Solid state relays

![relpol S.A. logo]

INPUT L1 L2 L3

CONTROL

4-32VDC

3 PHASE SOLID STATE RELAY
RSR62-60D40
600VAC 40A

OUTPUT T1 T2

RSR32-24D2R-12M
INPUT 12VDC
OUTPUT 240VAC

RSR52-24D10
10A 240VAC
SOLID STATE RELAY
4 - 32VDC

RSR72-48A20-H
SOLID STATE RELAY
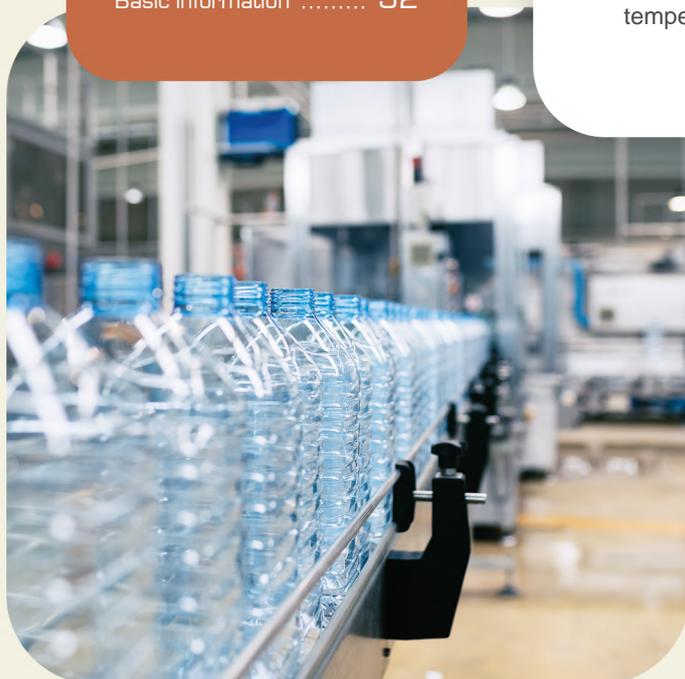LOAD 20A 480VAC

Solid state
relays

- I_n currents of outputs: 0,1 ... 80 A.
- Available versions:
  - miniature,
  - single-phase industrial,
  - three-phase industrial,
  - single-phase with heatsinks.
- Methods of mounting:
  THT, on panel or on heatsinks,
  on 35 mm rail mount
  - depending on the type of relay.

Applications:

- suitable for PCB mounted,
- temperature chamber,
  food processing machinery,
  injection molding machine,
  packaging machine,
  incubator, oiling machines,
  HVAC, lighting, fountain controller,
- three phase motor control,
  temperature control, large oven.

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RSR32	Single-phase solid state relays, miniature
page 4	Switching: zero-crossing or random-on Input circuit: DC - 5, 12, 24 V Output circuit: TTL drive compatibile Rated load: **AC1 - 2 A / 240 V AC** Mounting: for PCB
RSR35	Solid state relays, miniature
page 6	Switching: DC Input circuit: DC - 5, 12, 24, 48, 60 V Output circuit: transistor or MOSFET Rated load: **DC1 - 0,1 A, 3 A / 48 V DC; 4 A / 24 V DC** Mounting: for PCB
RSR52	Single-phase solid state relays, industrial
page 9	Switching: zero-crossing or random-on Input circuit: AC - 90...280 V; DC - 4...32 V Output circuit: SCR (thyristors) Rated load: **AC1 - 10, 25, 40, 60, 80 A / 240, 480, 600 V AC** Mounting: direct on panel or on heatsinks Accessories: thermal pads RTP-10, heatsinks RH **(pages 25-31)**
RSR62	Three-phase solid state relays, industrial
page 14	Switching: zero-crossing or random-on Input circuit: AC - 90...280 V; DC - 4...32 V Output circuit: SCR (thyristors) Rated load: **AC3 - 25, 40, 60, 80 A / 480, 600 V AC** Mounting: on heatsinks Accessories: thermal pads RTP-30, heatsinks RH **(pages 25-31)**
RSR72	Single-phase solid state relays, with heatsinks
page 19	Switching: zero-crossing or random-on Input circuit: AC - 90...280 V; DC - 4...32 V Output circuit: SCR (thyristors) Rated load: **AC1 - 10, 20, 30, 40, 75 A / 240, 480, 600 V AC** Mounting: direct on 35 mm rail mount (integrated with heatsink)

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RSR32
single-phase solid state relays, miniature

NEW

- Zero-crossing or random-on switching • DC control input
- TTL drive compatibile • Load current 2 A
- Load voltage 240 V AC (single-phase)
- Dielectric strength 2 500 Vrms (opto-isolation)
- Suitable for PCB mounted
- Recognitions, certifications, directives: RoHS, REACH, cULus, EHC

Input data ❶

Control voltage range	RSR32-..D.-5.	5 V DC	4...6 V DC
	RSR32-..D.-12.	12 V DC	9,6...14,4 V DC
	RSR32-..D.-24.	24 V DC	19,2...28,8 V DC
Must turn-on voltage		5 V DC	4 V DC
		12 V DC	9,6 V DC
		24 V DC	19,2 V DC
Must turn-off voltage		1 V DC	
Maximum input current		25 mA	

Output data ❶

| Operational voltage range	RSR32-24...	240 V AC	48...280 V AC
Blocking voltage		600 Vpk	
Load current range		0,1...2 A	
Response time pick-up		DC control (zero-crossing)	≤ 1/2 cycle + 1 ms
		DC control (random-on)	≤ 1 ms
Response time drop-out		≤ 1/2 cycle + 1 ms	
Maximum surge current (@ 10 ms)	RSR32-...2	40 A	
Maximum off-state leakage current (@ rated load voltage)		1,5 mA	
Maximum on-state voltage drop (@ rated current)		1,5 Vrms	
Minimum off-state dV/dt (@ maximum rated voltage)		200 V/μs	

General data ❶

Dielectric strength (50/60 Hz)	input - output	2 500 Vrms
Minimum insulation resistance (@ 500 V DC)	1 000 MΩ	
Dimensions (L x W x H)	28 x 5,2 x 15 mm	
Weight (typical)	4 g	
Ambient temperature (non-condensation and/or icing)	storage	-30...+80 °C
	operating	-30...+100 °C
Soldering time	max. 260 °C	max. 10 s
	max. 350 °C	max. 5 s

❶ Data are given for ambient temperature +25 °C. When temperature is above +25 °C the maximum load current decreases - see "Thermal derating curve", page 4.
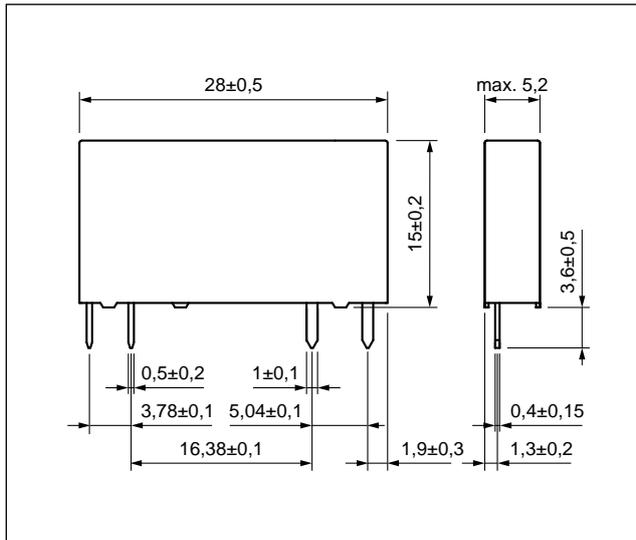

Thermal derating curve
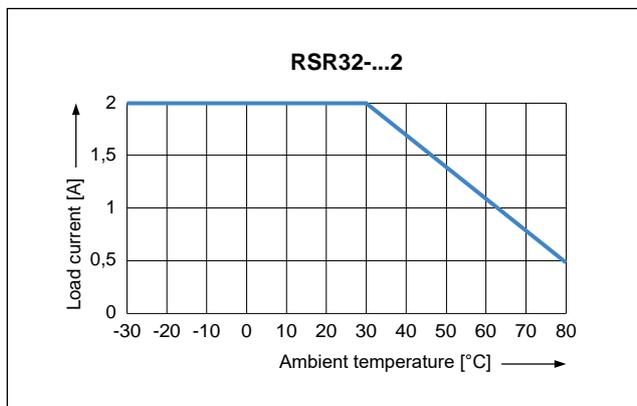
RSR32-...2

Connection diagram
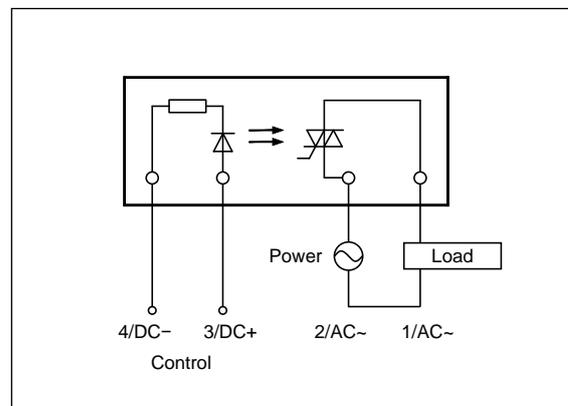
Dimensions

Pinout (solder side view)
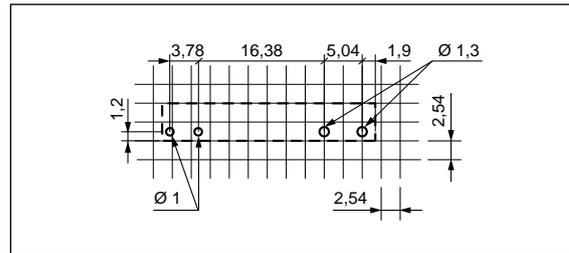
Table of codes   Table 1

zero-crossing switching, DC control	random-on switching, DC control
RSR32-24D2-5M	RSR32-24D2R-5M
RSR32-24D2-12M	RSR32-24D2R-12M
RSR32-24D2-24M	RSR32-24D2R-24M

Mounting

Relays **RSR32** are designed for direct PCB mounting.

Ordering codes

| Type | Load voltage | Control input | Load current | Switching mode | Input voltage | Version |

R S R 3 2 – ☐ ☐ ☐ ☐ ☐ – ☐ ☐ M

Version
M - miniature for PCB

Input voltage
5 - 5 V DC
12 - 12 V DC
24 - 24 V DC

Switching mode
without marks - zero-crossing
R - random-on

Load voltage
24 - 240 V AC

Control input
D - DC control
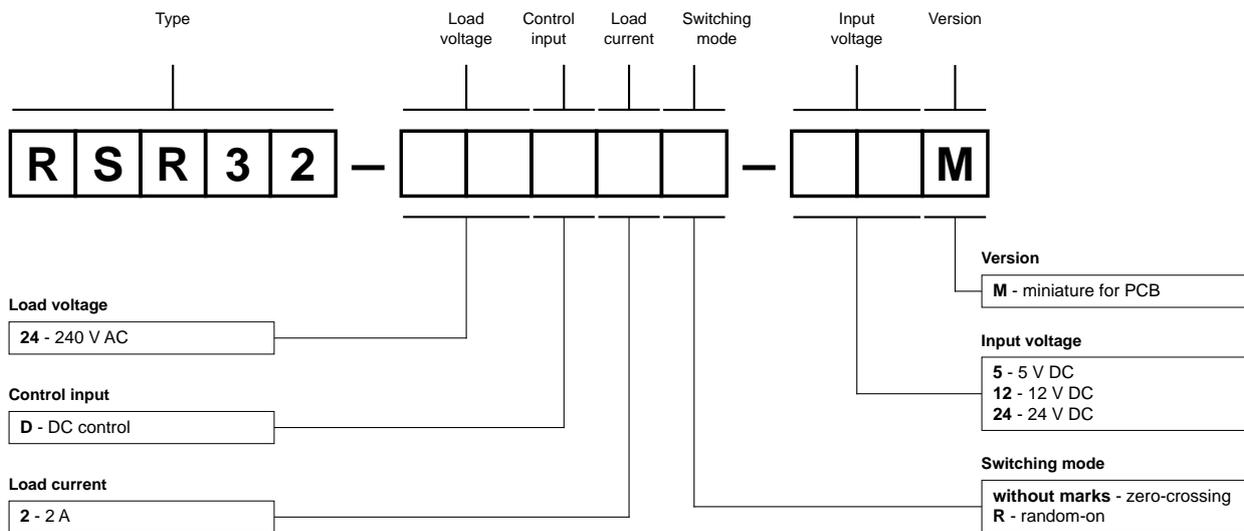
Load current
2 - 2 A

Examples of ordering codes ❷:

RSR32-24D2-5M   relay **RSR32**, miniature for PCB, zero-crossing switching, DC control, input voltage 5 V DC, load voltage 240 V AC (single-phase), load current 2 A

RSR32-24D2R-24M   relay **RSR32**, miniature for PCB, random-on switching, DC control, input voltage 24 V DC, load voltage 240 V AC (single-phase), load current 2 A

❷ Ordering codes **RSR32** are specified in Table 1.

