

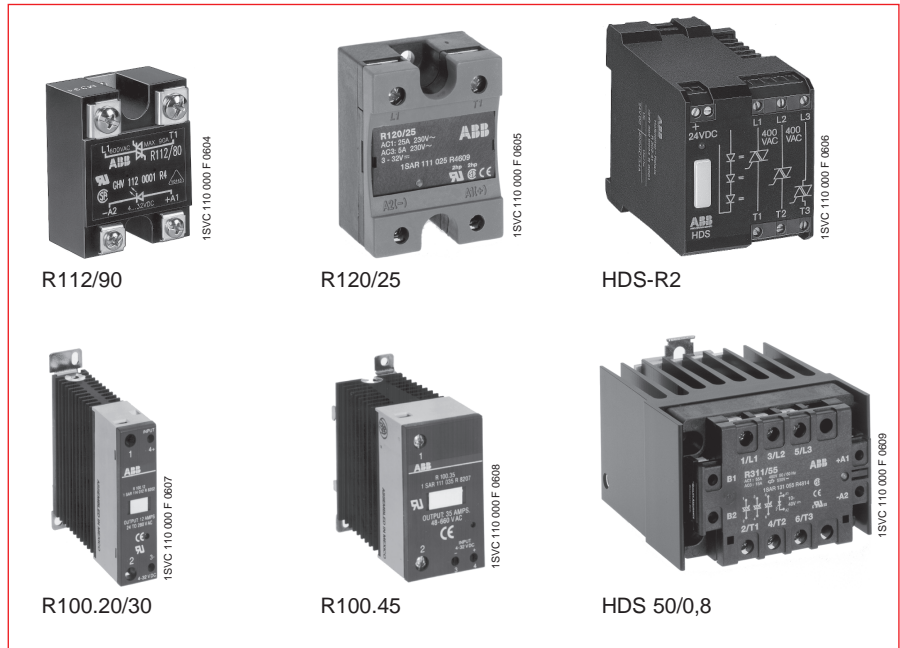


Solid-state relays SIGMASWITCH®

Content

Solid state relays

| | |
|--|-----|
| Description, certificates, approvals | 163 |
| Ordering details | 164 |
| Technical data R111, R12x | 167 |
| Technical data R100 | 168 |
| Technical data HDS R2 | 169 |
| Selection table for heat sinks | 170 |
| Examples of applications | 171 |
| Dimensional drawings | 172 |



Description

Type series R100

General features

- Complete, compact design
- Mounting on 35 mm DIN rail or screw-mounting on panel
- Current range 20A, 30A and 45A (thyristors)
- Cage terminal with incorporated shock protection (touch proof)
- Zero voltage or instantaneous tripping
- LED display of the input status
- **Integrated heat sink, ready for use**

Application

- Solid state switching of resistive and inductive AC and 3-phase loads

AC 1: resistive load
AC 3: motor load

Certifications and Approvals

| | |
|--------------------|---|
| R100 | x |
| R111 / R115 / R112 | x |
| R12x | x |
| R311 / R315 | x |
| HS / HDS | x |
| HDS-R2/HDWS | x |

Type series 111 / 311

General features

- Load side:
Single-phase devices: Thyristors for AC1 and AC3 up to 690VAC and 100A
3-phase devices:
alternistors for AC 1 and AC3 up to 530VAC and 55A, with internal RC-circuit
- Electrical isolation by means of an optocoupler between control circuit and load circuit
- Zero voltage switching, radio interference suppressed
- Screw mounting, snap on mounting with adapter for 35 mm top-hat rail to EN DIN 50 022
- Electrical connection: screw connection
- Shock protection
Series R111/R115 with additional terminal cover
NEW for Series R12x, R311/R315
Incorporated shock protection
LED status display

Application

- Contactless and wear-free switching of AC and 3-phase loads up to 0.5 power factor.

| | UL | CSA |
|---|-------------------|-----|
| | cUL ¹⁾ | |
| x | x | |
| x | x | |
| x | x | |
| x | x | |
| x | x | |

Semi-conductor 3-phase contactor HDS Semi-conductor 3-phase reversing contactor HDWS

General features

- Load side:
HDS R2: Triacs für AC 1 / AC 3 up to 460VAC and 3.4 A with internal overvoltage protection
HDS-50: Alternistors for AC 1 / AC 3 up to 530VAC and 50A, with internal RC-circuit and overvoltage protection
- Electrical isolation by means of optocoupler between control circuit and load circuit
- Switch-position indication by LED
- Control circuit protected against reverse polarity
- Zero voltage switching, radio interference suppressed
- Snap on mounting with adapter for 35 mm top-hat rail to EN DIN 50 022.
- Integrated shock hazard protection
- Electrical connection: screw connection
- **Integrated heat sink, ready-to-use**

Application

- Solid state switching of resistive and inductive AC and 3-phase loads

¹⁾ pending

SIGMASWITCH® solid state relays

Ordering details

Solid state relays - standard version

- Convenient
- Space-saving
- Standard enclosure

| Type | Rated control circuit voltage U_c | Rated operating voltage U_e | Rated current I_e AC1 | Order code | Pack. unit piece | Price 1 piece | Weight 1 piece kg/lb |
|------|-------------------------------------|-------------------------------|-------------------------|------------|------------------|---------------|----------------------|
|------|-------------------------------------|-------------------------------|-------------------------|------------|------------------|---------------|----------------------|

Standard version, single-phase, load voltage: 24-280VAC

| | | | | | | | |
|---------|--------------|-----------|-----|---------------------|---|--|------------|
| R111/25 | 3-32VDC | 24-280VAC | 25A | 1SAR 111 025 R 0102 | 1 | | 0.110/0.24 |
| R111/45 | 3-32VDC | 24-280VAC | 50A | 1SAR 111 050 R 0102 | 1 | | 0.110/0.24 |
| R115/25 | 90-280VAC/DC | 24-280VAC | 25A | 1SAR 111 025 R 0302 | 1 | | 0.110/0.24 |
| R115/45 | 90-280VAC/DC | 24-280VAC | 50A | 1SAR 111 050 R 0302 | 1 | | 0.110/0.24 |

Standard version, single-phase, load voltage: 42-530VAC

| | | | | | | | |
|---------|--------------|-----------|-----|---------------------|---|--|------------|
| R111/20 | 3-32VDC | 42-530VAC | 25A | 1SAR 111 025 R 0106 | 1 | | 0.110/0.24 |
| R111/40 | 3-32VDC | 42-530VAC | 50A | 1SAR 111 050 R 0106 | 1 | | 0.110/0.24 |
| R111/90 | 3-32VDC | 42-530VAC | 90A | 1SAR 111 090 R 0106 | 1 | | 0.140/0.28 |
| R115/20 | 90-280VAC/DC | 42-530VAC | 25A | 1SAR 111 025 R 0306 | 1 | | 0.110/0.24 |
| R115/40 | 90-280VAC/DC | 42-530VAC | 50A | 1SAR 111 050 R 0306 | 1 | | 0.110/0.24 |
| R115/90 | 90-280VAC/DC | 42-530VAC | 90A | 1SAR 111 090 R 0306 | 1 | | 0.140/0.28 |

Standard version, single-phase, load voltage: 24-690VAC

| | | | | | | | |
|----------|-----------|-----------|------|---------------------|---|--|------------|
| R112/50 | 4.5-32VDC | 24-690VAC | 50A | 1SAR 111 050 R 0608 | 1 | | 0.110/0.24 |
| R112/90 | 4.5-32VDC | 24-690VAC | 90A | 1SAR 111 090 R 0608 | 1 | | 0.140/0.28 |
| R112/110 | 4.5-32VDC | 24-690VAC | 110A | 1SAR 111 110 R 0608 | 1 | | 0.140/0.28 |

Solid state relays - touch proof, compact version

- Incorporated shock protection (no additional terminal cover necessary)
- LED status display
- Save foot print as in the standard series (easy interchangeability)

Compact version, single-phase, load voltage: 24-265VAC

| | | | | | | | |
|---------|---------|-----------|-----|---------------------|---|--|------------|
| R120/25 | 3-32VDC | 24-265VAC | 25A | 1SAR 111 025 R 4609 | 1 | | 0.060/0.13 |
| R120/50 | 3-32VDC | 24-265VAC | 50A | 1SAR 111 050 R 4609 | 1 | | 0.060/0.13 |

