

# Solid State Relays System Monitoring Relays (Sense Relay) Type RA.... ..S

CARLO GAVAZZI



- System (line and load) monitoring relay
- Zero switching
- Rated operational current: 25, 50 and 90 AACrms
- Rated operational voltage: 120, 230 and 400 VACrms
- High surge current capability
- Alarm output signal
- LED indication for alarm and supply

## Product Description

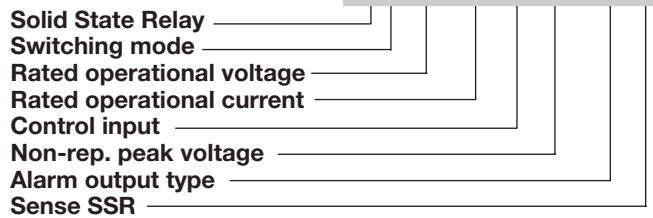
The system monitoring solid state relay (sense relay) provides an alarm output in the event of a circuit failure. Internal circuits monitor:

- line voltage/line current
- correct functioning of the SSR
- SSR input status

The relay is designed for applications where immediate fault detection is required. A red LED indicates an alarm, a green LED indicates DC control supply OK (half LED light intensity) resp. relay switched ON (full LED light intensity).

## Ordering Key

**RA 23 25 H 06 NO S**



## Type Selection

Switching mode	Rated operational voltage	Rated operational current	Control input	Non-rep. peak voltage	Alarm output type
A: Zero switching	12: 120 VACrms 23: 230 VACrms 40: 400 VACrms	25: 25 AACrms 50: 50 AACrms 90: 90 AACrms	H: Active high L: Active low	06: 650 V <sub>p</sub> 10: 1000 V <sub>p</sub>	NO: NPN, NO NC: NPN, NC PO: PNP, NO PC: PNP, NC

## Selection Guide

Rated operational voltage	Control input	Alarm output type	Rated operational current				
			25 AACrms	50 AACrms	90 AACrms		
120 VACrms	Active high	NPN, NO	RA 1225 H06NOS	RA 1250 H06NOS	RA 1290 H06NOS		
		NPN, NC	RA 1225 H06NCS	RA 1250 H06NCS	RA 1290 H06NCS		
		PNP, NO	RA 1225 H06POS	RA 1250 H06POS	RA 1290 H06POS		
		PNP, NC	RA 1225 H06PCS	RA 1250 H06PCS	RA 1290 H06PCS		
		Active low	NPN, NO	RA 1225 L06NOS	RA 1250 L06NOS	RA 1290 L06NOS	
			NPN, NC	RA 1225 L06NCS	RA 1250 L06NCS	RA 1290 L06NCS	
	PNP, NO		RA 1225 L06POS	RA 1250 L06POS	RA 1290 L06POS		
	PNP, NC		RA 1225 L06PCS	RA 1250 L06PCS	RA 1290 L06PCS		
	230 VACrms		Active high	NPN, NO	RA 2325 H06NOS	RA 2350 H06NOS	RA 2390 H06NOS
				NPN, NC	RA 2325 H06NCS	RA 2350 H06NCS	RA 2390 H06NCS
		PNP, NO		RA 2325 H06POS	RA 2350 H06POS	RA 2390 H06POS	
		PNP, NC		RA 2325 H06PCS	RA 2350 H06PCS	RA 2390 H06PCS	
Active low		NPN, NO		RA 2325 L06NOS	RA 2350 L06NOS	RA 2390 L06NOS	
		NPN, NC		RA 2325 L06NCS	RA 2350 L06NCS	RA 2390 L06NCS	
		PNP, NO	RA 2325 L06POS	RA 2350 L06POS	RA 2390 L06POS		
		PNP, NC	RA 2325 L06PCS	RA 2350 L06PCS	RA 2390 L06PCS		
		400 VACrms	Active high	NPN, NO	RA 4025 H10NOS	RA 4050 H10NOS	RA 4090 H10NOS
				NPN, NC	RA 4025 H10NCS	RA 4050 H10NCS	RA 4090 H10NCS
PNP, NO				RA 4025 H10POS	RA 4050 H10POS	RA 4090 H10POS	
PNP, NC				RA 4025 H10PCS	RA 4050 H10PCS	RA 4090 H10PCS	
Active low	NPN, NO			RA 4025 L10NOS	RA 4050 L10NOS	RA 4090 L10NOS	
	NPN, NC			RA 4025 L10NCS	RA 4050 L10NCS	RA 4090 L10NCS	
	PNP, NO		RA 4025 L10POS	RA 4050 L10POS	RA 4090 L10POS		
	PNP, NC		RA 4025 L10PCS	RA 4050 L10PCS	RA 4090 L10PCS		

