

Solid-State Switching Devices for Resistive Loads

Solid-State Contactors

3RF24 solid-state contactors, 3-phase

Technical specifications

Order No.	3RF24 ...-1....	3RF24 ...-2....	3RF24 ...-3....
General data			
Ambient temperature			
• During operation, derating from 40 °C	°C	-25 ... +60	
• During storage	°C	-55 ... +80	
Installation altitude	m	0 ... 1000; derating from 1000	
Shock resistance acc. to IEC 60068-2-27	g/ms	15/11	
Vibration resistance acc. to IEC 60068-2-6	g	2	
Degree of protection		IP20	
Insulation strength at 50/60 Hz (main/control circuit to floor)	V rms	4000	
Electromagnetic compatibility (EMC)			
• Emitted interference acc. to IEC 60947-4-3 - conducted interference voltage - emitted, high-frequency interference voltage		Class A for industrial applications ¹⁾ 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	
Connection type			
		Screw terminals	Spring-loaded terminals
Ring terminal lug connections			
Connection, main contacts			
• Conductor cross-section	mm ²	2 x (1.5 ... 2.5) ²⁾ , 2 x (2.5 ... 6) ²⁾	2x (0.5 ... 2.5)
- solid	mm ²	2 x (1 ... 2.5) ²⁾ , 2 x (2.5 ... 6) ²⁾ , 1 x 10	2x (0.5 ... 1.5)
- finely stranded with end sleeve	mm ²	--	--
- finely stranded without end sleeve	mm ²	2 x (AWG 14 ... 10)	2x (0.5 ... 2.5)
- solid or stranded, AWG cables	mm	10	2x (AWG 18 ... 14)
• Stripped length	mm	10	10
• Terminal screw		M4	--
- tightening torque	Nm	2 ... 2.5	
	lb.in	18 ... 22	
• Cable lug		--	--
- acc. to DIN 46234			5-2.5 ... 5-25
- acc. to JIS C 2805			R 2-5 ... 14-5
Connection, auxiliary/control contacts			
• Conductor cross-section	mm	1 x (0.5 ... 2.5), 2 x (0.5 ... 1.0)	0.5 ... 2.5
	AWG	AWG 20 ... 12	AWG 20 ... 12
• Stripped length	mm	7	10
• Terminal screw		M3	--
- tightening torque,	Nm	0.5 ... 0.6	
∅ 3.5, PZ 1	lb.in	4.5 ... 5.3	
Permissible mounting positions			

¹⁾ These products were built as Class A devices. The use of these devices in residential areas could result in lead in radio interference. In this case these may be required to introduce additional interference suppression measures.

²⁾ 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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Order No.	Type current	Rated operational current I_e		Power loss at I_{AC-51}	Minimum load current	Max. leakage current	Rated impulse withstand capacity I_{tsm}	I^2t value
	I_{AC-51} at 40 °C	acc. to IEC 60947-4-3 for 40 °C	acc. to UL/CSA for 50 °C					
Main circuit								
3RF24 10-.AB.5	10.5	7	7	23	0.1	10	200	200
3RF24 20-.AB.5	22	15	15	44	0.5	10	600	1.800
3RF24 30-.AB.5	30	22	22	61	0.5	10	1200	7200
3RF24 40-.AB.5	40	30	30	80	0.5	10	1150	6600
3RF24 50-.AB.5	50	38	38	107	0.5	10	1150	6600
3RF24 10-.AC.5	10.5	7	7	31	0.1	10	300	450
3RF24 20-.AC.5	22	15	15	66	0.5	10	600	1800
3RF24 30-.AC.5	30	22	22	91	0.5	10	1200	7200
3RF24 40-.AC.5	40	30	30	121	0.5	10	1150	6600
3RF24 50-.AC.5	50	38	38	160	0.5	10	1150	6600

1) 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 on page 4/36.

Type		3RF24 ..-.AB.5	3RF24 ..-.AC.5
Main circuit			
Controlled phases		2-phase	3-phase
Rated operational voltage U_e	V	48 ... 600	48 ... 600
• Operating range	V	40 ... 660	40 ... 660
• Rated frequency	Hz	50/60 ± 10 %	50/60 ± 10 %
Rated insulation voltage U_i	V	600	600
Rated impulse withstand voltage U_{imp}	kV	6	6
Blocking voltage	V	1200	1200
Rate of voltage rise	V/μs	1000	1000

Type		3RF24 ..-...4.	3RF24 ..-...5.
Control circuit			
Method of operation		DC operation	AC operation
Rated control supply voltage U_s	V	4 ... 30	190 ... 230
Rated frequency of the control supply voltage	Hz	--	50/60 ± 10%
Actuating voltage, max.	V	30	253
Typical actuating current	mA	30	15
Response voltage	V	4	180
Drop-out voltage	V	< 1	< 40
Operating times			
• ON-delay	ms	1 + max. one half-wave	40 + max. one half-wave
• OFF-delay	ms	1 + max. one half-wave	40 + max. one half-wave

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Fused version with semiconductor protection (similar to type of coordination "2")¹⁾

The semiconductor protection for the 3RF24 controls can be used with different protective devices. Siemens recommends the use of special SITOR semiconductor fuses. The table below lists the maximum permissible fuses for each 3RF24 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.

