




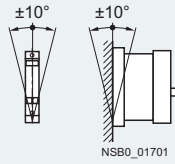
# Solid-State Switching Devices for Resistive Loads

## Solid-State Contactors

### 3RF23 solid-state contactors, single-phase

#### Technical specifications

Order No.	3RF23 ..-A...	3RF23 ..-B...	3RF23 ..-C...	3RF23 ..-D...
<b>General data</b>				
<b>Ambient temperature</b>				
• During operation, derating from 40 °C	°C	-25 ... +60		
• During storage	°C	-55 ... +80		
<b>Installation altitude</b>	m	0 ... 1000; derating from 1000		
<b>Shock resistance</b> acc. to IEC 60068-2-27	g/ms	15/11		
<b>Vibration resistance</b> acc. to IEC 60068-2-6	g	2		
<b>Degree of protection</b>	IP20			
<b>Electromagnetic compatibility (EMC)</b>				
• Emitted interference acc. to IEC 60947-4-3 - Conducted interference voltage - Emitted, high-frequency interference voltage		Class A for industrial applications	Class A for industrial applications; Class B for residential/ business/ commercial applications up to 16 A, AC51 Low Noise	Class A for industrial applications
• Interference immunity - Electrostatic discharge acc. to IEC 61000-4-2 (corresponds to degree of severity 3)	kV	Contact discharge 4; air discharge 8; behavior criterion 2		
- Induced RF fields acc. to IEC 61000-4-6	MHz	0.15 ... 80; 140 dBμV; behavior criterion 1		
- Burst acc. to IEC 61000-4-4	kV	2/5.0 kHz; behavior criterion 1		
- Surge acc. to IEC 61000-4-5	kV	Conductor - ground 2; conductor - conductor 1; behavior criterion 2		

Order No.	3RF23 ..-1....	3RF23 ..-2....	3RF23 ..-3....
<b>General data</b>			
<b>Connection type</b>	 <b>Screw terminals</b>	 <b>Spring-type terminals</b>	 <b>Ring terminal lug connections</b>
<b>Connection, main contacts</b>			
• Conductor cross-section	mm <sup>2</sup>	2 x (1.5 ... 2.5) <sup>1)</sup> , 2 x (2.5 ... 6) <sup>1)</sup>	2x (0.5 ... 2.5)
- Solid	mm <sup>2</sup>	2 x (1 ... 2.5) <sup>1)</sup> , 2 x (2.5 ... 6) <sup>1)</sup> , 1 x 10	2x (0.5 ... 1.5)
- Finely stranded with end sleeve	mm <sup>2</sup>		
- Finely stranded without end sleeve	mm <sup>2</sup>	--	2x (0.5 ... 2.5)
- Solid or stranded, AWG cables		2 x (AWG 14 ... 10)	2 x (AWG 18 ... 14)
• Terminal screw		M4	--
• Tightening torque	Nm	2 ... 2.5	--
	lb.in	7 ... 10.3	--
• Cable lug		--	--
- DIN			DIN 46234
- JIS			-5-2.5, -5-6, -5-10, -5-16, -5-25 JIS C 2805 R 2-5, 5.5-5, 8-5, 14-5
<b>Connection, auxiliary/control contacts</b>			
• Conductor cross-section	mm	1 x (0.5 ... 2.5) <sup>1)</sup> , 2 x (0.5 ... 1.0)	1 x (0.5 ... 2.5), 2 x (0.5 ... 1.0)
	AWG	AWG 20 ... 12	AWG 20 ... 12
• Stripped length	mm	7	7
• Terminal screw		M3	--
• Tightening torque	Nm	0.5 ... 0.6	--
	lb.in	4.5 ... 5.3	--
<b>Permissible mounting positions</b>			
			

<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.

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Type		3RF23 ..-...2	3RF23 ..-...4	3RF23 ..-...5	3RF23 ..-...6
<b>Main circuit</b>					
<b>Rated operational voltage <math>U_e</math></b>	V	24 ... 230	48 ... 460	48 ... 600	48 ... 600
• Operating range	V	20 ... 253	40 ... 506	40 ... 660	40 ... 660
• Rated frequency	Hz	50/60 ± 10 %			
<b>Rated insulation voltage <math>U_i</math></b>	V	600			
<b>Blocking voltage</b>	V	800	1200		1600
<b>Rate of voltage rise</b>	V/μs	1000			