## General Specifications

	RA12...06..S	RA23...06..S	RA40...10..S
Operational voltage range	40 to 140 VACrms	85 to 265 VACrms	150 to 440 VACrms
Non-rep. peak voltage	600 V <sub>p</sub>	600 V <sub>p</sub>	1000 V <sub>p</sub>
Zero voltage turn-on	≤ 15 V	≤ 15 V	≤ 15 V
Operational frequency range	45 to 65 Hz	45 to 65 Hz	45 to 65 Hz
Power factor cos φ	≥ 0.5 @ 120 VACrms	≥ 0.5 @ 230 VACrms	≥ 0.5 @ 400 VACrms
CE-marking	Yes	Yes	Yes

## Control Specifications

Supply voltage range	20 to 32 VDC	PNP Alarm output Alarm output voltage open Alarm output voltage @ 100 mA Alarm output current	0 VDC V <sub>cc</sub> - 2 VDC ≤ 100 mA
Supply current @ 24 VDC	≤ 40 mA DC		
Response time pick-up @ 50 Hz	≤ 10 ms	NPN Alarm output Alarm output voltage open Alarm output voltage @ 100 mA Alarm output current	≤ 32 VDC 2 VDC ≤ 100 mA
Response time drop-out @ 50 Hz	≤ 10 ms		
Active high control input			
Pick-up voltage	Typ. 7 VDC		
Drop-out voltage	Typ. 6.8 VDC		
Input current (V <sub>c</sub> = 32 V)	≤ 4 mA		
Active low control input			
Pick-up voltage	Typ. V <sub>cc</sub> - 10 VDC		
Drop-out voltage	Typ. V <sub>cc</sub> - 10 VDC		
Input current (V <sub>cc</sub> = 32 V)	≤ 4 mA		

## Output Specifications

	RA..25.06..S	RA..50.06..S	RA..90.10..S
Rated operational current AC 1	≤ 25 Arms	≤ 50 Arms	≤ 90 Arms
Min. operational load current	≤ 200 mA	≤ 200 mA	≤ 200 mA
Non-rep. surge current t=10 ms	≤ 250 A <sub>p</sub>	≤ 600 A <sub>p</sub>	≤ 1000 A <sub>p</sub>
Off-state leakage current @ rated voltage and frequency	≤ 6 mA	≤ 6 mA	≤ 6 mA
I <sup>2</sup> t for fusing t=1-10 ms	≤ 310 A <sup>2</sup> s	≤ 1800 A <sup>2</sup> s	≤ 5000 A <sup>2</sup> s
Critical dv/dt	≥ 500 V/μs	≥ 500 V/μs	≥ 500 V/μs

## Sense Specifications

	RA12...06..S	RA23...06..S	RA40...10..S
Current			
Sensed load current	≥ 50 mA	≥ 50 mA	≥ 50 mA
Non-sensed leakage current	≤ 20 mA	≤ 20 mA	≤ 20 mA
Voltage			
Sensed line voltage	≥ 60 Vrms	≥ 120 Vrms	≥ 150 Vrms
Non-sensed line voltage	≤ 30 Vrms	≤ 50 Vrms	≤ 80 Vrms
Timing			
Response time from fault to alarm output	≤ 100 ms	≤ 100 ms	≤ 100 ms
Short-circuit of semiconductor	Will be sensed	Will be sensed	Will be sensed

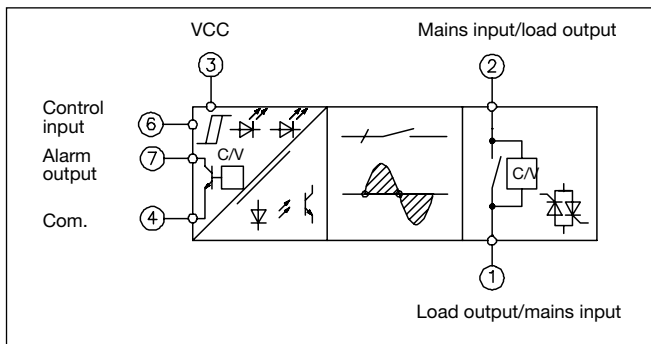
## Thermal Specifications

	RA..25....S	RA..50....S	RA..90....S
Operating temperature	-20° to +70°C (-4° to +158°F)	-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)	-40° to +100°C (-40° to +212°F)
Junction temperature	≤ 115°C (239°F)	≤ 115°C (239°F)	≤ 115°C (239°F)
R <sub>th</sub> junction to case	≤ 1.25 K/W	≤ 0.65 K/W	≤ 0.35 K/W
R <sub>th</sub> junction to ambient	≤ 12 K/W	≤ 12 K/W	≤ 12 K/W