Order No.	All-range fuses		Semiconductor fuses / back-up fuses				
	LV HRC design gR/SITOR	Cylindrical design gR/NEOZED ²⁾ SILIZED 5SE1	LV HRC design aR/SITOR	Cylindrical design		aR/SITOR	aR/SITOR
	3NE1	5SE1	3NE8	10 mm x 38 mm 3NC1 0	14 mm x 51 mm 3NC1 4	22 mm x 58 mm 3NC2 2	

Operational voltage U_e up to 460 V (+10%)

3RF24 10-A...	3NE1 813-0	5SE1 310	3NE8 015-1	3NC1 012	3NC1 415	3NC2 220
3RF24 20-A...	3NE1 814-0	5SE1 320	3NE8 015-1	3NC1 025	3NC1 425	3NC2 225
3RF24 30-A...	3NE1 803-0	5SE1 335	3NE8 003-1	3NC1 032	3NC1 432	3NC2 232
3RF24 40-A...	3NE1 802-0	5SE1 350	3NE8 017-1	--	3NC1 450	3NC2 250
3RF24 50-A...	3NE1 817-0	5SE1 350	3NE8 018-1	--	3NC1 450	3NC2 263

Operational voltage U_e up to 600 V (+10%)

3RF24 10-A...	3NE1 813-0	--	3NE8 015-1	3NC1 012	3NC1 415	3NC2 220
3RF24 20-A...	3NE1 814-0	--	3NE8 015-1	3NC1 025	3NC1 425	3NC2 225
3RF24 30-A...	3NE1 803-0	--	3NE8 003-1	3NC1 032	3NC1 432	3NC2 232
3RF24 40-A...	3NE1 802-0	--	3NE8 017-1	--	3NC1 450	3NC2 250
3RF24 50-A...	3NE1 817-0	--	3NE8 018-1	--	3NC1 450	3NC2 263

Order No.	Cable and line protection fuses				
	LV HRC design gG	Cylindrical design gG	gG	gG	DIAZED Quick
	3NA6	10 mm x 38 mm 3NW6 0	14 mm x 51 mm 3NW6 1	22 mm x 58 mm 3NW6 2	5SB

Operational voltage U_e up to 460 V (+10%)

3RF24 10-AB..	3NA3 801 ³⁾	3NW6 001-1 ³⁾	3NW6 101-1 ³⁾	--	5SB1 31 ³⁾
3RF24 10-AC..	3NA3 803	3NW6 001-1 ³⁾	3NW6 101-1 ³⁾	--	5SB1 61
3RF24 20-A...	3NA3 805 ³⁾	3NW6 005-1 ³⁾	3NW6 105-1 ³⁾	3NW6 205-1 ³⁾	5SB1 81
3RF24 30-A...	3NA3 812	--	3NW6 112-1	--	5SB3 11
3RF24 40-A...	3NA3 812 ³⁾	--	3NW6 112-1 ³⁾	3NW6 210-1 ³⁾	5SB3 21
3RF24 50-A...	3NA3 812 ³⁾	--	--	3NW6 210-1 ³⁾	5SB3 21 ³⁾

Suitable fuse holders, fuse bases and controls can be found in Catalog LV 1, Chapter 19.

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⁾ These fuses have a smaller rated current than the solid-state contactors.