Compact version, single-phase, load voltage: 42-530VAC

| | | | | | | | |
|----------|--------------------|-----------|------|---------------------|---|--|------------|
| R121/25 | 4-32VDC | 42-530VAC | 25A | 1SAR 111 025 R 4606 | 1 | | 0.060/0.13 |
| R121/50 | 4-32VDC | 42-530VAC | 50A | 1SAR 111 050 R 4606 | 1 | | 0.060/0.13 |
| R121/75 | 4-32VDC | 42-530VAC | 75A | 1SAR 111 075 R 4606 | 1 | | 0.100/0.22 |
| R121/100 | 4-32VDC | 42-530VAC | 100A | 1SAR 111 100 R 4606 | 1 | | 0.100/0.22 |
| R126/25 | 24-265VAC/24-48VDC | 42-530VAC | 25A | 1SAR 111 025 R 4707 | 1 | | 0.060/0.13 |
| R126/50 | 24-265VAC/24-48VDC | 42-530VAC | 50A | 1SAR 111 050 R 4707 | 1 | | 0.060/0.13 |
| R126/75 | 24-265VAC/24-48VDC | 42-530VAC | 75A | 1SAR 111 075 R 4707 | 1 | | 0.100/0.22 |
| R126/100 | 24-265VAC/24-48VDC | 42-530VAC | 100A | 1SAR 111 100 R 4707 | 1 | | 0.100/0.22 |

Compact version, single-phase, load voltage: 42-660VAC

| | | | | | | | |
|----------|---------|-----------|------|---------------------|---|--|------------|
| R122/50 | 4-32VDC | 42-660VAC | 50A | 1SAR 111 050 R 4607 | 1 | | 0.060/0.13 |
| R122/75 | 4-32VDC | 42-660VAC | 75A | 1SAR 111 075 R 4607 | 1 | | 0.100/0.22 |
| R122/100 | 4-32VDC | 42-660VAC | 100A | 1SAR 111 100 R 4607 | 1 | | 0.100/0.22 |

Compact version, three-phase, load voltage: 12-530VAC

| | | | | | | | |
|---------|--------------|-----------|-----|---------------------|---|--|------------|
| R311/25 | 10-40VDC | 12-530VAC | 25A | 1SAR 131 025 R 4814 | 1 | | 0.380/0.84 |
| R311/55 | 10-40VDC | 12-530VAC | 55A | 1SAR 131 055 R 4814 | 1 | | 0.380/0.84 |
| R315/55 | 20-265VAC/DC | 12-530VAC | 55A | 1SAR 131 055 R 4914 | 1 | | 0.380/0.84 |



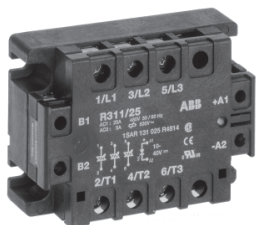
R 111/25



R 120/50



R 126/25



R 311/25

SIGMASWITCH® solid state relays

Ordering details



R 100.20
R 100.30



R 100.45
R 100.45-SG

Series R100

- Compact version
- Current range 20, 30, 40A (thyristors)
- Ready-for-use
- Incorporated heat sink
- Mounting on 35 mm top-hat rail or screw mounting on panel
- Cage terminal with incorporated shock protection (touch proof)
- Zero voltage or instantaneous tripping
- LED display for the input status

The devices of series R100 / R300 were redesigned for increased capacity. The cross reference to the the new designs is provided below:

| Type old | Order code old | Type new | Order code new | Notes |
|------------|--------------------|-------------------|---------------------------|---------------|
| R100.12 | 1SAR 114 012 R8202 | R100.20 | 1SAR 111 020 R8607 | |
| R100.25 | 1SAR 113 025 R8207 | R100.30 | 1SAR 113 030 R8607 | |
| R100.25 | 1SAR 111 025 R8207 | R100.30 | 1SAR 111 030 R8607 | |
| R100.35 | 1SAR 111 035 R8207 | R100.45 | 1SAR 111 045 R8607 | |
| R100.35-SG | 1SAR 111 035 R9207 | R100.45-SG | 1SAR 111 045 R9607 | (2.Q/2003) |
| R300.25 | 1SAR 131 025 R8207 | HDS 50/0.8 | 1SAR 131 055 R2814 | (+25mm width) |

Device series R100 (technical data, page 161)

| Type | Rated control circuit voltage V _c | Rated operating voltage V _e | Rated current I _e AC1 | Order code | Pack. unit piece | Price 1 piece | Weight 1 piece kg/lb |
|------|--|--|----------------------------------|------------|------------------|---------------|----------------------|
|------|--|--|----------------------------------|------------|------------------|---------------|----------------------|

Solid state relay, 1-phase, zero voltage switching, width: 22.5 mm, AC51: 20A/AC 53a: 5A at 25°C

| | | | | | | | |
|----------------|---------|-----------|-----|---------------------------|---|--|------------|
| R100.20 | 4-32VDC | 42-660VAC | 20A | 1SAR 111 020 R8607 | 1 | | 0.250/0.55 |
|----------------|---------|-----------|-----|---------------------------|---|--|------------|

Solid state relay, 1-phase, standard switching, width: 22.5 mm, AC51: 30A/AC 53a: 15A at 25°C

| | | | | | | | |
|-------------------|-----------|-----------|-----|---------------------------|---|--|------------|
| R100.30-IO | 4,5-32VDC | 42-660VAC | 30A | 1SAR 113 030 R8607 | 1 | | 0.250/0.55 |
|-------------------|-----------|-----------|-----|---------------------------|---|--|------------|

Solid state relay, 1-phase, zero voltage switching, width: 22.5 mm, AC51: 30A/AC 53a: 15A at 25°C

| | | | | | | | |
|-------------------|---------|-----------|-----|---------------------------|---|--|------------|
| R100.30-ZS | 4-32VDC | 42-660VAC | 30A | 1SAR 111 045 R8607 | 1 | | 0.250/0.55 |
|-------------------|---------|-----------|-----|---------------------------|---|--|------------|

Solid state relay, 1-phase, zero voltage switching, width: 45 mm, AC51: 45A/AC 53a: 20A at 25°C

| | | | | | | | |
|----------------|---------|-----------|-----|---------------------------|---|--|------------|
| R100.45 | 4-32VDC | 42-660VAC | 45A | 1SAR 111 030 R8607 | 1 | | 0.490/1.08 |
|----------------|---------|-----------|-----|---------------------------|---|--|------------|

Solid state relay, 1-phase, zero voltage switching, width: 45 mm, AC51: 45A/AC 53a: 20A at 25°C, with built-in overtemperature protection with alarm output

| | | | | | | | |
|-------------------|---------|-----------|-----|---------------------------|---|--|------------|
| R100.45-SG | 4-32VDC | 42-660VAC | 45A | 1SAR 111 045 R9607 | 1 | | 0.490/1.08 |
|-------------------|---------|-----------|-----|---------------------------|---|--|------------|

R100.45-SG, available from the 1st quarter of 2003

Accessories for solid-state relays

| Type | Order code | Pack. unit piece | Price 1 piece | Weight 1 piece kg/lb |
|------|------------|------------------|---------------|----------------------|
|------|------------|------------------|---------------|----------------------|

Heat sink for single-phase solid state relay (R111, R115, R120, R121, R122, R126)

- for screw-mounting on mounting plate:

| | | | | |
|---------------|---------------------------------|----------------------------|---|------------|
| KK-2.6 | Heat sink 2.6K/W ⁽¹⁾ | GHR 110 9401 P 0001 | 1 | 0.120/0.26 |
| KK-1.8 | Heat sink 1.8K/W ⁽¹⁾ | GHR 110 9401 P 0002 | 1 | 0.200/0.44 |
| KK-0.7 | Heat sink 0.7K/W ⁽¹⁾ | GHR 110 9404 P 0001 | 1 | 0.650/1.43 |

- for top-hat rail mounting:

| | | | | |
|--------------------|---------------------------------|----------------------------|---|------------|
| KK-R111-2.1 | Heat sink 2.1K/W ⁽¹⁾ | GHR 110 9402 P 0001 | 1 | 0.290/0.64 |
| KK-R111-1.5 | Heat sink 1.5K/W ⁽¹⁾ | GHR 110 9405 P 0001 | 1 | 0.420/0.92 |
| KK-R111-0.7 | Heat sink 0.7K/W ⁽¹⁾ | GHR 110 9406 P 0001 | 1 | 1.020/2.24 |
| KK-R111-0.5 | Heat sink 0.5K/W ⁽¹⁾ | GHR 110 9407 P 0001 | 1 | 1.300/2.86 |

- Heat sink for three-phase solid state relay (R311, R315) for top-hat rail mounting:

| | | | | |
|--------------------|---------------------------------|----------------------------|---|------------|
| KK-R311-0.8 | Heat sink 0.8K/W ⁽¹⁾ | GHR 310 9401 P 0001 | 1 | 1.000/2.20 |
|--------------------|---------------------------------|----------------------------|---|------------|

- Accessories for solid state relay:

| | | | |
|---|----------------------------|---|-------------|
| Terminal cover for single-phase relays R111, R115 | GHR 110 6605 P 0001 | 1 | 0.050/0.11 |
| Rapid-fastening plate for single-phase solid state relay | GHR 110 1105 R 0001 | 1 | 0.045/0.10 |
| Rapid-fastening plate for three-phase solid state relay | GHR 310 1105 R 0001 | 1 | 0.050/0.11 |
| EMC - 100, EMC filter for single-phase solid state relay | GHR 110 0000 R 0001 | 1 | 0.100/0.22 |
| EMV - 300, EMV filter for three-phase solid state relay | GHR 310 0000 R 0001 | 1 | 0.100/0.22 |
| TP-01, Heat-transfer foil for single-phase relay ⁽²⁾ | GHR 110 9500 P 0001 | 1 | 0.001/0.002 |
| TP-03, Heat-transfer foil for three-phase relay ⁽²⁾ | GHR 310 9500 P 0001 | 1 | 0.005/0.01 |

