

NAIS

AQ-R SOLID STATE RELAY

AQ-R RELAYS

UL File No.: E43149

CSA File No.: LR49089M14



- Two types of terminal shape: Plug-in terminal and Screw terminal
Plug-in terminal (output side): #250
(input side): #110
- Flat type of SSR realized by aluminium printed circuit board
Plug-in terminal: height max. 15 mm .591 inch
Screw terminal: height max. 17 mm .669 inch
- High dielectric strength: 1500 V AC (between input and output)
- Heat sink and DIN mounting rail are available as accessories

TYPES

Plug-in terminal type

Type	Load voltage	Input voltage	Part No.
Zero-cross 10 A	75 to 125 V AC	4 to 6 V DC	AQR10A1-Z4/6VDC
		10 to 18 V DC	AQR10A1-Z10/18VDC
		18 to 28 V DC	AQR10A1-Z18/28VDC
	75 to 250 V AC	4 to 6 V DC	AQR10A2-Z4/6VDC
		10 to 18 V DC	AQR10A2-Z10/18VDC
		18 to 28 V DC	AQR10A2-Z18/28VDC
Zero-cross 15 A	75 to 125 V AC	4 to 6 V DC	AQR15A1-Z4/6VDC
		10 to 18 V DC	AQR15A1-Z10/18VDC
		18 to 28 V DC	AQR15A1-Z18/28VDC
	75 to 250 V AC	4 to 6 V DC	AQR15A2-Z4/6VDC
		10 to 18 V DC	AQR15A2-Z10/18VDC
		18 to 28 V DC	AQR15A2-Z18/28VDC
Zero-cross 20 A	75 to 125 V AC	4 to 6 V DC	AQR20A1-Z4/6VDC
		10 to 18 V DC	AQR20A1-Z10/18VDC
		18 to 28 V DC	AQR20A1-Z18/28VDC
	75 to 250 V AC	4 to 6 V DC	AQR20A2-Z4/6VDC
		10 to 18 V DC	AQR20A2-Z10/18VDC
		18 to 28 V DC	AQR20A2-Z18/28VDC

Screw-terminal type

Type	Load voltage	Input voltage	Part No.
Zero-cross 10 A	75 to 125 V AC	4 to 6 V DC	AQR10A1-S-Z4/6VDC
		10 to 18 V DC	AQR10A1-S-Z10/18VDC
		18 to 28 V DC	AQR10A1-S-Z18/28VDC
	75 to 250 V AC	4 to 6 V DC	AQR10A2-S-Z4/6VDC
		10 to 18 V DC	AQR10A2-S-Z10/18VDC
		18 to 28 V DC	AQR10A2-S-Z18/28VDC
Zero-cross 15 A	75 to 125 V AC	4 to 6 V DC	AQR15A1-S-Z4/6VDC
		10 to 18 V DC	AQR15A1-S-Z10/18VDC
		18 to 28 V DC	AQR15A1-S-Z18/28VDC
	75 to 250 V AC	4 to 6 V DC	AQR15A2-S-Z4/6VDC
		10 to 18 V DC	AQR15A2-S-Z10/18VDC
		18 to 28 V DC	AQR15A2-S-Z18/28VDC
Zero-cross 20 A	75 to 125 V AC	4 to 6 V DC	AQR20A1-S-Z4/6VDC
		10 to 18 V DC	AQR20A1-S-Z10/18VDC
		18 to 28 V DC	AQR20A1-S-Z18/28VDC
	75 to 250 V AC	4 to 6 V DC	AQR20A2-S-Z4/6VDC
		10 to 18 V DC	AQR20A2-S-Z10/18VDC
		18 to 28 V DC	AQR20A2-S-Z18/28VDC

APPLICATIONS

- Photocopiers
- Air conditioners
- Vending machines
- Machine tools

ORDERING INFORMATION

Ex. AQR 10A 1 — S — Z 4/6VDC				
Load current	Load voltage	Terminal shape	Type	Input voltage
10 A, 15 A, 20 A	1: 75 to 125 V AC 2: 75 to 250 V AC	Nil: Plug-in terminal S: Screw terminal	Z: Zero-cross type	4/6, 10/18, 18/28 V DC

