

# RZ3A



## Industrial, 3-phase zero switching



### Main features

- 3-phase Solid State Relay
- Zero switching
- Rated operational current: 3 x 25, 55 or 75 A
- Rated operational voltage: Up to 690 VAC
- Control voltage, 4-32 VDC or 24-275 VAC
- Integral snubber network
- Built-in varistor
- Over-temperature protection option with alarm output
- IP 10 back-of-hand protection
- LED indication of control input and over-temperature alarm status

### Description

A Solid State Relay family designed to switch various loads such as heating elements, motors and transformers.

The relay is capable of switching high voltages up to 600 VACrms. The built-in varistor secures transient protection for heavy industrial applications.

For higher reliability and load cycle capability three semiconductor power units are soldered directly on to the direct copper bonded (DCB) substrate. AC- or DC-controlled versions are available. Built-in LED status indication for applied control voltage and overtemperature alarm (optional).

The series covers a range of load currents up to 75 AACrms.

### Applications

Plastic extrusion machines, thermoforming machines, blow moulding machines, coffee machines, electrical ovens, vending machines, soldering ovens, dryers, climatic chambers, air handling units, plastic sealing machines, shrink tunnels, etc.

### Main functions

- 3-pole switching AC solid state relay

## References

### Order code


 RZ3A    

 Enter the code entering the corresponding option instead of 

Code	Option	Description	Notes
RZ	-	Solid State Relay	
3	-	Number of poles	
A	-	Switching mode: zero switching	
<input type="checkbox"/>	40	Rated operational voltage: 400 VACrms	
	48	Rated operational voltage: 480 VACrms	
	60	Rated operational voltage: 600 VACrms	
	69	Rated operational voltage: 690 VACrms	Available only with 75 A version
<input type="checkbox"/>	D	Control voltage: 4 - 32 VDC	
	A	Control voltage: 24-275 VAC / 24-50 VDC	
<input type="checkbox"/>	25	Rated operational current: 3 x 25 AACrms	
	55	Rated operational current: 3 x 55 AACrms	
	75	Rated operational current: 3 x 75 AACrms	
<input type="checkbox"/>	P	Over-temperature protection and alarm output	Not available with 690 VAC version

### Selection guide

Rated operational voltage	Control voltage	Rated operational current		
		3 x 25 A	3 x 55 A	3 x 75 A
400 VACrms	4-32 VDC	<b>RZ3A40D25</b>	<b>RZ3A40D55</b>	<b>RZ3A40D75</b>
	24-275 VAC/ 24-50 VDC	<b>RZ3A40A25</b>	<b>RZ3A40A55</b>	<b>RZ3A40A75</b>
480 VACrms	4-32 VDC	<b>RZ3A48D25</b>	<b>RZ3A48D55</b>	<b>RZ3A48D75</b>
	24-275 VAC/ 24-50 VDC	<b>RZ3A48A25</b>	<b>RZ3A48A55</b>	<b>RZ3A48A75</b>
600 VACrms	4-32 VDC	<b>RZ3A60D25</b>	<b>RZ3A60D55</b>	<b>RZ3A60D75</b>
	24-275 VAC/ 24-50 VDC	<b>RZ3A60A25</b>	<b>RZ3A60A55</b>	<b>RZ3A60A75</b>
690 VACrms	4-32 VDC	-	-	<b>RZ3A69D75</b>
	24-275 VAC/ 24-50 VDC	-	-	<b>RZ3A69A75</b>

### Notes

Over-temperature protection and alarm output: add suffix P to include over-temperature protection and alarm output. Example: RZ3A60D75P. Not available on 690VACrms versions.

**CARLO GAVAZZI compatible components**

Purpose	Component name/code	Notes
Heatsinks	RHS	Heatsinks and fans
Thermal pad	RZHT	Packing qty. 10 pcs.