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RSR35
solid state relays, miniature

- DC switching • DC control input
- Transistor or MOSFET output • Load current 0,1...4 A
- Load voltage 24, 48 V DC
- Dielectric strength 2 500 Vrms (opto-isolation)
- Suitable for PCB mounted
- Recognitions, certifications, directives: RoHS, REACH, c⊕us EAC

Input data ❶

Control voltage range	RSR35-..D.-5.	5 V DC	4...6 V DC
	RSR35-..D.-12.	12 V DC	9,6...14,4 V DC
	RSR35-..D.-24.	24 V DC	19,2...28,8 V DC
	RSR35-..D.-48.	48 V DC	38,4...57,6 V DC
	RSR35-..D.-60.	60 V DC	48...72 V DC
Must turn-on voltage		5 V DC	4 V DC
		12 V DC	9,6 V DC
		24 V DC	19,2 V DC
		48 V DC	38,4 V DC
		60 V DC	48 V DC
Must turn-off voltage		5 V DC	1 V DC
		12, 24 V DC	2,4 V DC
		48, 60 V DC	4,8 V DC
Maximum input current		5, 12, 24 V DC	25 mA
		48, 60 V DC	23 mA

Output data ❶

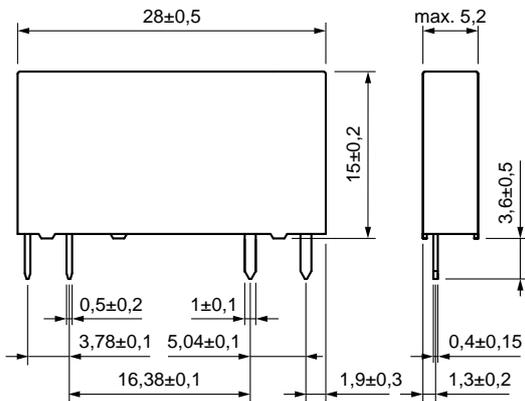| Operational voltage range	RSR35-24...	24 V DC	3...28 V DC
	RSR35-48...	48 V DC	3...58 V DC
Blocking voltage		24 V DC	33 V DC
		48 V DC	58 V DC
Load current range		0,1 A	0,001...0,1 A
		3 A	0,002...3 A
		4 A	0,002...4 A
Response time pick-up		300 µs	
Response time drop-out		300 µs	
Maximum surge current (@ 10 ms)	RSR35-...01	0,1 A	1 A
	RSR35-...3	3 A	30 A
	RSR35-...4	4 A	48 A
Maximum off-state leakage current (@ rated load voltage)		100 µA	
Maximum on-state voltage drop (@ rated current)		0,1 A	1,5 V DC
Maximum on-state resistance		3 A, 4 A	37 MΩ

General data ❶

Dielectric strength (50/60 Hz)	input - output	2 500 Vrms
Minimum insulation resistance (@ 500 V DC)	1 000 MΩ	
Dimensions (L x W x H)	28 x 5,2 x 15 mm	
Weight (typical)	4 g	
Ambient temperature (non-condensation and/or icing)	storage	-30...+80 °C
	operating	-30...+100 °C
Soldering time	max. 260 °C	max. 10 s
	max. 350 °C	max. 5 s

❶ Data are given for ambient temperature +25 °C. When temperature is above +25 °C the maximum load current decreases - see "Thermal derating curves", page 7.
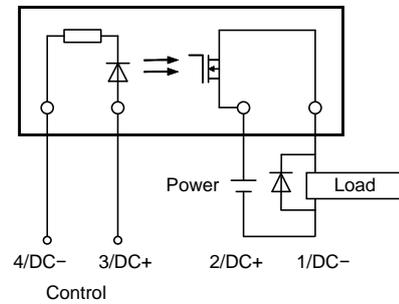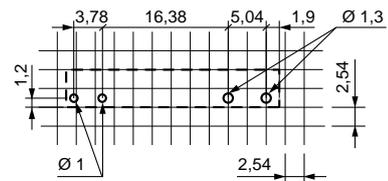
Thermal derating curves

RSR35-...01
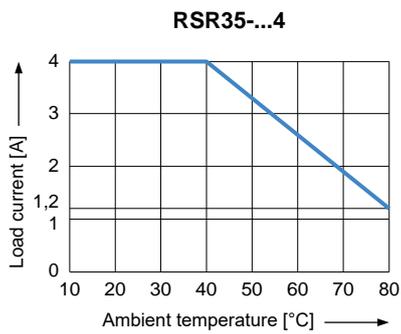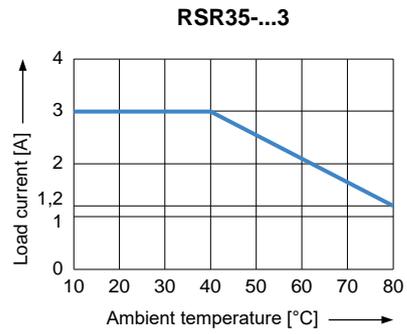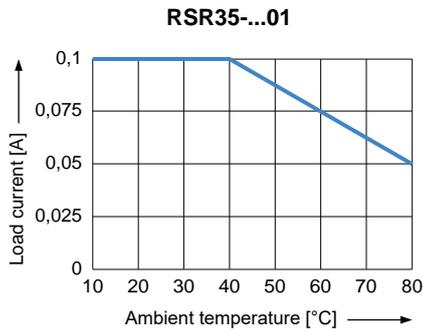
RSR35-...3

RSR35-...4

Dimensions

Connection diagram

4/DC−   3/DC+   2/DC+   1/DC−

Control   Power   Load

Pinout (solder side view)

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Mounting

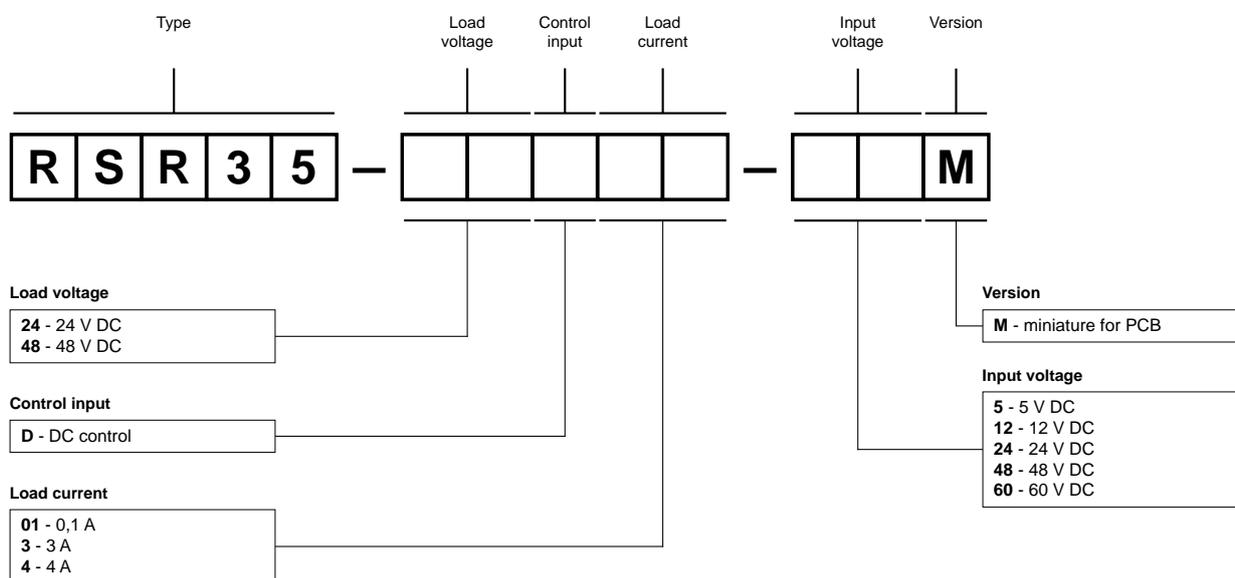Relays **RSR35** are designed for direct PCB mounting.

Table of codes   Table 1

DC control		
RSR35-48D01-5M	RSR35-48D3-5M	RSR35-24D4-5M
RSR35-48D01-12M	RSR35-48D3-12M	RSR35-24D4-12M
RSR35-48D01-24M	RSR35-48D3-24M	RSR35-24D4-24M
RSR35-48D01-48M	RSR35-48D3-48M	RSR35-24D4-48M
RSR35-48D01-60M	RSR35-48D3-60M	RSR35-24D4-60M

Ordering codes

| | Type | | Load voltage | Control input | Load current | | Input voltage | Version |

R S R 3 5 — ☐ ☐ ☐ ☐ — ☐ ☐ M

Load voltage

24 - 24 V DC
48 - 48 V DC

Control input

D - DC control

Load current

01 - 0,1 A
3 - 3 A
4 - 4 A

Version

M - miniature for PCB

Input voltage

5 - 5 V DC
12 - 12 V DC
24 - 24 V DC
48 - 48 V DC
60 - 60 V DC

Examples of ordering codes ❷:

RSR35-48D01-5M   relay **RSR35**, miniature for PCB, DC control, input voltage 5 V DC, load voltage 48 V DC, load current 0,1 A

RSR35-48D3-24M   relay **RSR35**, miniature for PCB, DC control, input voltage 24 V DC, load voltage 48 V DC, load current 3 A

RSR35-24D4-60M   relay **RSR35**, miniature for PCB, DC control, input voltage 60 V DC, load voltage 24 V DC, load current 4 A

❷ Ordering codes **RSR35** are specified in Table 1.

RSR52
single-phase solid state relays, industrial

NEW

- Zero-crossing or random-on switching • AC or DC control input
- SCR output (thyristors) • Load current 10...80 A
- Load voltage 240, 480, 600 V AC (single-phase)
- Dielectric strength 4 000 Vrms (opto-isolation)
- MOV protection (built-in varistor) • LED indicator (red)
- Screw terminals • Mounting on panel or on heatsinks
- Applications: temperature chamber, food processing machinery, injection molding machine, incubator, oiling machines, HVAC, lighting, fountain controller
- Recognitions, certifications, directives: RoHS, REACH, CE cULus EHC

Input data ❶

Control voltage range	RSR52-..A...	AC control	90...280 V AC (50/60 Hz)
	RSR52-..D...	DC control	4...32 V DC
Must turn-on voltage		AC control	90 V AC
		DC control	4 V DC
Must turn-off voltage		AC control	10 V AC
		DC control	1 V DC
Maximum input current		25 mA (@ 280 V AC, 50/60 Hz / 32 V DC)	

Output data ❶

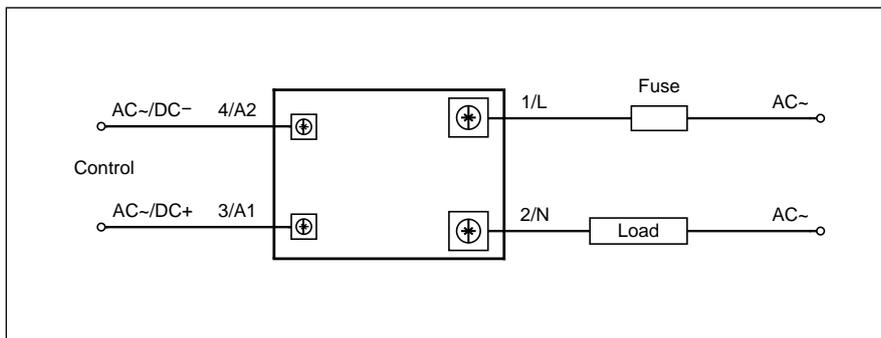| Operational voltage range	RSR52-24...	240 V AC	48...280 V AC
	RSR52-48...	480 V AC	48...530 V AC
	RSR52-60...	600 V AC	48...660 V AC
Blocking voltage		240 V AC	600 Vpk
		480 V AC	1 200 Vpk
		600 V AC	1 600 Vpk
Response time pick-up		AC control	≤ 40 ms
		DC control (zero-crossing)	≤ 1/2 cycle + 1 ms
		DC control (random-on)	≤ 1 ms
Response time drop-out		AC control	≤ 40 ms
		DC control	≤ 1/2 cycle + 1 ms
Maximum surge current (@ 10 ms)	RSR52-...10	10 A	120 A
	RSR52-...25	25 A	250 A
	RSR52-...40	40 A	500 A
	RSR52-...60	60 A	700 A
	RSR52-...80	80 A	1 000 A
Maximum I²t for fusing (@ 10 ms)		10 A	72 A²s
		25 A	312 A²s
		40 A	1 250 A²s
		60 A	2 450 A²s
		80 A	5 000 A²s
Maximum off-state leakage current (@ rated load voltage)		10 mA	
Maximum on-state voltage drop (@ rated current)		1,7 Vrms	
Minimum off-state dV/dt (@ maximum rated voltage)		500 V/μs	

General data ❶

Dielectric strength (50/60 Hz)	input - output	4 000 Vrms
	input, output - base	2 500 Vrms
Minimum insulation resistance (@ 500 V DC)	1 000 MΩ	
Dimensions (L x W x H)	58,6 x 45,7 x 33,5 mm	
Weight (typical)	10 A, 25 A	113 g
	40 A, 60 A	119 g
	80 A	170 g
Ambient temperature (non-condensation and/or icing)	storage	-30...+100 °C
	operating	-30...+80 °C
Cover protection category	IP 20 (EN 60529)	

❶ Data are given for ambient temperature +25 °C. When temperature is above +25 °C the maximum load current decreases - see "Thermal derating curves", page 10.

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Thermal derating curves

RSR52-...10

Load current [A] vs Ambient temperature [°C]

2,1 ºC/W

RSR52-...25

Load current [A] vs Ambient temperature [°C]

0,8 ºC/W
1,9 ºC/W

RSR52-...40

Load current [A] vs Ambient temperature [°C]

0,8 ºC/W
1,6 ºC/W

RSR52-...60

Load current [A] vs Ambient temperature [°C]

0,35 ºC/W
0,8 ºC/W

RSR52-...80

Load current [A] vs Ambient temperature [°C]

0,35 ºC/W
0,6 ºC/W

Connection diagram

AC~/DC− 4/A2   1/L   Fuse   AC~

Control

AC~/DC+ 3/A1   2/N   Load   AC~

Dimensions

27,9±0,3 Ø4,5

43,2±0,3
47,5±0,2
max. 58,6

25,4±0,3
max. 45,7
4x Ø6,8
Ø4,5

max. 33,5

Output
max. 12,5
max. 3

Input
max. 10
max. 3

Solid state relay **RSR52**

47,5±0,2
55±0,2

42±0,2   R2,25   0,15

Thermal pad **RTP-10**

RH

Heatsinks
for RSR52, RSR62
- see pages 25-31

NEW

Mounting, accessories for relays

Relays **RSR52** are designed for: • direct mounting on panel • mounting on heatsinks **RH** (see pages 25-31).
For **RSR52** relays we offer thermal pads **RTP-10**.

Mounting on panel or heatsink ❷		Input	Output
Screws		M4	
Tightening moment		0,98...1,37 N•m	
Screw length		7,5 mm	12 mm

Switching terminals ❸		Input	Output
Screws		M3	M4
Tightening moment		0,58...0,98 N•m	0,98...1,37 N•m
Stripping length		8 mm	12 mm
Aperture for termination lug		7,5 mm	12 mm

Cross section of the cables		Input	Output
Rigid (solid & stranded)		1 x 0,5...2,5 mm² (1 x 18...12 AWG) 2 x 0,5...2,5 mm² (2 x 18...12 AWG)	1 x 2,5...6 mm² (1 x 14...10 AWG) 2 x 2,5...6 mm² (2 x 14...10 AWG)
Flexible with end sleeve		1 x 0,5...2,5 mm² (1 x 18...12 AWG) 2 x 0,5...2,5 mm² (2 x 18...12 AWG)	1 x 1...4 mm² (1 x 18...12 AWG) 2 x 1...2,5 mm² (2 x 18...14 AWG) 2 x 2,5...4 mm² (2 x 14...12 AWG)
Flexible without end sleeve		–	1 x 1...6 mm² (1 x 18...10 AWG) 2 x 1...2,5 mm² (2 x 18...14 AWG) 2 x 2,5...6 mm² (2 x 14...10 AWG)

❷ Relay must be mounted to proper sized heatsink, based on "Thermal derating curves". Between relay and heatsink must be used thermal pad.
❸ When connection cables to relay: please ensure, screws are torqued down properly.

