

# Solid State Relays

## Zero-Point Switching, heatsink integrated

### Main Characteristics:

- Zero switching
- LED display
- Various connection technologies
- Plug-in control terminal
- Degree of protection IP 20
- Insulated mounting foot



### Standards / Approvals:

- DIN EN 60947-4-3
- UL 508 / CSA
- CE
- C-Tick

### Ordering Key:

<b>3RF23</b>	<b>10</b>	<b>- 1</b>	<b>A</b>	<b>A</b>	<b>0</b>	<b>2</b>
Solid state contactor with heat sink	Max. load current 10 = 10.5 A 20 = 20 A 30 = 30 A 40 = 40 A 50 = 50 A 70 = 70 A 90 = 88 A	Connection technology 1 = Screw connection 2 = Spring-loaded connection 3 = Ring cable connection M5	Switching function A = Zero-point switching	Controlled phases A = Single-phase	Control voltage 0 = 24 V DC 1 = 24 V AC/DC 2 = 110 - 230 V AC 4 = 4 - 30 V DC	Operating voltage 2 = 24 - 230 V 4 = 48 - 460 V 5 = 48 - 600 V 6 = 48 - 600 V

Not all possible versions are available ex stock!

### Main Circuit:

Values for 40 °C ambient temperature!	I <sub>AC-51</sub>	I <sub>e</sub> acc. to IEC947-4-3	I <sub>e</sub> UL/CSA	Power loss with I <sub>max</sub>	Min. load current	Max. leakage current
Type	A	A	A	W	A	mA
3RF2310- . A A .	10.5	7.5	9.6	11	0.1	10
3RF2320- . A A .	20	13.2	17.6	20	0.5	10
3RF2330- 1 A A .	30	22	27	33	0.5	10
3RF2330- 3 A A .	30	22	27	33	0.5	10
3RF2340- 1 A A .	40	33	36	44	0.5	10
3RF2340- 3 A A .	40	33	36	44	0.5	10
3RF2350- 1 A A .	50	36	45	54	0.5	10
3RF2350- 3 A A .	50	36	45	54	0.5	10
3RF2370- 3 A A .	70	70	62	83	0.5	10
3RF2390- 3 A A .	88	88	83	117	0.5	10

Type		3RF23...AA.2	3RF23...AA.4	3RF23...AA.5	3RF23...AA.6
Rated operating voltage U <sub>e</sub>	V	24 ... 230	48 ... 460	48 ... 600	48 ... 600
	• Voltage range	V	20 ... 253	40 ... 506	40 ... 660
	• Rated frequency	Hz	50/60 ± 10 %		
Rated insulation voltage U <sub>i</sub>	V	600			
Rated impulse withstand voltage U <sub>imp</sub>	kV	6			
Blocking voltage	V	800	1200	1200	1600
Slew rate	V/µs	1000			

	Rated impulse withstand strength $I_{tsm}$	$I^2t$ value
Type	A	A <sup>2</sup> s
3RF2310-.AA.2	200	200
3RF2310-.AA.4	200	200
3RF2310-.AA.6	400	800
3RF2320-.A.	600	1800
3RF2330-.A.	600	1800
3RF2340-.AA.2	1200	7200
3RF2340-.AA.4	1200	7200
3RF2340-.AA.6	1150	6600
3RF2350-.A.	1150	6600
3RF2370-.A.	1150	6600
3RF2390-.A.	1150	6600

### Control Circuit A1-A2:

Type		3RF23...AA0.	3RF23...AA1.	3RF23...AA2.	3RF23...AA4.	
Control voltage $U_s$	V	DC 24 acc. to EN 61131-2	AC/DC 24		AC 110 ... 230	DC 4 ... 30
Max. control voltage $U_s$	V	30	AC 26,5	DC 30	253	30
Typical operating current	mA	20	20	20	15	20
Response voltage	V	15	AC 14	DC 15	90	4
Drop-out voltage	V	5	5	5	40	1
Rated frequency of the control supply voltage	Hz	--	50/60 ± 10 %	--	50/60 ± 10 %	--
Switching times ON delay	ms	1 + Max. one half-wave	1 + Max. one hw.	40 + Max. one hw.	40 + Max. one half-wave	1 + Max. one half-wave
OFF delay	ms	1 + Max. one add. half-wave	1 + Max. one Hw	40 + Max. one hw.	40 + Max. one add. half-wave	1 + Max. one add. half-wave