**Further reading**

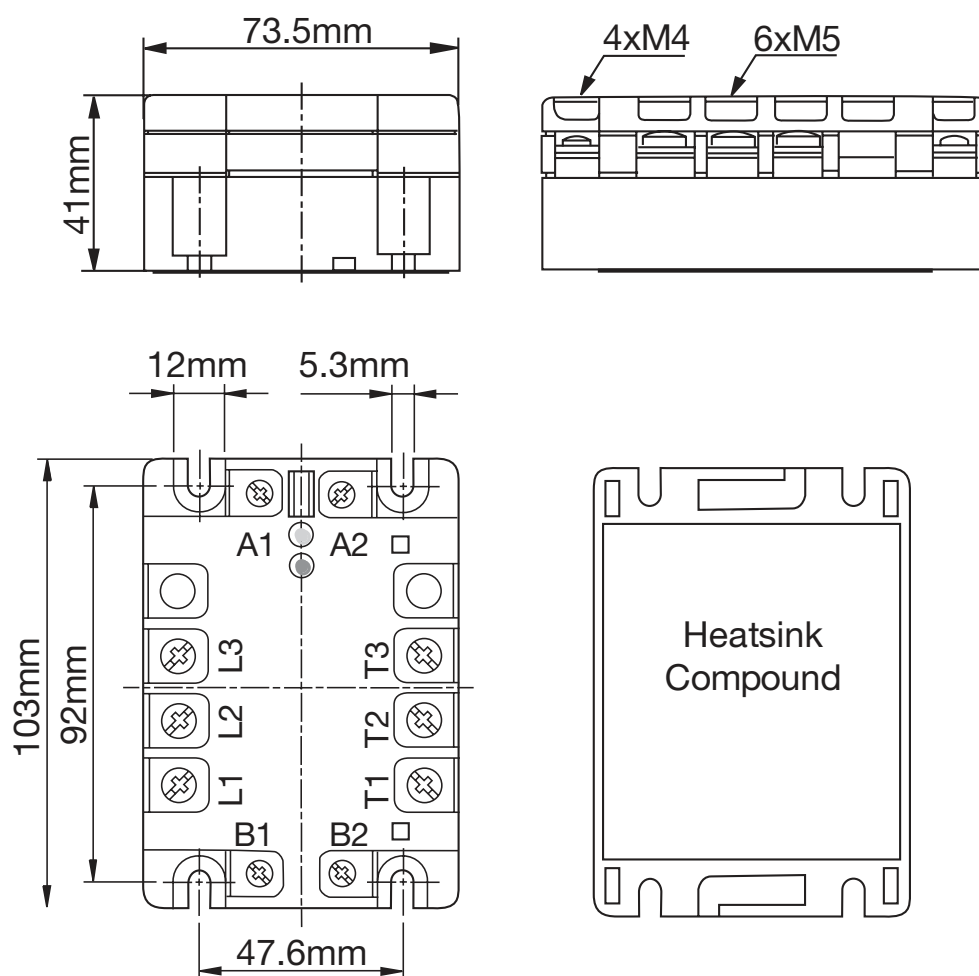
Information	Where to find it
Online heatsink selector tool	<a href="https://gavazziautomation.com/nsc/HQ/EN/solid_state_relays">https://gavazziautomation.com/nsc/HQ/EN/solid_state_relays</a>

## Features

### General

<b>Material</b>	Noryl
<b>Potting compound</b>	Polyurethane
<b>Weight</b>	Approx. 380 g
<b>Rated isolation voltage</b>	Input to output: 4000 VACrms Output to case: 4000 VACrms
<b>Pollution degree</b>	3
<b>Base plate</b>	25, 55A: aluminum, nickel-plated 75A: copper, nickel-plated

### Dimensions



- Relay On LED
- Over-temperature Alarm Trip LED (suffix "P" option)