Solid-State Switching Devices for Resistive Loads

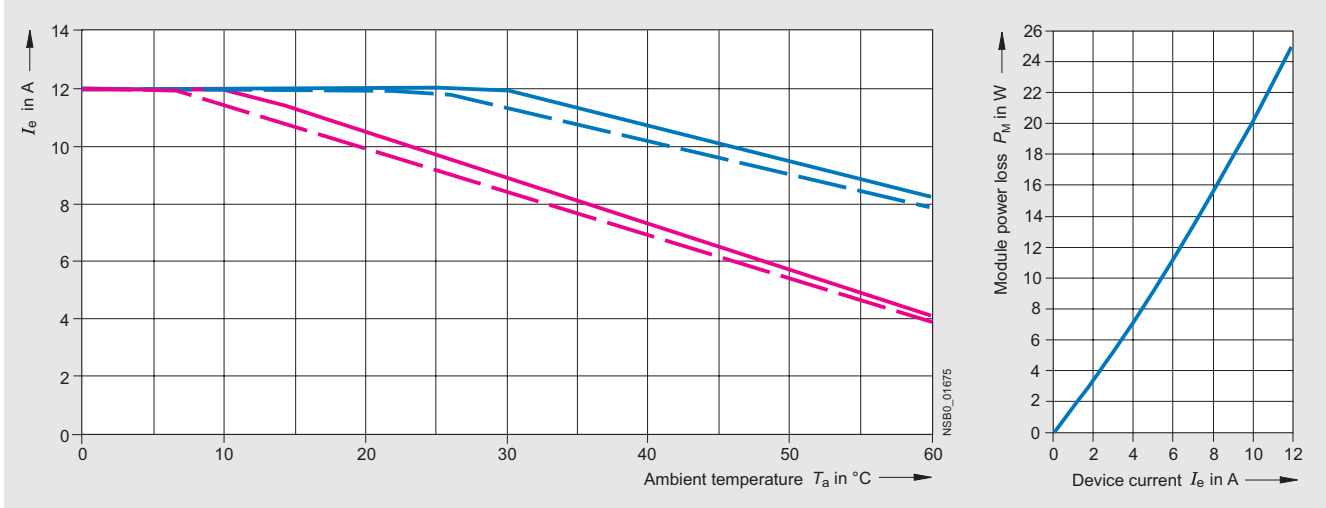
Solid-State Contactors

3RF24 solid-state contactors, 3-phase

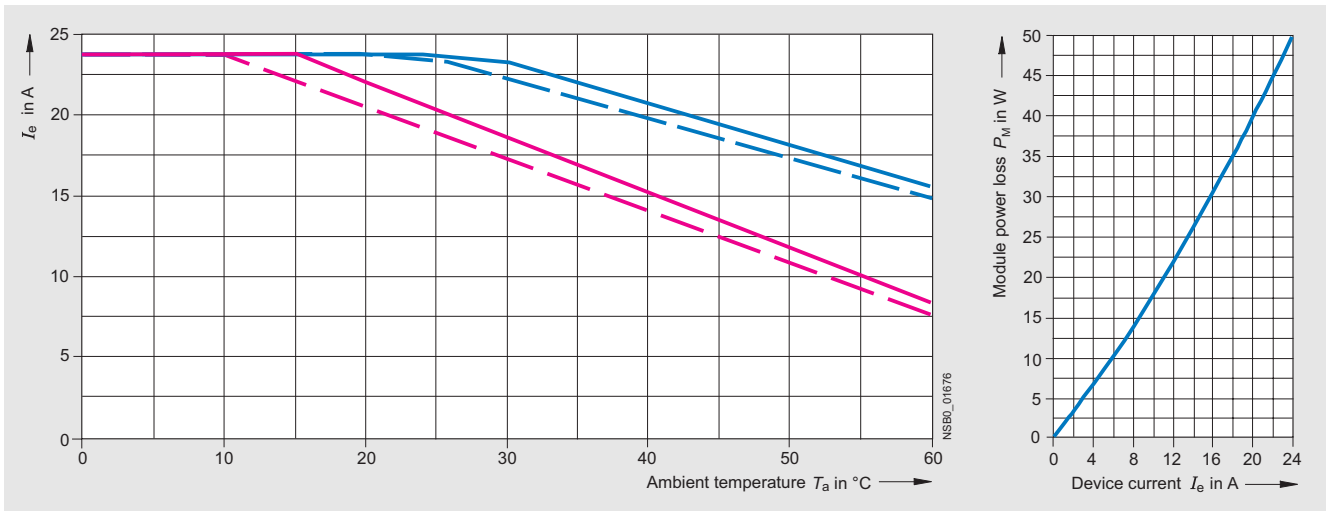
Characteristic curves

Derating curves, two-phase controlled

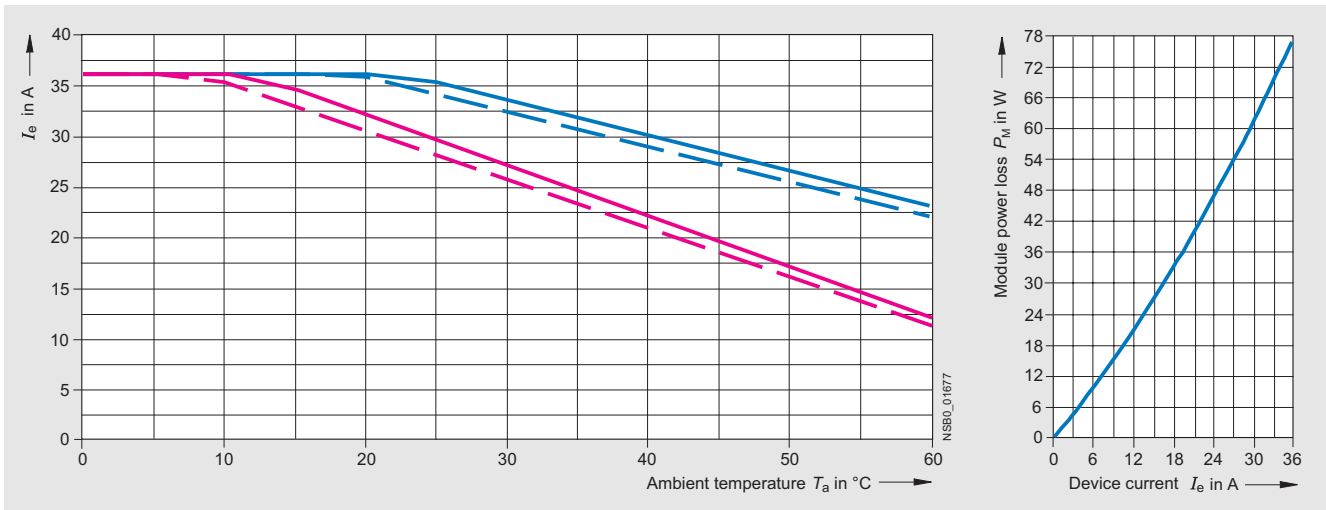
4



Type current 10.5 A (3RF24 10-.AB..)



Type current 20 A (3RF24 20-.AB..)

