

# RSR54

single-phase solid state relays, industrial



NEW

- Zero-crossing switching • AC or DC control input
- SCR output (thyristors) • Load current 25...125 A
- Max. load voltage 280, 530, 660 V AC (single-phase)
- Dielectric strength 4 000 Vrms (opto-isolation)
- TVS protection
- LED indicator (red) • Screw terminals
- Mounting on panel or on heatsinks
- Recognitions, certifications, directives: RoHS, REACH,   

## Applications

High-low temperature chambers, food processing machinery, plastics processing machinery.



## Basic technical data

Load voltage: 24...280 V AC, 24...530 V AC, 24...660 V AC

Control input: AC, DC

Load current: 25 A, 40 A, 60 A, 80 A, 100 A, 125 A

| Type          |                 | zero-crossing      | zero-crossing      | zero-crossing      |
|---------------|-----------------|--------------------|--------------------|--------------------|
| Load voltage  | Control voltage | Load current       |                    |                    |
|               |                 | 25 A               | 40 A               | 60 A               |
| 24...280 V AC | 90...280 V AC   | <b>RSR54-24A25</b> | <b>RSR54-24A40</b> | <b>RSR54-24A60</b> |
|               | 3...32 V DC     | <b>RSR54-24D25</b> | <b>RSR54-24D40</b> | <b>RSR54-24D60</b> |
| 24...530 V AC | 90...280 V AC   | <b>RSR54-48A25</b> | <b>RSR54-48A40</b> | <b>RSR54-48A60</b> |
|               | 3...32 V DC     | <b>RSR54-48D25</b> | <b>RSR54-48D40</b> | <b>RSR54-48D60</b> |
| 24...660 V AC | 90...280 V AC   | <b>RSR54-60A25</b> | <b>RSR54-60A40</b> | <b>RSR54-60A60</b> |
|               | 3...32 V DC     | <b>RSR54-60D25</b> | <b>RSR54-60D40</b> | <b>RSR54-60D60</b> |

| Type          |                 | zero-crossing      | zero-crossing       | zero-crossing       |
|---------------|-----------------|--------------------|---------------------|---------------------|
| Load voltage  | Control voltage | Load current       |                     |                     |
|               |                 | 80 A               | 100 A               | 125 A               |
| 24...280 V AC | 90...280 V AC   | <b>RSR54-24A80</b> | <b>RSR54-24A100</b> | <b>RSR54-24A125</b> |
|               | 3...32 V DC     | <b>RSR54-24D80</b> | <b>RSR54-24D100</b> | <b>RSR54-24D125</b> |
| 24...530 V AC | 90...280 V AC   | <b>RSR54-48A80</b> | <b>RSR54-48A100</b> | <b>RSR54-48A125</b> |
|               | 3...32 V DC     | <b>RSR54-48D80</b> | <b>RSR54-48D100</b> | <b>RSR54-48D125</b> |
| 24...660 V AC | 90...280 V AC   | <b>RSR54-60A80</b> | <b>RSR54-60A100</b> | <b>RSR54-60A125</b> |
|               | 3...32 V DC     | <b>RSR54-60D80</b> | <b>RSR54-60D100</b> | <b>RSR54-60D125</b> |

## Load voltage

|                             | RSR54-24...         | RSR54-48...           | RSR54-60...           |
|-----------------------------|---------------------|-----------------------|-----------------------|
| Rated load voltage          | 240 V AC            | 480 V AC              | 600 V AC              |
| Rated range of load voltage | 24...280 V AC       | 24...530 V AC         | 24...660 V AC         |
| Blocking voltage            | 600 V <sub>pk</sub> | 1 200 V <sub>pk</sub> | 1 200 V <sub>pk</sub> |
| Rated frequency             | 47...63 Hz          | 47...63 Hz            | 47...63 Hz            |
| Min. power factor           | 0,5                 | 0,5                   | 0,5                   |

## Control input

|                        | zero-crossing          | zero-crossing |
|------------------------|------------------------|---------------|
|                        | RSR54-...A...          | RSR54-...D... |
| Control voltage range  | 90...280 V AC 50/60 Hz | 3...32 V DC   |
| Must turn-on voltage   | 90 V AC                | 3 V DC        |
| Must turn-off voltage  | 15 V AC                | 1 V DC        |
| Maximum input current  | 35 mA 280 V AC, 50 Hz  | 25 mA 32 V DC |
| Response time pick-up  | 40 ms                  | 10 ms         |
| Response time drop-out | 20 ms                  | 10 ms         |