### General Data:

<b>Ambient temperature</b>		
During operation	°C	-25 ... 60
During storage	°C	-55 ... 80
<b>Mounting altitude</b>	m	0 ... 1000; at > 1000 m, please contact our Technical Assistance
<b>Impact resistance</b> acc. to DIN IEC 68	g/ms	15/11
<b>Vibration resistance</b>	g	2
<b>Degree of protection</b>		IP20
<b>Electromagnetic compatibility</b>	(EMC)	
Interference emission		
o Conducted interference voltage IEC 60 947-4-3		Class A for industrial applications <sup>1</sup>
o Radiated, high-frequency interference voltage IEC 60 947-4-3		Class A for industrial applications
Interference resistance		
o Electrostatic discharge acc. to IEC 61 000-4-2 (corresponds to severity 3)	kV	Contact discharge 4; air discharge 8; performance criterion 2
o Induced HF fields acc. to IEC 61 000-4-6	MHz	0.15 ... 80; 140 dBµV; performance criterion 1
o Burst acc. to IEC 61 000-4-4	kV	2/5.0 kHz; performance criterion 1
o Surge acc. to IEC 61 000-4-5	kV	Phase-to-ground 2; phase-to-phase 1; performance criterion 2
<b>Dielectric Strength</b> 50/60 Hz (Input, Output / Base)	V rms	4000

#### <sup>1</sup> Attention!

This product was constructed as a EMC Class A device. The use of this product in residential applications could lead to radio interferences. In such an application, additional filtering may be required.

Type		3RF23...-1.	3RF23...-2.	3RF23...-3.
Connection, main contacts		Screw connection	Spring-loaded connection	Ring cable connection
Conductor cross-section				
○ Solid	mm <sup>2</sup>	2 x (1.5 ... 2.5), 2 x (2.5 ... 6)	2x (0.5 ... 2.5)	
○ Finely stranded with end sleeve	mm <sup>2</sup>	2 x (1.5 ... 2.5), 2 x (2.5 ... 6), 1 x 10	2x (0.5 ... 1.5)	
○ Finely stranded w/o end sleeve	mm <sup>2</sup>		2x (0.5 ... 2.5)	
○ Solid or stranded	AWG	2 x (14 ... 10)	2 x (18 ... 14)	
Stripping length	mm	10	10	
Terminal screw		M 4	-	M 5
○ Tightening torque	Nm	2 ... 2.5	-	2 ... 2.5
D 5...6 mm / PZ 2	lb.in	18 ... 22	-	18 ... 22
Cable lug	DIN	-	-	DIN 46234 5-2.5 ... 5-25 <sup>2</sup>
	JIS	-	-	JIS C 2805 R 2-5 ... 14-5
Connection, control contacts				
Conductor cross-section with or without end sleeve	mm <sup>2</sup>	1 x (0.5 ... 2.5)	0.5 ... 2.5	1 x (0.5 ... 2.5)
	mm <sup>2</sup>	2 x (0.5 ... 1.0)		2 x (0.5 ... 1.0)
	AWG	20 ... 12	20 ... 12	20 ... 12
Stripping length	mm	7	10	7
Terminal screw		M 3	-	M 3
○ Tightening torque	Nm	0.5 ... 0.6	-	0.5 ... 0.6
D 3.5 / PZ 1	lb.in	4.5 ... 5.3	-	4.5 ... 5.3

