

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, 90 and 110 AACrms
- Rated operational voltage: 120, 230, 400 and 480 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

Solid State Relay _____
 Switching mode _____
 Rated operational voltage _____
 Rated operational current _____
 Control input _____
 Non-rep. peak voltage _____
 Alarm output type _____
 Sense SSR _____

Type Selection

Switching mode	Rated operational voltage	Rated operational current input	Control voltage	Non-rep. peak type	Alarm output type
A: Zero switching	12: 120 VACrms 23: 230 VACrms 40: 400 VACrms 48: 480 VACrms	25: 25 AACrms 50: 50 AACrms 90: 90 AACrms 110: 110 AACrms	H: Active high L: Active low	06: 650 V _p 10: 1000 V _p 12: 1200 V _p	NO: NPN, NO NC: NPN, NC PO: PNP, NO PC: PNP, NC

Selection Guide

Rated op. voltage	Control input	Alarm output type	Rated operational current			
			25 AACrms	50 AACrms	90 AACrms	110 AACrms
120 VACrms	Active high	NPN, NO	RA 1225 H06NOS	RA 1250 H06NOS	RA 1290 H06NOS	RA 12110 H06NOS
		NPN, NC	RA 1225 H06NCS	RA 1250 H06NCS	RA 1290 H06NCS	RA 12110 H06NCS
		PNP, NO	RA 1225 H06POS	RA 1250 H06POS	RA 1290 H06POS	RA 12110 H06POS
		PNP, NC	RA 1225 H06PCS	RA 1250 H06PCS	RA 1290 H06PCS	RA 12110 H06PCS
	Active low	NPN, NO	RA 1225 L06NOS	RA 1250 L06NOS	RA 1290 L06NOS	RA 12110 L06NOS
		NPN, NC	RA 1225 L06NCS	RA 1250 L06NCS	RA 1290 L06NCS	RA 12110 L06NCS
		PNP, NO	RA 1225 L06POS	RA 1250 L06POS	RA 1290 L06POS	RA 12110 L06POS
		PNP, NC	RA 1225 L06PCS	RA 1250 L06PCS	RA 1290 L06PCS	RA 12110 L06PCS
	Active high	NPN, NO	RA 2325 H06NOS	RA 2350 H06NOS	RA 2390 H06NOS	RA 23110 H06NOS
		NPN, NC	RA 2325 H06NCS	RA 2350 H06NCS	RA 2390 H06NCS	RA 23110 H06NCS
		PNP, NO	RA 2325 H06POS	RA 2350 H06POS	RA 2390 H06POS	RA 23110 H06POS
		PNP, NC	RA 2325 H06PCS	RA 2350 H06PCS	RA 2390 H06PCS	RA 23110 H06PCS
230 VACrms	Active low	NPN, NO	RA 2325 L06NOS	RA 2350 L06NOS	RA 2390 L06NOS	RA 23110 L06NOS
		NPN, NC	RA 2325 L06NCS	RA 2350 L06NCS	RA 2390 L06NCS	RA 23110 L06NCS
		PNP, NO	RA 2325 L06POS	RA 2350 L06POS	RA 2390 L06POS	RA 23110 L06POS
		PNP, NC	RA 2325 L06PCS	RA 2350 L06PCS	RA 2390 L06PCS	RA 23110 L06PCS
	Active high	NPN, NO	RA 2325 H06NOS	RA 2350 H06NOS	RA 2390 H06NOS	RA 23110 H06NOS
		NPN, NC	RA 2325 H06NCS	RA 2350 H06NCS	RA 2390 H06NCS	RA 23110 H06NCS
		PNP, NO	RA 2325 H06POS	RA 2350 H06POS	RA 2390 H06POS	RA 23110 H06POS
		PNP, NC	RA 2325 H06PCS	RA 2350 H06PCS	RA 2390 H06PCS	RA 23110 H06PCS

Selection Guide (cont.)