## Output circuit ❶

|                                                              | RSR54-...25...             | RSR54-...40...               | RSR54-...60...               |
|--------------------------------------------------------------|----------------------------|------------------------------|------------------------------|
| Rated load current                                           | 25 A                       | 40 A                         | 60 A                         |
| Maximum surge current                                        | 300 A 10 ms                | 500 A 10 ms                  | 500 A 10 ms                  |
| I <sup>2</sup> t for fusing                                  | 450 A <sup>2</sup> s 10 ms | 1 250 A <sup>2</sup> s 10 ms | 2 450 A <sup>2</sup> s 10 ms |
| Max. operational current AC-51 rating                        | 25 A                       | 40 A                         | 60 A                         |
| Max. operational current AC-53 rating                        | 5 A                        | 8 A                          | 12 A                         |
| Min. operational current                                     | ≥ 100 mA                   | ≥ 100 mA                     | ≥ 100 mA                     |
| Maximum off-state leakage current<br>(at rated load voltage) | 3 mA                       | 3 mA                         | 3 mA                         |
| Maximum on-state voltage drop<br>(at rated current)          | 1,5 V <sub>rms</sub>       | 1,5 V <sub>rms</sub>         | 1,5 V <sub>rms</sub>         |
| Minimum off-state dV/dt<br>(at max. rated voltage)           | 500 V/μs                   | 500 V/μs                     | 500 V/μs                     |

## Output circuit ❷

|                                                              | RSR54-...80...               | RSR54-...100...               | RSR54-...125...               |
|--------------------------------------------------------------|------------------------------|-------------------------------|-------------------------------|
| Rated load current                                           | 80 A                         | 100 A                         | 125 A                         |
| Maximum surge current                                        | 800 A 10 ms                  | 1 500 A 10 ms                 | 2 250 A 10 ms                 |
| I <sup>2</sup> t for fusing                                  | 3 200 A <sup>2</sup> s 10 ms | 11 250 A <sup>2</sup> s 10 ms | 25 000 A <sup>2</sup> s 10 ms |
| Max. operational current AC-51 rating                        | 80 A                         | 100 A                         | 125 A                         |
| Max. operational current AC-53 rating                        | 16 A                         | 20 A                          | 25 A                          |
| Min. operational current                                     | ≥ 100 mA                     | ≥ 100 mA                      | ≥ 100 mA                      |
| Maximum off-state leakage current<br>(at rated load voltage) | 3 mA                         | 3 mA                          | 3 mA                          |
| Maximum on-state voltage drop<br>(at rated current)          | 1,5 V <sub>rms</sub>         | 1,5 V <sub>rms</sub>          | 1,5 V <sub>rms</sub>          |
| Minimum off-state dV/dt<br>(at max. rated voltage)           | 500 V/μs                     | 500 V/μs                      | 500 V/μs                      |

❶ Data given for ambient temperature ≤ 25 °C. Above 25 °C the maximum current decreases - see "Thermal derating curves", page 4.

# RSR54

## single-phase solid state relays, industrial

### General data ❶

|                                                        | RSR54-...                                                                        |
|--------------------------------------------------------|----------------------------------------------------------------------------------|
| Dielectric strength                                    | input - output: 4 000 Vrms 50/60 Hz<br>input, output - base: 4 000 Vrms 50/60 Hz |
| Minimum insulation resistance                          | 100 MΩ 500 V DC                                                                  |
| Ambient temperature<br>(non-condensation and/or icing) | storage: -30...+100 °C<br>operating: -30...+80 °C                                |

### Mechanical data

|                                 | RSR54-...                                                                                                 |
|---------------------------------|-----------------------------------------------------------------------------------------------------------|
| Dimensions (L x W x H)          | 58,6 x 45,7 x 29,4 mm                                                                                     |
| Weight (typical)                | 80 g                                                                                                      |
| Protection category EN 60529    | IP 20                                                                                                     |
| Connection mode                 | input: screws M3 ❷ tightening moment: 1,5...1,7 N•m<br>output: screws M4 ❷ tightening moment: 2...2,2 N•m |
| Mounting on panel or heatsink ❸ | screws M4 tightening moment: 2...2,2 N•m                                                                  |

❶ Data given for ambient temperature ≤ 25 °C. Above 25 °C the maximum current decreases - see "Thermal derating curves", page 4.