### Fused Design with Semiconductor Protection

Type	Full-range fuse LV HBC design gR/SITOR	Semiconductor protection fuse LV HBC design aR / 3NE80	Semiconductor protection fuse, cylindrical design		
			10 x 38 mm aR / SITOR	14 x 51 mm aR / SITOR	22 x 58 mm aR / SITOR
3RF2310-.AA.	3NE1813-0	3NE8015-1	3NC1010	3NC1410	3NC2220
3RF2320-.AA.	3NE1814-0	3NE8015-1	3NC1020	3NC1420	3NC2220
3RF2330-.AA.	3NE1803-0	3NE8003-1	3NC1032	3NC1432	3NC2232
3RF2340-.AA.	3NE1802-0	3NE8017-1	-	3NC1440	3NC2240
3RF2350-.AA.	3NE1817-0	3NE8018-1	-	3NC1450	3NC2250
3RF2370-.AA.2	3NE1820-0	3NE8020-1	-	-	3NC2280
3RF2370-.AA.4	3NE1020-2	3NE8020-1	-	-	3NC2280
3RF2370-.AA.5	3NE1020-2	3NE8020-1	-	-	3NC2280
3RF2370-.AA.6	3NE1020-2	3NE8020-1	-	-	3NC2280
3RF2390-.AA.2	3NE1021-2	3NE8021-1	-	-	3NC2200
3RF2390-.AA.4	3NE1021-2	3NE8021-1	-	-	3NC2280 *
3RF2390-.AA.5	3NE1020-2 *	3NE8021-1	-	-	3NC2280 *
3RF2390-.AA.6	3NE1020-2 *	3NE8021-1	-	-	3NC2280 *

\* The fuses have a lower rated current than the solid state contactors.

### Accessories

Function module	Order No.	Applicable for	Versions
Converter	3RF2900-0EA18	3RF23...-AA0. 3RF23...-AA4.	Us = 24 V DC
Load monitoring Basic	3RF2920-0FA08	3RF23...-1AA0. 3RF23...-1AA4.	Screw connection, Us = 24 V DC
Load monitoring Extended <sup>3</sup>	3RF29...-0GA..	3RF23...-1. 3RF23...-3.	Screw connection Ring cable connection
Terminal cover <sup>4</sup>	3RF2900-3PA88	3RF23...-1. 3RF23...-3.	Screw connection Ring cable connection

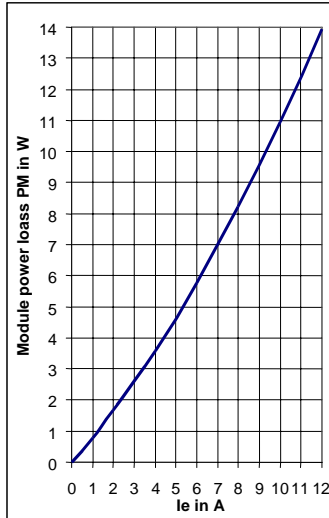
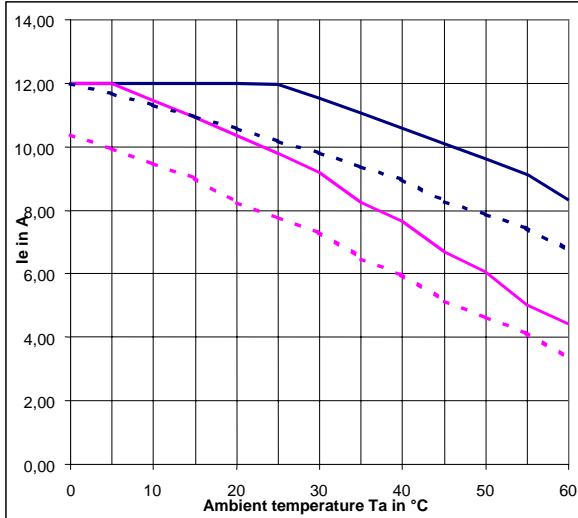
<sup>2</sup> Maximum breadth of the Cable lug 12 mm!

<sup>3</sup> For the exact allocation of the function modules, please refer to the LV 1 Catalog.

<sup>4</sup> The terminal covers can be easily adjusted for screw connection applications.