Type		3RF23 ..-...0.	3RF23 ..-...1.	3RF23 ..-...2.	3RF23 ..-...4.
<b>Control circuit</b>					
<b>Method of operation</b>		DC operation	AC/DC operation	AC operation	DC operation
<b>Rated control supply voltage <math>U_s</math></b>	V	24 DC acc. to EN 61131-2	24 AC    24 DC	110 ... 230 AC	4 ... 30 DC
<b>Rated frequency of the control supply voltage</b>	Hz	--	50/60 ± 10 %	--	50/60 ± 10 %
<b>Actuating voltage, max.</b>	V	30	26.5 AC    30 DC	253	30
<b>Typical actuating current</b>	mA	20/Low Power: <math>10^{1}</math>	20    20	15	20
<b>Response voltage</b>	V	15	14 AC    15 DC	90	4
<b>Drop-out voltage</b>	V	5	5 AC    55 DC	40	1
<b>Operating times</b>					
• ON-delay	ms	1 + max. one half-wave <sup>2)</sup>	10 + max. one half-wave <sup>2)</sup>	40 + max. one half-wave <sup>2)</sup>	1 + max. one half-wave <sup>2)</sup>
• OFF-delay	ms	1 + max. one half-wave	15 + max. one half-wave	40 + max. one half-wave	1 + max. one half-wave

<sup>1)</sup> Applies to the version "Low Power" 3RF23 ..-AA...-0KN0.

<sup>2)</sup> Only for zero-point-switching devices.

# Solid-State Switching Devices for Resistive Loads

## Solid-State Contactors

### 3RF23 solid-state contactors, single-phase

Order No.	Type current AC-51 <sup>1)</sup>			Power loss at $I_{max}$	Minimum load current	Leakage current	Rated impulse withstand capacity $I_{tsm}$	$I^2t$ value
	For $I_{max}$ at 40 °C	Acc. to IEC 60947-4-3 for 40 °C	Acc. to UL/CSA for 50 °C					
	A	A	A	W	A	mA	A	A <sup>2</sup> s
<b>Main circuit</b>								
3RF23 1.-A..2	10.5	7.5	9.6	11	0.1	10	200	200
3RF23 1.-A..4							200	200
3RF23 1.-A..5							200	200
3RF23 1.-A..6							400	800
3RF23 2.-A..2	20	13.2	17.6	20	0.5	10	600	1800
3RF23 2.-A..4						10	600	1800
3RF23 2.-A..5						10	600	1800
3RF23 2.-A..6						10	600	1800
3RF23 2.-C..2						25	600	1800
3RF23 2.-C..4						25	600	1800
3RF23 2.-D..2						10	1150	6600
3RF23 2.-D..4						10	1150	6600
3RF23 3.-A..2	30	22	27	33	0.5	10	600	1800
3RF23 3.-A..4						10	600	1800
3RF23 3.-A..5						10	600	1800
3RF23 3.-A..6						10	600	1800
3RF23 3.-C..2						25	600	1800
3RF23 3.-D..4						10	1150	6600
3RF23 4.-A..2	40	33	36	44	0.5	10	1200	7200
3RF23 4.-A..4						1200	7200	
3RF23 4.-A..5						1200	7200	
3RF23 4.-A..6						1150	6600	
3RF23 5.-A..2	50	36	45	54	0.5	10	1150	6600
3RF23 5.-A..4								
3RF23 5.-A..5								
3RF23 5.-A..6								
3RF23 7.-A..2	70	70	62	83	0.5	10	1150	6600
3RF23 7.-A..4								
3RF23 7.-A..5								
3RF23 7.-A..6								
3RF23 9.-A..2	88	88	80	117	0.5	10	1150	6600
3RF23 9.-A..4								
3RF23 9.-A..5								
3RF23 9.-A..6								

<sup>1)</sup> The type current provides information about the performance of the solid-state contactor. The actual permitted rated operational current  $I_e$  can be smaller depending on the connection method and start-up conditions.

[For derating see the characteristic curves.](#)