## Performance

### Mains supply

	RZ3A40..	RZ3A48..	RZ3A60..	RZ3A69..
Operational voltage range	24-440 VAC	42-530 VAC	42-660 VAC	42-750 VAC
Operational frequency range	45 to 65 Hz			
Blocking voltage	800 Vp	1200 Vp	1600 Vp	1600 Vp
Overvoltage category	III			

### Outputs

	RZ3A..25..	RZ3A..55..	RZ3A..75..
Rated operational current AC 51 @ $T_a = 25^\circ\text{C}$ AC 53a @ $T_a = 25^\circ\text{C}$	25 Arms 5 Arms	55 Arms 15 Arms	75 Arms 20 Arms
Min. operational load current	150 mArms	250 mArms	400 mArms
Rep. overload current $t=1$ s	37 Arms	< 125 Arms	< 150 Arms
Non-rep. surge current $t=10$ ms	325 Ap	600 Ap	1150 Ap
Off-state leakage current	< 3 mArms		
$I^2t$ for fusing $t=10$ ms	525 A <sup>2</sup> s	1800 A <sup>2</sup> s	6600 A <sup>2</sup> s
Critical dV/dt off state min.	$\geq 500$ V/ $\mu\text{s}$		
On-state voltage drop	< 1.6 Vrms		

### Inputs

	RZ3A..D..	RZ3A..A..
Control voltage	4-32 VDC	24-275 VAC/24-50 VDC
Pick-up voltage	3.8 VDC	18 VAC/20 VDC
Drop-out voltage	1.2 VDC	9 VAC/DC
Input current	$\leq 23$ mA	$\leq 15$ mA
Response time pick-up Power output = 50 Hz	10 ms	20 ms
Response time drop-out Power output = 50 Hz	10 ms	30 ms

### Thermal data

Operating temperature	-30° to +80°C (-22° to +176° F)
Storage temperature	-40° to +100°C (-40° to + 212° F)
Junction temperature	+125°C (+ 257°F)

## Compatibility and conformity

Approvals*	    
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Electromagnetic compatibility (EMC) - immunity	
Electrostatic discharge (ESD)	EN 61000-4-2 8 kV air discharge, 4 kV contact (PC2)
Radiated radio frequency	EN 61000-4-3 10 V/m, from 80 MHz to 1 GHz (PC1) 10 V/m, from 1.4 to 2 GHz (PC1) 3 V/m, from 2 to 2.7 GHz (PC1)
Electrical fast transient (burst)	EN 61000-4-4 Output: 2 kV, 5 kHz (PC1) Input: 1 kV, 5 kHz (PC1)
Conducted radio frequency	EN 61000-4-6 10V/m, from 0.15 to 80 MHz (PC1)
Electrical surge	EN 61000-4-5 Output, line to line: 1 kV (PC1) Output, line to earth: 2 kV (PC1) Input, line to earth: 2 kV (PC1)
Voltage dips	EN 61000-4-11 0% for 0.5, 1 cycle (PC2) 40% for 10 cycles (PC2) 70% for 25 cycles (PC2)
Voltage Interruptions	EN 61000-4-11 0% for 5000ms (PC2)

Electromagnetic compatibility (EMC) - emissions	
Radio interference field emission (radiated)	EN 55011 Class A: from 30 to 1000 MHz
Radio interference voltage emissions (conducted)	From 0.15 to 30 MHz EN 55011 Class A (industrial) with filters EN 60947-4-3 Class A (no filtering needed)