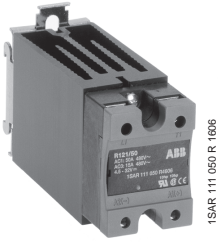
SIGMASWITCH® solid state relays

Ordering details

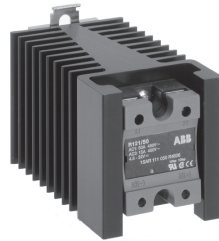
Compact Version

- Single or three-phase compact solid state relay mounted on a heat sink
- Complete ready to install
- Integrated shock protection (touch proof)
- DIN rail mounting
- LED status display
- Screw connections

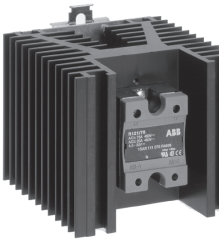
The compact solid state relays "HS" and "HDS" are composed of a solid state relay mounted on a heat sink. The devices are optimized for the switching currents specified in the ordering table at an ambient temperature of 40°C. All of the technical data of the separate relays apply.



HS 50/1.5
HS 50-AC/1.5
HS 50-H/1.5



HS 50/0.7
HS 75/0.7
HS 100/0.7



HS 75/0.5
HS 100/0.5



HDS R2



HDS 50/0.8
HDS 50-AC/0.8

| Complete assembly | | Solid state relay | Heat sink | Technical data |
|-------------------|----------------------------|-------------------|-------------|----------------|
| HS 50/1.5 | 1SAR 111 050 R 1606 | R 121/50 | KK-R111-1.5 | Page 167 |
| HS 50/0.7 | 1SAR 111 050 R 2606 | R 126/50 | KK-R111-1.5 | Page 167 |
| HS 50-AC/1.5 | 1SAR 111 050 R 1706 | R 122/50 | KK-R111-1.5 | Page 167 |
| HS 50-H/1.5 | 1SAR 111 050 R 1607 | R 121/75 | KK-R111-0.7 | Page 167 |
| HS 75/1.5 | 1SAR 111 075 R 1606 | R 121/75 | KK-R111-1.5 | Page 167 |
| HS 75/0.7 | 1SAR 111 075 R 2606 | R 121/75 | KK-R111-0.7 | Page 167 |
| HS 75/0.5 | 1SAR 111 075 R 3606 | R 121/75 | KK-R111-0.5 | Page 167 |
| HS 90/0.5-AC | 1SAR 111 090 R 3306 | R 115/90 | KK-R111-0.5 | Page 167 |
| HS 100/0.7 | 1SAR 111 100 R 2606 | R 121/100 | KK-R111-0.7 | Page 167 |
| HS 100/0.5 | 1SAR 111 100 R 3606 | R 121/100 | KK-R111-0.5 | Page 167 |
| HDS R2 | GHR 302 0004 R 0004 | HDS R2 | | Page 169 |
| HDWS | GHR 302 1004 R 0001 | HDWS | | Page 169 |
| HDS 50/0.8 | 1SAR 131 055 R 2814 | R 311/55 | KK-R111-0.8 | Page 167 |
| HDS 50-AC/0.8 | 1SAR 131 055 R 2914 | R 315/55 | KK-R111-0.8 | Page 167 |

| Type | Rated control voltage V_c | Rated operating voltage V_e | Rated current I_e max. | Order code | Pack. unit Pcs. | Price 1 pc. | Weight 1 pc. kg/lb |
|------|--------------------------------|----------------------------------|-----------------------------|------------|--------------------|----------------|--------------------------|
|------|--------------------------------|----------------------------------|-----------------------------|------------|--------------------|----------------|--------------------------|

Single-phase device

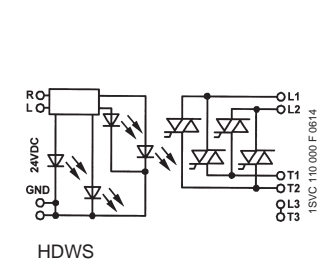
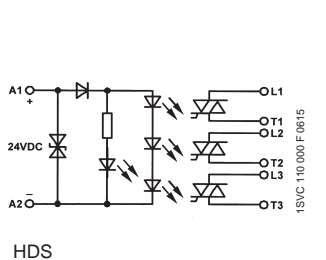
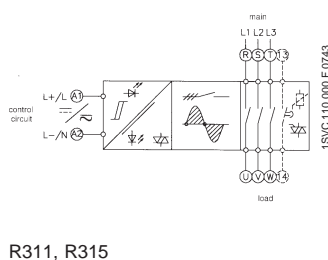
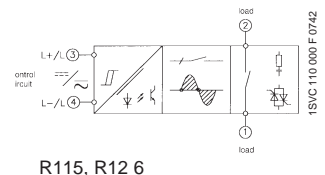
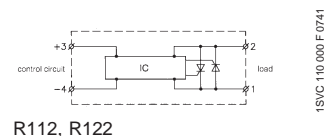
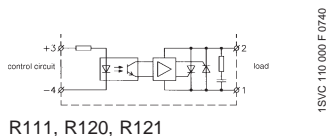
| | | | | | | |
|---------------------|------------------------|------------|-------------------|----------------------------|---|------------|
| HS 50/1.5 | 4-32 VDC | 42-530 VAC | 30A ¹⁾ | 1SAR 111 050 R 1606 | 1 | 0.530/1.17 |
| HS 50/0.7 | 4-32 VDC | 42-530 VAC | 50A ¹⁾ | 1SAR 111 050 R 2606 | 1 | 1.100/2.42 |
| HS 50-AC/1.5 | 24-265VAC/ 24-48VDC | 42-530 VAC | 30A ¹⁾ | 1SAR 111 050 R 1706 | 1 | 0.530/1.17 |
| HS 50-H/1.5 | 4-32 VDC | 42-660 VAC | 30A ¹⁾ | 1SAR 111 050 R 1607 | 1 | 0.530/1.17 |
| HS 75/0.7 | 4-32 VDC | 42-530 VAC | 67A ¹⁾ | 1SAR 111 075 R 2606 | 1 | 1.100/2.42 |
| HS 75/0.5 | 4-32 VDC | 42-530 VAC | 75A ¹⁾ | 1SAR 111 075 R 3606 | 1 | 1.400/3.08 |
| HS 100/0.7 | 4-32 VDC | 42-530 VAC | 75A ¹⁾ | 1SAR 111 100 R 2606 | 1 | 1.100/1.42 |
| HS 100/0.5 | 4-32 VDC | 42-530 VAC | 85A ¹⁾ | 1SAR 111 100 R 3606 | 1 | 1.400/3.08 |

Three-phase device

| | | | | | | |
|----------------------|--------------|------------|--------------------|----------------------------|---|------------|
| HDS R2 | 17-32 VDC | 24-460 VAC | 3.5A ²⁾ | GHR 302 0004 R 0004 | 1 | 0.270/0.59 |
| HDWS | 17-32 VDC | 24-460 VAC | 3.5A ²⁾ | GHR 302 1004 R 0001 | 1 | 0.270/0.59 |
| HDS 50/0.8 | 10-40 VDC | 12-530 VAC | 30A ¹⁾ | 1SAR 131 055 R 2814 | 1 | 1.500/3.30 |
| HDS 50-AC/0.8 | 20-265VAC/DC | 12-530 VAC | 30A ¹⁾ | 1SAR 131 055 R 2914 | 1 | 1.500/3.30 |

1) Maximum thermal continuous (AC 1) current at an ambient temperature of 40°C.
2) Maximum continuous (AC 3) current at an ambient temperature of 40°C.