❷ When connection cables to relay: please ensure, screws are torqued down properly.

❸ Relay must be mounted to proper sized heatsink, based on "Thermal derating curves". Between relay and heatsink must be used thermal pad.

#### RH21



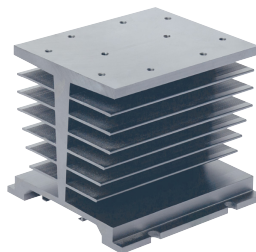
|                        |                               |
|------------------------|-------------------------------|
| Material               | aluminum                      |
| Dimensions (L x W x H) | 80 x 50 x 50 mm               |
| Weight (typical)       | 115 g                         |
| Thermal resistance     | 2,1 °C/W                      |
| Additional equipment   | —                             |
| Mounting               | on panel, on 35 mm rail mount |

#### RH16



|                        |                               |
|------------------------|-------------------------------|
| Material               | aluminum                      |
| Dimensions (L x W x H) | 106 x 50 x 96 mm              |
| Weight (typical)       | 375 g                         |
| Thermal resistance     | 1,6 °C/W                      |
| Additional equipment   | —                             |
| Mounting               | on panel, on 35 mm rail mount |

#### RH08



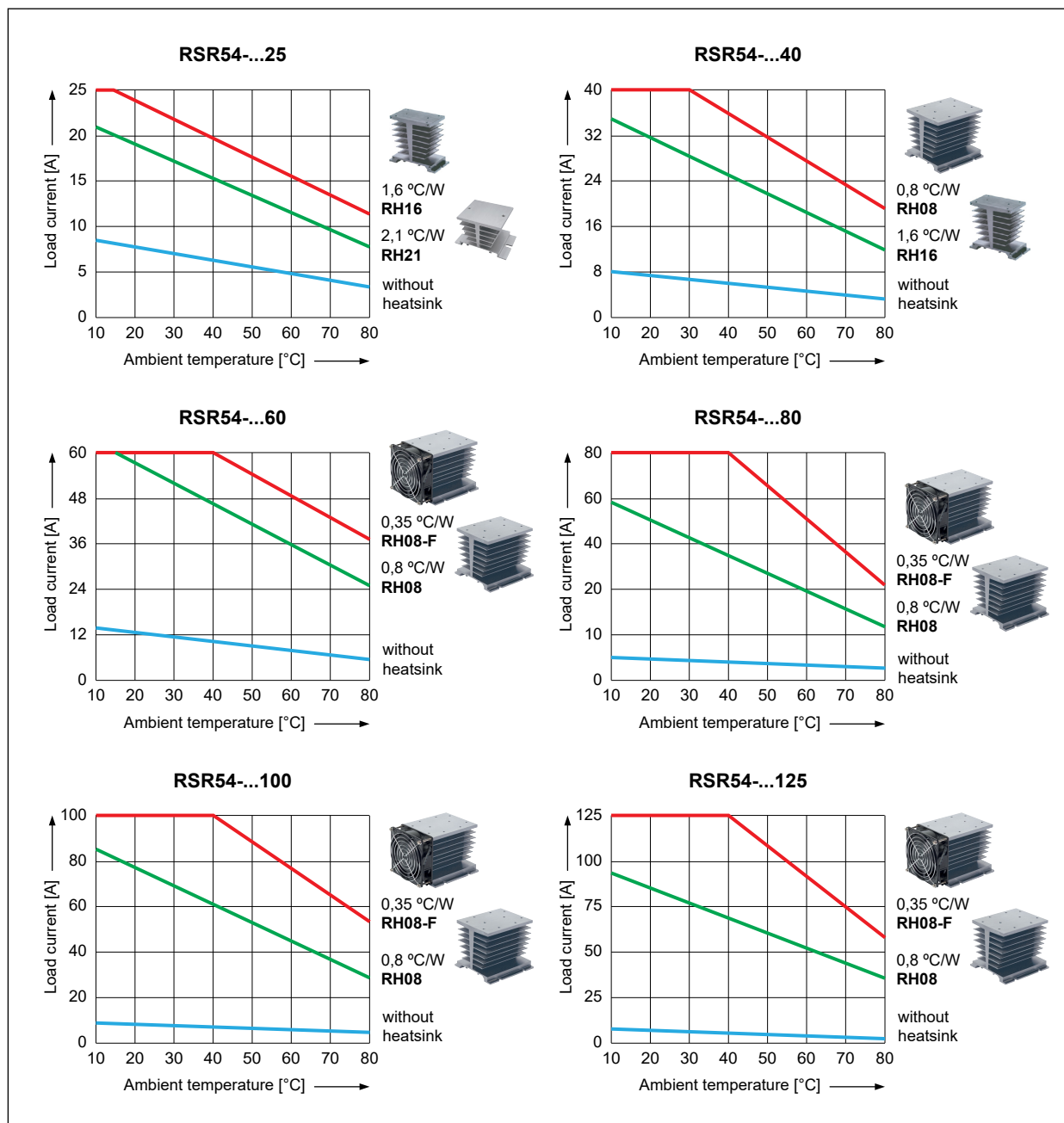
|                        |                               |
|------------------------|-------------------------------|
| Material               | aluminum                      |
| Dimensions (L x W x H) | 106 x 110 x 96 mm             |
| Weight (typical)       | 825 g                         |
| Thermal resistance     | 0,8 °C/W                      |
| Additional equipment   | —                             |
| Mounting               | on panel, on 35 mm rail mount |