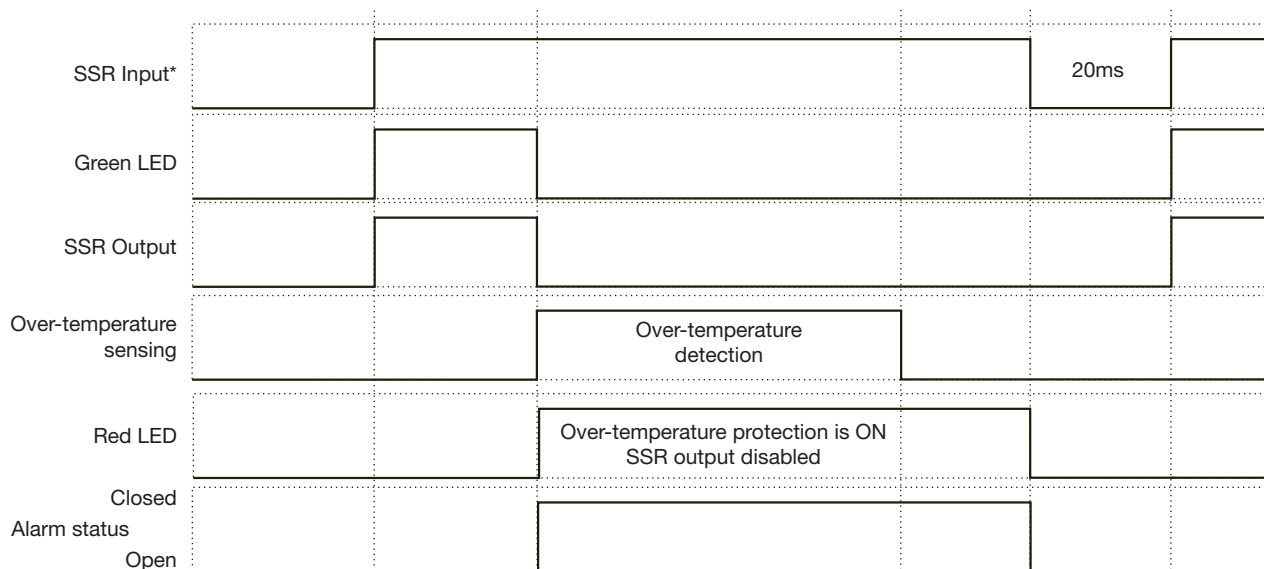
\*UR, cUR and CSA not applicable for RZ3A69..

CSA approval for 75 A models (RZ3A..75..) is limited to 65 A @ 40°C.

Note:

- Performance Criteria 1 (PC1): no degradation of performance or loss of function is allowed when the product is operated as intended.
- Performance Criteria 2 (PC2): during the test, degradation of performance or partial loss of function is allowed. However when the test is complete the product should return operating as intended by itself.
- Performance Criteria 3 (PC3): temporary loss of function is allowed, provided the function can be restored by manual operation of the controls.
- Control input lines must be installed together to maintain products' susceptibility to Radio Frequency interference.

### Over-temperature protection (option: ...P)



\*After over-temperature condition is removed, SSR can be reset by switching OFF the control input for more than 20 ms and switching back ON: this will switch ON the SSR output

### Heatsink selection

Thermal resistance [ $^{\circ}\text{C}/\text{W}$ ] of RZ3..25

Load current [A]	Ambient temp. [ $^{\circ}\text{C}$ ]							Power dissipation [W]
	20	30	40	50	60	70	80	
25.0	0.44	0.34	0.23	0.12	0.01	-	-	92
22.5	0.62	0.49	0.37	0.24	0.12	-	-	80
20.0	0.84	0.69	0.54	0.40	0.25	0.10	-	68
17.5	1.12	0.95	0.78	0.60	0.43	0.25	0.08	58
15.0	1.51	1.30	1.09	0.88	0.67	0.46	0.25	47
12.5	2.06	1.80	1.54	1.27	1.01	0.75	0.48	38
10.0	2.75	2.40	2.06	1.72	1.37	1.03	0.69	29
7.5	3.83	3.35	2.87	2.39	1.91	1.43	0.96	21
5.0	6.01	5.26	4.51	3.76	3.01	2.25	1.50	13
2.5	12.62	11.04	9.46	7.89	6.31	4.73	3.15	6