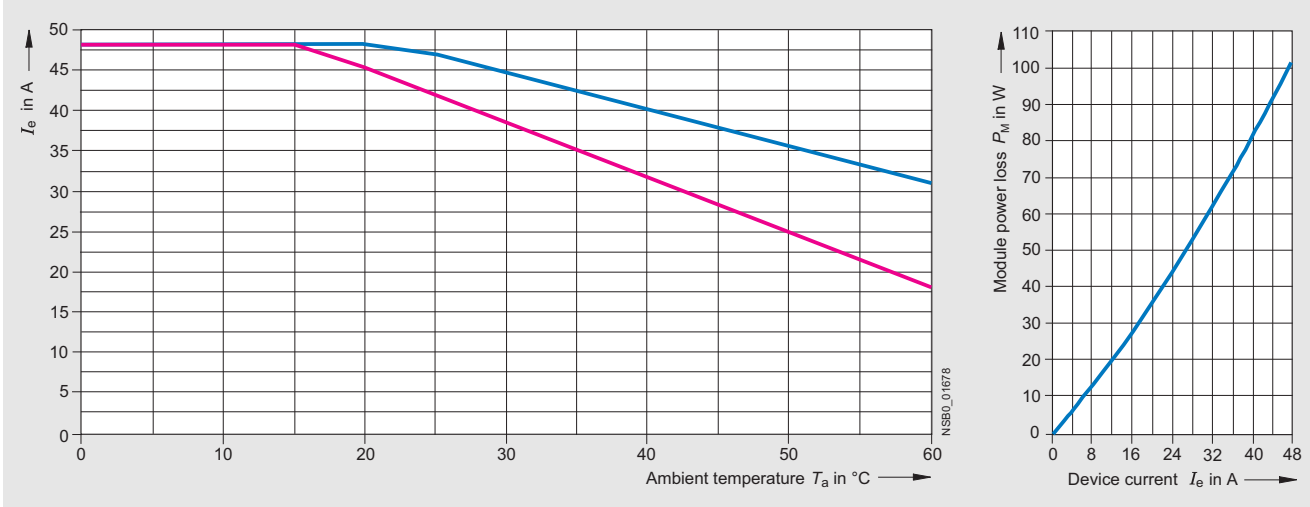


Type current 30 A (3RF24 30-.AB..)

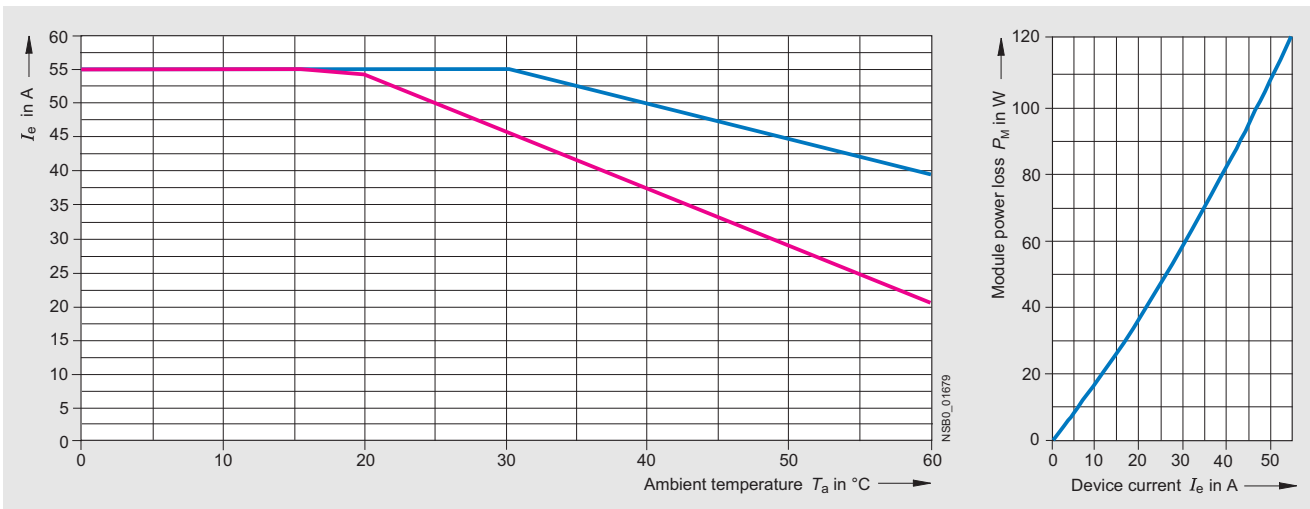
Solid-State Switching Devices for Resistive Loads

Solid-State Contactors

3RF24 solid-state contactors, 3-phase



Type current 40 A (3RF24 40-AB..)¹)

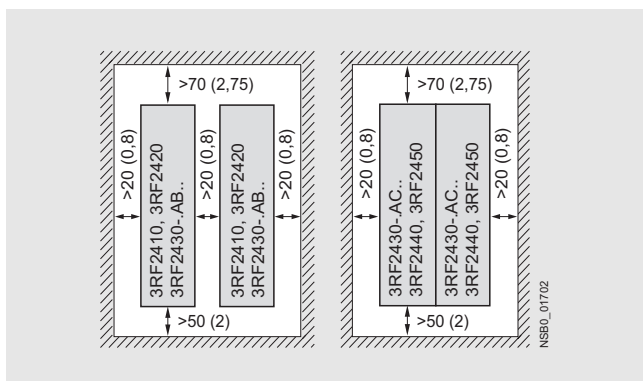


Type current 50 A (3RF24 50-AB..)¹)

- I_{max} Thermal limit current for individual mounting
- I_{max} Thermal limit current for side-by-side mounting
- I_{IEC} Current acc. to IEC 947-4-3 for individual mounting
- I_{IEC} Current acc. to IEC 947-4-3 for side-by-side mounting

Note: When loaded with I_{IEC} , the maximum overtemperature at the heat sink is 50 K.