#### RH08-F



|                        |                               |
|------------------------|-------------------------------|
| Material               | aluminum                      |
| Dimensions (L x W x H) | 106 x 140 x 96 mm             |
| Weight (typical)       | 1 095 g                       |
| Thermal resistance     | 0,35 °C/W                     |
| Additional equipment   | built-in fan                  |
| Mounting               | on panel, on 35 mm rail mount |

### Thermal derating curves

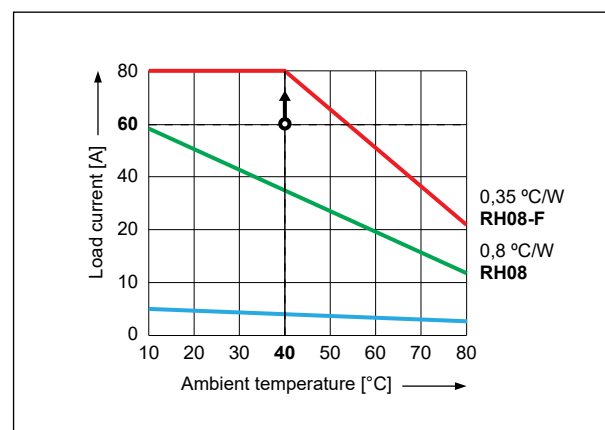


#### To select the proper sized heatsink:

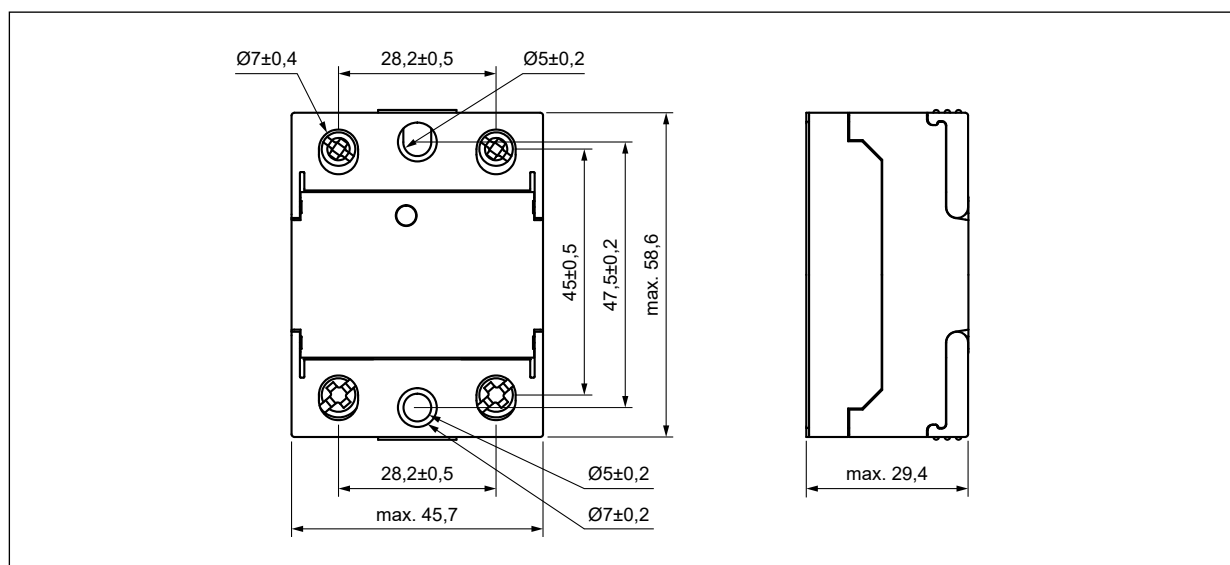
- determine the load current and the maximum ambient temperature the relay will be exposed to,
- use the "Thermal derating curves" (see above).

