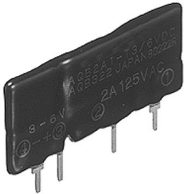




NAIS

AQ-B SOLID STATE RELAY

AQ-B RELAYS



FEATURES

- **Two types available: Non zero-cross type and Zero-cross type**
Non zero-cross type permits phase control and Zero-cross type suppresses occurrence of noise.
- **Slim type**
The small-sized slim type (43 mm long × 9 mm wide × 24 mm high) (1.693×.354×.945 inch) permits high density mounting to PC board.
- **High dielectric strength: 1500 V AC (between input and output)**

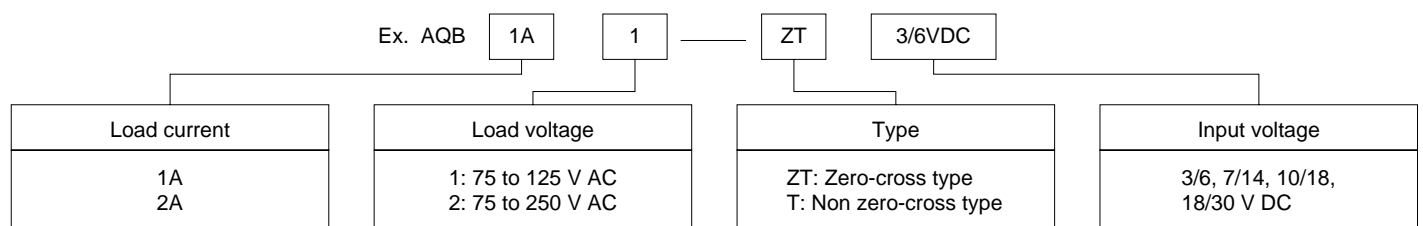
TYPICAL APPLICATIONS

- Copying equipment
- NC machines, sequencers, robots
- Air conditioners

TYPES

Type	Load voltage	Input voltage	Part No.
Zero-cross 1 A	75 to 125 V AC	3 to 6 V DC	AQB1A1-ZT3/6VDC
		7 to 14 V DC	AQB1A1-ZT7/14VDC
		10 to 18 V DC	AQB1A1-ZT10/18VDC
		18 to 30 V DC	AQB1A1-ZT18/30VDC
	75 to 250 V AC	3 to 6 V DC	AQB1A2-ZT3/6VDC
		7 to 14 V DC	AQB1A2-ZT7/14VDC
		10 to 18 V DC	AQB1A2-ZT10/18VDC
		18 to 30 V DC	AQB1A2-ZT18/30VDC
Zero-cross 2 A	75 to 125 V AC	3 to 6 V DC	AQB2A1-ZT3/6VDC
		7 to 14 V DC	AQB2A1-ZT7/14VDC
		10 to 18 V DC	AQB2A1-ZT10/18VDC
		18 to 30 V DC	AQB2A1-ZT18/30VDC
	75 to 250 V AC	3 to 6 V DC	AQB2A2-ZT3/6VDC
		7 to 14 V DC	AQB2A2-ZT7/14VDC
		10 to 18 V DC	AQB2A2-ZT10/18VDC
		18 to 30 V DC	AQB2A2-ZT18/30VDC
Non zero-cross 1 A	75 to 125 V AC	3 to 6 V DC	AQB1A1-T3/6VDC
		7 to 14 V DC	AQB1A1-T7/14VDC
		10 to 18 V DC	AQB1A1-T10/18VDC
		18 to 30 V DC	AQB1A1-T18/30VDC
	75 to 250 V AC	3 to 6 V DC	AQB1A2-T3/6VDC
		7 to 14 V DC	AQB1A2-T7/14VDC
		10 to 18 V DC	AQB1A2-T10/18VDC
		18 to 30 V DC	AQB1A2-T18/30VDC
Non zero-cross 2 A	75 to 125 V AC	3 to 6 V DC	AQB2A1-T3/6VDC
		7 to 14 V DC	AQB2A1-T7/14VDC
		10 to 18 V DC	AQB2A1-T10/18VDC
		18 to 30 V DC	AQB2A1-T18/30VDC
	75 to 250 V AC	3 to 6 V DC	AQB2A2-T3/6VDC
		7 to 14 V DC	AQB2A2-T7/14VDC
		10 to 18 V DC	AQB2A2-T10/18VDC
		18 to 30 V DC	AQB2A2-T18/30VDC

ORDERING INFORMATION



AQ-B

SPECIFICATIONS

Ratings (at 20°C 68°F, Input voltage ripple: 1% or less)