Circuit diagrams / Function diagrams



Solid state relays

Technical data

Standard Series (R111, R115, R112)

| Output data | Unit | R111/25 R115/25 | R111/45 R115/45 | R111/20 R115/20 | R111/40 R115/40 | R111/90 R115/90 | R112/50 | R112/90 | R112/110 | |
|--|------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------|-----------------|----------|--|
| Control element | Thyristor | yes | yes | yes | yes | yes | yes | yes | yes | |
| Operating voltage range U_e (Veff max) | VAC | 24-280 | 24-280 | 42-530 | 42-530 | 42-530 | 24-690 | 24-690 | 24-690 | |
| period. peak off-state voltage (Vpeak) | V ss | 650 | 650 | 1200 | 1200 | 1200 | 1600 | 1600 | 1600 | |
| Rated load current, AC1 (resistive) | A_{eff} | 25 | 50 | 25 | 50 | 90 | 50 | 90 | 110 | |
| | A_{eff} | 5 | 15 | 5 | 15 | 20 | 15 | 20 | 30 | |
| Operating frequency | Hz | 45-65 | 45-65 | 45-65 | 45-65 | 45-65 | 45-65 | 45-65 | 45-65 | |
| Max. off-state leakage current (at Vmax and T=25°C) | mA | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 5 | |
| Minimal load current | mA eff | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | |
| Max. surge current I_{TSM} (t=20ms) | A | 250 | 600 | 250 | 600 | 1000 | 400 | 1000 | 1500 | |
| Max. load integral $\int i^2 dt$ (t=10 ms) | A ² s | 310 | 1800 | 350 | 1800 | 5000 | 800 | 5000 | 11250 | |
| Conducting state voltage at I max and T=25°C (Vpeak) | V | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | |
| Permissible rate of voltage rise du/dt | V/μs | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | |
| Critical current gradient di/dt | A/s | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | |
| Max. thermal resistance barrier/case | K/W | 1.25 | 0.65 | 1.25 | 0.65 | 0.3 | 0.65 | 0.35 | 0.3 | |
| Max. thermal resistance barrier/ambient | K/W | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | |
| Input data | | R111 | | | R115 | | | R112 | | |
| Control voltage | V | 3-32VDC | | | 90-280VAC/DC | | | 4.5-32VDC | | |
| Make voltage, max. | V | 3VDC | | | 90VAC/DC | | | 4.5VDC | | |
| Break voltage, min. | V | 1VDC | | | 10VAC/DC | | | 1VDC | | |
| Input impedance | kΩ | 1.5 | | | 44 | | | - | | |
| Input current max. (at Vmax) | mA | - | | | - | | | 40 | | |
| Turn-on time | ms | 0.5 period max. | | | 1 period max. | | | 0.5 period max. | | |
| Turn-off time | ms | 0.5 period max. | | | 1 period max. | | | 0.5 period max. | | |

Compact Series (R120, R121, R122, R126, R311, R315)

| Output data | Dim. | R120/25 | 50 | R121/25 R126/25 | 50 | 75 | 100 | R122/50 | 75 | 100 | R311/25 R315/- | /55 /55 |
|--|------------------|----------------------------|------|--------------------|------|---------------------|-------|---------|------|------------------------------------|-------------------|------------|
| Control element | Thyristor | yes | yes | yes | yes | yes | yes | yes | yes | yes | Alternistor | |
| Operating voltage range V_e (Veff max) | VAC | 24-265 | | 42-530 | | | | 42-660 | | | 12-530 | |
| Period. peak off-state voltage (Vpeak) | V ss | 650 | | 1200 | | | | 1600 | | | 1200 | |
| Rated load current, AC1 (resistive) | A_{eff} | 25 | 50 | 25 | 50 | 75 | 100 | 50 | 75 | 100 | 25 | 55 |
| | A_{eff} | 5 | 15 | 5 | 15 | 20 | 30 | 15 | 20 | 30 | 5 | 15 |
| Operating frequency | Hz | 45-65 | | 45-65 | | | | 45-65 | | | 45-65 | |
| Max. off-state leakage current (at Vmax and T=25°C) | mA | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 10 | 10 |
| Minimal load current | mA eff | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 100 | 200 |
| Max. surge current I_{TSM} (t=10ms) | A | 250 | 600 | 250 | 600 | 1000 | 1500 | 600 | 1000 | 1500 | - | - |
| Max. surge current I_{TSM} (t=20ms) | A | - | - | - | - | - | - | - | - | - | 230 | 550 |
| Max. overcurrent (t =1s) | A | 55 | 125 | 55 | 125 | 150 | 200 | 125 | 150 | 200 | 37 | 85 |
| Max. load integral $\int i^2 dt$ (t=10 ms) | A ² s | 310 | 1800 | 310 | 1800 | 6600 | 18000 | 1800 | 6600 | 18000 | 265 | 1500 |
| Conducting state voltage at I max and T=25°C (Vpeak) | V | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| Permissible rate of voltage rise du/dt | V/μs | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |
| Critical current gradient di/dt | A/s | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 50 | 100 |
| Max. thermal resistance barrier/case | K/W | 0.8 | 0.5 | 0.8 | 0.5 | 0.2 | 0.2 | 0.5 | 0.2 | 0.2 | 0.5 | 0.2 |
| Max. thermal resistance barrier/ambient | K/W | 20 | 20 | 20 | 20 | 20 | 15 | 20 | 20 | 15 | 1.5 | 0.6 |
| Input data | | R120/R121/R122/R126 | | | | R311 | | | | R315 | | |
| Control voltage | V | 4-32VDC | | | | 24-265VAC/ 24-48VDC | | | | 10-40VDC | | |
| Make voltage, max. | V | 3.75VDC | | | | 22VAC/DC | | | | 20VAC/DC | | |
| Break voltage, min. | V | 1VDC | | | | 6VAC/DC | | | | 5VAC/DC | | |
| Input impedance | kΩ | 1.5 | | | | 44 | | | | - | | |
| Input current max.. (at Vmax) | mA | 10 | | | | 5 | | | | 18mA (at 10VDC) 28mA (at 40VDC) | | |
| Turn-on time | ms | 0.5 period max. | | | | 1 period max. | | | | 0.5 period max. | | |
| Turn-off time | ms | 0.5 period max. | | | | 1 period max. | | | | 0.5 period max. 2 period max. | | |

General characteristics of the solid state relay in standard and compact version

| | | | |
|------------------------|----|-------------------------------------|---|
| Power factor (cos Phi) | | 0.5-1 ¹⁾ | |
| Operating temperature | °C | R111, R115: R112, R311: R12x: | -40 to +100 -20 to + 80 -20 to + 70 |
| Storage temperature | °C | | -40 to +100 |
| Proof voltage | V | | 4000 |
| Dielectric strength | V | | 4000 |

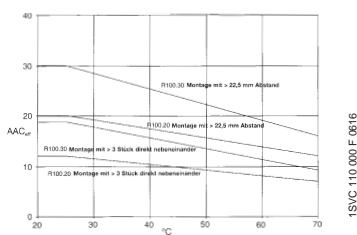
¹⁾ If the threshold values are complied with, the solid state relays are suitable for the switching of inductive loads.

Solid state relays

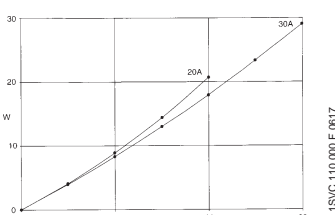
Technical data R 100.xx

| | Dim. | R100.20 | R100.30 Mom./zero point tripping | R100.45 |
|--|--------------------------|---------------------------|-------------------------------------|---------------------------|
| General technical data | | | | |
| Switching element | | Thyristors | Thyristors | Thyristors |
| Rated operating voltage U_o (Veff max) | VAC | 42-660 | 42-660 | 42-660 |
| Period. peak inverse voltage (Vpeak) | Vss | 1200 | 1200 | 1200 |
| Operating frequency | Hz | 45-65 | 45-65 | 45-65 |
| Power factor at 600VAC | | < 0.5 | < 0.5 | < 0.5 |
| Approvals | | UL, CSA | UL, CSA | UL, CSA |
| CE marking | | yes | yes | yes |
| Technical Data - Load circuit | | | | |
| Rated load current | | | | |
| AC51 at $T_a = 25^\circ\text{C}$ | AAC | 20 | 30 | 45 |
| AC53a at $T_a = 25^\circ\text{C}$ | AAC | 5 | 15 | 20 |
| (see Current Carrying Capacity diagram) | | | | |
| Minimum load current | mA | 350 | 150 | 150 |
| Surge current limit value I_{TSM} (25°C , $t = 10\text{ms}$) | A | 250 | 400 | 1150 |
| Max. overcurrent ($t = 1\text{s}$) | A | < 35 | < 125 | 125 |
| Off-state leakage current | | | | |
| (at rated voltage and frequency) | mA_{eff} | < 3 | < 3 | < 3 |
| Limit load integral $\int i^2 dt$ ($t=10\text{ ms}$) | A^2s | 310 | 1800 | 6600 |
| Forward voltage at I max and $T=25^\circ\text{C}$ (Vpeak) | V | 1.6 | 1.6 | 1.6 |
| Critical current gradient di/dt | $\text{A}/\mu\text{s}$ | ≥ 10 | ≥ 100 | ≥ 150 |
| Critical commutating voltage gradient du/dt | $\text{V}/\mu\text{s}$ | 500 | 500 | 500 |
| Critical static voltage gradient du/dt | $\text{V}/\mu\text{s}$ | 250 | 250 | 500 |
| Thermal Data | | | | |
| Operating temperature | $^\circ\text{C}$ | -30 to +80 | -30 to +80 | -30 to +80 |
| Storage temperature | $^\circ\text{C}$ | -40 to +100 | -40 to +100 | -40 to +100 |
| Barrier temperature | $^\circ\text{C}$ | 125 | 125 | 125 |
| General characteristics | | | | |
| Weight | g/lb | 250/0.55 | 250/0.55 | 490/1.08 |
| Max. connection cross-section | | | | |
| Input terminals | mm^2 / AWG | 2x2.5 or 1x4 / 2x14 or 1x | 2x2.5 or 1x4 / 2x14 or 1x | 2x2.5 or 1x4 / 2x14 or 1x |
| Output terminals | mm^2 / AWG | 2x2.5 or 1x4 / 2x14 or 1x | 2x2.5 or 1x4 | 25 |
| Proof voltage | V | | 4000 | |
| Material Enclosure | | | self-extinguishing (UL 94 V0) | |
| Heat sink | | | Aluminum | |