Example: for a single-phase **RSR54** 80 A, at 60 A load current and ambient temperature at 40 °C:

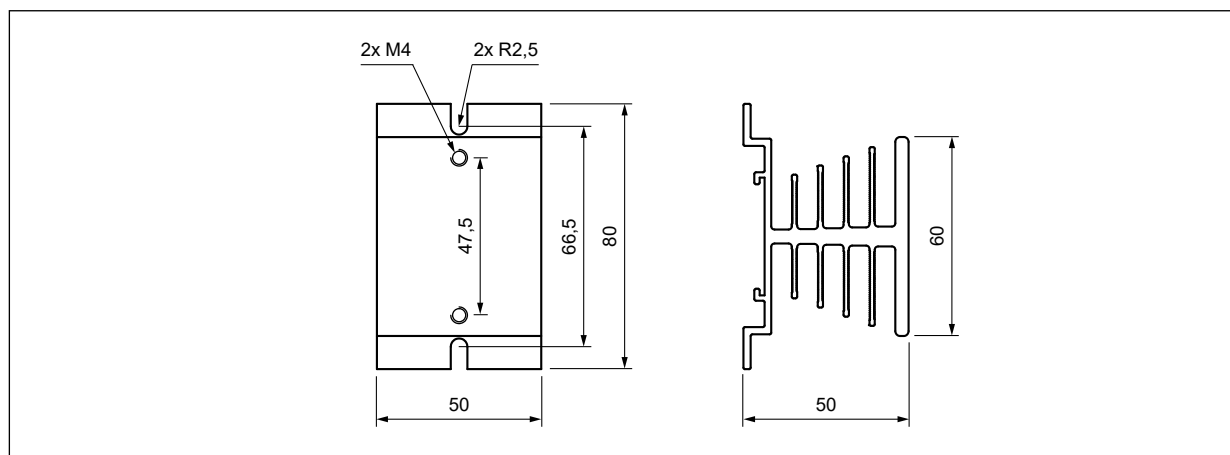
- on the Y axis we find the current value for which we draw a line perpendicular to Y,
- on the X axis we find the ambient temperature for which we draw a line perpendicular to X,
- we determine the intersection of both lines,
- read the heatsink rating – **always choose the rating above your point**: we need a 0,35 °C/W sized heatsink, since the 0,8 °C/W heatsink will not ensure sufficient cooling of the solid state relay.