1. Zero-cross type

1 A type

Item	Part No.	AQB1A1-ZT 3/6VDC	AQB1A1-ZT 7/14VDC	AQB1A1-ZT 10/18VDC	AQB1A1-ZT 18/30VDC	AQB1A2-ZT 3/6VDC	AQB1A2-ZT 7/14VDC	AQB1A2-ZT 10/18VDC	AQB1A2-ZT 18/30VDC	Remarks	
Input side	Input voltage	3 to 6 VDC	7 to 14 VDC	10 to 18 VDC	18 to 30 VDC	3 to 6 VDC	7 to 14 VDC	10 to 18 VDC	18 to 30 VDC		
	Input impedance	Approx. 0.18 k Ω	Approx. 0.75 k Ω	Approx. 1.2 k Ω	Approx. 2.15 k Ω	Approx. 0.18 k Ω	Approx. 0.75 k Ω	Approx. 1.2 k Ω	Approx. 2.15 k Ω		
	Drop-out voltage, min.	1 V									
Load side	Max.load current	1 A									See "DATA 1"
	Load voltage	75 to 125 V AC				75 to 250 V AC					
	Frequency	45 to 65 Hz									
	Repetitive peak voltage, max.	400 V				600 V					
	Non-repetitive surge current	10A									In one cycle at 60 Hz
	"OFF-state" leakage current	0.6 mA/100 V applied				1.1 mA/200 V applied					at 60 Hz
	Max. "ON-state" voltage drop	1.6 V									at max. carrying current
	Min. load current	10 mA				20 mA					
	OFF state dV/dt	100 V/ μ s									

2 A type

Item	Part No.	AQB2A1-ZT 3/6VDC	AQB2A1-ZT 7/14VDC	AQB2A1-ZT 10/18VDC	AQB2A1-ZT 18/30VDC	AQB2A2-ZT 3/6VDC	AQB2A2-ZT 7/14VDC	AQB2A2-ZT 10/18VDC	AQB2A2-ZT 18/30VDC	Remarks	
Input side	Input voltage	3 to 6 VDC	7 to 14 VDC	10 to 18 VDC	18 to 30 VDC	3 to 6 VDC	7 to 14 VDC	10 to 18 VDC	18 to 30 VDC		
	Input impedance	Approx. 0.18 k Ω	Approx. 0.75 k Ω	Approx. 1.2 k Ω	Approx. 2.15 k Ω	Approx. 0.18 k Ω	Approx. 0.75 k Ω	Approx. 1.2 k Ω	Approx. 2.15 k Ω		
	Drop-out voltage, min.	1 V									
Load side	Max.load current	2 A									See "DATA 1"
	Load voltage	75 to 125 V AC				75 to 250 V AC					
	Frequency	45 to 65 Hz									
	Repetitive peak voltage, max.	400 V				600 V					
	Non-repetitive surge current	20A									In one cycle at 60 Hz
	"OFF-state" leakage current	0.6 mA/100 V applied				1.1 mA/200 V applied					at 60 Hz
	Max. "ON-state" voltage drop	1.6 V									at max. carrying current
	Min. load current	10 mA				20 mA					
	OFF state dV/dt	100 V/ μ s									

2. Non zero-cross type

1 A type

Item		Part No.	AQB1A1-T 3/6VDC	AQB1A1-T 7/14VDC	AQB1A1-T 10/18VDC	AQB1A1-T 18/30VDC	AQB1A2-T 3/6VDC	AQB1A2-T 7/14VDC	AQB1A2-T 10/18VDC	AQB1A2-T 18/30VDC	Remarks	
Input side	Input voltage		3 to 6 VDC	7 to 14 VDC	10 to 18 VDC	18 to 30 VDC	3 to 6 VDC	7 to 14 VDC	10 to 18 VDC	18 to 30 VDC		
	Input impedance		Approx. 0.18 k Ω	Approx. 0.75 k Ω	Approx. 1.2 k Ω	Approx. 2.15 k Ω	Approx. 0.18 k Ω	Approx. 0.75 k Ω	Approx. 1.2 k Ω	Approx. 2.15 k Ω		
	Drop-out voltage, min.		1 V									
Load side	Max.load current		1 A									See "DATA 1"
	Load voltage		75 to 125 V AC				75 to 250 V AC					
	Frequency		45 to 65 Hz									
	Repetitive peak voltage, max.		400 V				600 V					
	Non-repetitive surge current		10A									In one cycle at 60 Hz
	"OFF-state" leakage current		0.6 mA/100 V applied				1.1 mA/200 V applied					at 60 Hz
	Max. "ON-state" voltage drop		1.6 V									at max. carrying current
	Min. load current		10 mA				20 mA					
	OFF state dV/dt		100 V/ μ s									