Rated op. voltage	Control input	Alarm output type	Rated operational current			
			25 AACrms	50 AACrms	90 AACrms	110 AACrms
400 VACrms	Active high	NPN, NO	RA 4025 H10NOS	RA 4050 H10NOS	RA 4090 H10NOS	RA 40110 H10NOS
		NPN, NC	RA 4025 H10NCS	RA 4050 H10NCS	RA 4090 H10NCS	RA 40110 H10NCS
		PNP, NO	RA 4025 H10POS	RA 4050 H10POS	RA 4090 H10POS	RA 40110 H10POS
		PNP, NC	RA 4025 H10PCS	RA 4050 H10PCS	RA 4090 H10PCS	RA 40110 H10PCS
	Active low	NPN, NO	RA 4025 L10NOS	RA 4050 L10NOS	RA 4090 L10NOS	RA 40110 L10NOS
		NPN, NC	RA 4025 L10NCS	RA 4050 L10NCS	RA 4090 L10NCS	RA 40110 L10NCS
		PNP, NO	RA 4025 L10POS	RA 4050 L10POS	RA 4090 L10POS	RA 40110 L10POS
		PNP, NC	RA 4025 L10PCS	RA 4050 L10PCS	RA 4090 L10PCS	RA 40110 L10PCS
480 VACrms	Active high	NPN, NO	RA 4825 H12NOS	RA 4850 H12NOS	RA 4890 H12NOS	RA 48110 H12NOS
		NPN, NC	RA 4825 H12NCS	RA 4850 H12NCS	RA 4890 H12NCS	RA 48110 H12NCS
		PNP, NO	RA 4825 H12POS	RA 4850 H12POS	RA 4890 H12POS	RA 48110 H12POS
		PNP, NC	RA 4825 H12PCS	RA 4850 H12PCS	RA 4890 H12PCS	RA 48110 H12PCS
	Active low	NPN, NO	RA 4825 L12NOS	RA 4850 L12NOS	RA 4890 L12NOS	RA 48110 L12NOS
		NPN, NC	RA 4825 L12NCS	RA 4850 L12NCS	RA 4890 L12NCS	RA 48110 L12NCS
		PNP, NO	RA 4825 L12POS	RA 4850 L12POS	RA 4890 L12POS	RA 48110 L12POS
		PNP, NC	RA 4825 L12PCS	RA 4850 L12PCS	RA 4890 L12PCS	RA 48110 L12PCS

General Specifications

	RA12...06..S	RA23...06..S	RA40...10..S	RA48...12..S
Operational voltage range	60 to 140 VACrms	170 to 250 VACrms	150 to 440 VACrms	180 to 530 VAC
Non-rep. peak voltage	600 V _p	600 V _p	1000 V _p	1200 V _p
Zero voltage turn-on	≤ 15 V	≤ 15 V	≤ 15 V	≤ 25 V
Operational frequency range	45 to 65 Hz	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	≥ 0.5 @ 400 VACrms
Approvals	UL, CSA	UL, CSA	UL, CSA	UL, CSA
CE-marking	Yes	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 _{cc} - 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 _c = 32 V)	≤ 4 mA		
Active low control input			
Pick-up voltage	Typ. V _{cc} - 10 VDC		
Drop-out voltage	Typ. V _{cc} - 10 VDC		
Input current (V _{cc} = 32 V)	≤ 4 mA		

Output Specifications

	RA..25.06..S	RA..50.06..S	RA..90.10..S	RA..110.12..S
Rated operational current AC 1	≤ 25 Arms	≤ 50 Arms	≤ 90 Arms	≤ 110 Arms
Min. operational load current	≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
Non-rep. surge current t=10 ms	≤ 250 A _p	≤ 600 A _p	≤ 1000 A _p	≤ 1500 A _p
Off-state leakage current @ rated voltage and frequency	≤ 6 mA	≤ 6 mA	≤ 6 mA	≤ 6 mA
I ² t for fusing t=1-10 ms	≤ 310 A ² s	≤ 1800 A ² s	≤ 5000 A ² s	≤ 11250 A ² s
Critical dv/dt	≥ 500 V/μs	≥ 500 V/μs	≥ 500 V/μs	≥ 500 V/μs

Sense Specifications

	RA..25.....S	RA..50.....S	RA..90.....S	RA..110.....S
Current				
Sensed load current	≥ 50 mA	≥ 50 mA	≥ 50 mA	≥ 50 mA
Non-sensed leakage current	≤ 20 mA	≤ 20 mA	≤ 20 mA	≤ 20 mA
Voltage				
Sensed line voltage	≥ 60 Vrms	≥ 120 Vrms	≥ 150 Vrms	≥ 180 Vrms
Non-sensed line voltage	≤ 30 Vrms	≤ 50 Vrms	≤ 80 Vrms	≤ 100 Vrms
Timing				
Response time from fault to alarm output	≤ 100 ms	≤ 100 ms	≤ 100 ms	≤ 100 ms
Short-circuit of semiconductor	Will be sensed	Will be sensed	Will be sensed	Will be sensed