RH

Thermal resistance	RH21	2,1 °C/W
	RH19A	1,9 °C/W
	RH19B	1,9 °C/W
	RH17A	1,7 °C/W
	RH17B	1,7 °C/W
	RH06B	1,5 °C/W
	RH16	1,6 °C/W
	RH16-F	0,6 °C/W
	RH11	1,1 °C/W
	RH09	0,9 °C/W
	RH04A-F	0,4 °C/W
	RH08	0,8 °C/W
	RH08-F	0,35 °C/W
	RH04B	0,4 °C/W
	RH04B-F	0,15 °C/W

RTP-10

Material	graphite	
Color	black	
Dimensions (L x W x H)	55 x 42 x 0,15 mm	
Weight (typical)	0,4 g	
Thermal resistance	0,1 °C/W ❹	
Flammability class	V-0 (UL 94)	
Temperature range	continuous	-60...+180 °C
Storage conditions	temperature	+23...+27 °C
	humidity	65±20 %HR

❹ This value is provided for reference only. Actual application performance is directly related to the surface roughness, flatness and pressure applied.
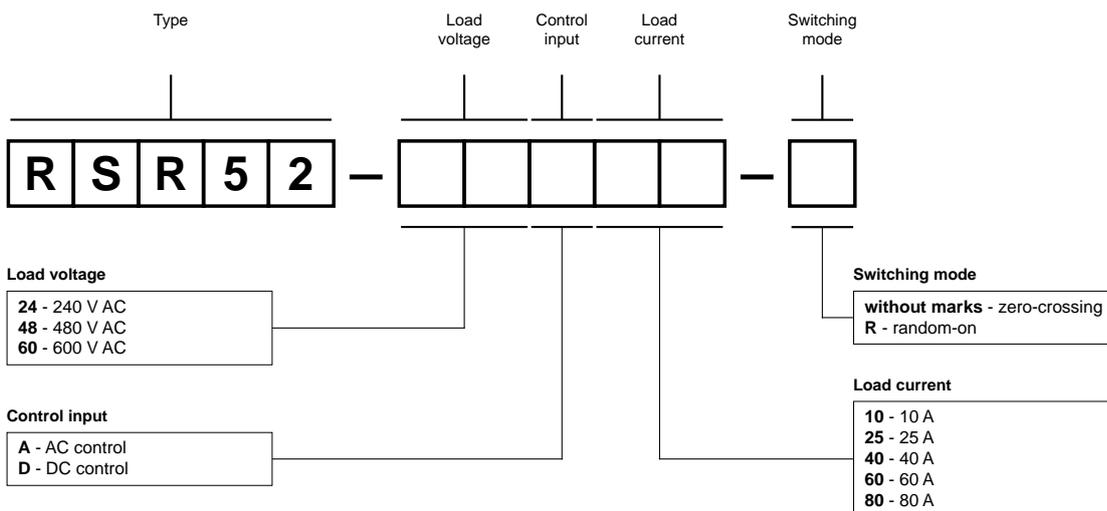
RTP-10

Table of codes   Table 1

zero-crossing switching, AC control	zero-crossing switching, DC control	random-on switching, DC control
RSR52-24A10	RSR52-24D10	–
RSR52-24A25	RSR52-24D25	RSR52-24D25-R
RSR52-24A40	RSR52-24D40	–
RSR52-24A60	RSR52-24D60	RSR52-24D60-R
RSR52-24A80	RSR52-24D80	RSR52-24D80-R
RSR52-48A10	RSR52-48D10	–
RSR52-48A25	RSR52-48D25	RSR52-48D25-R
RSR52-48A40	RSR52-48D40	–
RSR52-48A60	RSR52-48D60	RSR52-48D60-R
RSR52-48A80	RSR52-48D80	RSR52-48D80-R
RSR52-60A25	RSR52-60D25	RSR52-60D25-R
RSR52-60A40	RSR52-60D40	–
RSR52-60A60	RSR52-60D60	RSR52-60D60-R

Ordering codes

Load voltage

24	- 240 V AC
48	- 480 V AC
60	- 600 V AC

Control input

A	- AC control
D	- DC control

Switching mode

without marks - zero-crossing
R - random-on

Load current

10	- 10 A
25	- 25 A
40	- 40 A
60	- 60 A
80	- 80 A

Examples of ordering codes ❺:

RSR52-24A10   relay **RSR52**, zero-crossing switching, AC control, load voltage 240 V AC (single-phase), load current 10 A

RSR52-48D40   relay **RSR52**, zero-crossing switching, DC control, load voltage 480 V AC (single-phase), load current 40 A

RSR52-60D60-R   relay **RSR52**, random-on switching, DC control, load voltage 600 V AC (single-phase), load current 60 A

❺ Ordering codes **RSR52** are specified in Table 1.

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RSR62
three-phase solid state relays, industrial

NEW

- Zero-crossing or random-on switching • AC or DC control input
- SCR output (thyristors) • Load current 25...80 A
- Load voltage 480, 600 V AC (three-phase)
- Dielectric strength 4 000 Vrms (opto-isolation)
- RC/MOV protection (built-in resistor, capacitor, varistor)
- LED indicators (red) • Screw terminals • Mounting on heatsinks
- Applications: three phase motor control, temperature control, large oven
- Recognitions, certifications, directives: RoHS, REACH, CE cᴿᵁ us EAC

Input data ❶

Control voltage range	RSR62-..A...	AC control	90...280 V AC (50 Hz)
	RSR62-..D...	DC control	4...32 V DC
Must turn-on voltage		AC control	90 V AC
		DC control	4 V DC
Must turn-off voltage		AC control	15 V AC
		DC control	1 V DC
Maximum reverse voltage		DC control	32 V DC
Maximum input current		AC control	30 mA (@ 280 V AC, 50 Hz)
		DC control	35 mA (@ 32 V DC)

Output data ❶

Operational voltage range	RSR62-48...	480 V AC	24...530 V AC
	RSR62-60...	600 V AC	24...660 V AC
Blocking voltage		480 V AC	1 200 Vpk
		600 V AC	1 600 Vpk
Response time pick-up		AC control	≤ 40 ms
		DC control (zero-crossing)	≤ 1/2 cycle + 1 ms
		DC control (random-on)	≤ 1 ms
Response time drop-out		AC control	≤ 40 ms
		DC control	≤ 1/2 cycle + 1 ms
Maximum surge current (@ 10 ms)	RSR62-...25	25 A	300 A
	RSR62-...40	40 A	500 A
	RSR62-...60	60 A	600 A
	RSR62-...80	80 A	1 000 A
Maximum I²t for fusing (@ 10 ms)		25 A	450 A²s
		40 A	1 250 A²s
		60 A	1 800 A²s
		80 A	5 000 A²s
Maximum off-state leakage current (@ rated load voltage)		10 mA	
Maximum on-state voltage drop (@ rated current)		1,6 Vrms	
Minimum off-state dV/dt (@ maximum rated voltage)		500 V/µs	

General data ❶

Dielectric strength (50/60 Hz)	input - output	4 000 Vrms
	input, output - base	2 500 Vrms
Minimum insulation resistance (@ 500 V DC)	1 000 MΩ	
Dimensions (L x W x H)	105 x 78 x 38 mm	
Weight (typical)	25 A, 40 A	385 g
	60 A, 80 A	530 g
Ambient temperature (non-condensation and/or icing)	storage	-30...+100 °C
	operating	-30...+80 °C
Cover protection category	IP 20 (EN 60529)	

❶ Data are given for ambient temperature +25 °C. When temperature is above +25 °C the maximum load current decreases - see "Thermal derating curves", page 15.
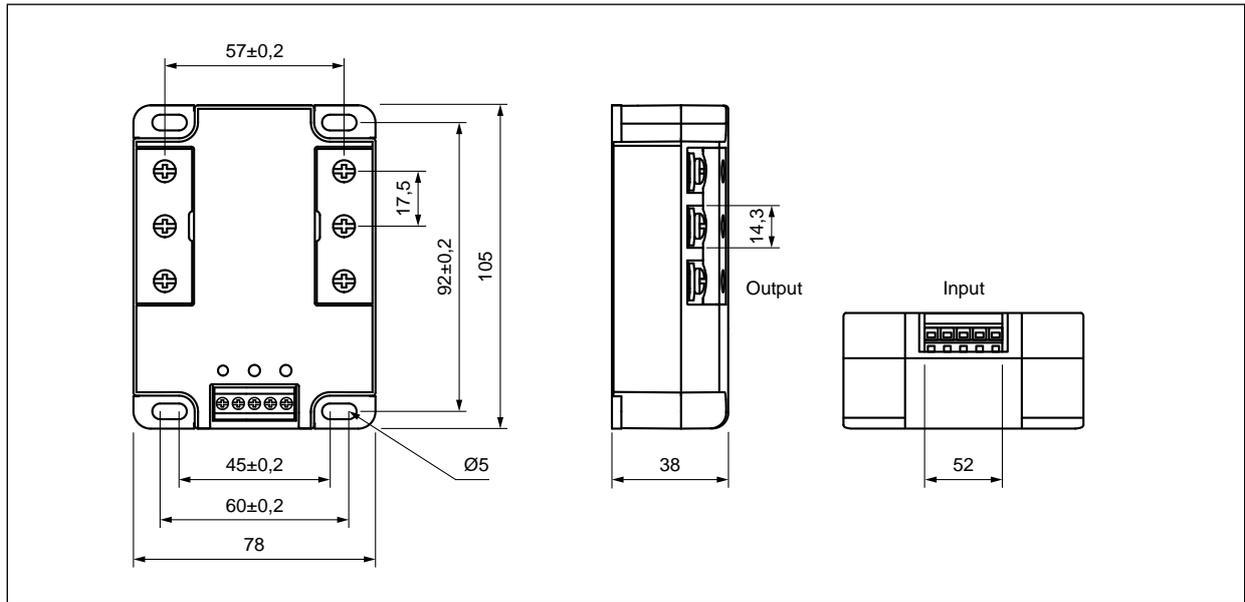
Thermal derating curves
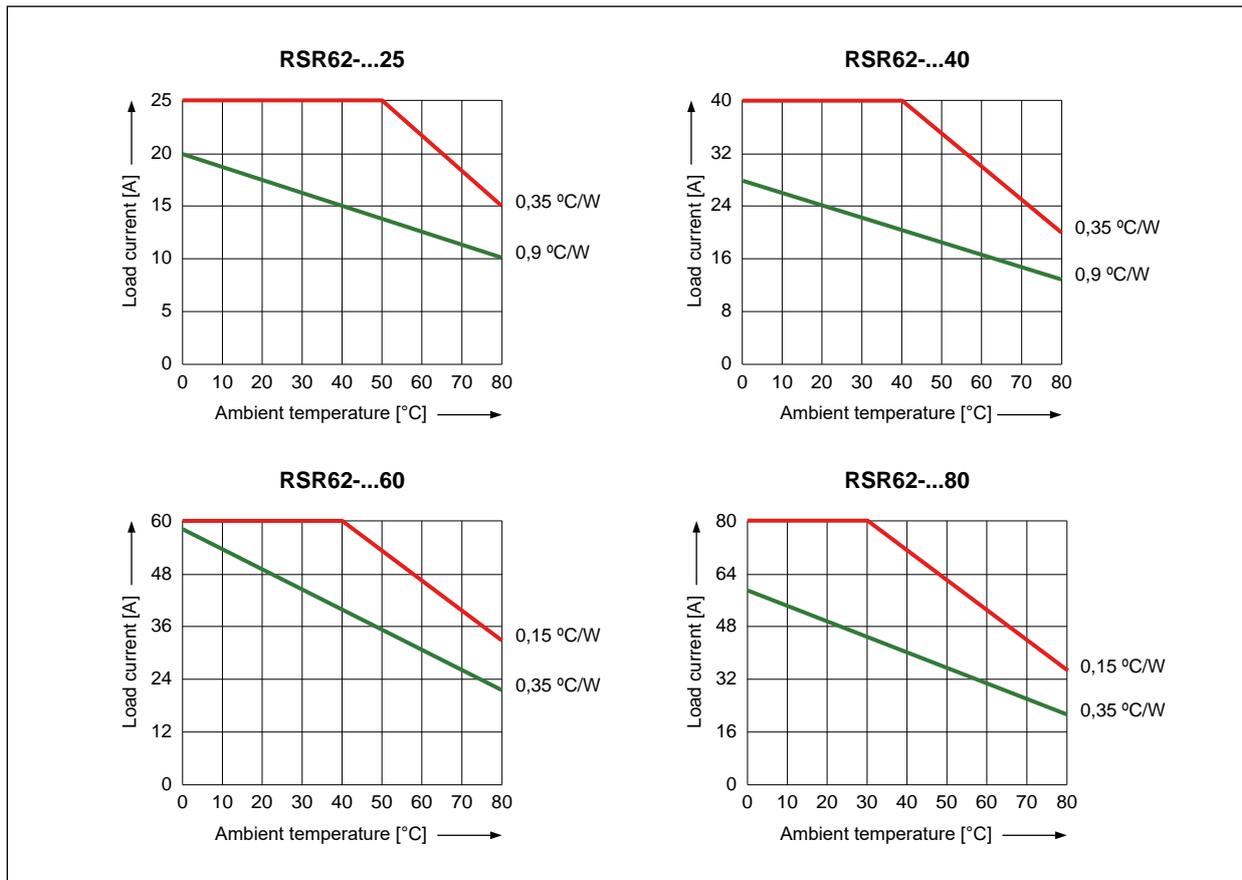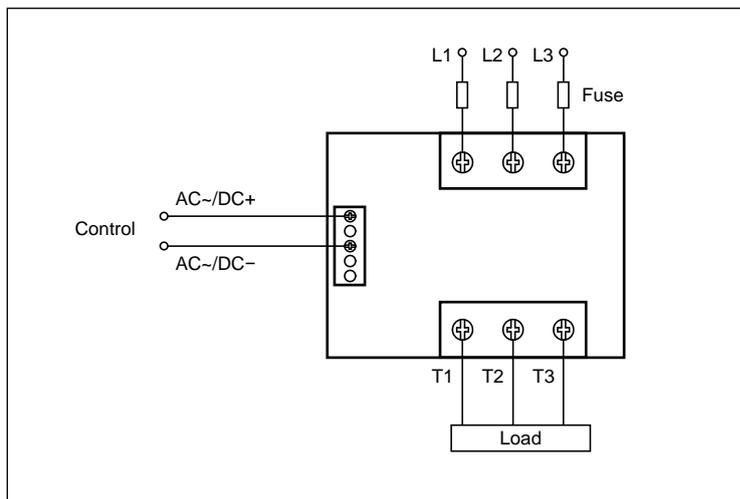
RSR62-...25
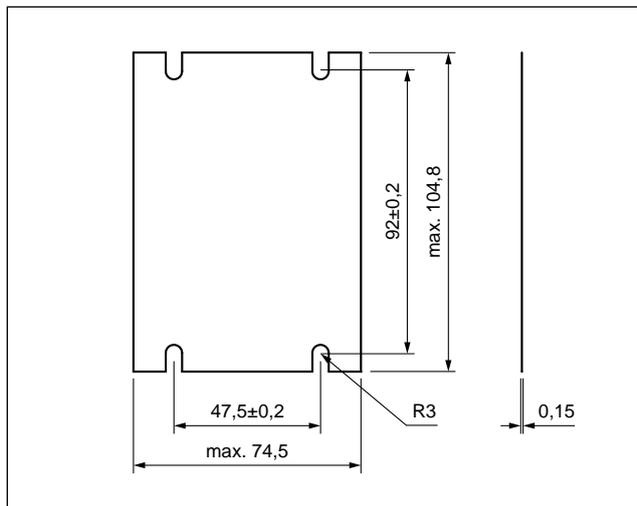

Load current [A] vs Ambient temperature [°C]
- 0,35 ºC/W
- 0,9 ºC/W

RSR62-...40

Load current [A] vs Ambient temperature [°C]
- 0,35 ºC/W
- 0,9 ºC/W

RSR62-...60

Load current [A] vs Ambient temperature [°C]
- 0,15 ºC/W
- 0,35 ºC/W

RSR62-...80

Load current [A] vs Ambient temperature [°C]
- 0,15 ºC/W
- 0,35 ºC/W

Connection diagram

L1 L2 L3 Fuse

Control AC~/DC+ AC~/DC−

T1 T2 T3

Load

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Dimensions

57±0,2

17,5

92±0,2

105

45±0,2

60±0,2

78

Ø5

38

14,3

Output

52

Input

Solid state relay **RSR62**

92±0,2

max. 104,8

47,5±0,2

R3

0,15

max. 74,5

Thermal pad **RTP-30**

RH

Heatsinks
for RSR52, RSR62
- see pages 25-31

NEW

Mounting, accessories for relays

Relays **RSR62** are designed for mounting on heatsinks **RH** (see pages 25-31).
For **RSR62** relays we offer thermal pads **RTP-30**.