2 A type

Item		Part No.	AQB2A1-T 3/6VDC	AQB2A1-T 7/14VDC	AQB2A1-T 10/18VDC	AQB2A1-T 18/30VDC	AQB2A2-T 3/6VDC	AQB2A2-T 7/14VDC	AQB2A2-T 10/18VDC	AQB2A2-T 18/30VDC	Remarks	
Input side	Input voltage		3 to 6 VDC	7 to 14 VDC	10 to 18 VDC	18 to 30 VDC	3 to 6 VDC	7 to 14 VDC	10 to 18 VDC	18 to 30 VDC		
	Input impedance		Approx. 0.18 k Ω	Approx. 0.75 k Ω	Approx. 1.2 k Ω	Approx. 2.15 k Ω	Approx. 0.18 k Ω	Approx. 0.75 k Ω	Approx. 1.2 k Ω	Approx. 2.15 k Ω		
	Drop-out voltage, min.		1 V									
Load side	Max.load current		2 A									See "DATA 1"
	Load voltage		75 to 125 V AC				75 to 250 V AC					
	Frequency		45 to 65 Hz									
	Repetitive peak voltage, max.		400 V				600 V					
	Non-repetitive surge current		20A									In one cycle at 60 Hz
	"OFF-state" leakage current		0.6 mA/100 V applied				1.1 mA/200 V applied					at 60 Hz
	Max. "ON-state" voltage drop		1.6 V									at max. carrying current
	Min. load current		10 mA				20 mA					
	OFF state dV/dt		100 V/ μ s									

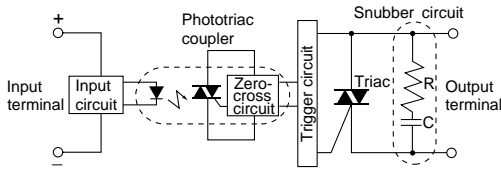
Characteristics (at 20°C 68°F, Input voltage ripple: less than 1%)

Item	Zero-cross type	Non zero-cross type	Remarks
Operate time, max.	(1/2 cycle of voltage sine wave) +1 ms	0.5 ms	
Release time, max.	(1/2 cycle of voltage sine wave) +1 ms		
Insulation resistance, min.	10 ⁹ Ω between input and output		
Breakdown voltage	1,500 V AC between input and output		For 1 minute
Vibration resistance	Functional	10 to 55 Hz at double amplitude of 3 mm	10 minutes for X, Y, Z axes
	Destructive	10 to 55 Hz at double amplitude of 3 mm	1 hour for X, Y, Z axes
Shock resistance	Functional	Min. 980 m/s ² {100 G}	4 times for X, Y, Z axes
	Destructive	Min. 980 m/s ² {100 G}	5 times for X, Y, Z axes
Ambient temperature	-20°C to +80°C -4°F to +176°F		
Storage temperature	-25°C to +85°C -13°F to +185°F		
Operational method	Zero-cross Turn-ON Zero-cross Turn-OFF	Random Turn-ON Zero-cross Turn-OFF	

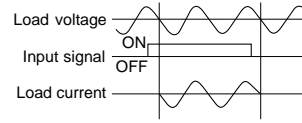
AQ-B

OPERATING PRINCIPLE

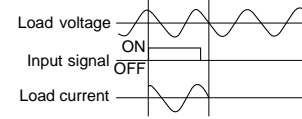
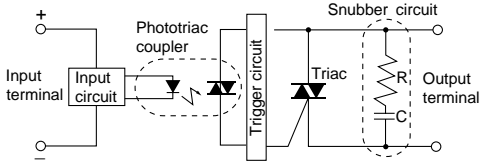
Internal circuit
Zero-cross type



Wave form of input and output (Resistive load)

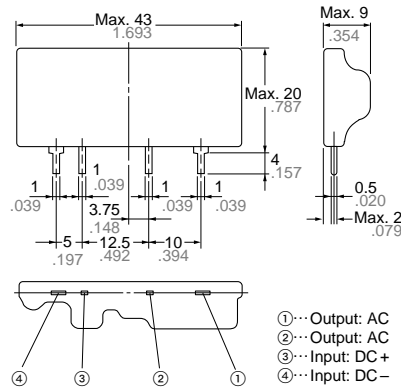
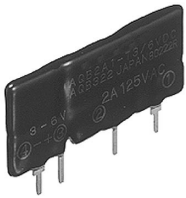


Non zero-cross type



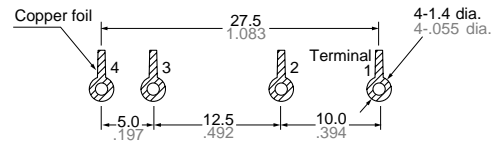
DIMENSIONS

(Common for zero-cross and Non zero-cross type)