## Characteristic Curves

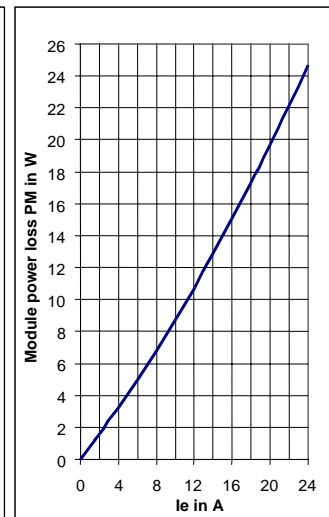
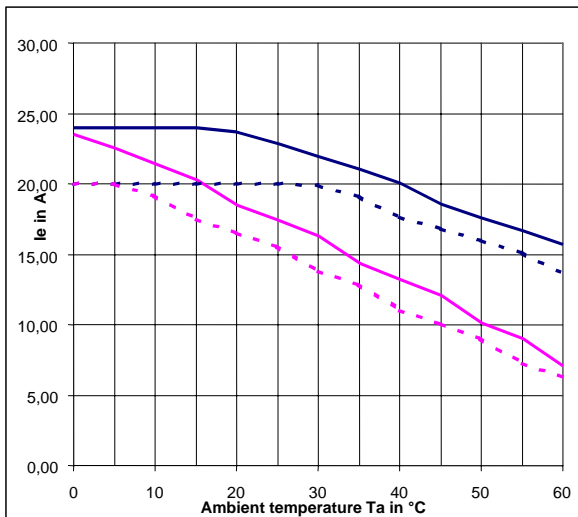
3RF2310-



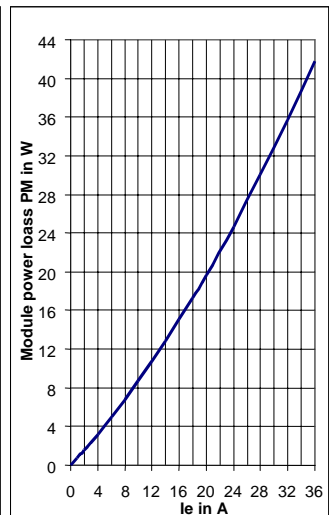
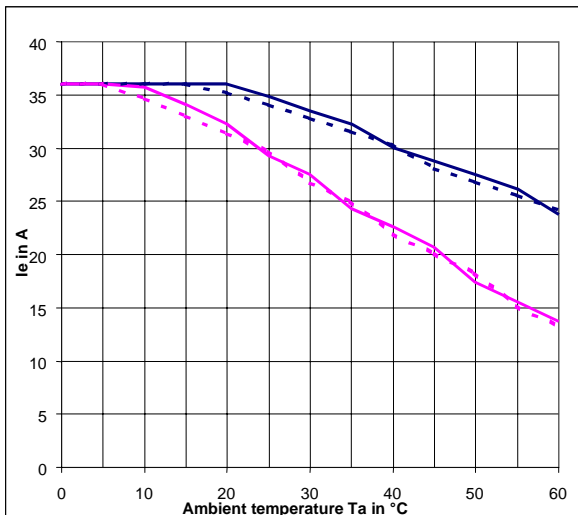
**Upper curves:**  
 $I_{max}$  thermal limit current  
**Lower curves:**  
 Rated current  $I_e$   
 acc. to  
 DIN EN 60947-4-3

**Continuous lines:**  
 Stand-alone mounting  
**Dashed lines:**  
 Side-by-side mounting

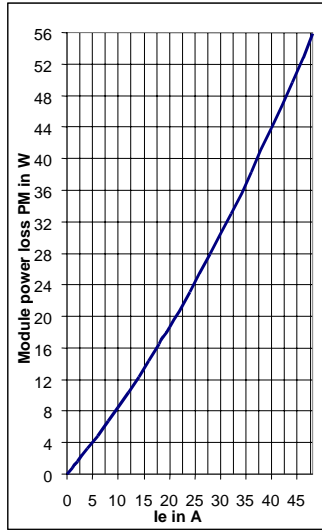
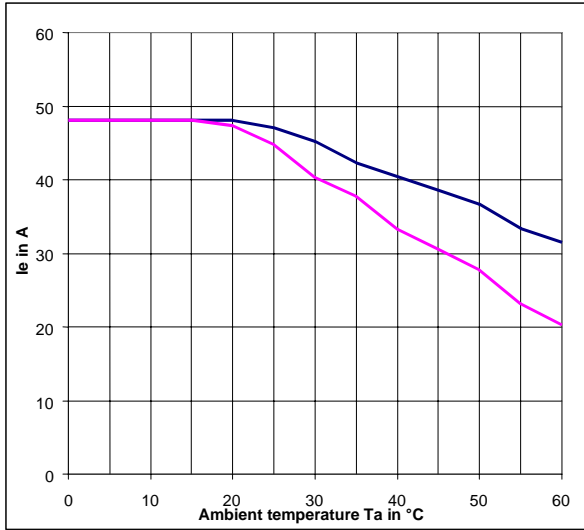
3RF2320-