Mounting on heatsink ❷			
Screws	⊕	M4	
Tightening moment		0,98...1,37 N•m	
Screw length		12 mm	
Switching terminals ❸		Input	Output
Screws	⊕	M3 (plugable connector)	M4
Tightening moment		0,58...0,98 N•m	0,98...1,37 N•m
Stripping length		7 mm	12 mm
Aperture for termination lug		–	12 mm
Cross section of the cables		Input	Output
Rigid (solid & stranded)		1 x 1,5...2 mm² (1 x 16...14 AWG)	1 x 2,5...6 mm² (1 x 14...10 AWG) 2 x 2,5...6 mm² (2 x 14...10 AWG)
Flexible with end sleeve		1 x 1,5...2 mm² (1 x 16...14 AWG)	1 x 1...4 mm² (1 x 18...12 AWG) 2 x 1...2,5 mm² (2 x 18...14 AWG) 2 x 2,5...4 mm² (2 x 14...12 AWG)
Flexible without end sleeve		–	1 x 1...6 mm² (1 x 18...10 AWG) 2 x 1...2,5 mm² (2 x 18...14 AWG) 2 x 2,5...6 mm² (2 x 14...10 AWG)

❷ Relay must be mounted to proper sized heatsink, based on "Thermal derating curves". Between relay and heatsink must be used thermal pad.
❸ When connection cables to relay: please ensure, screws are torqued down properly.

RH

Thermal resistance	RH11	1,1 °C/W
	RH09	0,9 °C/W
	RH04A-F	0,4 °C/W
	RH08	0,8 °C/W
	RH08-F	0,35 °C/W
	RH04B	0,4 °C/W
	RH04B-F	0,15 °C/W

RTP-30

Material	graphite	
Color	black	
Dimensions (L x W x H)	104,8 x 74,5 x 0,15 mm	
Weight (typical)	0,9 g	
Thermal resistance	0,1 °C/W ❹	
Flammability class	V-0 (UL 94)	
Temperature range	continuous	-60...+180 °C
Storage conditions	temperature	+23...+27 °C
	humidity	65±20 %HR

RTP-30

❹ This value is provided for reference only. Actual application performance is directly related to the surface roughness, flatness and pressure applied.

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Table of codes   Table 1

zero-crossing switching, AC control	zero-crossing switching, DC control	random-on switching, DC control
RSR62-48A25	RSR62-48D25	–
RSR62-48A40	RSR62-48D40	–
RSR62-48A60	RSR62-48D60	–
RSR62-48A80	RSR62-48D80	–
RSR62-60A25	RSR62-60D25	RSR62-60D25-R
RSR62-60A40	RSR62-60D40	RSR62-60D40-R
RSR62-60A60	RSR62-60D60	RSR62-60D60-R
RSR62-60A80	RSR62-60D80	RSR62-60D80-R

Ordering codes

| Type | Load voltage | Control input | Load current | Switching mode |

R S R 6 2 – ☐☐☐☐☐ – ☐

Load voltage
48 - 480 V AC
60 - 600 V AC

Control input
A - AC control
D - DC control

Switching mode
without marks - zero-crossing
R - random-on

Load current
25 - 25 A
40 - 40 A
60 - 60 A
80 - 80 A
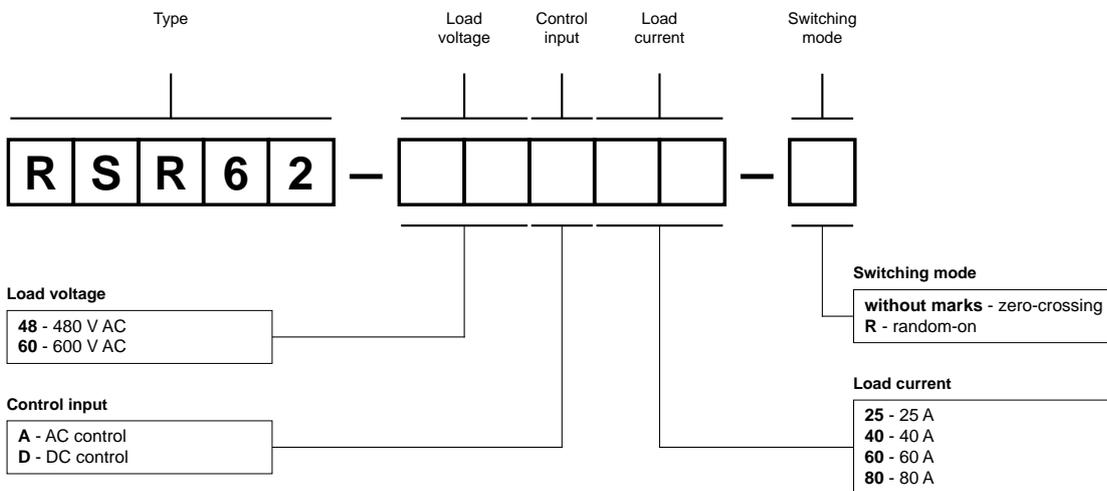
Examples of ordering codes ❺:

RSR62-48A25   relay **RSR62**, zero-crossing switching, AC control, load voltage 480 V AC (three-phase), load current 25 A

RSR62-48D80   relay **RSR62**, zero-crossing switching, DC control, load voltage 480 V AC (three-phase), load current 80 A

RSR62-60D60-R   relay **RSR62**, random-on switching, DC control, load voltage 600 V AC (three-phase), load current 60 A

❺ Ordering codes **RSR62** are specified in Table 1.

RSR72
single-phase solid state relays, with heatsinks

NEW

- Zero-crossing or random-on switching • AC or DC control input
- SCR output (thyristors) • Load current 10...75 A
- Load voltage 240, 480, 600 V AC (single-phase)
- Dielectric strength 4 000 Vrms (opto-isolation)
- RC/MOV protection (built-in resistor, capacitor, varistor)
- LED indicator (red) • Screw terminals
- Mounting on 35 mm rail mount acc. to EN 60715
  (integrated with heatsink)
- Applications: temperature chamber, injection molding machine, packaging machine
- Recognitions, certifications, directives: RoHS, REACH, CE, cULus, EAC

Input data ❶

Control voltage range	RSR72-..A...	AC control	90...280 V AC (50 Hz)
	RSR72-..D...	DC control	4...32 V DC
Must turn-on voltage		AC control	90 V AC
		DC control	4 V DC
Must turn-off voltage		AC control	15 V AC
		DC control	1 V DC
Maximum input current		25 mA (@ 280 V AC, 50 Hz / 32 V DC)	

Output data ❶

Operational voltage range	RSR72-28...	240 V AC (AC control)	24...280 V AC
	RSR72-24...	240 V AC (DC control)	
	RSR72-48...	480 V AC	24...530 V AC
	RSR72-60...	600 V AC	24...660 V AC
Blocking voltage		240 V AC	600 Vpk
		480 V AC	1 200 Vpk
		600 V AC	1 600 Vpk
Response time pick-up		AC control	≤ 40 ms
		DC control (zero-crossing)	≤ 1/2 cycle + 1 ms
		DC control (random-on)	≤ 1 ms
Response time drop-out		AC control	≤ 40 ms
		DC control	≤ 1/2 cycle + 1 ms
Maximum surge current (@ 10 ms)	RSR72-...10	10 A	200 A
	RSR72-...20	20 A	300 A
	RSR72-...30	30 A	500 A
	RSR72-...40	40 A	600 A
	RSR72-...75	75 A	800 A
Maximum I²t for fusing (@ 10 ms)		10 A	200 A²s
		20 A	450 A²s
		30 A	1 250 A²s
		40 A	1 800 A²s
		75 A	3 200 A²s
Maximum off-state leakage current (@ rated load voltage)		10 mA	
Maximum on-state voltage drop (@ rated current)		1,6 Vrms	
Minimum off-state dV/dt (@ maximum rated voltage)		500 V/µs	

General data ❶

Dielectric strength (50/60 Hz)	input - output	4 000 Vrms
	input, output - base	2 500 Vrms
Minimum insulation resistance (@ 500 V DC)	1 000 MΩ	
Dimensions (L x W x H)	10 A, 20 A, 30 A	100 x 30,5 x 112,5 mm
	40 A	122 x 50,5 x 110 mm
	75 A	153 x 105 x 122 mm
Weight (typical)	10 A, 20 A, 30 A	355 g
	40 A	540 g
	75 A	1 062 g
Ambient temperature (non-condensation and/or icing)	storage	-30...+100 °C
	operating	-30...+80 °C
Cover protection category	IP 20 (EN 60529)	

❶ Data are given for ambient temperature +25 °C. When temperature is above +25 °C the maximum load current decreases - see "Thermal derating curves", page 20.
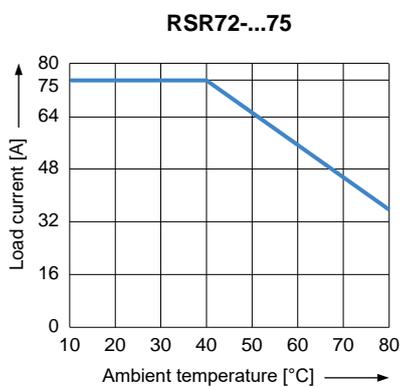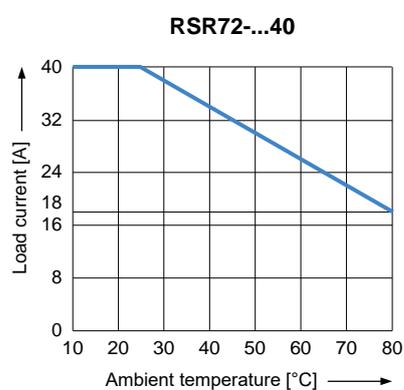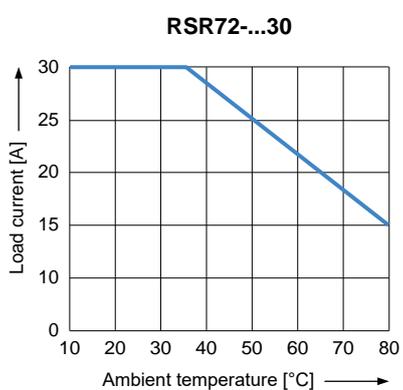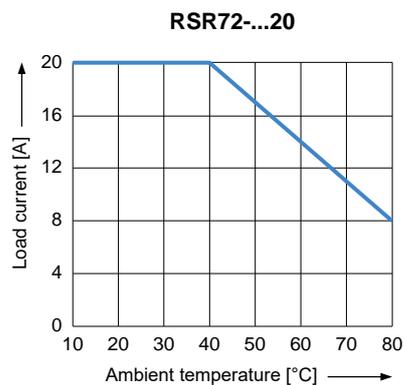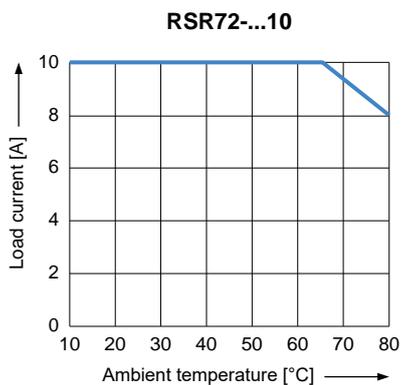
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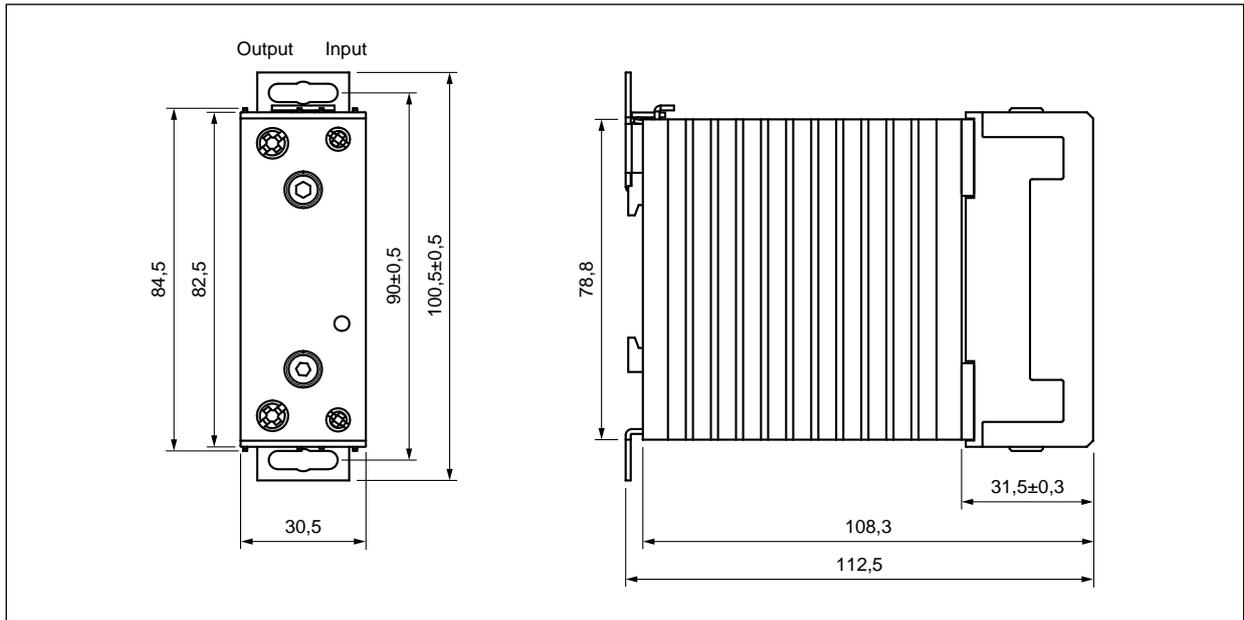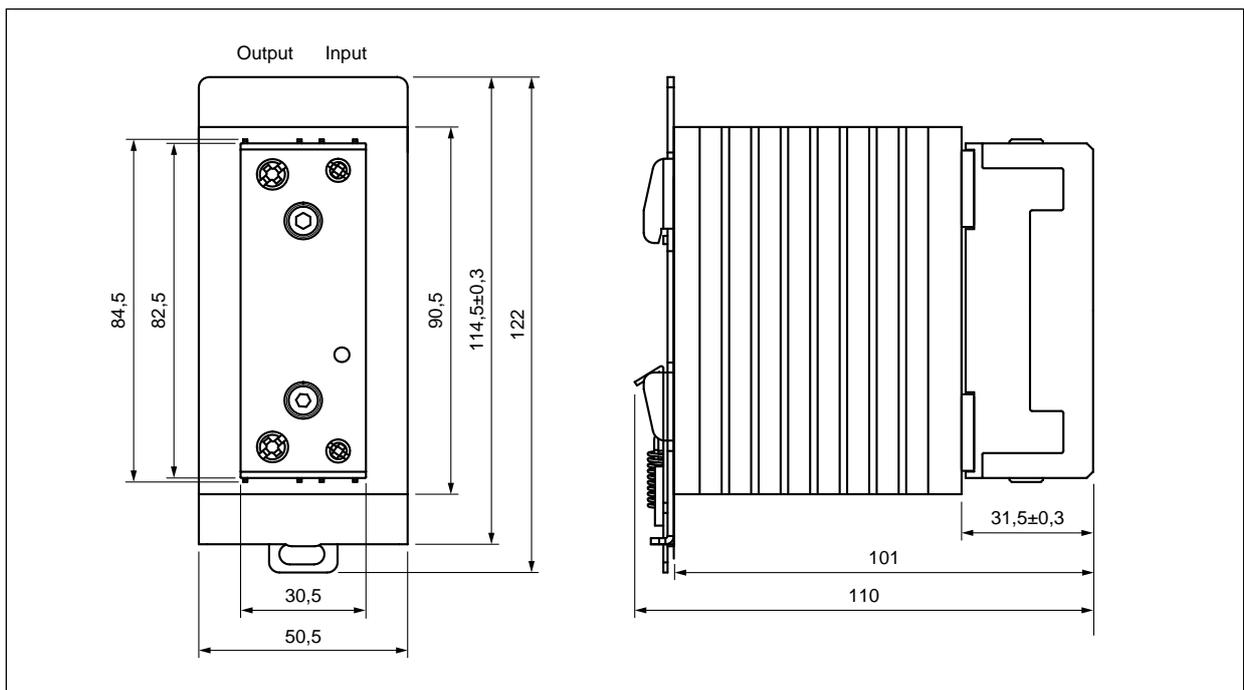## Thermal derating curves