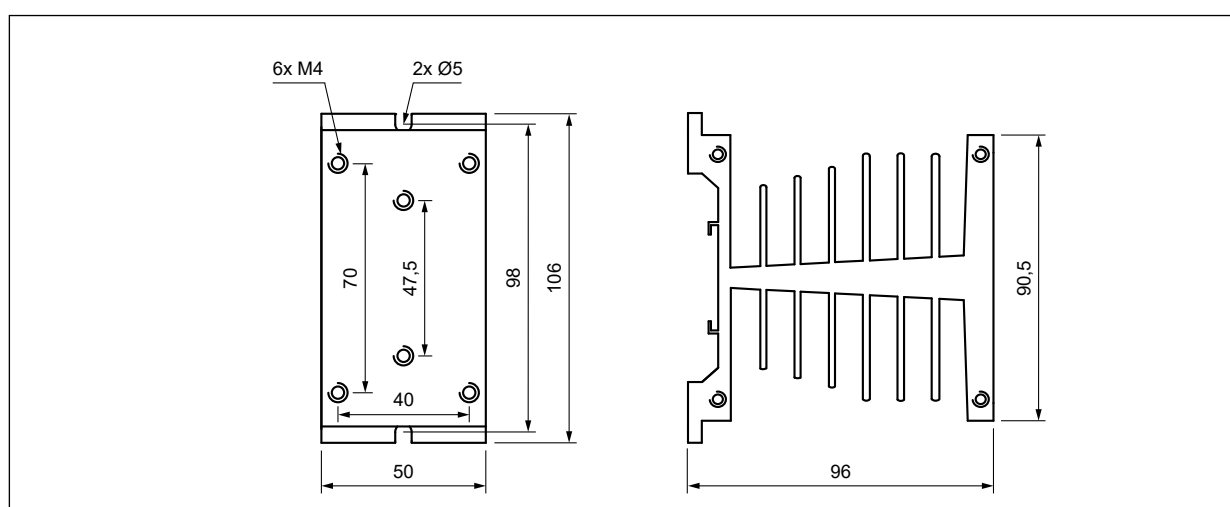
### Dimensions



Solid state relay **RSR54**

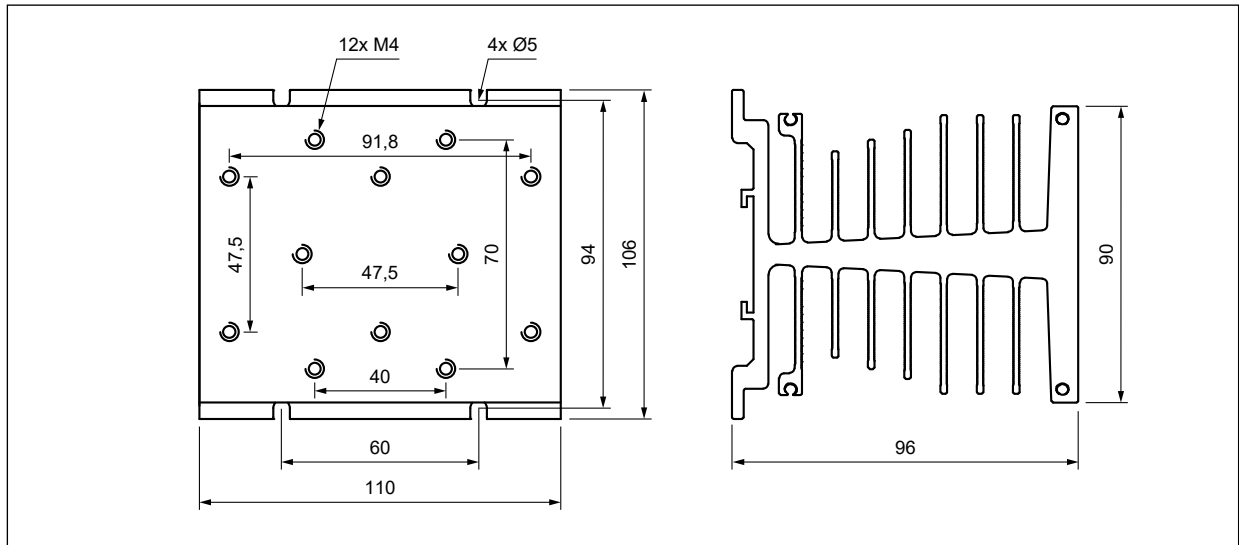


Heatsink **RH21**