3RF2330-

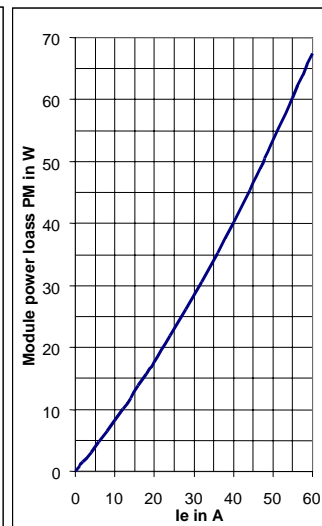
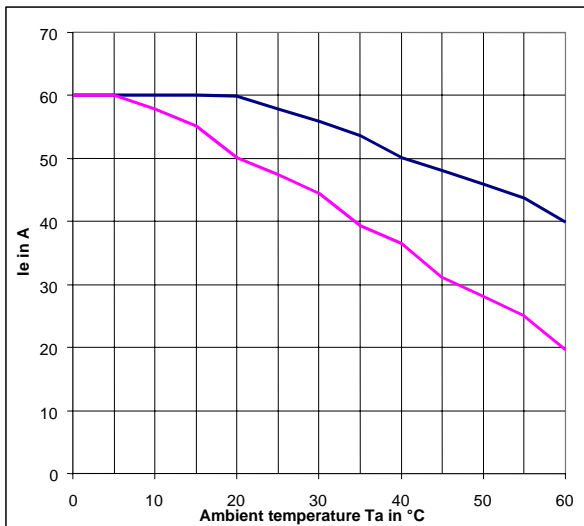


### 3RF2340-<sup>5</sup>

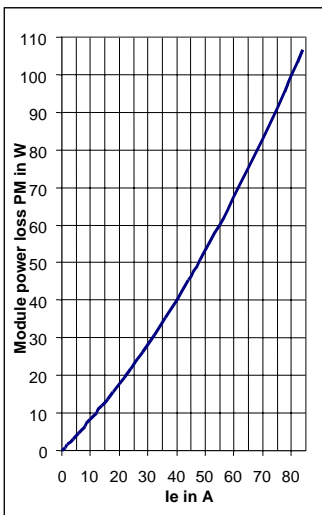
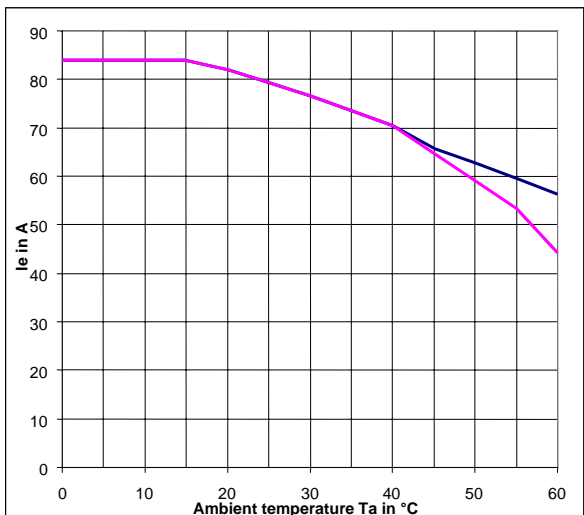