RSR72-...10

RSR72-...20

RSR72-...30

RSR72-...40

RSR72-...75

Connection diagram

Control

AC~/DC+ 3

AC~/DC− 4

2 — Load — N

1 — L

Dimensions

Output   Input

84,5
82,5
90±0,5
100,5±0,5
30,5

78,8
31,5±0,3
108,3
112,5
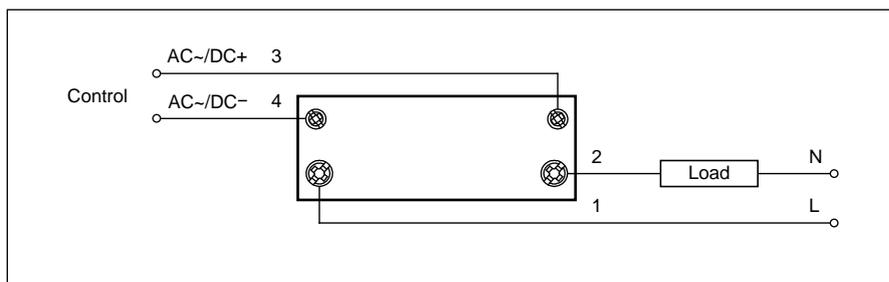
Solid state relay **RSR72-...10/20/30-.H**

Output   Input

84,5
82,5
90,5
114,5±0,3
122
30,5
50,5

31,5±0,3
101
110

Solid state relay **RSR72-...40-.H**

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Dimensions

Output   Input

84,5
82,5
60
110
max. 145
max. 153
30,5
90
Ø4,5
max. 105

31,5±0,3
max. 113
max. 122
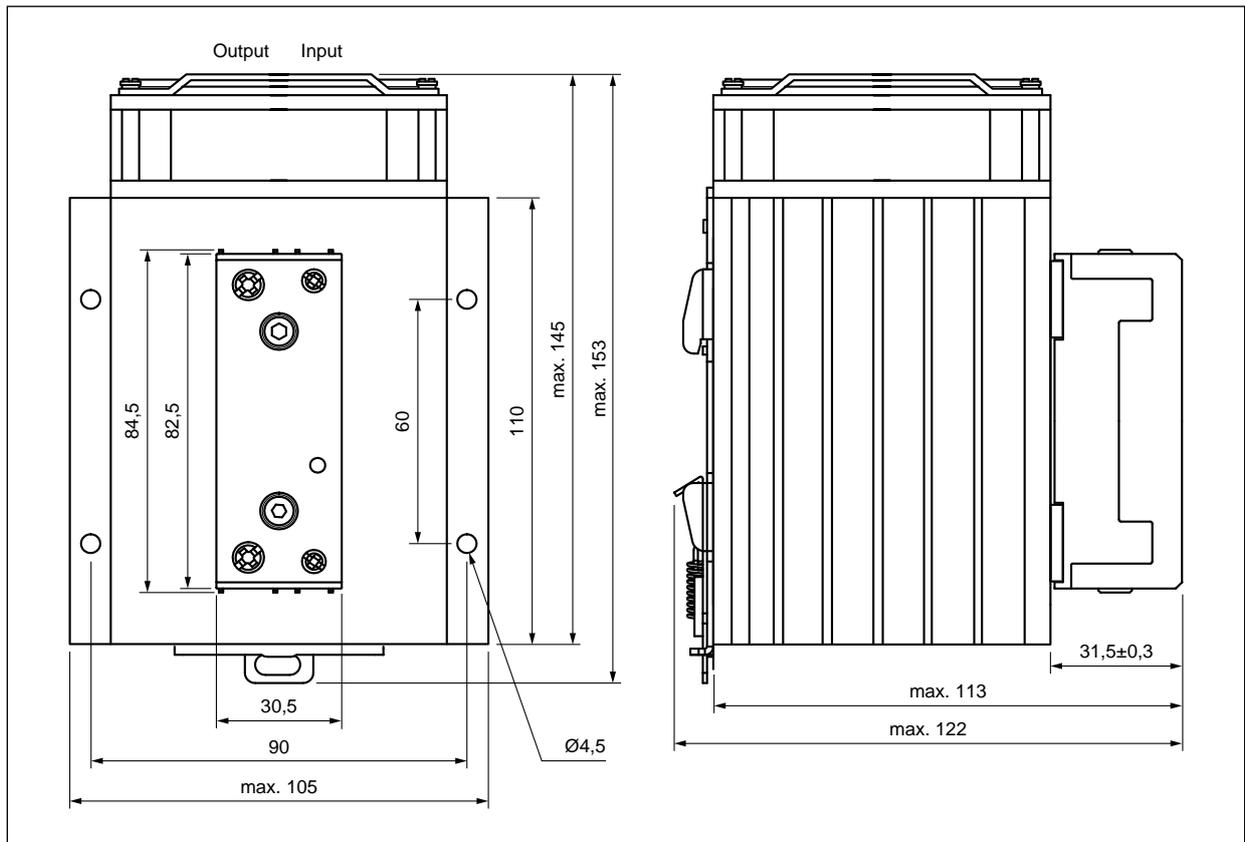
Solid state relay **RSR72-...75-.H**

RSR72

Solid state relays with integrated heatsinks

NEW

Mounting, accessories for relays

Relays **RSR72** integrated with heatsink are designed for direct mounting on 35 mm rail mount acc. to EN 60715.
For relays mounted side by side, the recommended minimum distance is 30 mm.

Mounting on heatsink ❷			
Screws	⊕	M4	
Tightening moment		0,98...1,37 N•m	
Screw length		12 mm	
Switching terminals ❸		Input	Output
Screws	⊕	M3	M4
Tightening moment		0,6 N•m	1 N•m
Stripping length		7 mm	10 mm
Aperture for termination lug		6,5 mm	11,5 mm
Cross section of the cables		Input	Output
Single core cable	–	1 x 0,5...2,5 mm^2 (1 x 18...12 AWG) 2 x 0,5...1 mm^2 (2 x 18...17 AWG)	2 x 1,5...6 mm^2 (2 x 16...10 AWG)
Multi-core cable (with ferrule)	–	1 x 0,5...2,5 mm^2 (1 x 18...12 AWG) 2 x 0,5...1 mm^2 (2 x 18...17 AWG)	1 x 1,5...10 mm^2 (1 x 16...8 AWG) 2 x 1,5...6 mm^2 (2 x 16...10 AWG)

❷ Relay is mounted to heatsink, based on "Thermal derating curves".
❸ When connection cables to relay: please ensure, screws are torqued down properly.

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Table of codes
Table 1

Solid state relay code			Heatsink width
zero-crossing switching, AC control	**zero-crossing switching, DC control**	**random-on switching, DC control**	
RSR72-28A10-H	RSR72-24D10-H	–	30,5 mm
RSR72-28A20-H	RSR72-24D20-H	–	30,5 mm
RSR72-28A30-H	RSR72-24D30-H	–	30,5 mm
RSR72-28A40-H	RSR72-24D40-H	–	50,5 mm
RSR72-28A75-H	RSR72-24D75-H	–	105 mm
RSR72-48A10-H	RSR72-48D10-H	RSR72-48D10-RH	30,5 mm
RSR72-48A20-H	RSR72-48D20-H	RSR72-48D20-RH	30,5 mm
RSR72-48A30-H	RSR72-48D30-H	RSR72-48D30-RH	30,5 mm
RSR72-48A40-H	RSR72-48D40-H	RSR72-48D40-RH	50,5 mm
RSR72-48A75-H	RSR72-48D75-H	–	105 mm
–	RSR72-60D20-H	RSR72-60D20-RH	30,5 mm
–	RSR72-60D30-H	RSR72-60D30-RH	30,5 mm
–	RSR72-60D40-H	RSR72-60D40-RH	50,5 mm
–	RSR72-60D75-H	RSR72-60D75-RH	105 mm

Ordering codes

Load voltage

28 - 240 V AC (AC control)
24 - 240 V AC (DC control)
48 - 480 V AC
60 - 600 V AC

Control input

A - AC control
D - DC control

Version

H - integrated with heatsink

Switching mode

without marks - zero-crossing
R - random-on

Load current

10 - 10 A
20 - 20 A
30 - 30 A
40 - 40 A
75 - 75 A
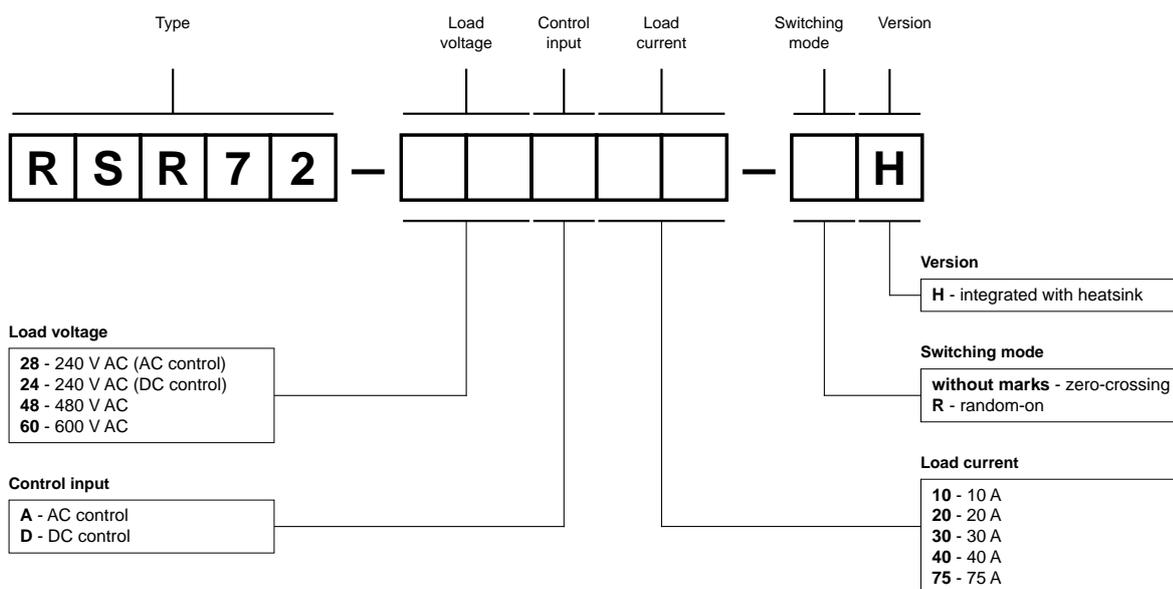
Examples of ordering codes ❺:

RSR72-28A10-H	relay **RSR72**, integrated with heatsink, zero-crossing switching, AC control, load voltage 240 V AC (single-phase), load current 10 A
RSR72-24D30-H	relay **RSR72**, integrated with heatsink, zero-crossing switching, DC control, load voltage 240 V AC (single-phase), load current 30 A
RSR72-48A40-H	relay **RSR72**, integrated with heatsink, zero-crossing switching, AC control, load voltage 480 V AC (single-phase), load current 40 A
RSR72-60D75-RH	relay **RSR72**, integrated with heatsink, random-on switching, DC control, load voltage 600 V AC (single-phase), load current 75 A

❺ Ordering codes **RSR72** are specified in Table 1.

	RH21	RH19A	RH19B
Applications	for RSR52	for RSR52	for RSR52
Material	aluminum	aluminum	aluminum
Color	black	black	black
Dimensions (L x W x H)	80 x 50 x 50 mm	70 x 50 x 69 mm	81 x 50 x 83 mm
Weight (typical)	115 g	275 g	335 g
Thermal resistance	2,1 °C/W	1,9 °C/W	1,9 °C/W
Additional equipment	–	RDR-10 ❶	–
Mounting	on panel, on 35 mm rail mount	on panel	on 35 mm rail mount

	RH17A	RH17B	RH06B
Applications	for RSR52	for RSR52	for RSR52
Material	aluminum	aluminum	aluminum
Color	grey	black	black
Dimensions (L x W x H)	90 x 50 x 69 mm	100 x 49 x 81 mm	123 x 76 x 67 mm
Weight (typical)	350 g	255 g	300 g
Thermal resistance	1,7 °C/W	1,7 °C/W	1,5 °C/W
Additional equipment	RDR-30 ❷	–	–
Mounting	on panel	on panel	on panel

	RH16	RH16-F	RH11
Applications	for RSR52	for RSR52	for RSR52, RSR62
Material	aluminum	aluminum	aluminum
Color	black	black	black
Dimensions (L x W x H)	106 x 50 x 96 mm	106 x 80 x 96 mm	142 x 150 x 55 mm
Weight (typical)	375 g	645 g	539 g
Thermal resistance	1,6 °C/W	0,6 °C/W	1,1 °C/W
Additional equipment	–	built-in fan	–
Mounting	on panel, on 35 mm rail mount	on panel, on 35 mm rail mount	on panel

❶ Clip RDR-10 for heatsink RH19A: for mounting on 35 mm rail mount (including 6 holes on M4 screws).
❷ Clip RDR-30 for heatsink RH17A, RH09: for mounting on 35 mm rail mount (including 6 holes on M3 screws).