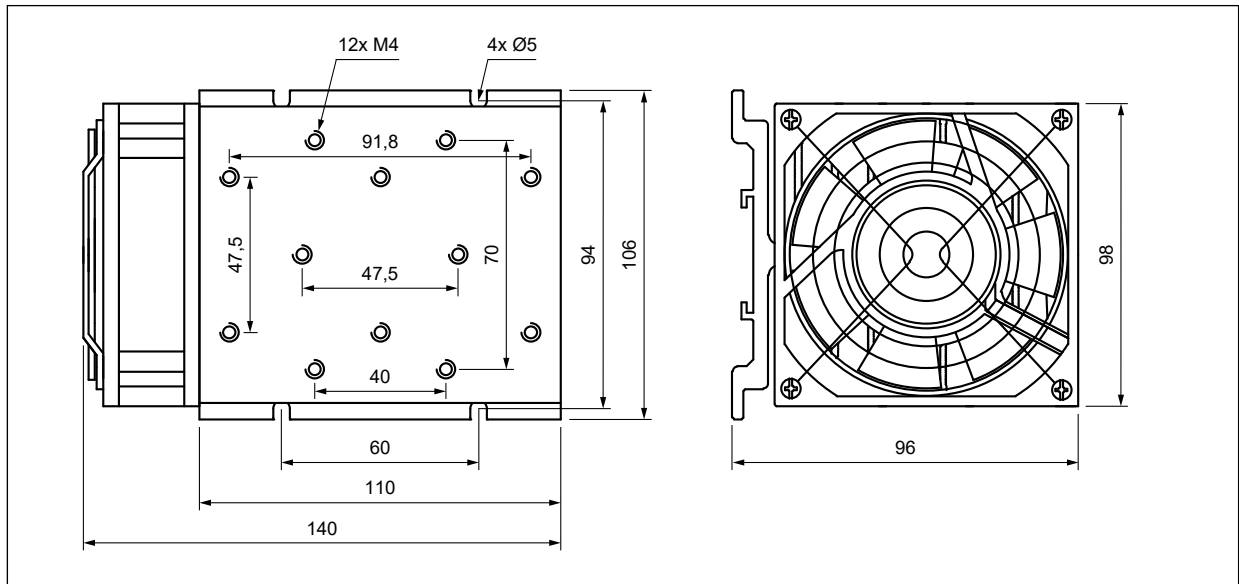


Heatsink **RH16**

### Dimensions

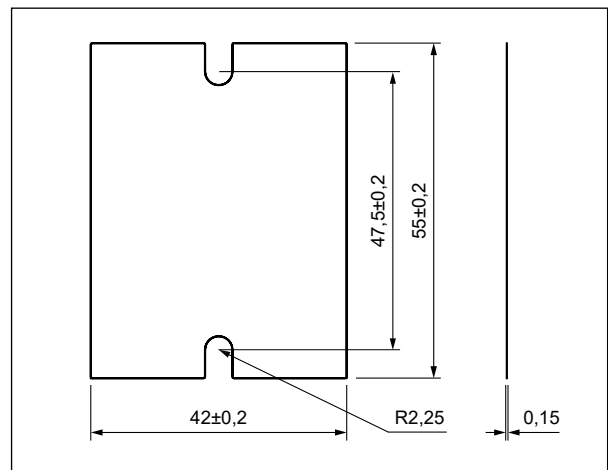
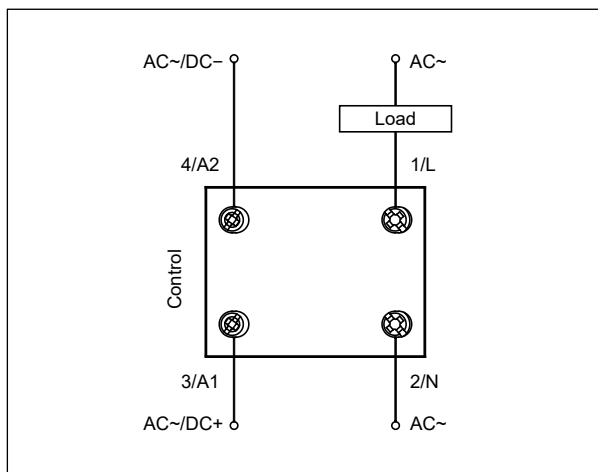


