup>1)</sup>	2 x (1 ... 2.5) <sup>1)</sup> , 2 x (2.5 ... 6) <sup>1)</sup> , 1 x 10	1 ... 16, max. 6 + 16
• AWG cables, solid or stranded	AWG	2 x (18 ... 14) <sup>1)</sup> , 2 x 12	2 x (16 ... 12) <sup>1)</sup> , 2 x (14 ... 8) <sup>1)</sup>	2 x (14 ... 10)

#### Connection type spring-type terminals

#### ⊖ Spring-type terminals

Operating devices	mm	3.0 x 0.5 and 3.5 x 0.5		
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#### Conductor cross-sections (min./max.),

1 or 2 conductors can be connected

• Solid	mm <sup>2</sup>	2 x (0.5 ... 4)	2 x (1 ... 10)	--
• Finely stranded without end sleeve	mm <sup>2</sup>	2 x (0.5 ... 2.5)	2 x (1 ... 6)	--
• Finely stranded with end sleeves (DIN 46228 T1)	mm <sup>2</sup>	2 x (0.5 ... 2.5)	2 x (1 ... 6)	--
• AWG cables, solid or stranded	AWG	2 x (20 ... 12)	2 x (18 ... 8)	--
Max. external diameter of the conductor insulation	mm	3.6	3.6	--

#### Connection type ring lug terminals

#### ⊕ Ring lug terminal connection

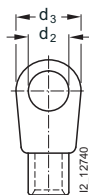
Terminal screw	M3, Pozidriv size 2	M4, Pozidriv size 2	--
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Operating devices	mm	∅ 5 ... 6	∅ 5 ... 6	--
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Prescribed tightening torque	Nm	0.8 ... 1.2	2 ... 2.5	--
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#### Usable ring lug terminals

- DIN 46234 without insulation sleeve
- DIN 46225 without insulation sleeve
- DIN 46237 with insulation sleeve
- JIS C2805 Type R without insulation sleeve
- JIS C2805 Type RAV with insulation sleeve
- JIS C2805 Type RAP with insulation sleeve



<sup>1)</sup> 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.

# SIRIUS 3RV2 Motor Starter Protectors/Circuit Breakers up to 40 A

## Motor Starter Protectors

For motor protection

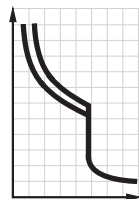
### Selection and ordering data

#### CLASS 10, without auxiliary switches<sup>1)</sup>

The **3RV20 1 & 3RV20 2 MSP's** can be used as components in Group Installation per NEC 430-53(C) to turn motors on and off. Each device has built-in heater elements that provide overload protection and magnetic trip elements to protect the motor.

When the 3RV2 is used as a component in Group Installation, multiple MSP's can be installed below one circuit breaker to protect its own motor. A contactor can be mounted to the MSP to provide a remotely operated starter.

The **3RV20** can also be used as Type E self-protected manual combination starters per UL 508 with the use of an additional type E terminal adapter. See [page 5/21](#) and [5/29](#).



