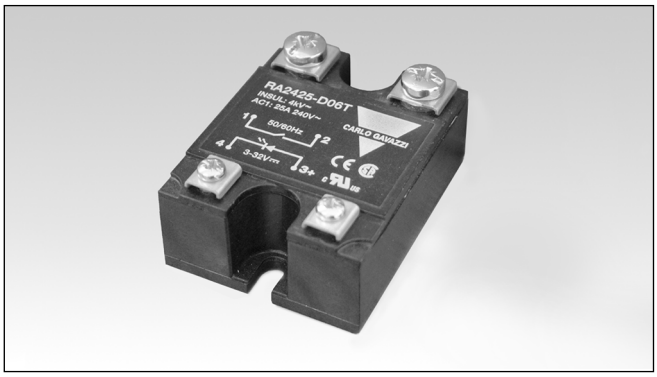
# Solid State Relays
# Industrial, 1-Phase ZS
# Types RA 24.. -D 06 T, RA 24.. -D 06 TF




- **AC Solid State Relay**
- **Zero switching**
- **Low-cost triac type**
- **Rated operational current: 10 and 25 AACrms**
- **Blocking voltage: Up to 650 $V_p$**
- **Rated operational voltage: 230 VACrms**
- **Input ranges: 3 to 32 VDC**
- **Isolation: OPTO (input-output) 4000 VACrms**
- **Fast-on version available**

## Product Description

The triac version of the zero switching relay is an inexpensive solution for resistive loads. The zero switching relay switches ON when the AC sine curve just crosses zero, and switches OFF when the current crosses zero.

## Ordering Key

**RA 24 10 -D 06 T**

- **Solid State Relay**
- **Switching mode**
- **Rated operational voltage**
- **Rated operational current**
- **Control voltage**
- **Blocking voltage**
- **Output**

## Type Selection

| Switching mode | Rated operational voltage | Rated operational current | Control voltage | Blocking voltage | Output |
|---|---|---|---|---|---|
| A: Zero switching | 24: 230 VACrms | 10: 10 AACrms<br>25: 25 AACrms | -D: 3 to 32 VDC | 06: 650 $V_p$ | T: Triac<br>TF: Triac/Fast-on terminals |

## Selection Guide

| Rated operational voltage | Blocking voltage | Terminal type | Control voltage | Rated operational current 10 AACrms | 25 AACrms |
|---|---|---|---|---|---|
| 230 VACrms | 650 $V_p$ | Rivet terminals | 3 to 32 VDC | **RA 2410 -D 06T** | **RA 2425 -D 06T** |
| | | Fast-on terminals | 3 to 32 VDC | **RA 2410 -D 06TF** | **RA 2425 -D 06TF** |

## General Specifications

| | |
|---|---|
| Operational voltage range | 24 to 280 VACrms |
| Blocking voltage | ≥ 650 $V_p$ |
| Operational frequency range | 45 to 65 Hz |
| Power factor | ≥ 0.5 @ 230 VACrms |
| Approvals | CSA, UL |
| CE-marking | Yes |

## Isolation

| | |
|---|---|
| Rated isolation voltage | |
| Input to output | ≥ 4000 VACrms |
| Output to case | ≥ 4000 VACrms |
| Insulation resistance | |
| Input to output | ≥ $10^{10}$ W |
| Output to case | ≥ $10^{10}$ W |
| Insulation capacitance | |
| Input to output | ≤ 8 pF |
| Output to case | ≤ 25 pF |

## Input Specifications

| | |
|---|---|
| Control voltage range | 3 to 32 VDC |
| Pick-up voltage | ≤ 3 V |
| Drop-out voltage | ≥ 1 V |
| Reverse voltage | ≤ 32 VDC |
| Input impedance | 1.5 kΩ |
| Response time pick-up | ≤ 1/2 cycle |
| Response time drop-out | ≤ 1/2 cycle |

## Housing Specifications

| | |
|---|---|
| Weight | Approx. 110 g |
| Housing material | Noryl GFN 1, black |
| Base plate | Aluminium |
| Potting compound | Polyurethane |
| Relay | |
| Mounting screws | M5 |
| Mounting torque | ≤ 1.5 Nm |
| Control terminal | |
| Mounting screws/Fast-on | M3 x 6/6.3 x 0.8 mm |
| Mounting torque | ≤ 0.5 Nm |
| Power terminal | |
| Mounting screws/Fast-on | M5 x 6/6.3 x 0.8 mm |
| Mounting torque | ≤ 2.4 Nm |