Thermal resistance [°C/W] of RZ3 ..55

Load current [A]	Ambient temp. [°C]							Power dissipation [W]
	20	30	40	50	60	70	80	
55.0	0.29	0.23	0.17	0.11	0.05	-	-	164
50.0	0.36	0.29	0.22	0.16	0.09	0.02	-	148
45.0	0.44	0.36	0.29	0.21	0.14	0.06	-	133
40.0	0.54	0.46	0.37	0.29	0.20	0.12	0.03	118
35.0	0.67	0.58	0.48	0.38	0.28	0.19	0.09	103
30.0	0.85	0.74	0.62	0.51	0.39	0.28	0.16	87
25.0	1.10	0.96	0.82	0.68	0.55	0.41	0.27	73
20.0	1.38	1.21	1.04	0.87	0.69	0.52	0.35	58
15.0	1.85	1.62	1.39	1.16	0.93	0.70	0.46	43
10.0	2.80	2.45	2.10	1.75	1.40	1.05	0.70	29
5.0	5.62	4.92	4.21	3.51	2.81	2.11	1.40	14
2.5	11.26	9.85	8.45	7.04	5.63	4.22	2.82	7

Thermal resistance [°C/W] of RZ3 ..75


Load current [A]	Ambient temp. [°C]							Power dissipation [W]
	20	30	40	50	60	70	80	
75.0	0.27	0.22	0.17	0.12	0.07	0.02	-	201
70.0	0.32	0.27	0.21	0.16	0.10	0.05	-	184
65.0	0.38	0.32	0.26	0.20	0.14	0.08	0.02	167
60.0	0.44	0.38	0.31	0.25	0.18	0.11	0.05	151
55.0	0.52	0.45	0.38	0.30	0.23	0.16	0.08	136
50.0	0.62	0.54	0.45	0.37	0.29	0.21	0.12	121
45.0	0.74	0.64	0.55	0.46	0.36	0.27	0.17	106
40.0	0.87	0.76	0.65	0.54	0.43	0.32	0.22	92
35.0	1.01	0.89	0.76	0.63	0.51	0.38	0.25	79
30.0	1.21	1.06	0.91	0.76	0.60	0.45	0.30	66
25.0	1.49	1.30	1.11	0.93	0.74	0.56	0.37	54
20.0	1.90	1.67	1.43	1.19	0.95	0.71	0.48	42
15.0	2.60	2.28	1.95	1.63	1.30	0.98	0.65	31
10.0	4.01	3.51	3.01	2.51	2.01	1.50	1.00	20
5.0	8.24	7.21	6.18	5.15	4.12	3.09	2.06	10

### Alarm output specifications

Collector - emitter voltage	35 VDC
Emitter - collector voltage	6 VDC
Collector current	50 mA
Delay time on reset	20 ms



## Environmental specifications

EU RoHS compliant	Yes
China RoHS	

The declaration in this section is prepared in compliance with People's Republic of China Electronic Industry Standard SJ/T11364-2014: Marking for the Restricted Use of Hazardous Substances in Electronic and Electrical Products.

Part Name	Toxic or Harardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
Power Unit Assembly	x	○	○	○	○	○

O: Indicates that said hazardous substance contained in homogeneous materials for this part are below the limit requirement of GB/T 26572.

X: Indicates that said hazardous substance contained in one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.

这份申明根据中华人民共和国电子工业标准  
SJ/T11364-2014：标注在电子电气产品中限定使用的有害物质

零件名称	有毒或有害物质与元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴化联苯 (PBB)	多溴联苯醚 (PBDE)
功率单元	x	○	○	○	○	○

O:此零件所有材料中含有的该有害物低于GB/T 26572的限定。

X: 此零件某种材料中含有的该有害物高于GB/T 26572的限定。

## Short circuit protection

### Protection Co-ordination, Type 1 vs Type 2:

Type 1 protection implies that after a short circuit, the device under test will no longer be in a functioning state. In type 2 co-ordination the device under test will still be functional after the short circuit. In both cases, however the short circuit has to be interrupted. The fuse between enclosure and supply shall not open. The door or cover of the enclosure shall not be blown open. There shall be no damage to conductors or terminals and the conductors shall not separate from terminals. There shall be no breakage or cracking of insulating bases to the extent that the integrity of the mounting of live parts is impaired. Discharge of parts or any risk of fire shall not occur.