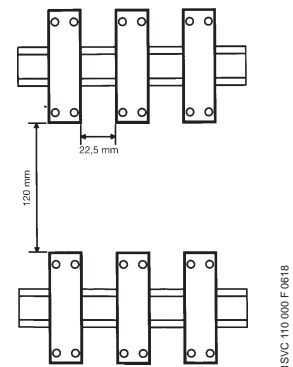
Load current at ambient temperature
R 100.20 / R 100.30



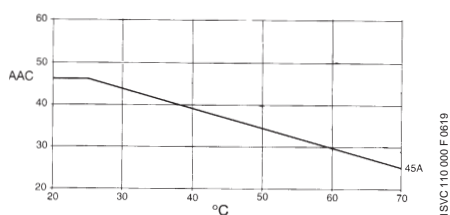
Dissipation at load current
R 100.20 / R 100.30



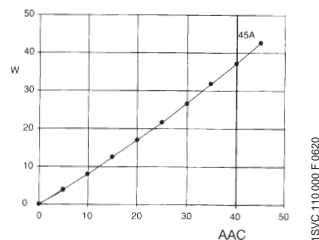
DIN-rail mounting



Load current at ambient temperature
R 100.45



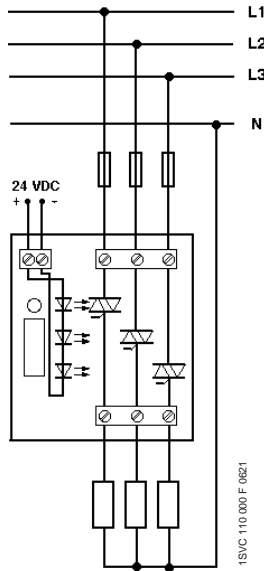
Dissipation at load current
R 100.45



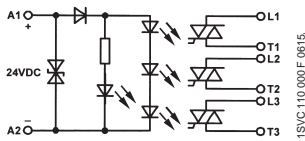
Three-phase solid-state relay HDS R2

Technical data, dimensional drawings

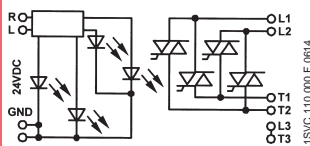
Connection diagram HDS



Circuit diagram HDS

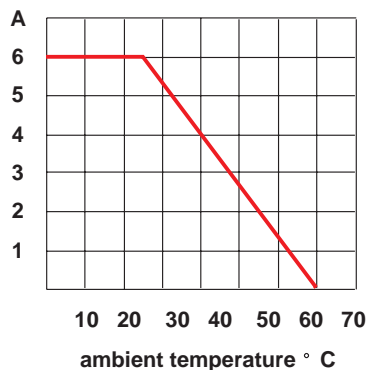


Circuit diagram HDWS



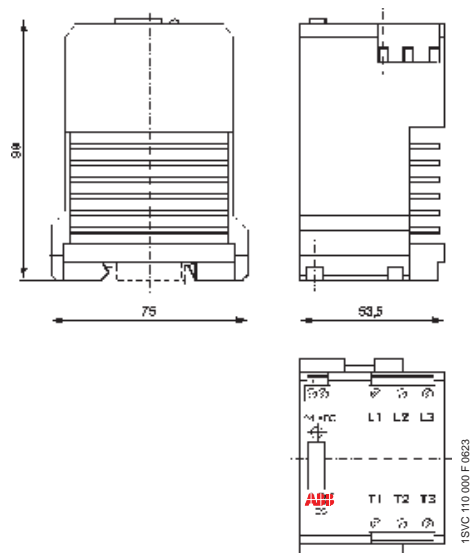
| Type | HDS R2 | HDWS R2 |
|---|--|--|
| Ordering number | GHR 302 0004 R0004 | GHR 302 1004 R0001 |
| Control-side | | |
| Rated voltage V_N | DC24V | DC24V |
| Rated voltage range | 17 - 30VDC | 17 - 30VDC |
| Rated current (at V_N) | 25mA | 25mA per channel |
| Make voltage | > 17V | > 17V |
| Break voltage | < 8V | < 8V |
| Status display | Yellow LED | 2 yellow LED's |
| Protective circuitry | Suppressor diode | Varistor/ Reverse polarity protection diode |
| Rated insulation voltage (prEN50178) | 50V Pollution degree 2 Overvoltage category I | 50V Pollution degree 2 Overvoltage category I |
| Load-side | | |
| Switch type | n/o | c/o |
| Switching voltage, min./max. | min. AC24V (24-460) | min. AC24V (24-460) |
| Switching current, min./max. | min. 10mA max. 3.4A (at 45°C) | min. 10mA max. 3.4A (at 45°C) |
| Switching capacity | max. 1500W | max. 1500W |
| Leakage current at off state output (at V_N) | < 1.7mA per channel | < 1.7mA per channel |
| Holding current | min. 10mA | min. 10mA |
| Surge current limit value (10 ms) | AC120A | AC120A |
| Protective circuitry | VDR | VDR / RC |
| Switching frequency | 10/sec. (resistive load) 5/sec. (inductive load) | 5/sec. (resistive load) 1/sec. (inductive load) |
| Make time | ca. 5.5 ms | ca. 115 ms |
| Break time | max. 10 ms (1 half wave) | max. 10 ms (1 half wave) |
| Rated insulation voltage (prEN50178) | 500V Pollution degree 2 Overvoltage category I | 500V Pollution degree 2 Overvoltage category I |

Deratingcurve



Dimensional drawings

Dimensions in mm



Solid-state relays

Solid state relays

Technical data

Dimensioning/sizing of solid state relays and heat sinks

When choosing the suitable heat sinks and determining the dissipation or heating of the devices, answer the following questions:

- 1.) Max. load current?
- 2.) Control voltage?
- 3.) Load voltage?
- 4.) Ambient temperature while operating?
- 5.) Continuous duty, clocking?

Example:

- 30A load current, control voltage of 230VAC, load voltage of 400VAC, 40°C ambient temperature in the panel, continuous duty
- Possible relays: R 115/40, R 115/90, R 126/50, R 126/75, R 126/100
- R 126/50 chosen

With the maximum load current, the control and load voltage, you can choose the suitable relay. With a load current of 30A, choose a relay with at least 50A rated current. Once you have this value, refer to the diagram of the selected relay (R 126/50).

- The Y axis of the diagram shows the load current in A.
 - The X axis shows the ambient temperature in °C.
 Follow the curve to the peak of the current (e.g. 30A) to the right up to the intersection point with the ambient temperature (40°C). The right angle in the intersection point comprises the value of the minimum required heat sink. For R 126/50 = 1.65K/W (Kelvin/Watt). The required heat sink must have at least 1.65 K/W. The lower this number is, the better the heat sink is, i.e. 0.5K/W is better than 1.5K/W.

The corresponding heat sink can now be chosen from the ordering table at page 158. The dissipation of the solid state relay can be read in the right column of the diagram, in our example = 33W.
 The choice of the heat sinks affects directly the heating of the device.

Device temperature T = ambient temperature + (dissipation * heat sink value).

The calculated device temperature must not exceed 100°C. There is a danger of fire as well as damage to the device.

- Example 1: Heat sink KK-R111-2,1**
 $T = 40^{\circ}\text{C} + (33\text{W} + 2.1\text{K/W}) = 40^{\circ}\text{C} + 69.3^{\circ}\text{C} = 109.3^{\circ}\text{C}$ **Too hot!**
- Example 2: Heat sink KK-R111-1,5**
 $T = 40^{\circ}\text{C} + (33\text{W} + 1.5\text{K/W}) = 40^{\circ}\text{C} + 49.5^{\circ}\text{C} = 89.5^{\circ}\text{C}$ **OK!**
- Example 3: Heat sink KK-R111-0,5**
 $T = 40^{\circ}\text{C} + (33\text{W} + 0.5\text{K/W}) = 40^{\circ}\text{C} + 16.5^{\circ}\text{C} = 56.5^{\circ}\text{C}$ **OK!**

Example 2 is the best selection because of space and cost.
 The calculated values apply for continuous duty; during cycling the heating is lower depending on the duty cycle.