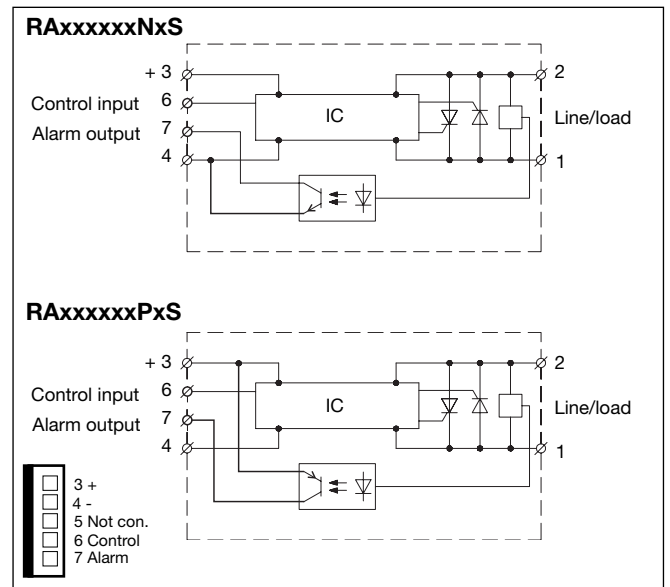
## Insulation

Rated insulation voltage Input to output	≥ 4000 VACrms
Rated insulation voltage Output to case	≥ 4000 VACrms