Order No.	Type current AC-51 <sup>1)</sup>			Type current AC-15		Power loss at $I_{max}$	Minimum load current	Leakage current	Rated impulse withstand capacity $I_{tsm}$	$I^2t$ value
	For $I_{max}$ at 40 °C	Acc. to IEC 60947-4-3 for 40 °C	Acc. to UL/CSA for 50 °C	10 x $I_e$ for 60 ms	Parameters					
	A	A	A	A		W	A	mA	A	A <sup>2</sup> s
<b>Main circuit</b>										
3RF23 1.-B..2	10.5	7.5	9.6	6	1200 1/h 50 % ON period	11	0.1	10	200	200
3RF23 1.-B..4									200	200
3RF23 1.-B..6									400	800
3RF23 2.-B..2	20	13.2	17.6	12	1200 1/h 50 % ON period	20	0.5	10	600	1800
3RF23 2.-B..4										
3RF23 2.-B..6										
3RF23 3.-B..2	30	22	27	15	1200 1/h 50 % ON period	33	0.5	10	600	1800
3RF23 3.-B..4										
3RF23 3.-B..6										
3RF23 4.-B..2	40	33	36	20	1200 1/h 50 % ON period	44	0.5	10	1200	7200
3RF23 4.-B..4									1200	7200
3RF23 4.-B..6									1150	6600
3RF23 5.-B..2	50	36	45	25	1200 1/h 50 % ON period	54	0.5	10	1150	6600
3RF23 5.-B..4										
3RF23 5.-B..6										
3RF23 7.-B..2	70	70	62	27.5	1200 1/h 50 % ON period	83	0.5	10	1150	6600
3RF23 7.-B..4										
3RF23 7.-B..6										
3RF23 9.-B..2	88	88	80	30	1200 1/h 50 % ON period	117	0.5	10	1150	6600
3RF23 9.-B..4										
3RF23 9.-B..6										

<sup>1)</sup> The type current provides information about the performance of the solid-state contactor. The actual permitted rated operational current  $I_e$  can be smaller depending on the connection method and start-up conditions.

[For derating see the characteristic curves.](#)

# Solid-State Switching Devices for Resistive Loads

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#### Fused version with semiconductor protection (similar to type of coordination "2"<sup>1)</sup>)

The semiconductor protection for the SIRIUS controls can be used with different protective devices. This allows protection by means of LV HRC fuses of gG operational class or miniature circuit breakers. Siemens recommends the use of special SITOR semiconductor fuses. The table below lists the maximum permissible fuses for each SIRIUS control.

If a fuse is used with a higher rated current than specified, semiconductor protection is no longer guaranteed. However, smaller fuses with a lower rated current for the load can be used without problems.

For protective devices with gG operational class and for SITOR 3NE1 all-range fuses, the minimum cross-sections for the conductor to be connected must be taken into account.

Order No.	All-range fuses		Semiconductor fuses/partial-range fuses			
	LV HRC design	Cylindrical design	LV HRC design	Cylindrical design	aR/SITOR	aR/SITOR
	gR/SITOR	gR/NEOZED <sup>2)</sup>	aR/SITOR	aR/SITOR	aR/SITOR	aR/SITOR
	3NE1	SILIZED 5SE1	3NE8	10 mm x 38 mm 3NC1 0	14 mm x 51 mm 3NC1 4	22 mm x 58 mm 3NC2 2
<b>3RF23 1-.....</b>	3NE1813-0	5SE1 316	3NE8 015-1	3NC1 010	3NC1 410	3NC2 220
<b>3RF23 2-.....</b>	3NE1814-0	5SE1 325	3NE8 015-1	3NC1 020	3NC1 420	3NC2 220
<b>3RF23 3-.....</b>	3NE1803-0	5SE1 335	3NE8 003-1	3NC1 032	3NC1 432	3NC2 232
<b>3RF23 4-.....</b>	3NE1802-0	5SE1 350	3NE8 017-1	--	3NC1 440	3NC2 240
<b>3RF23 5-.....</b>	3NE1817-0	5SE1 363	3NE8 018-1	--	3NC1 450	3NC2 250
<b>3RF23 7-.....2</b>	3NE1820-0	--	3NE8 020-1	--	--	3NC2 280
<b>3RF23 7-.....4</b>	3NE1020-2	--	3NE8 020-1	--	--	3NC2 280
<b>3RF23 7-.....5<sup>3)</sup></b>	3NE1020-2	--	3NE8 020-1	--	--	3NC2 280
<b>3RF23 7-.....6</b>	3NE1020-2	--	3NE8 020-1	--	--	3NC2 280
<b>3RF23 9-.....2</b>	3NE1021-2	--	3NE8 021-1	--	--	3NC2 200
<b>3RF23 9-.....4</b>	3NE1021-2	--	3NE8 021-1	--	--	3NC2 280 <sup>4)</sup>
<b>3RF23 9-.....5<sup>3)</sup></b>	3NE1021-2	--	3NE8 021-1	--	--	3NC2 280 <sup>4)</sup>
<b>3RF23 9-.....6</b>	3NE1020-2 <sup>4)</sup>	--	3NE8 021-1	--	--	3NC2 280 <sup>4)</sup>