Mounting regulations



Clearances for stand-alone and side-by-side installation

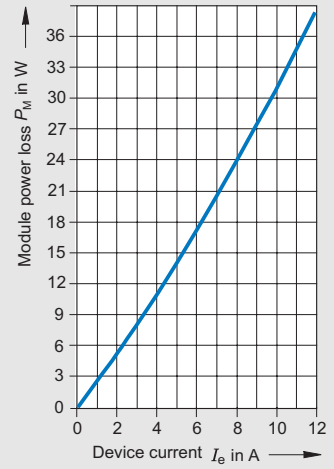
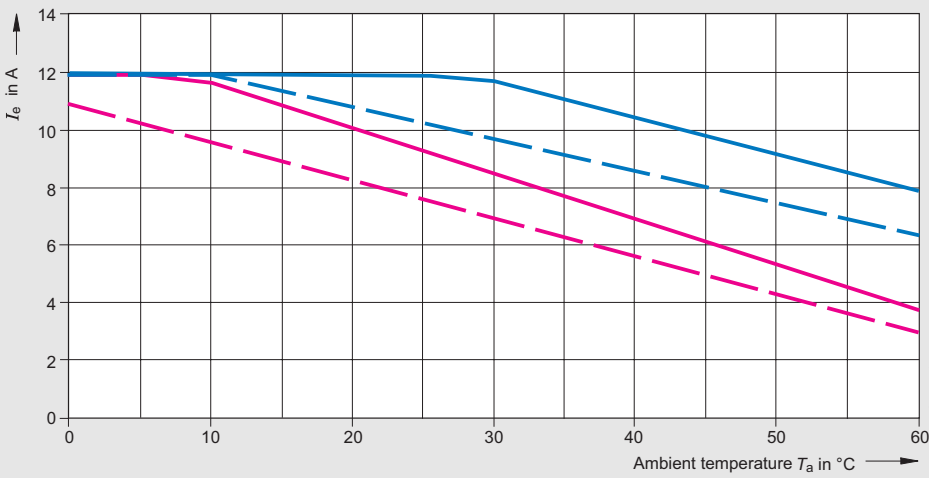
¹) Identical current/temperature curves for stand-alone and side-by-side installation.

Solid-State Switching Devices for Resistive Loads

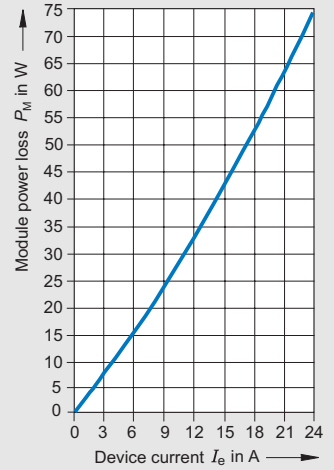
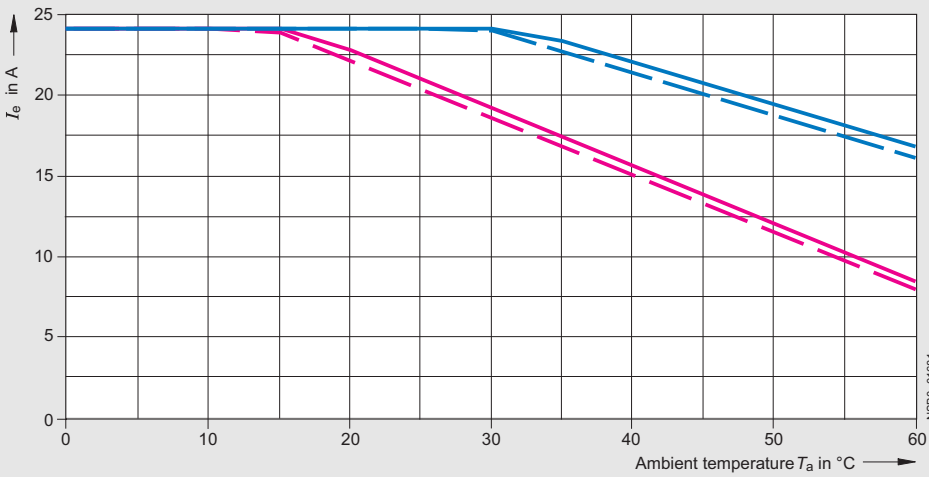
Solid-State Contactors