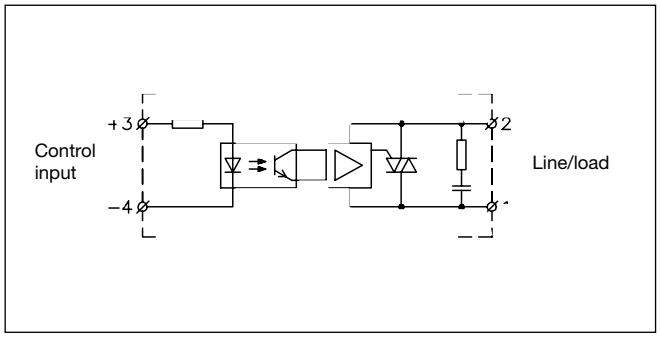
## Output Specifications

| | RA 2410 -D 06 T/F | RA 2425 -D 06 T/F |
|---|---|---|
| Rated operational current AC 51 | 10 Arms | 25 Arms |
| Minimum operational current | 20 mArms | 20 mArms |
| Rep. overload current t=1 s | ≤ 30 $A_p$ | ≤ 50 $A_p$ |
| Non-rep. surge current t=20 ms | 90 $A_p$ | 200 $A_p$ |
| Off-state leakage current @ rated voltage and frequency | ≤ 5 mArms | ≤ 5 mArms |
| $I^2t$ for fusing t=10 ms | ≤ 40 $A^2s$ | ≤ 200 $A^2s$ |
| Critical dI/dt | ≥ 10 A/µs | ≥ 10 A/µs |
| On-state voltage drop @ rated current | ≤ 1.6 Vrms | ≤ 1.6 Vrms |
| Critical dV/dt commutating | ≥ 10 V/µs | ≥ 10 V/µs |
| Critical dV/dt off-state | ≥ 250 V/µs | ≥ 250 V/µs |

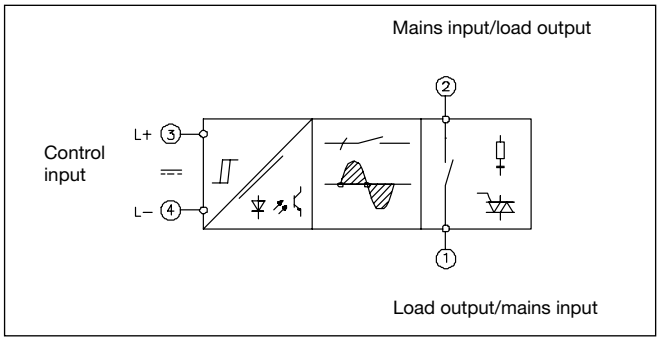
## Thermal Specifications

| | RA 2410 -D 06 T/TF | RA 2425 -D 06 T/TF |
|---|---|---|
| Operating temperature | -20° to +70°C (-4° to +158°F) | -20° to +70°C (-4° to +158°F) |
| Storage temperature | -40° to +100°C (-40° to +212°F) | -40° to +100°C (-40° to +212°F) |
| Junction temperature | ≤ 125°C (≤ 257°F) | ≤ 125°C (≤ 257°F) |
| $R_{th}$ junction to case | ≤ 2.5 K/W | ≤ 1.8 K/W |
| $R_{th}$ junction to ambient | ≤ 12.5 K/W | ≤ 12.5 K/W |

## Wiring Diagram




## Functional Diagram



# Heatsink Dimensions (load current versus ambient temperature)

**RA 24 10 .. .. T/F**

| Load current [A] | Thermal resistance [K/W] | | | | | | Power dissipation [W] |
|---|---|---|---|---|---|---|---|
| 10 | 6.5 | 5.6 | 4.7 | 3.9 | 3 | 2.1 | 12 |
| 9 | 7.8 | 6.8 | 5.8 | 4.8 | 3.8 | 2.8 | 10 |
| 8 | 9.2 | 8 | 6.9 | 5.7 | 4.6 | 3.4 | 9 |
| 7 | 10.8 | 9.5 | 8.1 | 6.8 | 5.4 | 4.1 | 7 |
| 6 | - | 11.4 | 9.8 | 8.2 | 6.5 | 4.9 | 6 |
| 5 | - | - | 12.2 | 10.2 | 8.1 | 6.1 | 5 |
| 4 | - | - | - | - | 10.5 | 7.9 | 4 |
| 3 | - | - | - | - | - | 10.9 | 3 |
| 2 | - | - | - | - | - | - | 2 |
| 1 | - | - | - | - | - | - | 1 |
| | 20 | 30 | 40 | 50 | 60 | 70 | $T_A$ |