RH09

RH04A-F

Applications	for RSR52, RSR62	for RSR52, RSR62
Material	aluminum	aluminum
Color	black	black
Dimensions (L x W x H)	100 x 110 x 81 mm	100 x 140 x 81 mm
Weight (typical)	560 g	830 g
Thermal resistance	0,9 °C/W	0,4 °C/W
Additional equipment	RDR-30 ❷	built-in fan
Mounting	on panel	on panel

RH08

RH08-F

Applications	for RSR52, RSR62	for RSR52, RSR62
Material	aluminum	aluminum
Color	black	black
Dimensions (L x W x H)	106 x 110 x 96 mm	106 x 140 x 96 mm
Weight (typical)	825 g	1 095 g
Thermal resistance	0,8 °C/W	0,35 °C/W
Additional equipment	–	built-in fan
Mounting	on panel, on 35 mm rail mount	on panel, on 35 mm rail mount

RH04B

RH04B-F

Applications	for RSR52, RSR62	for RSR52, RSR62
Material	aluminum	aluminum
Color	black	black
Dimensions (L x W x H)	125 x 150 x 135 mm	125 x 193 x 135 mm
Weight (typical)	2 320 g	2 590 g
Thermal resistance	0,4 °C/W	0,15 °C/W
Additional equipment	–	built-in fan
Mounting	on 35 mm rail mount	on 35 mm rail mount

❷ Clip RDR-30 for heatsink RH17A, RH09: for mounting on 35 mm rail mount (including 6 holes on M3 screws).

Dimensions
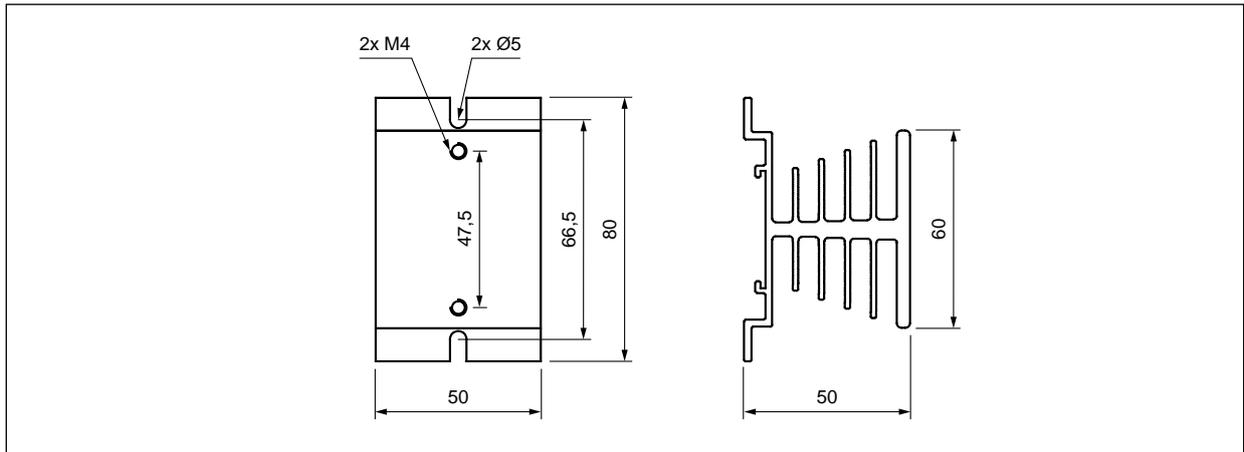
Heatsink **RH21**
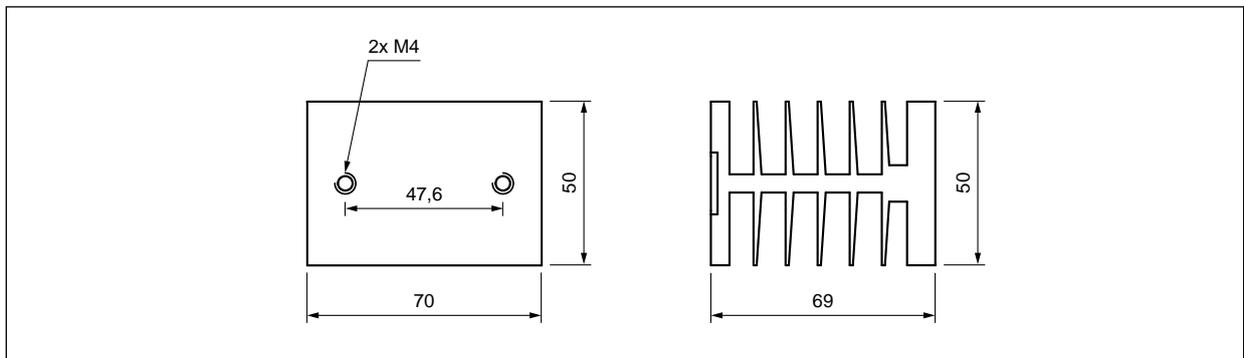
Heatsink **RH19A**
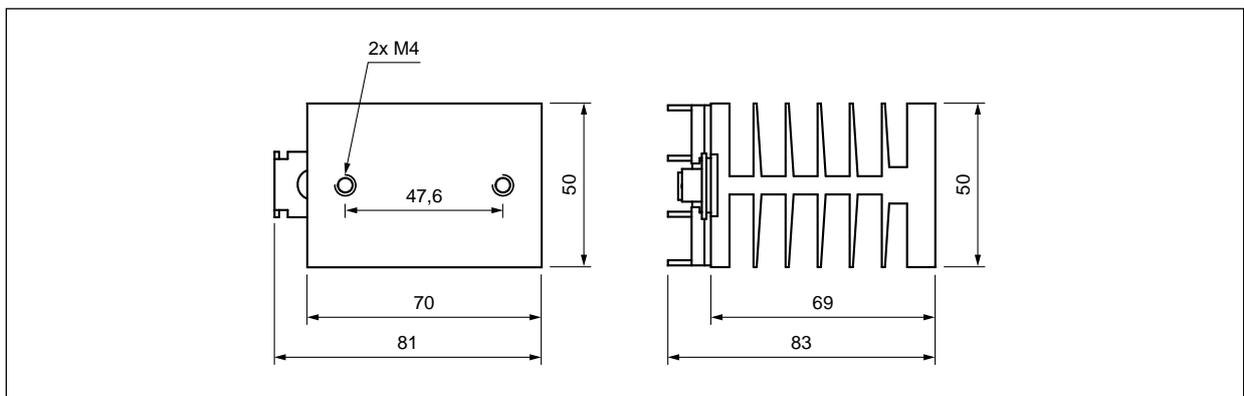
Heatsink **RH19B**

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Dimensions

6x M4

70

40

47,5

50

90

50

69

Heatsink **RH17A**

2x M4   2x Ø6

47,5

93,5

100

49

80

81

Heatsink **RH17B**

2x M4   4x Ø5

47,5

110

123

50

100

63,5

76

67
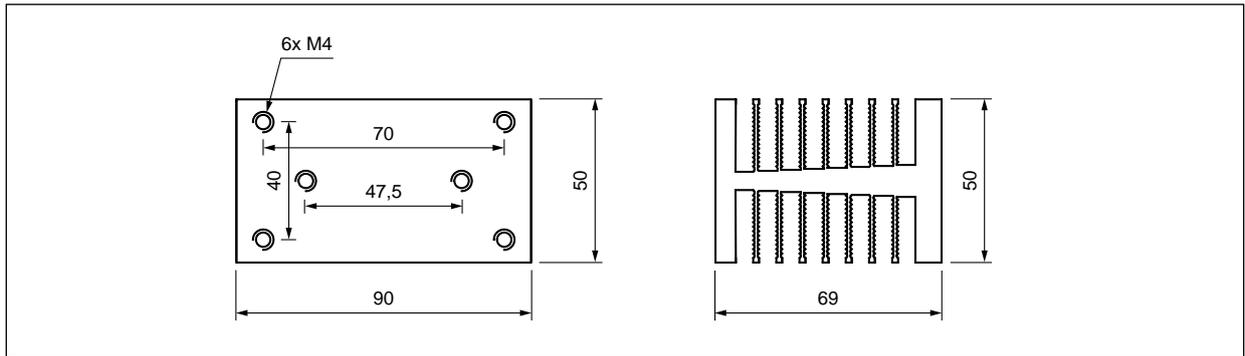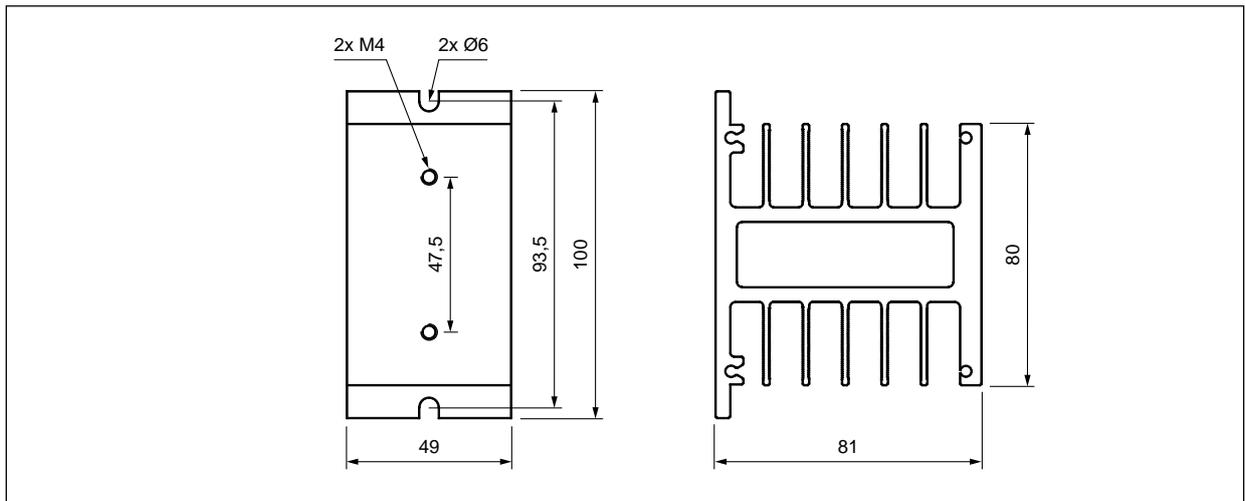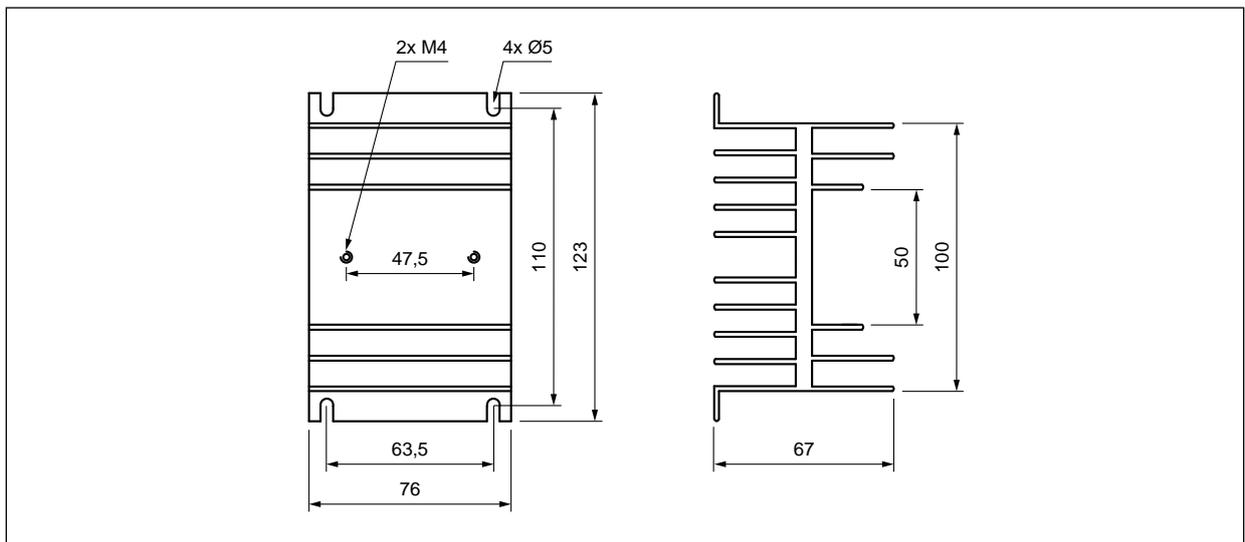
Heatsink **RH06B**

Dimensions
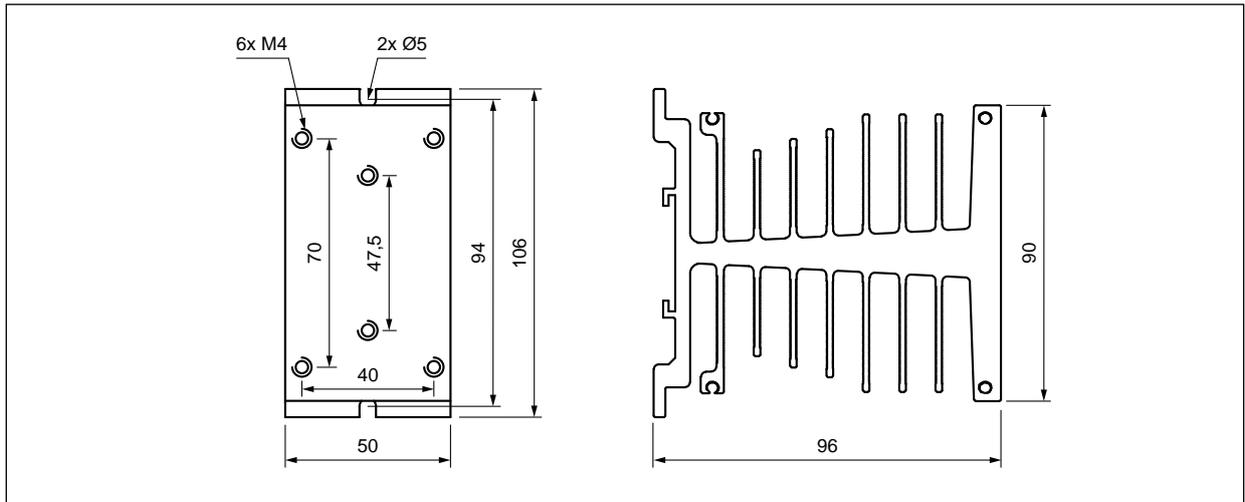
Heatsink **RH16**
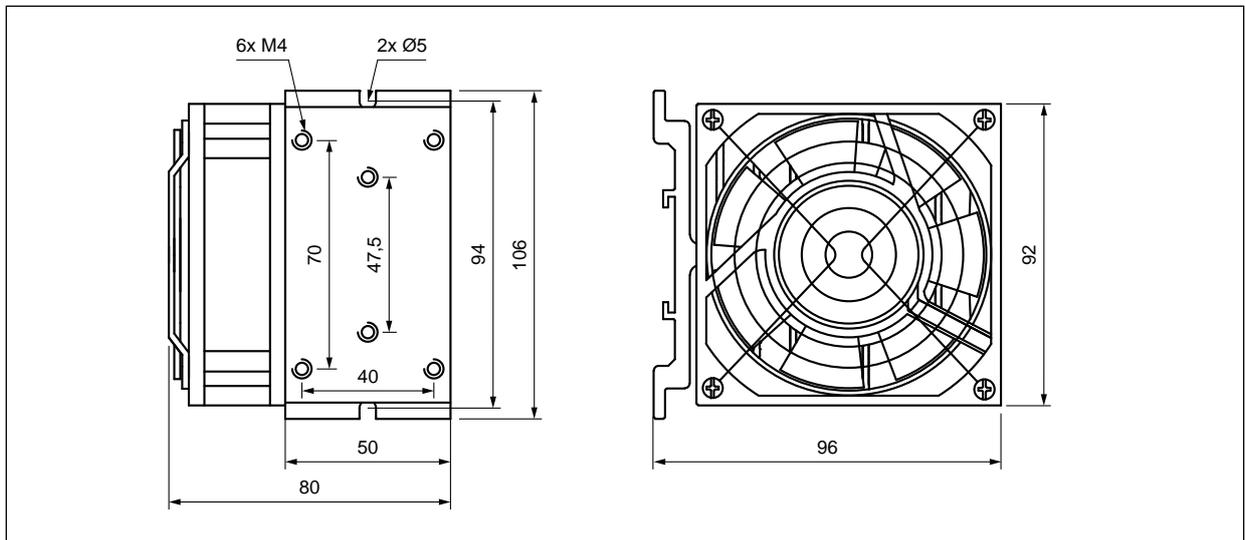
Heatsink **RH16-F**