The product variants listed in the table hereunder are suitable for use on a circuit capable of delivering not more than 65,000 Arms Symmetrical Amperes 600 Volts maximum when protected by fuses. Tests at 65,000 A were performed with Class J fuses, fast acting; please refer to the table below for maximum allowed ampere rating of the fuse. Use fuses only.

Tests with Class J fuses are representative of Class CC fuses.

Protection co-ordination Type 1 according to UL 508				
Part No.	Prospective short circuit current [kArms]	Max fuse size [A]	Class	Voltage [VAC]
RZ3A..25	65	30	CC	600
RZ3A..55		50	J	
RZ3A..75		30	CC	
		70	J	

Protection co-ordination Type 2 for fuses						
Part No.	Prospective short circuit current [kArms]	Ferraz Shawmut (Mersen)				
		Max fuse size [A]	Part number	Fuse size (mm)	Fuse holder type	Voltage [VAC]
RZ3A..25	65	25	6.9 gRB 10-25	10.3 x 38	CMS10 3P	400
		20	6.9 gRB 10-20	10.3 x 38	CMS10 3P	600
50		6.9xx CP gRC 14 x 51/50	14 x 51	CMS14 3P	400	
		6.9xx CP gRC 22 x 58/50	22 x 58	CMS22 3P	600	
RZ3A..55		63	6.9xx CP gRC 14 x 58/63	22 x 58	CMS22 3P	400
			6.9xx CP gRC 22 x 58/63	22 x 58	CMS22 3P	600
RZ3A..75		63	6.9xx CP gRC 14 x 58/63	22 x 58	CMS22 3P	400
			6.9xx CP gRC 22 x 58/63	22 x 58	CMS22 3P	600

Protection co-ordination Type 2 with Minature Circuit Breakers (M.C.B.s)				
Solid State Relay type	ABB Model no. for Z - type M. C. B. (rated current)	ABB Model no. for B - type M. C. B. (rated current)	Wire cross sectional area [mm <sup>2</sup> ]	Minimum length of Cu wire conductor [m] <sup>1</sup>
RZ3A..25	S203 - Z4 (4 A) S203 - Z6 UC (6 A)	S203 - B2 (2 A) S203 - B2 (2 A)	1.0	21.0
			1.0	21.0
			1.5	31.5
RZ3A..55	S203 - Z10 (10 A)	S203 - B4 (4 A)	1.0	7.6
			1.5	11.4
			2.5	19.0
	S203 - Z16 (16 A)	S203 - B6 (6 A)	1.0	5.2
			1.5	7.8
			2.5	13.0
			4.0	20.8
	S203 - Z20 (20 A)	S203 - B10 (10A)	1.5	12.6
			2.5	21.0
	S203 - Z25 (25 A)	S203 - B13 (13 A)	2.5	25.0
			4.0	40.0
	RZ3A..75	S203 - Z20 (20 A)	S203 - B10 (10 A)	1.5
2.5				7.0
4.0				11.2
S203 - Z32 (32 A)		S203 - B16 (16 A)	2.5	13
			4.0	20.8
			6.0	31.2

1. Between MCB and Load (including return path which goes back to the mains)

Note: A prospective current of 6 kA and a 230 / 400 V power supply is assumed for the above suggested specifications. For cables with different cross section than those mentioned above please consult Carlo Gavazzi's Technical Support Group.