Order No.	Cable and line protection fuses				
	LV HRC design	Cylindrical design	gG	gG	DIAZED
	gG	gG	gG	gG	quick
	3NA6	10 mm x 38 mm 3NW6 0	14 mm x 51 mm 3NW6 1	22 mm x 58 mm 3NW6 2	5SB
<b>3RF23 1-.....2</b>	3NA6 803	3NW6 001-1 <sup>4)</sup>	3NW6 101-1 <sup>4)</sup>	--	5SB1 41
<b>3RF23 1-.....4</b>	3NA6 801	3NW6 001-1 <sup>4)</sup>	3NW6 101-1 <sup>4)</sup>	--	5SB1 41
<b>3RF23 1-.....5<sup>3)</sup></b>	3NA6 801	3NW6 001-1 <sup>4)</sup>	3NW6 101-1 <sup>3)</sup>	--	5SB1 41
<b>3RF23 1-.....6</b>	3NA6 803-6	--	--	--	--
<b>3RF23 2-.....2</b>	3NA6 807	3NW6 007-1 <sup>4)</sup>	3NW6 107-1	3NW6 207-1	5SB1 71
<b>3RF23 2-.....4</b>	3NA6 807	3NW6 005-1 <sup>4)</sup>	3NW6 105-1 <sup>4)</sup>	3NW6 205-1 <sup>4)</sup>	5SB1 71
<b>3RF23 2-.....5<sup>3)</sup></b>	3NA6 807	3NW6 005-1 <sup>4)</sup>	3NW6 105-1 <sup>4)</sup>	3NW6 205-1 <sup>4)</sup>	5SB1 71
<b>3RF23 2-.....6</b>	3NA6 807-6	--	--	--	--
<b>3RF23 3-.....2</b>	3NA6 810 <sup>4)</sup>	--	3NW6 107-1 <sup>4)</sup>	3NW6 207-1	5SB3 11
<b>3RF23 3-.....4</b>	3NA6 807 <sup>4)</sup>	--	3NW6 105-1 <sup>4)</sup>	3NW6 205-1 <sup>4)</sup>	5SB3 11
<b>3RF23 3-.....5<sup>3)</sup></b>	3NA6 807 <sup>4)</sup>	--	3NW6 105-1 <sup>4)</sup>	3NW6 205-1 <sup>4)</sup>	5SB3 11
<b>3RF23 3-.....6</b>	3NA6 807-6 <sup>4)</sup>	--	--	--	--
<b>3RF23 4-.....2</b>	3NA6 817	--	3NW6 117-1	3NW6 217-1	5SB3 21
<b>3RF23 4-.....4</b>	3NA6 812 <sup>4)</sup>	--	3NW6 112-1 <sup>4)</sup>	3NW6 212-1 <sup>4)</sup>	5SB3 21
<b>3RF23 4-.....5<sup>3)</sup></b>	3NA6 812 <sup>4)</sup>	--	3NW6 112-1 <sup>4)</sup>	3NW6 212-1 <sup>4)</sup>	5SB3 21
<b>3RF23 4-.....6</b>	--	--	--	--	--
<b>3RF23 5-.....2</b>	--	--	--	3NW6 217-1 <sup>4)</sup>	5SB3 21
<b>3RF23 5-.....4</b>	--	--	--	--	5SB3 21
<b>3RF23 5-.....5<sup>3)</sup></b>	--	--	--	--	5SB3 21
<b>3RF23 5-.....6</b>	--	--	--	--	--
<b>3RF23 7-.....2</b>	--	--	--	--	5SB3 21 <sup>4)</sup>
<b>3RF23 7-.....4</b>	--	--	--	--	5SB3 21 <sup>4)</sup>
<b>3RF23 7-.....5<sup>3)</sup></b>	--	--	--	--	5SB3 21 <sup>4)</sup>
<b>3RF23 7-.....6</b>	--	--	--	--	--
<b>3RF23 9-.....2</b>	--	--	--	--	5SB3 31 <sup>4)</sup>
<b>3RF23 9-.....4</b>	--	--	--	--	5SB3 21 <sup>4)</sup>
<b>3RF23 9-.....5<sup>3)</sup></b>	--	--	--	--	5SB3 21 <sup>4)</sup>
<b>3RF23 9-.....6</b>	--	--	--	--	--

Suitable fuse holders, fuse bases and controls can be found in "BETA Low-Voltage Circuit Protection".

- 1) Type of coordination "2" according to EN 60947-4-1:  
In the event of a short-circuit, the controls in the load feeder must not endanger persons or the installation. They must be suitable for further operation. For fused configurations, the protective device must be replaced.
- 2) For use only with operational voltage  $U_e$  up to 400 V.
- 3) For use only with operational voltage  $U_e$  up to 506 V.
- 4) These fuses have a smaller rated current than the solid-state contactors.