Load current related to the ambient temperature, heat sink sizing

Standard Version

| load current (A) | thermal resistance (K/W) | | | | | power dissipation (W) |
|------------------|--------------------------|------|------|------|------|-----------------------|
| 25 | 2 | 1,7 | 1,4 | 1 | 0,71 | 0,40 |
| 22,5 | 2,5 | 2,1 | 1,8 | 1,4 | 1 | 0,66 |
| 20 | 3,1 | 2,7 | 2,3 | 1,9 | 1,4 | 1 |
| 17,5 | 4,0 | 3,5 | 3 | 2,5 | 2 | 1,4 |
| 15 | 4,9 | 4,3 | 3,7 | 3,1 | 2,5 | 1,9 |
| 12,5 | 6,2 | 5,4 | 4,6 | 3,9 | 3,1 | 2,3 |
| 10 | 8,1 | 7,1 | 6,1 | 5,1 | 4 | 3 |
| 7,5 | 11,3 | 9,9 | 8,5 | 7,1 | 5,6 | 4,2 |
| 5 | - | 15,6 | 13,3 | 11,1 | 8,9 | 6,7 |
| 2,5 | - | - | - | - | 18,7 | 14 |

ambient temperature [°C]

1SVC 110 000 F 0744

| load current (A) | thermal resistance (K/W) | | | | | power dissipation (W) |
|------------------|--------------------------|------|------|------|------|-----------------------|
| 50 | 0,92 | 0,76 | 0,60 | 0,45 | 0,29 | - |
| 45 | 1,2 | 0,99 | 0,80 | 0,62 | 0,44 | 0,26 |
| 40 | 1,5 | 1,3 | 1,1 | 0,85 | 0,63 | 0,42 |
| 35 | 1,9 | 1,6 | 1,4 | 1,1 | 0,89 | 0,63 |
| 30 | 2,4 | 2,1 | 1,8 | 1,5 | 1,2 | 0,91 |
| 25 | 3 | 2,7 | 2,3 | 1,9 | 1,5 | 1,1 |
| 20 | 3,9 | 3,5 | 3 | 2,5 | 2 | 1,5 |
| 15 | 5,5 | 4,8 | 4,1 | 3,4 | 2,7 | 2,1 |
| 10 | 8,6 | 7,5 | 6,4 | 5,4 | 4,3 | 3,2 |
| 5 | 17,9 | 15,6 | 13,4 | 11,2 | 8,9 | 6,7 |

ambient temperature [°C]

1SVC 110 000 F 0745

| load current (A) | thermal resistance (K/W) | | | | | power dissipation (W) | thermal protection [°C] |
|------------------|--------------------------|------|------|------|------|-----------------------|-------------------------|
| 90 | 0,63 | 0,53 | 0,42 | 0,32 | - | - | 97 |
| 80 | 0,81 | 0,69 | 0,57 | 0,45 | 0,33 | - | 84 |
| 70 | 1 | 0,89 | 0,75 | 0,61 | 0,47 | 0,33 | 71 |
| 60 | 1,3 | 1,2 | 1 | 0,83 | 0,66 | 0,49 | 59 |
| 50 | 1,7 | 1,5 | 1,3 | 1,1 | 0,85 | 0,64 | 47 |
| 40 | 2,2 | 1,9 | 1,7 | 1,4 | 1,1 | 0,83 | 36 |
| 30 | 3,1 | 2,7 | 2,3 | 1,9 | 1,5 | 1,2 | 26 |
| 20 | 4,8 | 4,2 | 3,6 | 3 | 2,4 | 1,8 | 17 |
| 10 | 10 | 8,8 | 7,5 | 6,3 | 5 | 3,8 | 8 |

ambient temperature [°C]

1SVC 110 000 F 0746

R111/25, R115/25,
R111/20, R115/20

R111/45, R115/45,
R111/40, R115/40

R111/90
R115/90

| load current (A) | thermal resistance (K/W) | | | | | power dissipation (W) |
|------------------|--------------------------|------|------|------|------|-----------------------|
| 50 | 0,92 | 0,76 | 0,60 | 0,45 | 0,29 | - |
| 45 | 1,2 | 0,99 | 0,80 | 0,62 | 0,44 | 0,26 |
| 40 | 1,5 | 1,3 | 1,1 | 0,85 | 0,63 | 0,42 |
| 35 | 1,9 | 1,6 | 1,4 | 1,1 | 0,89 | 0,63 |
| 30 | 2,4 | 2,1 | 1,8 | 1,5 | 1,2 | 0,91 |
| 25 | 3 | 2,7 | 2,3 | 1,9 | 1,5 | 1,1 |
| 20 | 3,9 | 3,5 | 3 | 2,5 | 2 | 1,5 |
| 15 | 5,5 | 4,8 | 4,1 | 3,4 | 2,7 | 2,1 |
| 10 | 8,6 | 7,5 | 6,4 | 5,4 | 4,3 | 3,2 |
| 5 | 17,9 | 15,6 | 13,4 | 11,2 | 8,9 | 6,7 |

ambient temperature [°C]

1SVC 110 000 F 0747

| load current (A) | thermal resistance (K/W) | | | | | power dissipation (W) |
|------------------|--------------------------|------|------|------|------|-----------------------|
| 90 | 0,63 | 0,53 | 0,42 | 0,32 | - | - |
| 80 | 0,81 | 0,69 | 0,57 | 0,45 | 0,33 | - |
| 70 | 1 | 0,89 | 0,75 | 0,61 | 0,47 | 0,33 |
| 60 | 1,3 | 1,2 | 1 | 0,83 | 0,66 | 0,49 |
| 50 | 1,7 | 1,5 | 1,3 | 1,1 | 0,85 | 0,64 |
| 40 | 2,2 | 1,9 | 1,7 | 1,4 | 1,1 | 0,83 |
| 30 | 3,1 | 2,7 | 2,3 | 1,9 | 1,5 | 1,2 |
| 20 | 4,8 | 4,2 | 3,6 | 3 | 2,4 | 1,8 |
| 10 | 10 | 8,8 | 7,5 | 6,3 | 5 | 3,8 |

ambient temperature [°C]

1SVC 110 000 F 0748

| load current (A) | thermal resistance (K/W) | | | | | power dissipation (W) | thermal protection [°C] |
|------------------|--------------------------|------|------|------|------|-----------------------|-------------------------|
| 110 | 0,54 | 0,45 | 0,36 | 0,27 | - | - | 112 |
| 100 | 0,66 | 0,55 | 0,45 | 0,35 | 0,25 | - | 100 |
| 90 | 0,80 | 0,69 | 0,57 | 0,46 | 0,34 | - | 87 |
| 80 | 0,98 | 0,85 | 0,72 | 0,59 | 0,46 | - | 76 |
| 70 | 1,2 | 1,1 | 0,91 | 0,76 | 0,60 | - | 65 |
| 60 | 1,5 | 1,3 | 1,1 | 0,92 | 0,74 | - | 54 |
| 50 | 1,8 | 1,6 | 1,4 | 1,1 | 0,91 | - | 44 |
| 40 | 2,3 | 2 | 1,8 | 1,5 | 1,2 | - | 34 |
| 30 | 3,2 | 2,8 | 2,4 | 2 | 1,6 | - | 25 |
| 20 | 4,9 | 4,3 | 3,7 | 3,1 | 2,5 | - | 16 |
| 10 | 10,2 | 8,9 | 7,6 | 6,4 | 5,1 | - | 8 |

ambient temperature [°C]

1SVC 110 000 F 0749

R112/50

R112/90

R112/110

Solid state relays

Technical data, dimensional drawings

Load current related to the ambient temperature, heat sink sizing

Compact version

| load current (A) | thermal resistance (K/W) | | | | | power dissipation (W) | |
|------------------|--------------------------|------|------|------|------|-----------------------|----|
| 25,0 | 2,70 | 2,34 | 1,98 | 1,61 | 1,25 | 0,89 | 28 |
| 22,5 | 3,10 | 2,69 | 2,28 | 1,86 | 1,45 | 1,04 | 24 |
| 20,0 | 3,61 | 3,13 | 2,65 | 2,18 | 1,70 | 1,23 | 21 |
| 17,5 | 4,26 | 3,70 | 3,14 | 2,59 | 2,03 | 1,47 | 18 |
| 15,0 | 5,14 | 4,47 | 3,80 | 3,14 | 2,47 | 1,80 | 15 |
| 12,5 | 6,38 | 5,56 | 4,73 | 3,91 | 3,09 | 2,27 | 12 |
| 10,0 | 8,25 | 7,19 | 6,14 | 5,08 | 4,02 | 2,97 | 9 |
| 7,5 | 11,4 | 9,94 | 8,49 | 7,04 | 5,59 | 4,14 | 7 |
| 5,0 | 17,7 | 15,4 | 13,2 | 11,0 | 8,74 | 6,51 | 4 |
| 2,5 | - | - | - | - | 18,2 | 13,6 | 2 |

ambient temperature [°C]