Heatsink **RH11**

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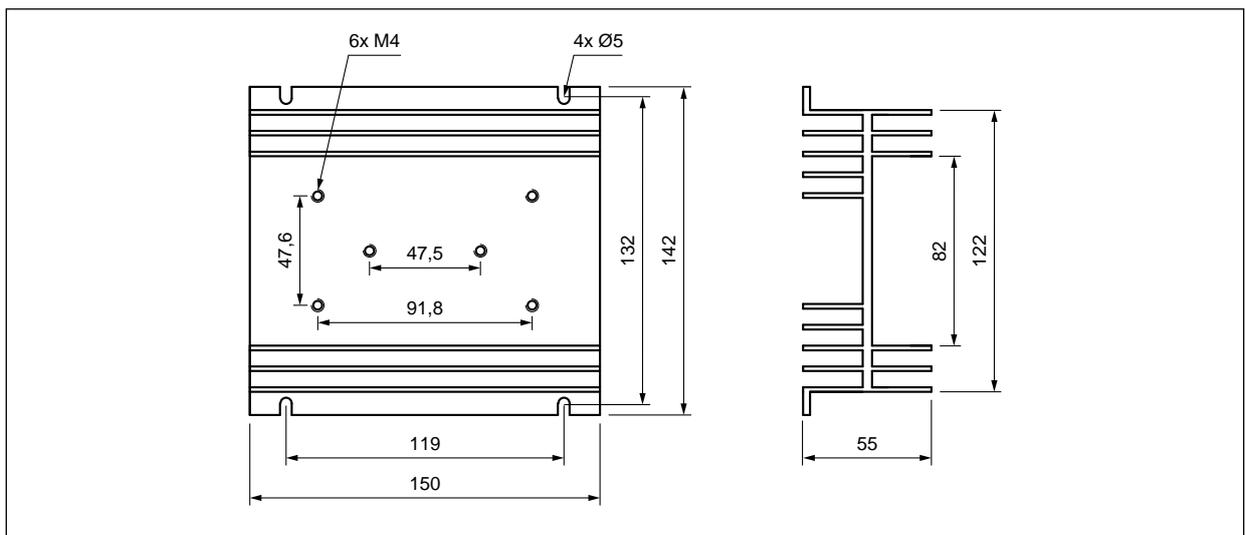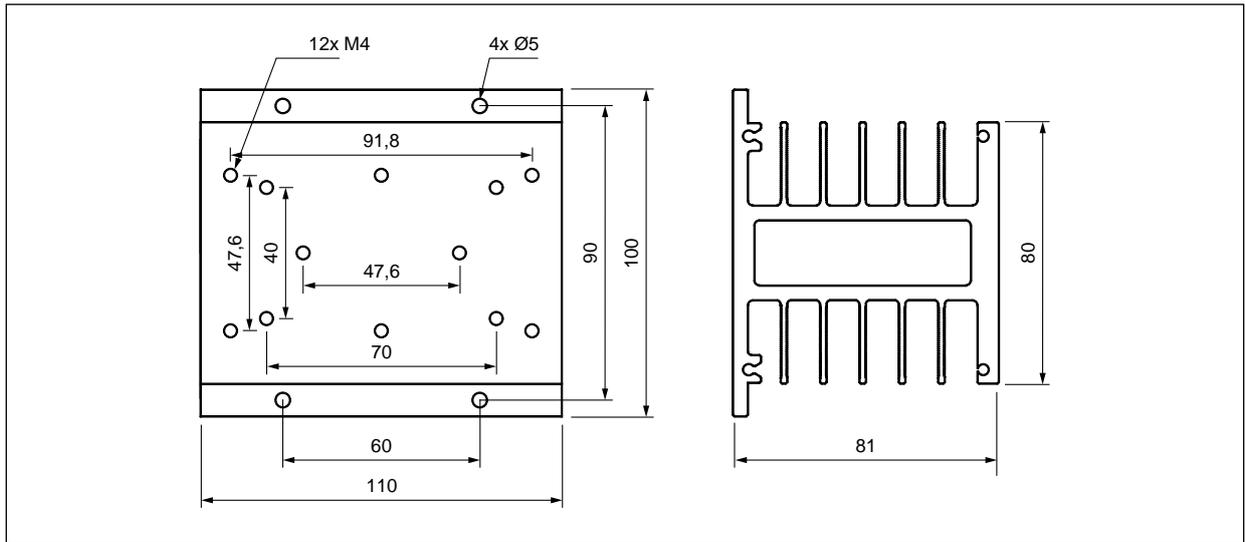
Dimensions
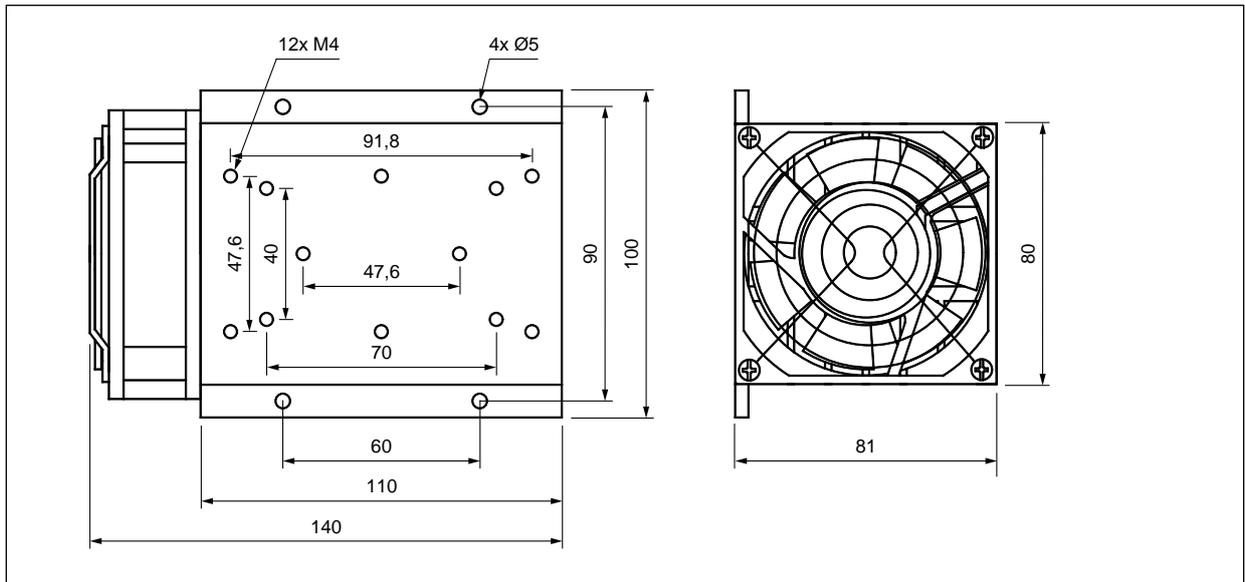
Heatsink **RH09**

Heatsink **RH04A-F**
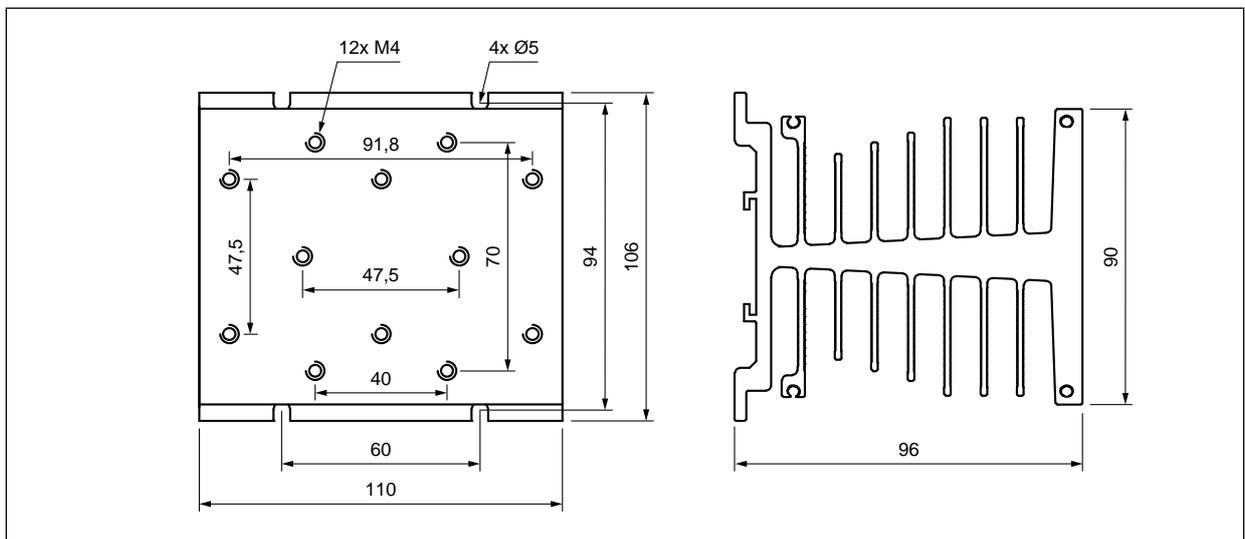
Heatsink **RH08**
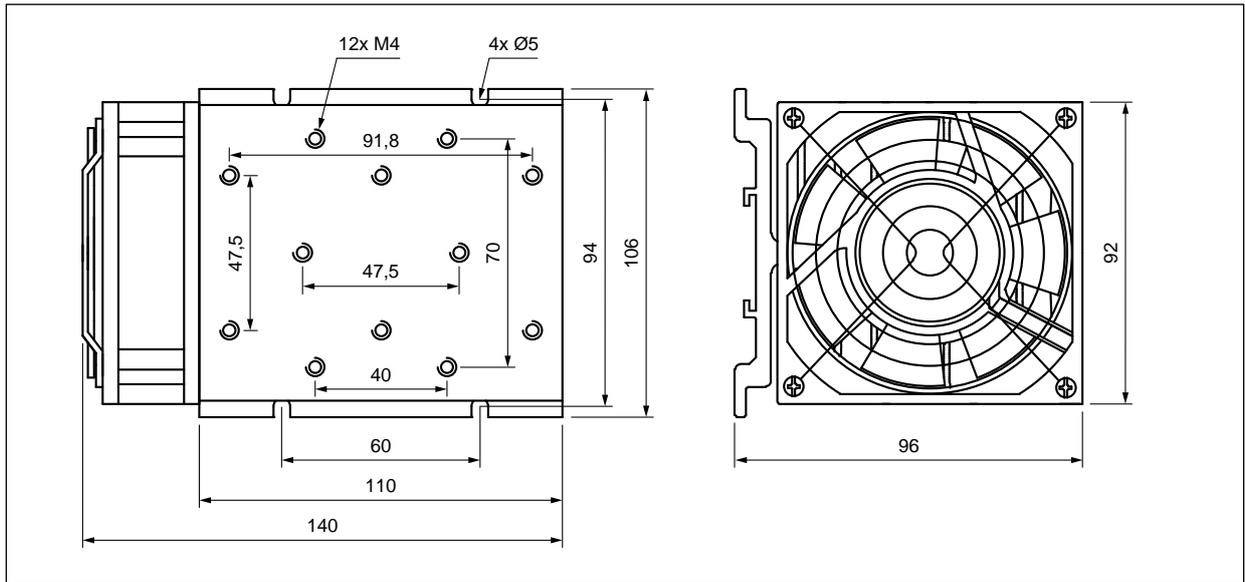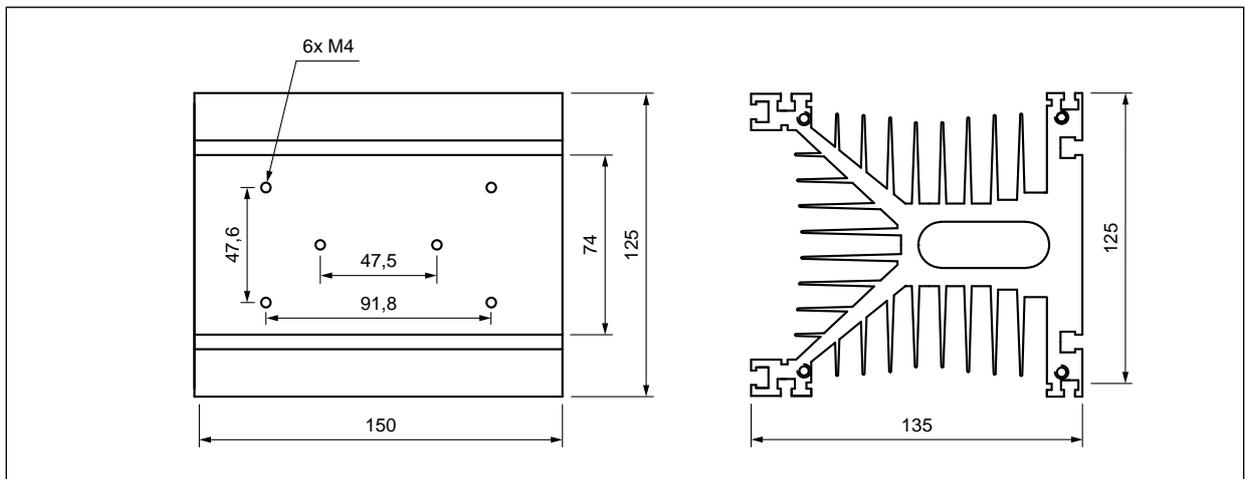
Dimensions

12x M4 4x Ø5

91,8

47,5

47,5 70

94 106

40

60

110

140

96 92

Heatsink **RH08-F**

6x M4

47,6

47,5

91,8

74 125

150

135 125

Heatsink **RH04B**


6x M4

47,6

47,5

91,8

74 125

150

193

135 125

Heatsink **RH04B-F**

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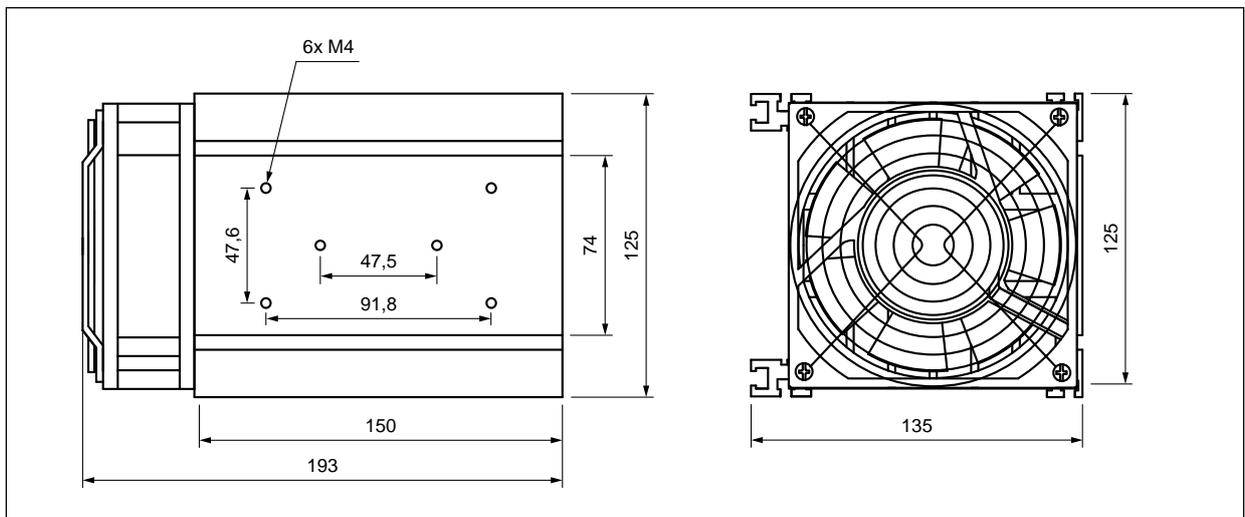
Solid state relays (SSR) and electromagnetic relays (EMR)

At the end of the 1980s, the first solid-state relays appeared on sale. Already at that time the question was asked: will solid state relays (**SSRs**) replace electromechanical relays (**EMRs**)? However, after all these years, both groups are developing side by side and even complement each other.