**Upper curves:**  
 $I_{max}$  thermal limit current  
**Lower curves:**  
 Rated current  $I_e$   
 acc. to  
 DIN EN 60947-4-3

### 3RF2350-

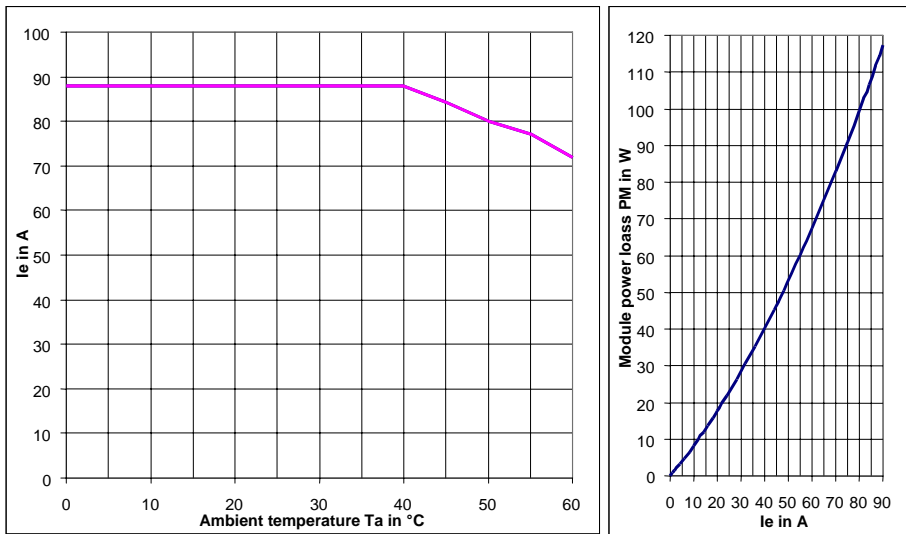


### 3RF2370-<sup>5</sup>



<sup>5</sup> Identical current / temperature curves for stand-alone and side-by-side mounting

### 3RF2390-<sup>5</sup>



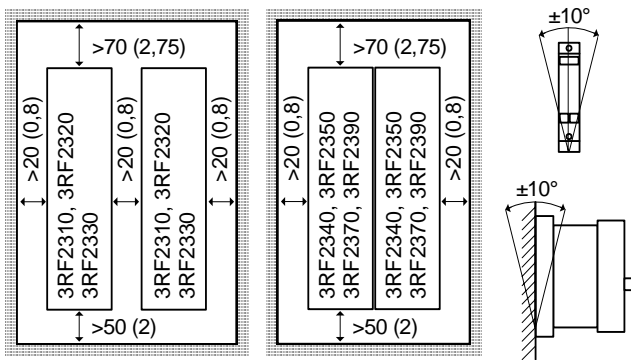
**Curve:**

$I_{max}$  thermal limit current and rated current  $I_e$  acc. to DIN EN 60947-4-3