R120/25, R121/25,
R126/25

| load current (A) | thermal resistance (K/W) | | | | | power dissipation (W) | |
|------------------|--------------------------|------|------|------|------|-----------------------|----|
| 50,0 | 1,03 | 0,86 | 0,70 | 0,53 | 0,37 | 0,20 | 61 |
| 45,0 | 1,27 | 1,09 | 0,90 | 0,71 | 0,52 | 0,33 | 53 |
| 40,0 | 1,54 | 1,32 | 1,10 | 0,89 | 0,67 | 0,45 | 46 |
| 35,0 | 1,85 | 1,59 | 1,34 | 1,08 | 0,82 | 0,57 | 39 |
| 30,0 | 2,26 | 1,95 | 1,65 | 1,34 | 1,03 | 0,72 | 33 |
| 25,0 | 2,85 | 2,47 | 2,08 | 1,70 | 1,32 | 0,94 | 26 |
| 20,0 | 3,73 | 3,24 | 2,75 | 2,26 | 1,77 | 1,27 | 20 |
| 15,0 | 5,22 | 4,54 | 3,86 | 3,19 | 2,51 | 1,83 | 15 |
| 10,0 | 8,21 | 7,16 | 6,11 | 5,05 | 4,00 | 2,95 | 10 |
| 5,0 | 17,2 | 15,0 | 12,9 | 10,7 | 8,51 | 6,33 | 5 |

ambient temperature [°C]

R120/50, R121/50,
R126/50, R122/50

| load current (A) | thermal resistance (K/W) | | | | | power dissipation (W) | |
|------------------|--------------------------|-------|-------|------|------|-----------------------|----|
| 75,0 | 0,91 | 0,78 | 0,65 | 0,52 | 0,39 | 0,26 | 77 |
| 67,5 | 1,10 | 0,96 | 0,81 | 0,66 | 0,51 | 0,36 | 68 |
| 60,0 | 1,34 | 1,17 | 1,00 | 0,83 | 0,66 | 0,49 | 59 |
| 52,5 | 1,60 | 1,40 | 1,20 | 1,00 | 0,80 | 0,60 | 50 |
| 45,0 | 1,93 | 1,68 | 1,44 | 1,20 | 0,96 | 0,72 | 42 |
| 37,5 | 2,38 | 2,08 | 1,78 | 1,49 | 1,19 | 0,89 | 34 |
| 30,0 | 3,06 | 2,68 | 2,30 | 1,91 | 1,53 | 1,15 | 26 |
| 22,5 | 4,21 | 3,68 | 3,16 | 2,63 | 2,10 | 1,58 | 19 |
| 15,0 | 6,51 | 5,70 | 4,88 | 4,07 | 3,26 | 2,44 | 12 |
| 7,5 | 13,5 | 11,77 | 10,09 | 8,41 | 6,73 | 5,04 | 6 |

ambient temperature [°C]

R121/75, R126/75,
R122/75

Load current related to the ambient temperature

| load current (A) | thermal resistance (K/W) | | | | | power dissipation (W) | |
|------------------|--------------------------|------|------|------|------|-----------------------|-----|
| 100,0 | 0,54 | 0,45 | 0,36 | 0,27 | 0,18 | 0,09 | 111 |
| 90,0 | 0,68 | 0,58 | 0,47 | 0,37 | 0,27 | 0,17 | 97 |
| 80,0 | 0,86 | 0,74 | 0,62 | 0,50 | 0,38 | 0,26 | 84 |
| 70,0 | 1,08 | 0,94 | 0,80 | 0,66 | 0,52 | 0,38 | 71 |
| 60,0 | 1,37 | 1,20 | 1,03 | 0,85 | 0,68 | 0,51 | 59 |
| 50,0 | 1,70 | 1,49 | 1,28 | 1,06 | 0,85 | 0,64 | 47 |
| 40,0 | 2,21 | 1,93 | 1,66 | 1,38 | 1,10 | 0,83 | 36 |
| 30,0 | 3,06 | 2,68 | 2,30 | 1,91 | 1,53 | 1,15 | 26 |
| 20,0 | 4,78 | 4,18 | 3,59 | 2,99 | 2,39 | 1,79 | 17 |
| 10,0 | 9,98 | 8,73 | 7,49 | 6,24 | 4,99 | 3,74 | 8 |

ambient temperature [°C]

R121/100, R126/100,
R122/100

| load current (A) | thermal resistance (K/W) | | | | | power dissipation (W) | thermal protection °C |
|------------------|--------------------------|------|------|------|------|-----------------------|-----------------------|
| 25 | 0,46 | 0,36 | 0,26 | - | - | - | 101 70°C |
| 22,5 | 0,62 | 0,50 | 0,39 | 0,8 | - | - | 88 80°C |
| 20 | 0,81 | 0,68 | 0,55 | 0,42 | 0,28 | - | 76 80°C |
| 17,5 | 1,0 | 0,91 | 0,76 | 0,60 | 0,44 | - | 64 90°C |
| 15 | 1,4 | 1,2 | 1,0 | 0,85 | 0,66 | - | 53 90°C |
| 12,5 | 1,9 | 1,6 | 1,4 | 1,1 | 0,95 | - | 43 90°C |
| 10 | 2,4 | 2,1 | 1,8 | 1,5 | 1,2 | - | 33 90°C |
| 7,5 | 3,4 | 3,0 | 2,5 | 2,1 | 1,7 | - | 24 90°C |
| 5 | 5,3 | 4,7 | 4,0 | 3,3 | 2,6 | - | 15 90°C |
| 2,5 | 11,2 | 9,8 | 8,4 | 7,0 | 5,6 | - | 7 90°C |

ambient temperature [°C]

R311/25

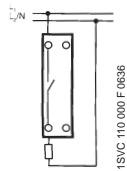
| load current (A) | thermal resistance (K/W) | | | | | power dissipation (W) | thermal protection °C |
|------------------|--------------------------|------|------|------|------|-----------------------|-----------------------|
| 55 | - | - | - | - | - | - | 215 80°C |
| 50 | 0,28 | - | - | - | - | - | 191 80°C |
| 45 | 0,35 | 0,29 | - | - | - | - | 167 80°C |
| 40 | 0,45 | 0,38 | 0,31 | - | - | - | 145 90°C |
| 35 | 0,58 | 0,50 | 0,42 | 0,33 | 0,25 | - | 123 90°C |
| 30 | 0,75 | 0,65 | 0,55 | 0,46 | 0,36 | - | 103 90°C |
| 25 | 0,96 | 0,84 | 0,72 | 0,60 | 0,48 | - | 83 90°C |
| 20 | 1,3 | 1,1 | 0,93 | 0,78 | 0,62 | - | 65 90°C |
| 15 | 1,8 | 1,5 | 1,3 | 1,1 | 0,85 | - | 47 90°C |
| 10 | 2,7 | 2,4 | 2,0 | 1,7 | 1,4 | - | 30 90°C |
| 5 | 5,5 | 4,8 | 4,1 | 3,5 | 2,8 | - | 15 90°C |

ambient temperature [°C]

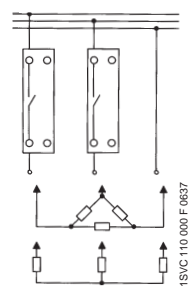
R311/55, R315/55

Examples of applications for 1-phase solid state relays

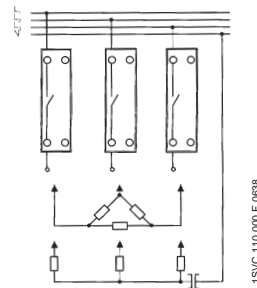
1-pin solid state relay
Single-phase application
Phase neutral, Phase-Phase



Two 1-pin solid state relay
in a 3-phase application
star-delta (economy circuit)

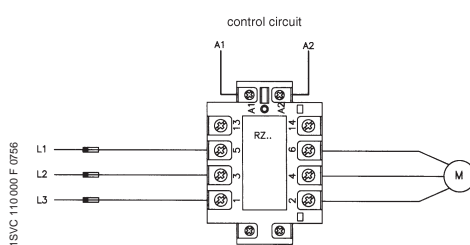


Three 1-pin semi-conductor relays in
a 3-phase application
delta, star, star with neutral