Solid State Relay - is a static semiconductor relay, which does not have mechanical elements. Connecting element in this case is a semiconductor structure and input circuit (control circuit) is isolated from the output circuit.

Control input   Power output
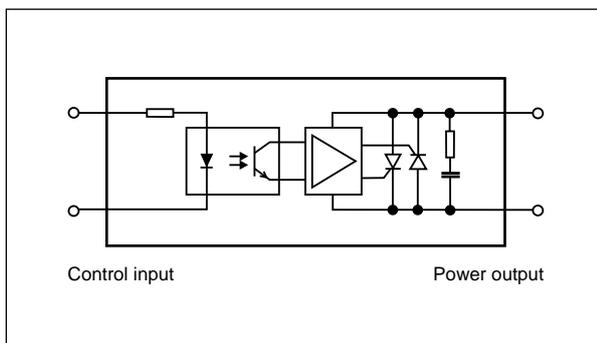
Connection diagram of SSR

Control input   Power output
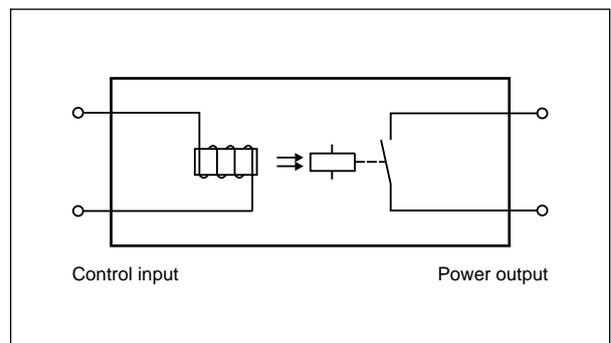
Connection diagram of EMR

Characteristics of solid state relays (SSR) and electromagnetic relays (EMR)

Systems controlled by solid state or electromagnetic relays have their advantages and disadvantages. Solutions with the use of solid state relays allow to increase the frequency of switching operations and give the possibility to choose the switching method.

Both groups of relays should be treated as separate types of devices.
In order to better understand and use both types of relays, it is good to know the advantages and limitations that result from the design of these relays.

Pros of SSR

- high durability,
- no electrical arc at the contacts,
- no electromechanical interference,
- high resistance to shocks and vibrations,
- high resistance to aggressive environment, dust and chemicals,
- fast switching speeds,
- silent operation,
- low power of the control signal required.

Cons of SSR

- voltage drop across the SSR output terminals,
- necessity to use a heat sink,
- leakage current,
- limited resistance to overvoltages (limitation of current increase -dI/dt, limitation of voltage increase dV/dt),
- can not be used for low signals,
- influence of the electromagnetic environment on their operation.

Pros of EMR

- the same ability to switch AC and DC loads,
- negligible voltage drop across contacts,
- high resistance to overvoltages,
- no leakage current.

Cons of EMR

- contacts wear (shorter service life),
- bounces when connecting and contacts sparking,
- electromagnetic interference,
- long response time,
- insufficient quality when switching on surge currents.

Advantages of solid state relays

Durability
Lack of moving parts ensures high reliability and increases the number of operations repeatedly. The correct usage of the solid state relay increases the number of performed switching operations several times.

No arc on contacts
In case of solid state relays there is no concept of arc because switching occurs inside the semiconductor material. Burnout and contact wear does not occur, which reduces radio frequency emissions and does not cause contact vibration.

No electromechanical interference
Electronic control eliminates interference in the control signal.

High resistance to shocks and vibrations
SSRs do not have moving parts, they are electronic devices. As a consequence, they are very resistant to high vibrations, which applies to both amplitude and frequency.

High resistance to aggressive environment, dust and chemicals
Compared to electromechanical relays, they are minimally exposed to aggressive environments or dust that can damage the contacts.

Fast switching speeds
SSRs can switch up to several dozen times per second, which is not possible when using electromagnetic relays.

Silent operation
There are no moving parts, so the solid state relay does not make noises like electromagnetic relays or contactors when switching the circuit on and off.

Low power of control signal
The solid state relay has no coil. Comparing to EMR, the larger the electromagnetic relay, then the coil is larger, and thus the coil has need for higher current.

SSR or EMR - which relay should I choose?

What should you do to choose the right relay? Should you choose a solid state relay or electromagnetic relay? Differences between electromagnetic and solid state relays described earlier will help us partly to answer those questions.

How many times does the relay have to operate?
Solid state relays are characterized by long, failure-free operation. For example: if an electromagnetic relay has a lifetime of 100,000 connections, then its semiconductor equivalent will operate 1,000,000 connections. A solid state relay should be used in applications requiring long lifetime.

Where do we use the relay?
Referring to the first point, to ensure a reliable and long lifetime of semiconductor device, it should be remembered that solid state relay is much more exposed to overvoltage, electrostatic and switching discharges. On the other hand, the construction of an electromagnetic relay ensures that they are insensitive to those events.

Do you need quiet operation?
The advantage of using a solid state relay is its noiseless operation.

How fast should the relay react?
The solid state relay is ideal for applications requiring fast response times. Electromagnetic relays due to their construction (moving parts), have response times between 7 and 20 ms, while solid state relays are much faster and additionally handle better at high switching frequencies.

How much space do we have available?
When using a solid state relay, we must remember about proper heat dissipation. A heat sink should almost always be used, so more space is needed for the relay and heat sink.

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Operation sequence

Due to the way of switching, solid state relays can be divided into two basic groups:
• relays switching at zero-crossing,
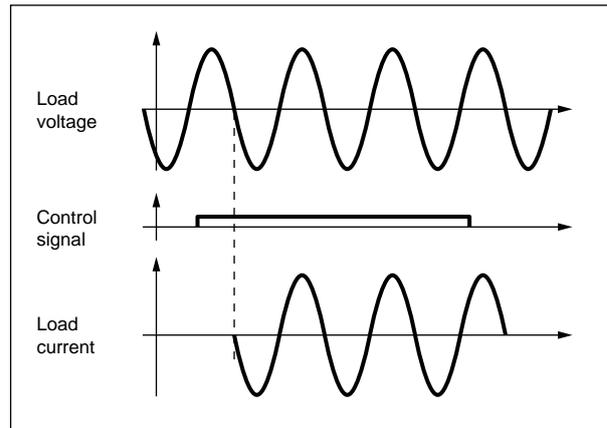• random-on relays.

Zero-crossing relays
The relay is switched on when the voltage goes through zero, and it switches off when the current reaches zero. This method of switching allows limiting surge currents generated during switching operations. The relays are recommended for applications controlling resistive, capacitive or slightly inductive loads.

Random-on (instant-on) relays
The relay is activated immediately after the control signal appears (control voltage is applied).
In this case, we have a faster turn on time than when using zero-crossing switching. This type of switching is used for inductive loads in applications where a fast response time is required.

Solid state relays are a good solution as an intermediate element between the control circuit and circuit directly connected to load. Zero-crossing relays and random-on relays are subject to division due to AC or DC control voltage. Relays with AC output are most commonly used.

Zero-crossing switching
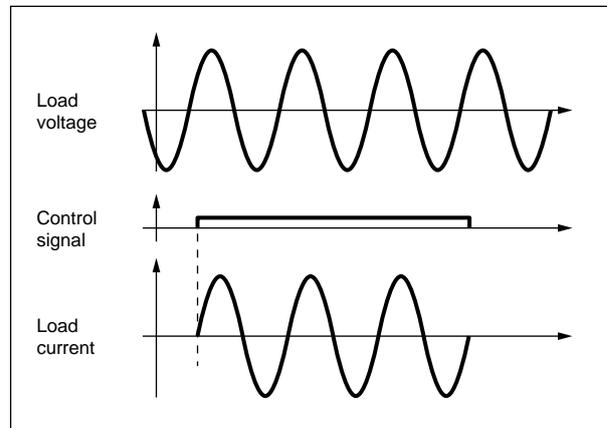
Random-on switching

Control signal

Typical control signal voltages for single- and three-phase relays:
• AC control signal: **90...280 V AC**,
• DC control signal: **4...32 V DC**.

Load current

Rated load current of relay for resistive load:
• single-phase: **I=P/220** or **I=P/380**,
• three-phase: **I=P/√3/380**.

Considering the ambient temperature, heat emission and other conditions, include **40...80%** safety margin for load current.

Additional relay protection

For proper protection of the solid state relay, it is recommended to connect in series to the load circuit:
• thermal relay – overcurrent protection,
• ultra-fast fuse with a value less than the I^2t value of the relay – protection against short circuit or overload.

Leakage current

During the SSR is turned-off, we can observe an extremely small current when apply a voltage to SSR output, due to the power component has an impedance. Besides this, the leakage current is caused also by the snubber network which is a resistor and capacitor in series placed in parallel across the output of the SSR. This snubber protects the relay from static and commutating dV/dt.
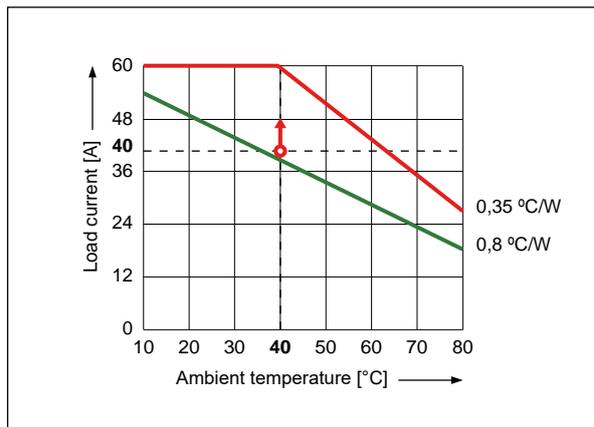
Selection of heat sink

When a SSR is on, the relay will generate heat. The amount of heat generated is a function of the load current. **The maximum chip temperature for a SCR is 125 °C**, if the SCR exceeds this temperature the relay is damaged. Therefore, the use of heat sinks is required. The heat sink takes the heat generated by the SSR and dissipate it keeping the SSR cooler.

To select the proper sized heat sink:
• determine the load current and the maximum ambient temperature the relay will be exposed to,
• use the "Thermal derating curves" included in the data sheet of selected SSR.

Example: for a single-phase RSR52 60 A, at 40 A load current and ambient temperature at 40 °C:
• on the Y axis we find the current value for which we draw a line perpendicular to Y,
• on the X axis we find the ambient temperature for which we draw a line perpendicular to X,
• we determine the intersection of both lines,

Thermal derating curve

• read the heat sink rating – **always choose the rating above your point**: we need a 0,35 °C/W sized heat sink, since the 0,8 °C/W heat sink will not ensure sufficient cooling of the solid state relay.

Selection of varistor (MOV)

SSR is used for various applications, overvoltage may occur during its operation. Usage of MOV to suppress the transient voltage on power components and reduce the possibility to damage SSR.

To choose an appropriate MOV, determine:
• circuit conditions such as peak voltage and current during the event,
• number of surges the MOV must survive,
• acceptable let-through voltage for the application.

Example: SSR can work without MOV if transient over-voltage endurance is:
• 800 V – SSR can operate a 220 V AC load, or lower,
• 1 200V – SSR can operate a 380 V AC load, or lower.

relpol S.A.

The offer of Relpol S.A. includes the following products:

subminiature signal relays
rated switching capacity: from 0,5 A to 3 A, coil voltage range: from 3 V to 48 V DC

miniature relays
rated switching capacity: from 5 A to 20 A

industrial relays
rated switching capacity: from 5 A to 48 A, mounting: to plug-in sockets
on 35 mm rail mount acc. to EN 60715 or on panel mounting, for PCB

plug-in sockets for relays
for PCB, for 35 mm rail mount acc. to EN 60715 or on panel mounting

interface relays
rated switching capacity: from 0,05 A to 16 A, number of contacts: from 1 to 4

installation relays
rated switching capacity: 8 A, 16 A, number of contacts: from 1 to 3

relays for railroad industry
for rail-vehicles and railroad tractions, rated switching capacity: from 6 A to 16 A,
number of contacts: from 1 to 4

programmable relays
versions: 8 inputs / 4 outputs, 16 inputs / 8 outputs, with LCD display,
without display, supply voltages: 12, 24, 220 V DC, 230 V AC,
programming: LAD, STL, LED indicators of the relay and input / output status

time relays
single- and multifunction time relays, wide range of time adjustments

monitoring relays
monitoring of current, voltage, temperature

signal lamps
single-phase 130...260 V AC/DC (one LED), three-phase 3(N)~ 400/230 V AC (three LEDs)

solid state relays
rated load currents: from 0,1 A to 80 A, zero-crossing or random-on switching

installation contactors
rated switching power: from 2,2 kW to 15 kW (at 400 V AC3)

power supplies
for automation systems, output circuit: 12, 24 V DC, rated currents: from 0,42 A to 40 A

overvoltage arresters
classes I, II and III, available with changeover signal contact

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system for MV switchgears

systems SMP
radiation portal monitors

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01/2020

PRECAUTIONS
1. Ensure that the parameters of the product described in its specification provide a safety margin for the appropriate operation of the device or system and never use the product in circumstances which exceed the parameters of the product.
2. Never touch any live parts of the device.
3. Ensure that the product has been connected correctly. An incorrect connection may cause malfunction, excessive heating or risk of fire.
4. In case of any risk of any serious material loss or death or injuries of humans or animals, the devices or systems shall be designed so to equip them with double safety system to guarantee their reliable operation.

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