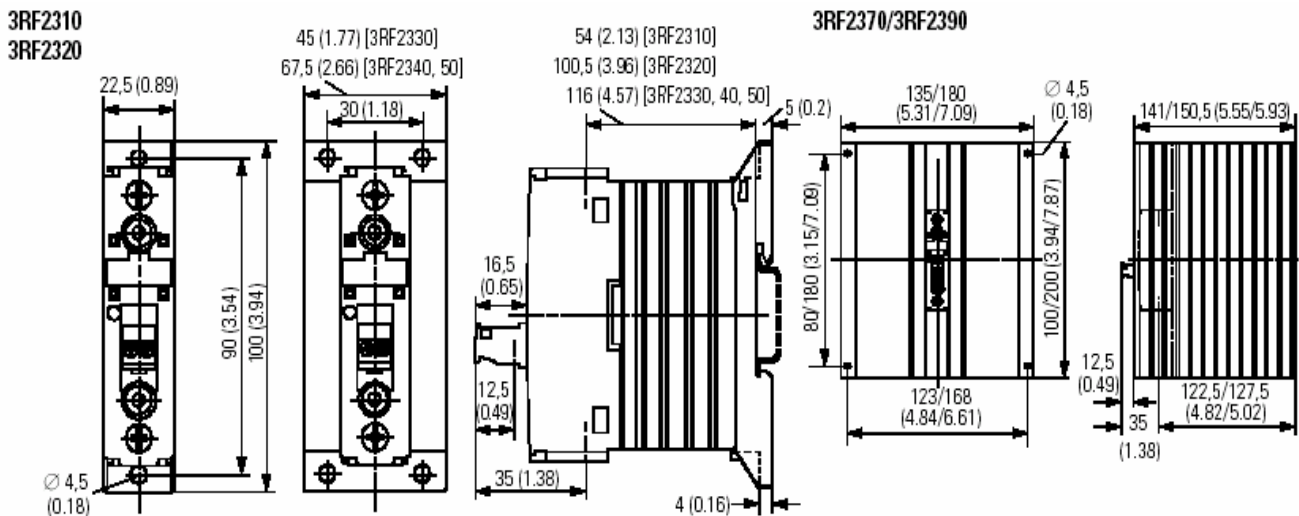
**For:**

Stand-alone mounting and side-by-side mounting

### Mounting Instructions <sup>6</sup>:



### Dimension Drawings :

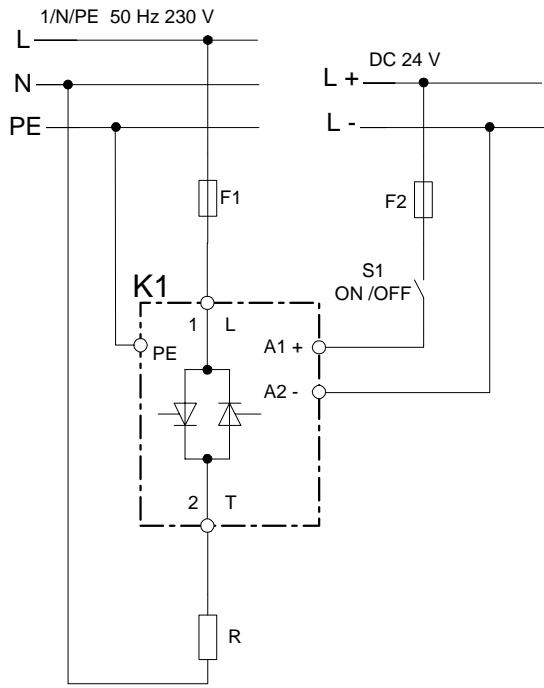


<sup>6</sup> Dimensions in mm, (in);

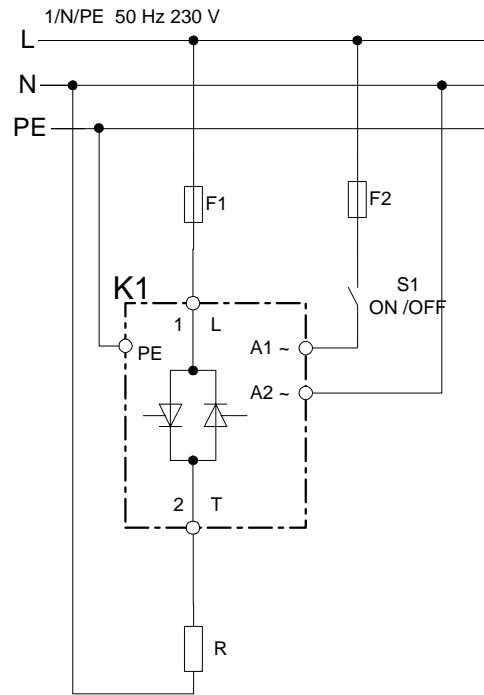
Stand-alone mounting, Characteristic curves show derating for side-by-side mounting

**Device / Example Circuit Diagram:**

**3RF23...-AA0.**  
Us = 24 V DC



**3RF23...-AA2.**  
Us = 110 ... 230 V AC



- F1 Main circuit fuse  
(semiconductor protection recommended)
- F2 Control circuit fuse
- K1 3RF2 solid state contactor
- R Load resistance



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