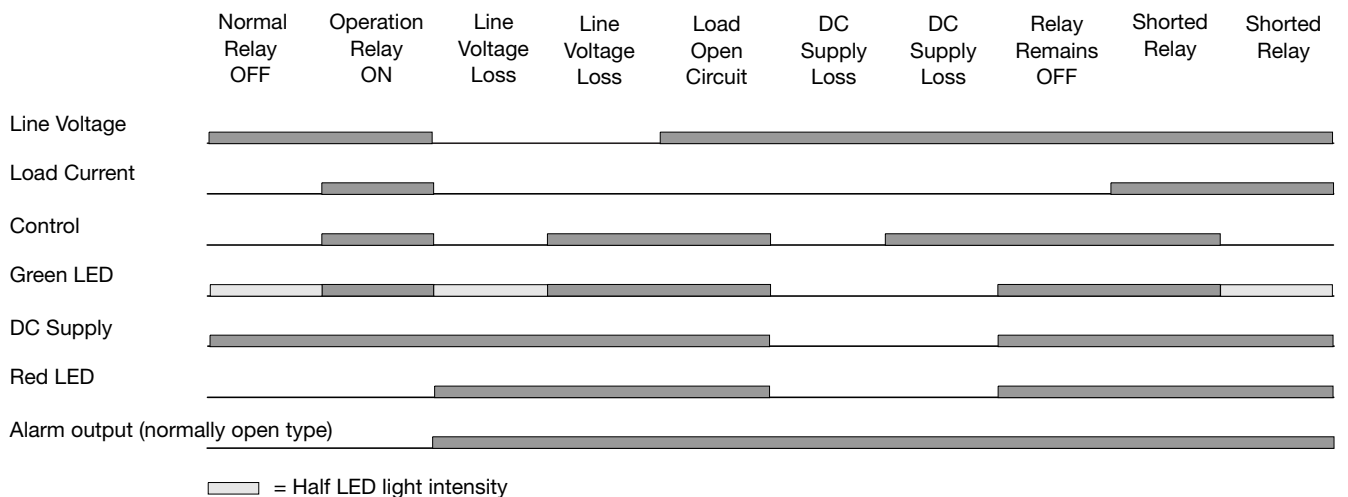
## Functional Diagram



## Wiring Diagrams



## Operation Diagram





## Heatsink Dimensions (load current versus ambient temperature)

### RA ..25 .....S

### RA ..50 .....S

Load current [A]	Thermal resistance [K/W]						Power dissipation [W]
	20	30	40	50	60	70	
25	2	1.7	1.4	1	0.71	0.40	32
22.5	2.5	2.1	1.8	1.4	1	0.66	27
20	3.1	2.7	2.3	1.9	1.4	1	23
17.5	4	3.5	3	2.5	2	1.4	20
15	4.9	4.3	3.7	3.1	2.5	1.9	16
12.5	6.2	5.4	4.6	3.9	3.1	2.3	13
10	8.1	7.1	6.1	5.1	4	3	10
7.5	11.3	9.9	8.5	7.1	5.6	4.2	7
5	-	15.6	13.3	11.1	8.9	6.7	5
2.5	-	-	-	-	18.7	14	2

Ambient temp. [°C]

Load current [A]	Thermal resistance [K/W]						Power dissipation [W]
	20	30	40	50	60	70	
50	0.92	0.76	0.60	0.45	0.29	-	63
45	1.2	0.99	0.80	0.62	0.44	0.26	55
40	1.5	1.3	1.1	0.85	0.63	0.42	47
35	1.9	1.6	1.4	1.1	0.89	0.63	40
30	2.4	2.1	1.8	1.5	1.2	0.91	33
25	3	2.7	2.3	1.9	1.5	1.1	26
20	3.9	3.5	3	2.5	2	1.5	20
15	5.5	4.8	4.1	3.4	2.7	2.1	15
10	8.6	7.5	6.4	5.4	4.3	3.2	9
5	17.9	15.6	13.4	11.2	8.9	6.7	4

Ambient temp. [°C]

### RA ..90 .....S

Load current [A]	Thermal resistance [K/W]						Power dissipation [W]
	20	30	40	50	60	70	
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 temp. [°C]

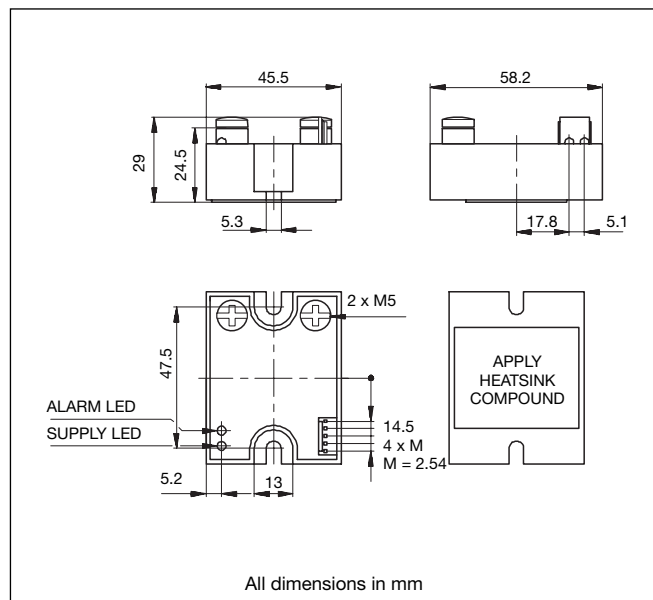


## Heatsink Selection

Carlo Gavazzi Heatsink (See "General Accessories")	Thermal resistance
No heatsink required	$R_{th\ s-a} > 12.5$ 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 load current versus temperature chart with the standard heatsink values and select the heatsink with the next lower value.

## Dimensions



## Housing Specifications

Weight	Approx. 110 g
Housing material	Noryl GFN 1, black
Base plate	Aluminium, nickel-plated
Potting compound	Polyurethane
Relay	
Mounting screws	M5
Mounting torque	$\leq 1.5$ Nm
Power terminal	
Mounting screws	M5 x 6
Mounting torque	$\leq 2.4$ Nm
Control connector	5 pole, centre distance 2.54 mm

## Accessories

- Heatsinks
- DIN rail adapter
- Varistors
- Fuses
- Connector for ribbon cable: Methode 1300-105-424
- Header for PCB mounting: Methode 1100-8-105-01
- Ribbon cable: 5 x 0.5 mm<sup>2</sup>,  
centre distance 2.54 mm

## Ribbon Cable Ordering No.

**RCS 5-200-0\***

R-System \_\_\_\_\_  
 Cable sense \_\_\_\_\_  
 5-wire \_\_\_\_\_  
 Cable length in cm \_\_\_\_\_

- \* 0: No connector mounted (Method 1300-105-424)
- 1: 1 connector mounted
- 2: 2 connectors mounted