3RV20 11-0AA10



3RV20 11-0EA20



3RV20 21-4AA10



3RV20 21-4AA20

Rated current	Suitable for induction motors <sup>2)</sup> with P	Setting range for thermal overload release	Instantaneous electronic releases	Short-circuit breaking capacity at 460 V AC	Screw terminals	Weight approx.	Spring-type terminals	Weight approx.
$I_n$				$I_{cu}$	Order No.	kg	Order No.	kg
A	HP	A	A	kA				
<b>Size S00</b>								
0.16	--	0.11 ... 0.16	2.1	65	<b>3RV20 11-0AA10</b>	0.260	<b>3RV20 11-0AA20</b>	0.280
0.2	--	0.14 ... 0.2	2.6	65	<b>3RV20 11-0BA10</b>	0.260	<b>3RV20 11-0BA20</b>	0.290
0.25	--	0.18 ... 0.25	3.3	65	<b>3RV20 11-0CA10</b>	0.260	<b>3RV20 11-0CA20</b>	0.290
0.32	--	0.22 ... 0.32	4.2	65	<b>3RV20 11-0DA10</b>	0.260	<b>3RV20 11-0DA20</b>	0.280
0.4	--	0.28 ... 0.4	5.2	65	<b>3RV20 11-0EA10</b>	0.260	<b>3RV20 11-0EA20</b>	0.290
0.5	--	0.35 ... 0.5	6.5	65	<b>3RV20 11-0FA10</b>	0.260	<b>3RV20 11-0FA20</b>	0.290
0.63	--	0.45 ... 0.63	8.2	65	<b>3RV20 11-0GA10</b>	0.260	<b>3RV20 11-0GA20</b>	0.280
0.8	--	0.55 ... 0.8	10	65	<b>3RV20 11-0HA10</b>	0.260	<b>3RV20 11-0HA20</b>	0.280
1	--	0.7 ... 1	13	65	<b>3RV20 11-0JA10</b>	0.320	<b>3RV20 11-0JA20</b>	0.350
1.25	1/2	0.9 ... 1.25	16	65	<b>3RV20 11-0KA10</b>	0.320	<b>3RV20 11-0KA20</b>	0.350
1.6	3/4	1.1 ... 1.6	21	65	<b>3RV20 11-1AA10</b>	0.320	<b>3RV20 11-1AA20</b>	0.350
2	3/4	1.4 ... 2	26	65	<b>3RV20 11-1BA10</b>	0.320	<b>3RV20 11-1BA20</b>	0.350
2.5	1	1.8 ... 2.5	33	65	<b>3RV20 11-1CA10</b>	0.320	<b>3RV20 11-1CA20</b>	0.350
3.2	1.5	2.2 ... 3.2	42	65	<b>3RV20 11-1DA10</b>	0.330	<b>3RV20 11-1DA20</b>	0.350
4	2	2.8 ... 4	52	65	<b>3RV20 11-1EA10</b>	0.320	<b>3RV20 11-1EA20</b>	0.350
5	3	3.5 ... 5	65	65	<b>3RV20 11-1FA10</b>	0.330	<b>3RV20 11-1FA20</b>	0.350
6.3	3	4.5 ... 6.3	82	65	<b>3RV20 11-1GA10</b>	0.330	<b>3RV20 11-1GA20</b>	0.360
8	5	5.5 ... 8	104	65	<b>3RV20 11-1HA10</b>	0.330	<b>3RV20 11-1HA20</b>	0.360
10	5	7 ... 10	130	65	<b>3RV20 11-1JA10</b>	0.330	<b>3RV20 11-1JA20</b>	0.360
12.5	7.5	9 ... 12.5	163	65	<b>3RV20 11-1KA10</b>	0.330	<b>3RV20 11-1KA20</b>	0.360
16	10	11 ... 16	208	65	<b>3RV20 11-4AA10</b>	0.340	<b>3RV20 11-4AA20</b>	0.360
<b>Size S0</b>								
16	10	11 ... 16	208	65	<b>3RV20 21-4AA10</b>	0.340	<b>3RV20 21-4AA20</b>	0.390
20	10	14 ... 20	260	65	<b>3RV20 21-4BA10</b>	0.340	<b>3RV20 21-4BA20</b>	0.400
22	15	17 ... 22	286	65	<b>3RV20 21-4CA10</b>	0.340	<b>3RV20 21-4CA20</b>	0.390
25	15	20 ... 25	325	65	<b>3RV20 21-4DA10</b>	0.340	<b>3RV20 21-4DA20</b>	0.400
28	20	23 ... 28	364	50	<b>3RV20 21-4NA10</b>	0.350	<b>3RV20 21-4NA20</b>	0.410
32	20	27 ... 32	400	50	<b>3RV20 21-4EA10</b>	0.350	<b>3RV20 21-4EA20</b>	0.410
36	25	30 ... 36	432	12	<b>3RV20 21-4PA10</b>	0.360	--	--
40	30	34 ... 40	480	12	<b>3RV20 21-4FA10</b>	0.360	--	--

<sup>1)</sup> The 3RV20 .1-...A.0 motor starter protectors up to 32 A are also available with ring lug terminal connection. The Order No. must be changed in the 11th position to "4": e. g. 3RV20 11-0AA40.

<sup>2)</sup> Guide value for 4-pole standard motors at AC 60 Hz 460 V. Select MSP by motor full load amps. Horsepower ratings for reference only.

Auxiliary switches can be ordered separately (see "Mountable accessories").