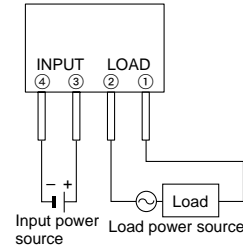


General tolerance: $\pm 0.5 \pm .020$

PC board pattern (BOTTOM VIEW) mm inch

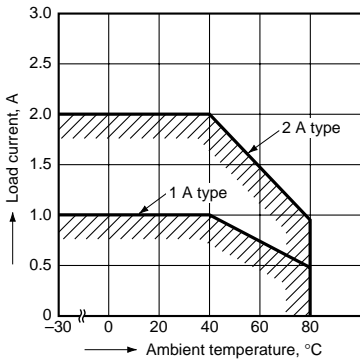


Terminal connection diagram

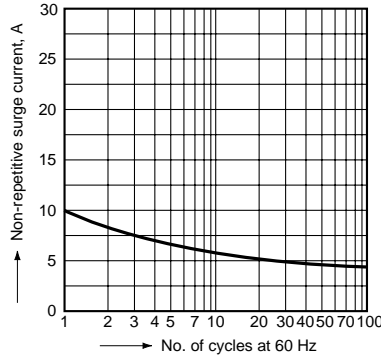


REFERENCE DATA

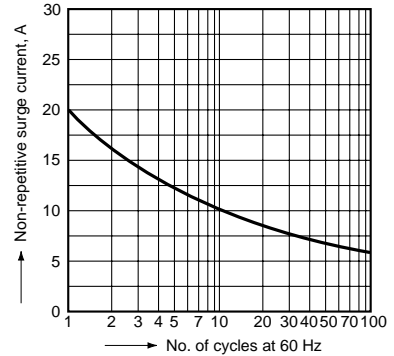
1. Load current vs. ambient temperature



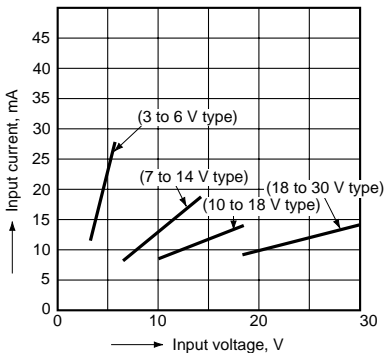
2-1. Non-repetitive surge current vs. carrying time (1 A type)



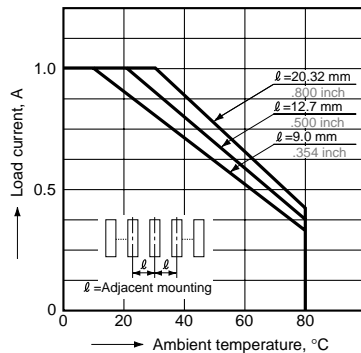
2-2. Non-repetitive surge current vs. carrying time (2 A type)



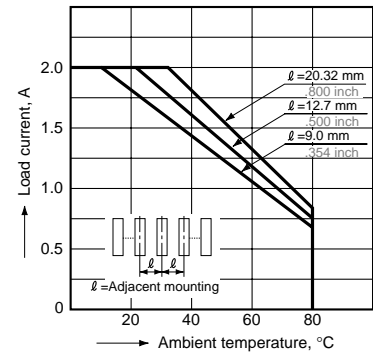
3. Input voltage vs. input current



4. Load current vs. ambient temperature for adjacent mounting
1 A type



2 A type

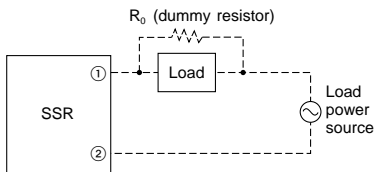


NOTE

When used for the load less than rated

In case of the load current less than rated, malfunction may result from the residual voltage across the both ends of the load even if the solid state relay is turned off. Use a dummy resistor as a countermeasure.

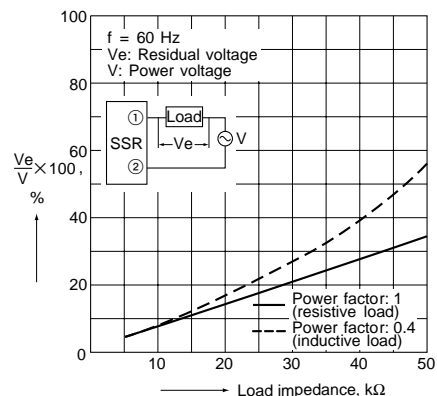
The total of the current through the resistor and the load current must exceed the min. rated load current.



In case the dummy resistor is not used, keep in mind that the residual voltage becomes as follows:

Example:
For the inductive load by the 5 mA load current and the 200 V AC load voltage, the load impedance becomes 40 kΩ and $V_e/V = 16\%$ is estimated from the right above graph. Accordingly, the 32 V voltage remains across the both ends of the load when the solid state relay is turned off.

• Characteristics of load impedance vs. residual voltage



For Cautions for Use, see Page 634 to 637.