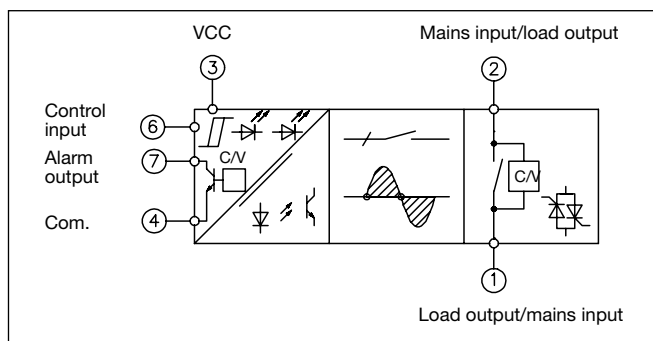
Thermal Specifications

	RA..25.....S	RA..50.....S	RA..90.....S	RA..110.....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)	-20° to +70°C (-4° to +158°F)
Storage temperature	-40° to +100°C (-40° to +212°C)	-40° to +100°C (-40° to +212°C)	-40° to +100°C (-40° to +212°C)	-40° to +100°C (-40° to +212°C)
Junction temperature	≤ 125°C (257°F)	≤ 125°C (257°F)	≤ 125°C (257°F)	≤ 125°C (257°F)
R _{th} junction to case	≤ 1.25 K/W	≤ 0.65 K/W	≤ 0.35 K/W	≤ 0.30 K/W
R _{th} junction to ambient	≤ 12 K/W	≤ 12 K/W	≤ 12 K/W	≤ 12 K/W