3RF24 solid-state contactors, 3-phase

Derating curves, three-phase controlled

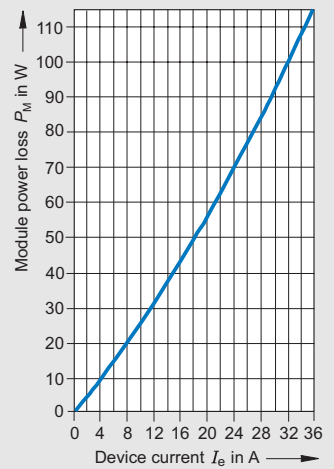
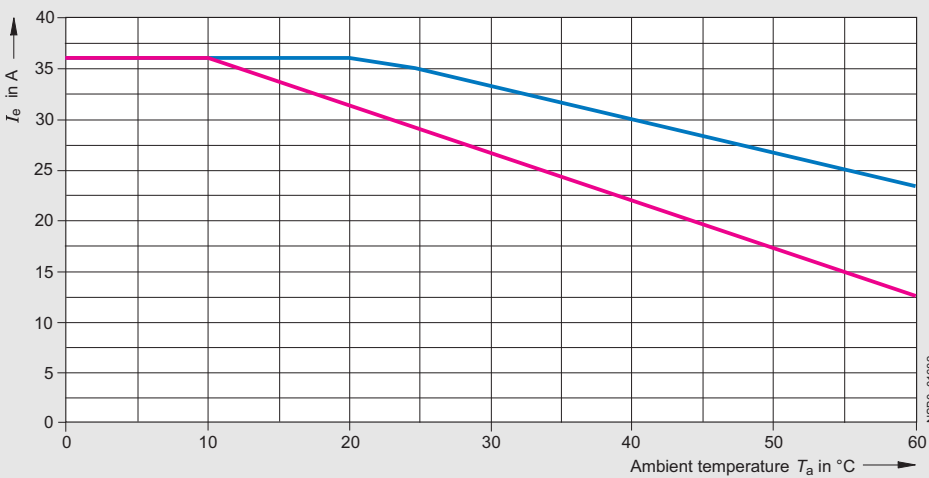


Type current 10.5 A (3RF24 10-.AC..)



Type current 20 A (3RF24 20-.AC..)

¹⁾ Identical current/temperature curves for stand-alone and side-by-side installation.

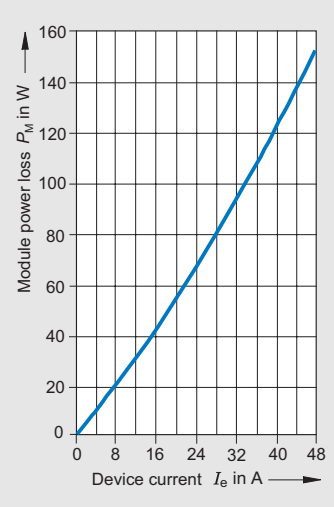
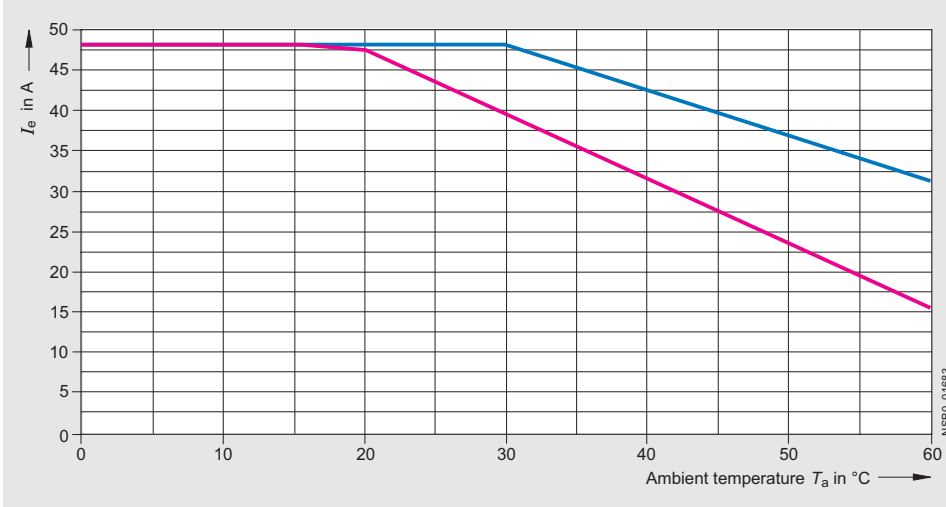