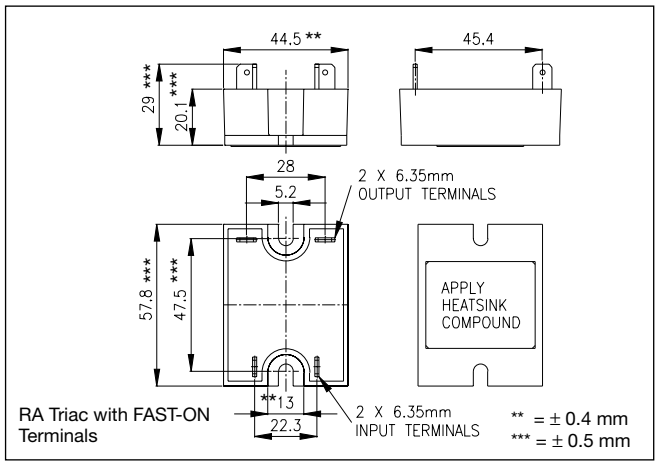
Ambient temp. [°C]

**RA 24 25 .. .. T/F**

| Load current [A] | Thermal resistance [K/W] | | | | | | Power dissipation [W] |
|---|---|---|---|---|---|---|---|
| 25 | 1.4 | 1.1 | 0.77 | 0.45 | - | - | 32 |
| 23 | 1.9 | 1.5 | 1.2 | 0.79 | 0.43 | - | 28 |
| 20 | 2.5 | 2.1 | 1.6 | 1.2 | 0.81 | 0.39 | 24 |
| 18 | 3.3 | 2.8 | 2.3 | 1.8 | 1.3 | 0.8 | 20 |
| 15 | 4.3 | 3.7 | 3.1 | 2.5 | 2 | 1.4 | 17 |
| 13 | 5.8 | 5.1 | 4.4 | 3.6 | 2.8 | 2.2 | 14 |
| 10 | 7.6 | 6.7 | 5.7 | 4.8 | 3.8 | 2.9 | 11 |
| 8 | 10.5 | 9.2 | 7.9 | 6.6 | 5.3 | 4 | 8 |
| 5 | - | 14.4 | 12.3 | 10.3 | 8.2 | 6.2 | 5 |
| 3 | - | - | - | - | 17.1 | 12.8 | 3 |
| | 20 | 30 | 40 | 50 | 60 | 70 | $T_A$ |

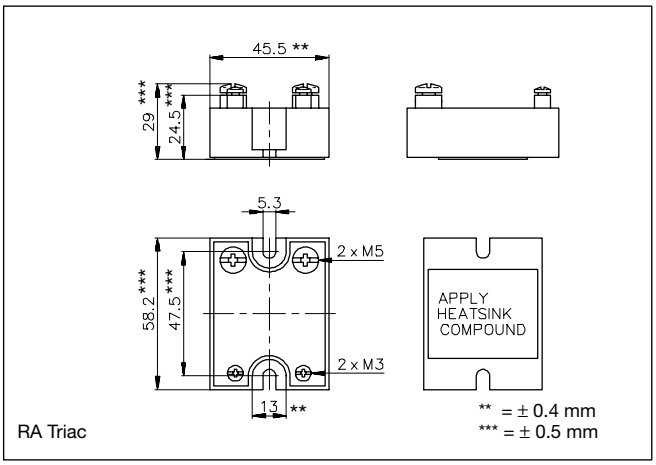
Ambient temp. [°C]

# Dimensions




RA Triac with FAST-ON Terminals

All dimensions in mm




RA Triac

All dimensions in mm

# Accessories

Protection cover
Heatsinks
DIN rail adapter
Varistors
Fuses

For further information refer to "General Accessories".

# Terminals RA 24.. -D 06 TF

| | |
|---|---|
| Control terminal (Fast-on) | 6.3 x 0.8 mm |
| Power terminal (Fast-on) | 6.3 x 0.8 mm |

# Heatsink Selection

| **Carlo Gavazzi Heatsink** (see Accessories) | **Thermal resistance** |
|---|---|
| No heatsink required | $R_{th\ s\text{-}a}$ > 12.5 K/W |
| RHS 100 Assy | 3.0 K/W |
| RHS 301 Assy | 0.8 K/W |
| RHS 301 F Assy | 0.25 K/W |
| Consult your distributor | < 0.25 K/W |

Compare the value found in the current versus temperature chart with the standard heatsink values and select the heatsink with the next lower value.