# Connection Diagrams

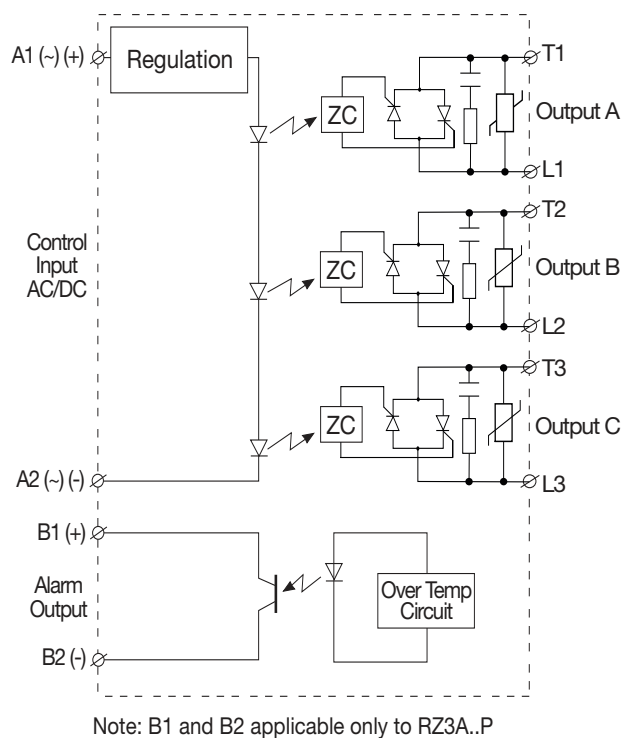


Fig. 1 Terminal wiring

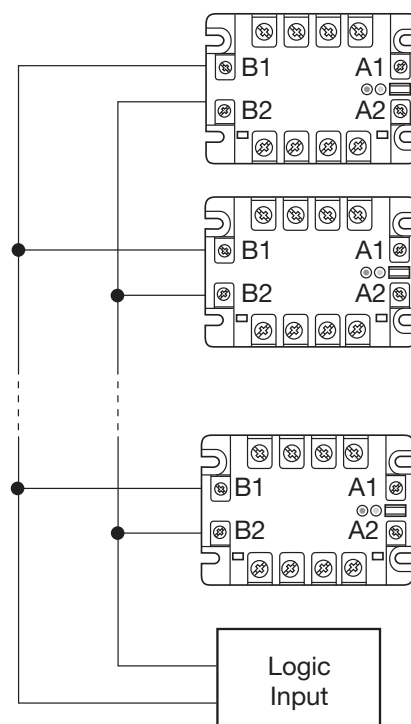
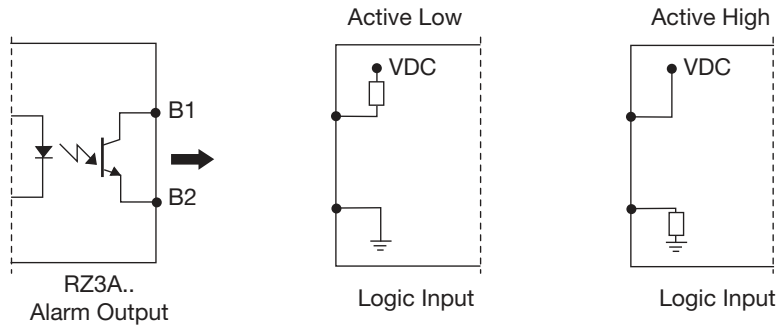


Fig. 2 Common alarm wiring

## Connection specifications

<b>Relay</b>	
Mounting screws	M5
Mounting torque	≤ 1.5 Nm
<b>Control terminal</b>	
Mounting screws	M4
Mounting torque	≤ 0.5 Nm
Wire size	Max: 2 x 2.5 mm <sup>2</sup> (AWG14) Min: 2 x 1 mm <sup>2</sup>
<b>Power terminal</b>	
Mounting screws	M5
Mounting torque	2.5 Nm
Wire size	Max: 2 x 6 mm <sup>2</sup> (AWG8) Min: 2 x 1 mm <sup>2</sup>

▶ Alarm output connection



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