Type current 30 A (3RF24 30-.AC..) ¹⁾

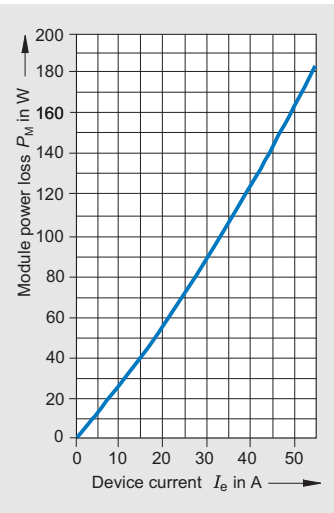
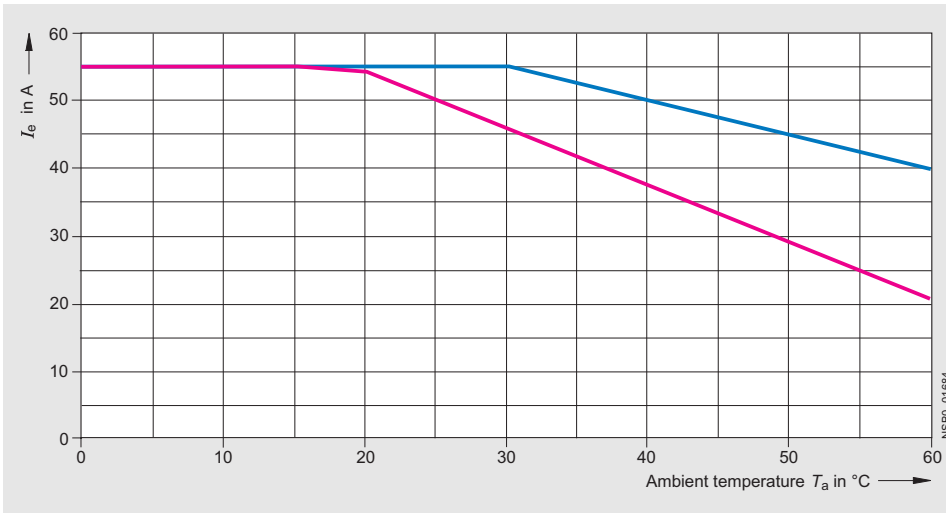
¹⁾ Identical current/temperature curves for stand-alone and side-by-side installation.

Solid-State Switching Devices for Resistive Loads Solid-State Contactors

3RF24 solid-state contactors, 3-phase



Type current 40 A (3RF24 40-.AC..)¹)

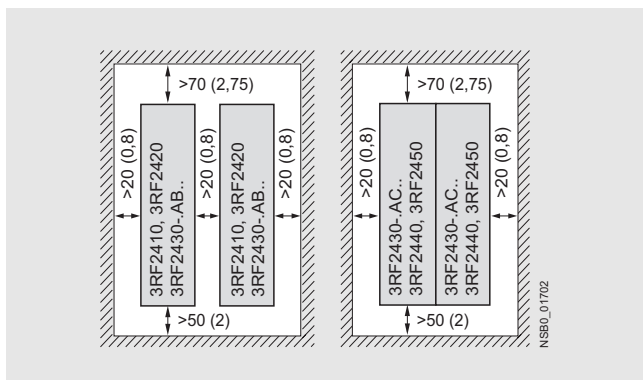


Type current 50 A (3RF24 50-.AC..)¹)

- I_{max} Thermal limit current for individual mounting
- I_{max} Thermal limit current for side-by-side mounting
- I_{IEC} Current acc. to IEC 947-4-3 for individual mounting
- I_{IEC} Current acc. to IEC 947-4-3 for side-by-side mounting

Note: When loaded with I_{IEC} , the maximum overtemperature at the heat sink is 50 K.

Mounting regulations



Clearances for stand-alone and side-by-side installation

¹) Identical current/temperature curves for stand-alone and side-by-side installation.

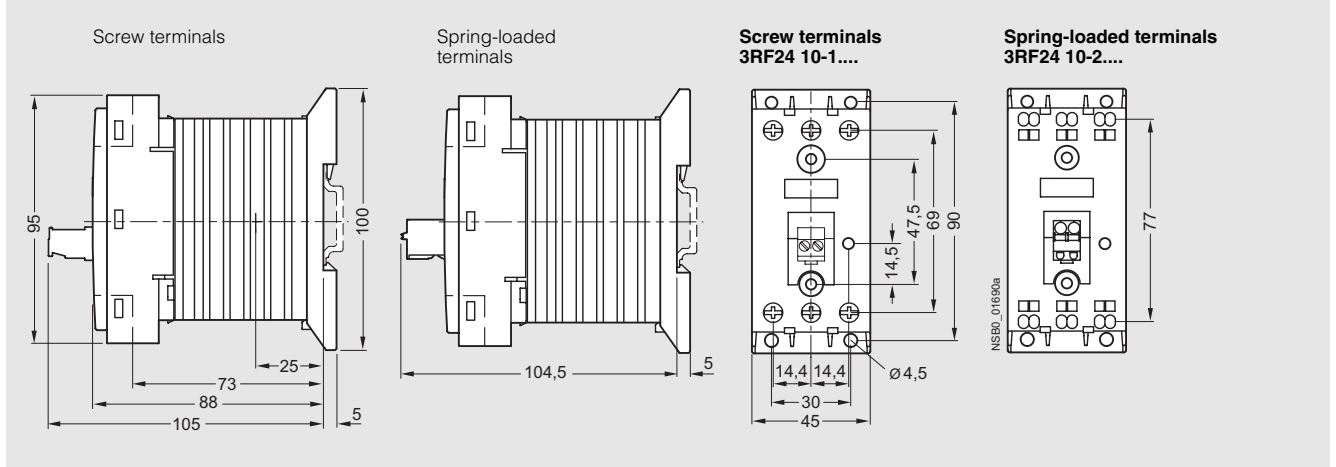
Solid-State Switching Devices for Resistive Loads