Switching of motors with R311/R315

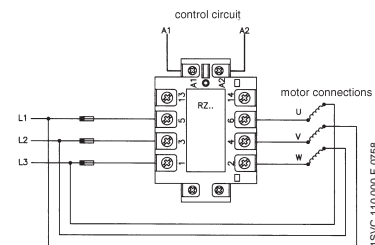
direct start up



Selection table

| 380/400 V | | solid-state relay type [A] |
|------------------------|--|----------------------------|
| rated motor power [kW] | rated motor power [A _{mot}]* | 25 55 |
| 0,25 | 0,8 | 150000 F 0757 |
| 0,37 | 1,1 | |
| 0,55 | 1,5 | |
| 0,75 | 1,9 | |
| 1,1 | 2,6 | |
| 1,5 | 3,5 | |
| 2,2 | 4,7 | |
| 3,0 | 6,2 | |
| 4,0 | 8,1 | |
| 5,5 | 10,7 | |
| 7,5 | 15,0 | |

delta circuit



Selection table

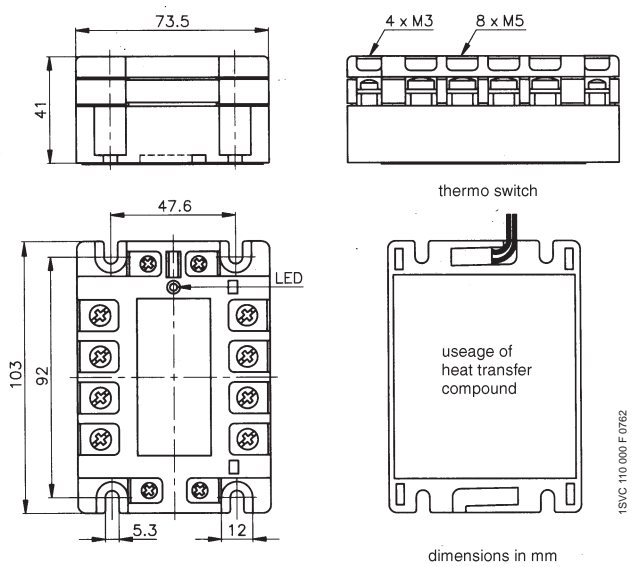
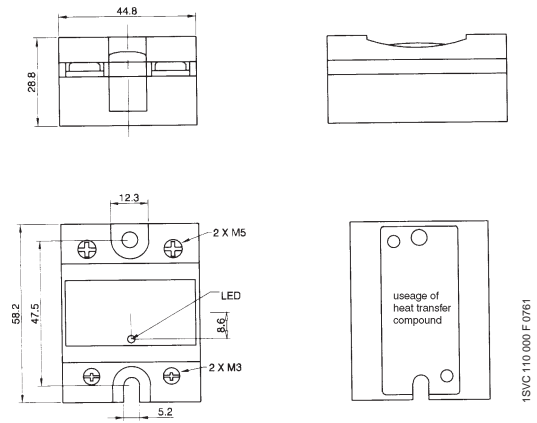
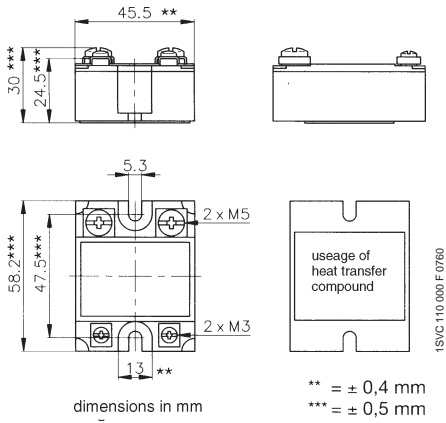
| 380/400 V | | solid-state relay type [A] |
|------------------------|--|----------------------------|
| rated motor power [kW] | rated motor power [A _{mot}]* | 25 55 |
| 1,1 | 1,5 | 150000 F 0759 |
| 1,5 | 2,1 | |
| 2,2 | 3,0 | |
| 3,0 | 4,0 | |
| 4,0 | 4,6 | |
| 5,5 | 6,2 | |
| 7,5 | 8,7 | |
| 11,0 | 12,1 | |
| 15,0 | 16,2 | |

*1/√3

Solid state relays

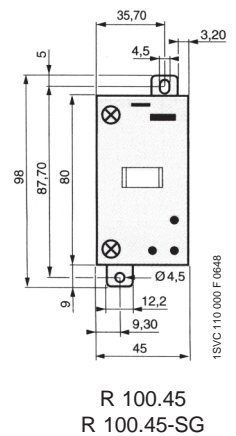
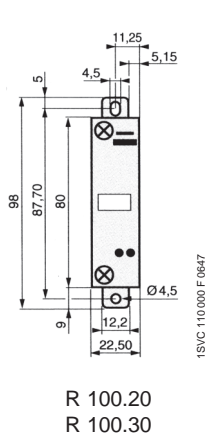
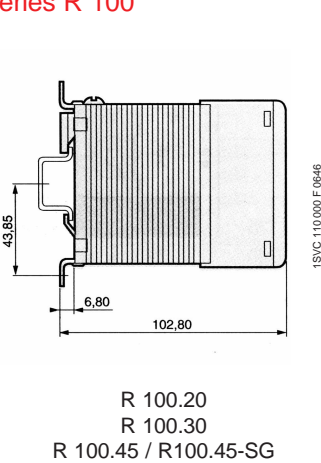
Dimensional drawings

Dimensional drawings, standard and compact series



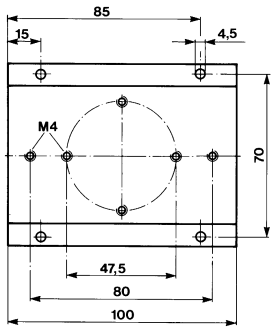
Solid-state relays

Dimensional drawings Series R 100

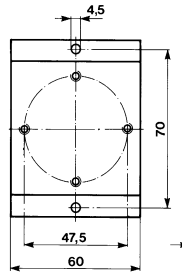


Solid state relays Heat Sink / Complete devices Dimensional drawings

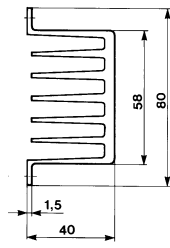
Heat sink for screw-mounting on a mounting plate for solid state relays R111 / R115 / R112



Heat sink KK-1.8
GHR 1109401 P2

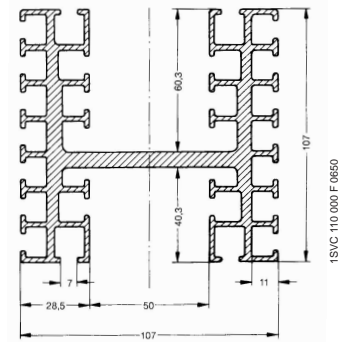


Heat sink KK-2.6
GHR 1109401 P1



Heat sink KK-1.8 / KK-2.6
GHR 1109401 P1 & P2

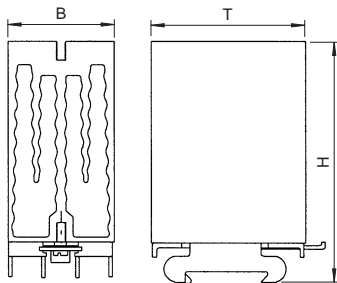
1SVC 110 000 F 0649



Heat sink KK-0.7
GHR 1109404 P1, Length 100 mm

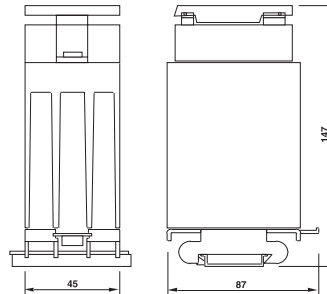
1SVC 110 000 F 0650

Heat sink for 35 mm DIN rail mounting and complete assemblies



KK-R111-2.1
KK-111-1.5

1SVC 110 000 F 0651

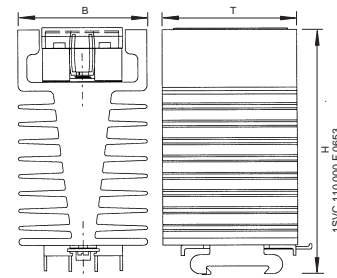


HS 50/1.5
HS 50-AC/1.5
HS 50-H/1.5

1SVC 110 000 F 0652

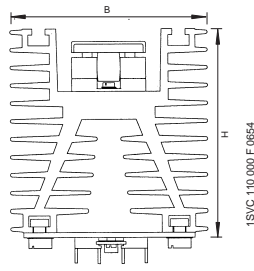
Dimensions, heat sink only

| Type | W | D | H |
|-------------|-----|----|-----|
| KK-R111-2.1 | 51 | 65 | 65 |
| KK-R111-1.5 | 45 | 65 | 97 |
| KK-R111-0.7 | 80 | 85 | 139 |
| KK-R111-0.5 | 120 | 85 | 139 |
| KK-R113-0.8 | 114 | 85 | 139 |



HS 50 / 0.7
HS 75/0.7
HS 100/0.7
KK-R111-0.7

1SVC 110 000 F 0653

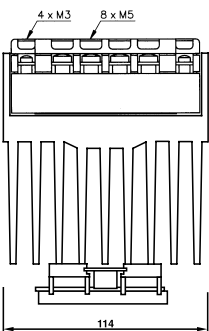


HS 100/0.5
HS 75/0.5
KK-R111-0.5

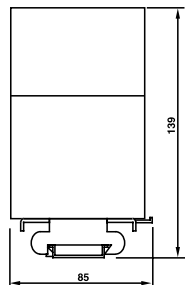
1SVC 110 000 F 0654

Dimensions, complete device

| Type | W | D | H |
|-----------------------------------|-----|----|-----|
| HS50/1.5; HS50-AC/1.5; HS50-H/1.5 | 45 | 87 | 147 |
| HS50/0.7; HS75-0.7; HS100/0.7 | 80 | 85 | 139 |
| HS75/0.5; H100/0.5 | 120 | 85 | 139 |
| HDS50/0.8; HDS50-AC/0.8 | 114 | 85 | 139 |



HDS 50 / 0.8
HDS 50-AC / 0.8
KK-R311-0.8



1SVC 110 000 F 0655

Notes