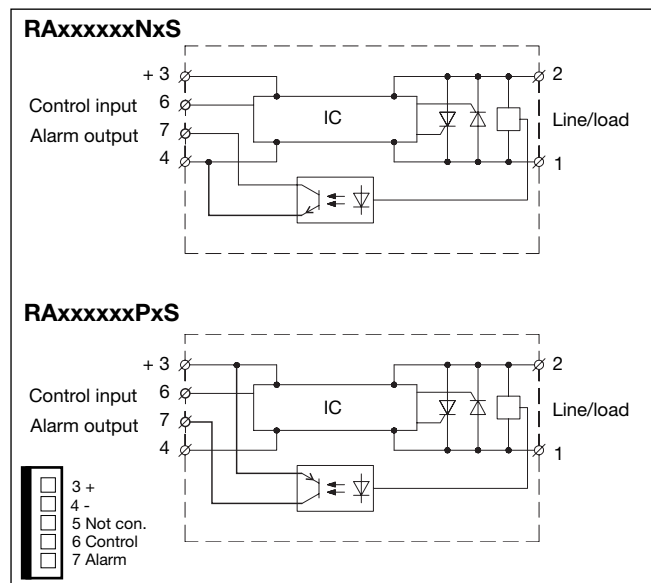
Insulation

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

Functional Diagram

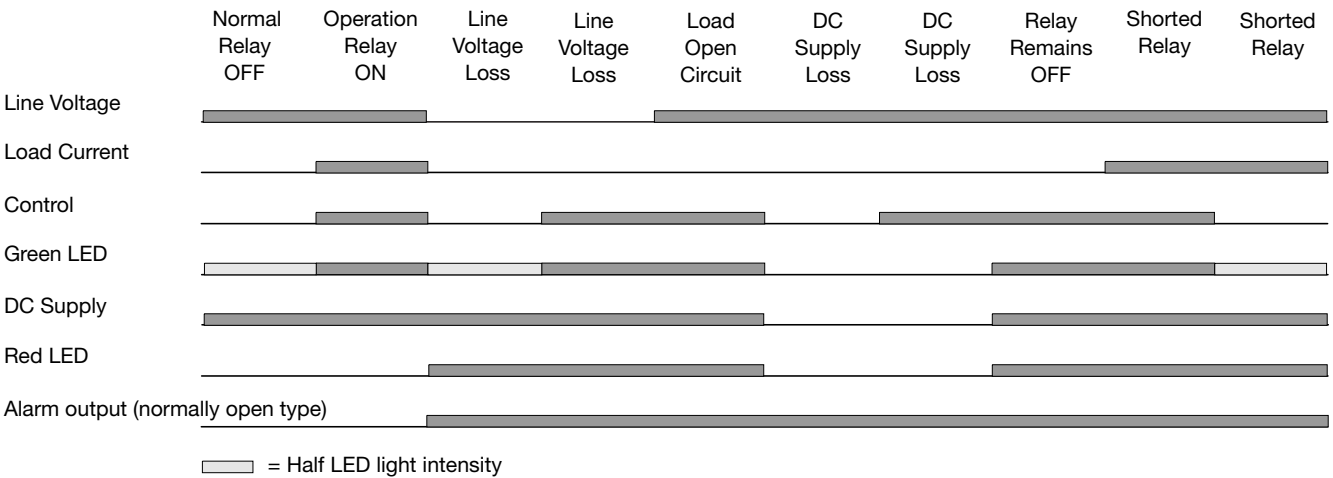


Wiring Diagrams





Operation Diagram



Heatsink Dimensions (load current versus ambient temperature)

RA ..25 ..S

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
T _A							Ambient temp. [°C]

RA ..50 ..S

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
T _A							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
T _A							Ambient temp. [°C]

RA ..110 ..S

Load current [A]	Thermal resistance [K/W]						Power dissipation [W]
	20	30	40	50	60	70	
110	0.43	0.35	0.27	-	-	-	126
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
T _A							Ambient temp. [°C]

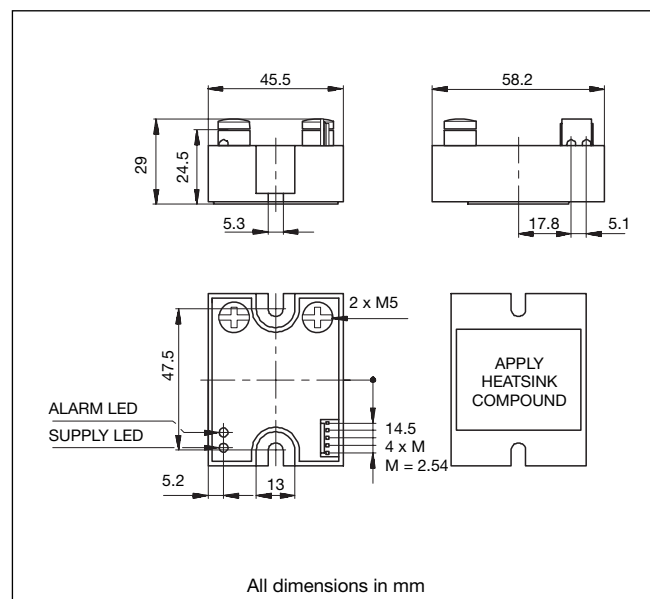
Heatsink Selection

Carlo Gavazzi Heatsink (See "General Accessories")	Thermal resistance..	...for power dissipation
No heatsink required	---	N/A
RHS 300	5.00 K/W	> 0 W
RHS 100	3.00 K/W	> 25 W
RHS 45A	2.70 K/W	> 60 W
RHS 45B	2.00 K/W	> 60 W
RHS 90	1.35 K/W	> 60 W
RHS 45A plus fan	1.25 K/W	> 0 W
RHS 45B plus fan	1.20 K/W	> 0 W
RHS 112	1.10 K/W	> 100 W
RHS 301	0.80 K/W	> 70 W
RHS 90 plus fan	0.45 K/W	> 0 W
RHS 112 plus fan	0.40 K/W	> 0 W
RHS 301 plus fan	0.25 K/W	> 0 W
Consult your distributor	> 0.25 K/W	N/A
Infinite heatsink - No solution	---	N/A

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	≤ 1.5 Nm
Power terminal	
Mounting screws	M5 x 6
Mounting torque	≤ 2.4 Nm
Control connector	5 pole, centre distance 2.54 mm

Dimensions



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 mm²,
centre distance 2.54 mm

Ribbon Cable Selection

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