Solid-State Contactors

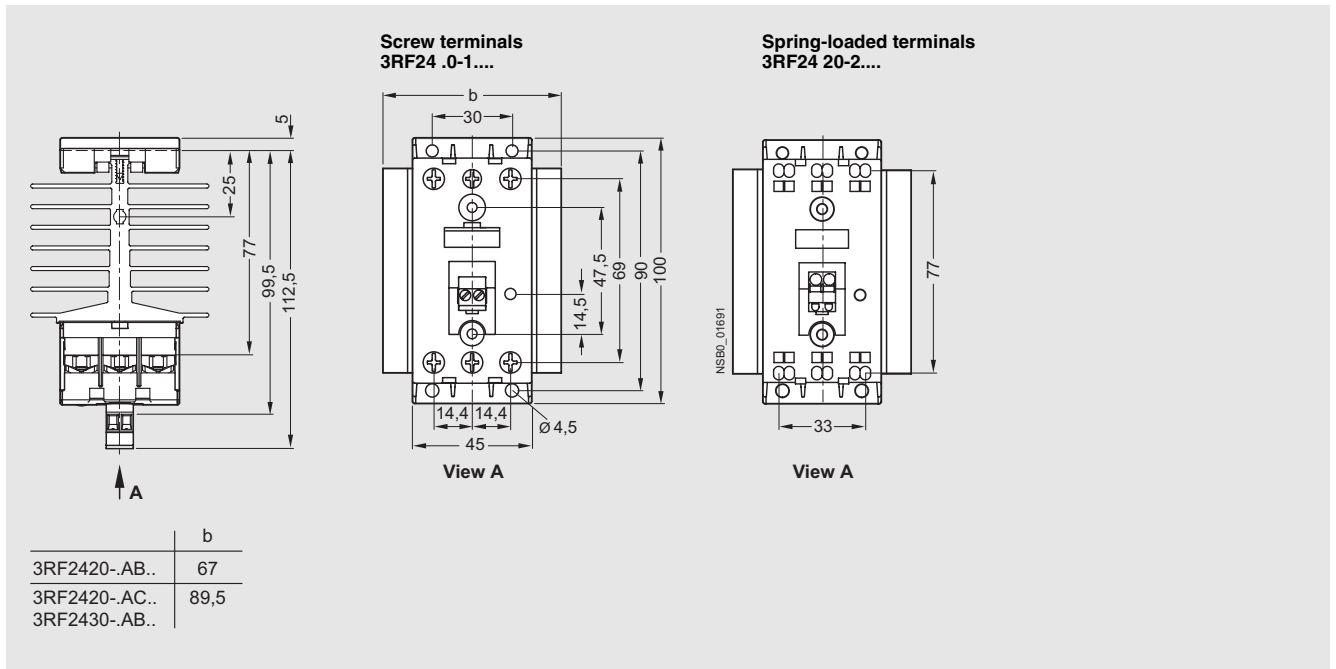
3RF24 solid-state contactors, 3-phase

Dimensional drawings

Type current 10.5 A



Type current 20 A; 30 A (two-phase controlled)



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3RF24 solid-state contactors, 3-phase

Type current 30 A (three-phase controlled); 40 A, 50 A

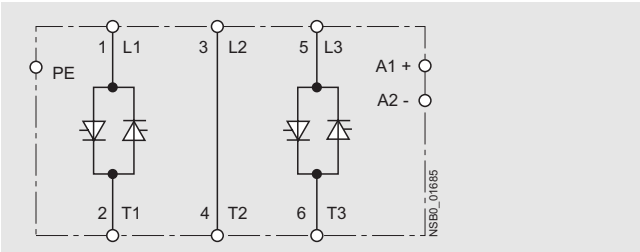
Screw terminals
3RF24 .0-1....

Ring terminal lug connection
3RF24 50-3....

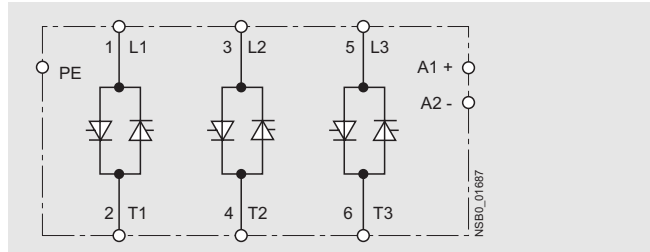
	a	b	d	e
3RF2430-.AC..	100	113,5	100	85
3RF2440-.AB..				
3RF2440-.AC..	100	157,5	146	80
3RF2450-.AB..				
3RF2450-.AC..	180	157,5	146	160

Schematics

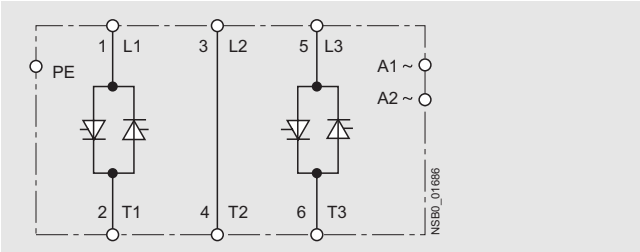
Two-phase controlled,
DC control supply voltage



Three-phase controlled,
DC control supply voltage



Two-phase controlled,
AC control supply voltage



Three-phase controlled,
AC control supply voltage