Heatsink RH08



Heatsink RH08-F

### Connection diagram



Thermal pad RTP-10

### Mounting, accessories for relays

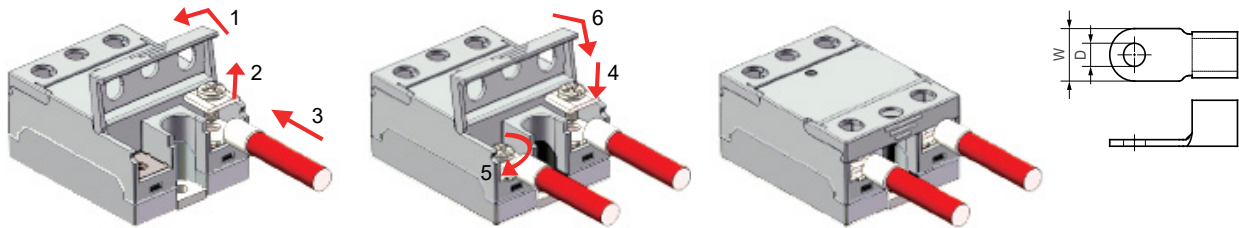
Relays **RSR54** are designed for: • direct mounting on panel • mounting on heatsinks **RH**. For **RSR54** relays we offer thermal pads **RTP-10**.

**Note:** the product's side panels may be hot, allow the product to cool before touching; disconnect all power before installing or working with this equipment; verify all connections and replace all covers before turning on power.



Thermal pad **RTP-10**

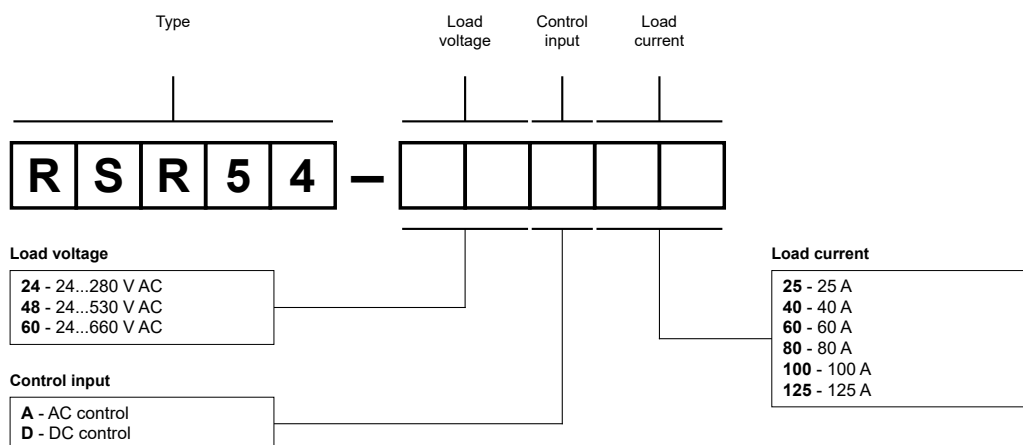
### Wire connection



| Load current [A] | Cross section area of wire [mm²] ④ | Wire size [AWG] | DIN 46234 terminal model | Terminal mounting hole size D [mm] | Terminal width W [mm] |
|------------------|------------------------------------|-----------------|--------------------------|------------------------------------|-----------------------|
| 15...20          | 2,5                                | 12              | 4...6                    | 4,3                                | 8                     |
|                  |                                    |                 | 5...6                    | 5,3                                | 10                    |
| 20...35          | 4                                  | 10              | 4...6                    | 4,3                                | 8                     |
|                  |                                    |                 | 5...6                    | 5,3                                | 10                    |
| 25...32          | 6                                  | 10              | 4...6                    | 4,3                                | 8                     |
|                  |                                    |                 | 5...6                    | 5,3                                | 10                    |
| 32...50          | 10                                 | 8               | 5...10                   | 5,3                                | 10                    |
| 50...65          | 16                                 | 6               | 5...16                   | 5,3                                | 11                    |
| 65...85          | 25                                 | 4               | 5...25                   | 5,3                                | 12                    |

④ When use the wire cross-sectional area greater than 25 mm², we suggest to break it in to two smaller wires and connect them back to back super-imposed.

### Ordering codes



Examples of ordering codes ⑤:

**RSR54-24A25**

relay **RSR54**, zero-crossing switching, AC control, load voltage 24...280 V AC (single-phase), load current 25 A

**RSR54-60D125**

relay **RSR54**, zero-crossing switching, DC control, load voltage 24...660 V AC (single-phase), load current 125 A

⑤ Ordering codes **RSR54** are specified in tables "Type" on page 1.