SPECIFICATIONS

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

Part No.		AQR10A1-Z 4/6VDC	AQR10A1-Z 10/18VDC	AQR10A1-Z 18/28VDC	AQR10A2-Z 4/6VDC	AQR10A2-Z 10/18VDC	AQR10A2-Z 18/28VDC	Remarks
		AQR10A1-S-Z 4/6VDC	AQR10A1-S-Z 10/18VDC	AQR10A1-S-Z 18/28VDC	AQR10A2-S-Z 4/6VDC	AQR10A2-S-Z 10/18VDC	AQR10A2-S-Z 18/28VDC	
Items	Input voltage	4 to 6 V DC	10 to 18 V DC	18 to 28 V DC	4 to 6 V DC	10 to 18 V DC	18 to 28 V DC	
	Input impedance	Approx. 0.26 kΩ	Approx. 0.86 kΩ	Approx. 1.36 kΩ	Approx. 0.26 kΩ	Approx. 0.86 kΩ	Approx. 1.36 kΩ	
	Drop-out voltage, min.	1 V						
Load side	Max. load current	10 A						See “DATA 1”
	Load voltage	75 to 125 V AC			75 to 250 V AC			
	Frequency	45 to 65 Hz						
	Repetitive peak voltage	400 V			600 V			
	Non-repetitive surge current	100 A						In one cycle at 60 Hz
	Max. “OFF-state” leakage current	2.5 mA (when 100 V AC applied)			5 mA (when 200 V AC applied)			at 60 Hz
	Max. “ON-state” voltage drop	1.6 V						at max. carrying current
	Min. load current	100 mA						
	OFF-state dV/dt	100 V/μs						

15 A type

Part No.		AQR15A1-Z 4/6VDC	AQR15A1-Z 10/18VDC	AQR15A1-Z 18/28VDC	AQR15A2-Z 4/6VDC	AQR15A2-Z 10/18VDC	AQR15A2-Z 18/28VDC	Remarks
		AQR15A1-S-Z 4/6VDC	AQR15A1-S-Z 10/18VDC	AQR15A1-S-Z 18/28VDC	AQR15A2-S-Z 4/6VDC	AQR15A2-S-Z 10/18VDC	AQR15A2-S-Z 18/28VDC	
Items	Input voltage	4 to 6 V DC	10 to 18 V DC	18 to 28 V DC	4 to 6 V DC	10 to 18 V DC	18 to 28 V DC	
	Input impedance	Approx. 0.26 kΩ	Approx. 0.86 kΩ	Approx. 1.36 kΩ	Approx. 0.26 kΩ	Approx. 0.86 kΩ	Approx. 1.36 kΩ	
	Drop-out voltage, min.	1 V						
Load side	Max. load current	15 A						See “DATA 1”
	Load voltage	75 to 125 V AC			75 to 250 V AC			
	Frequency	45 to 65 Hz						
	Repetitive peak voltage	400 V			600 V			
	Non-repetitive surge current	150 A						In one cycle at 60 Hz
	Max. “OFF-state” leakage current	2.5 mA (when 100 V AC applied)			5 mA (when 200 V AC applied)			at 60 Hz
	Max. “ON-state” voltage drop	1.6 V						at max. carrying current
	Min. load current	100 mA						
	OFF-state dV/dt	100 V/μs						

20 A type

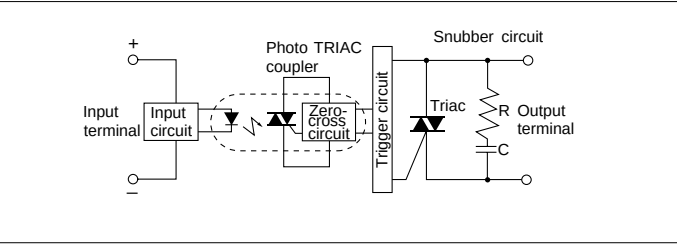
Part No.		AQR20A1-Z 4/6VDC	AQR20A1-Z 10/18VDC	AQR20A1-Z 18/28VDC	AQR20A2-Z 4/6VDC	AQR20A2-Z 10/18VDC	AQR20A2-Z 18/28VDC	Remarks
		AQR20A1-S-Z 4/6VDC	AQR20A1-S-Z 10/18VDC	AQR20A1-S-Z 18/28VDC	AQR20A2-S-Z 4/6VDC	AQR20A2-S-Z 10/18VDC	AQR20A2-S-Z 18/28VDC	
Items	Input voltage	4 to 6 V DC	10 to 18 V DC	18 to 28 V DC	4 to 6 V DC	10 to 18 V DC	18 to 28 V DC	
	Input impedance	Approx. 0.26 kΩ	Approx. 0.86 kΩ	Approx. 1.36 kΩ	Approx. 0.26 kΩ	Approx. 0.86 kΩ	Approx. 1.36 kΩ	
	Drop-out voltage, min.	1 V						
Load side	Max. load current	20 A						See “DATA 1”
	Load voltage	75 to 125 V AC			75 to 250 V AC			
	Frequency	45 to 65 Hz						
	Repetitive peak voltage	400 V			600 V			
	Non-repetitive surge current	200 A						In one cycle at 60 Hz
	Max. “OFF-state” leakage current	2.5 mA (when 100 V AC applied)			5 mA (when 200 V AC applied)			at 60 Hz
	Max. “ON-state” voltage drop	1.6 V						at max. carrying current
	Min. load current	100 mA						
	OFF-state dV/dt	100 V/μs						

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

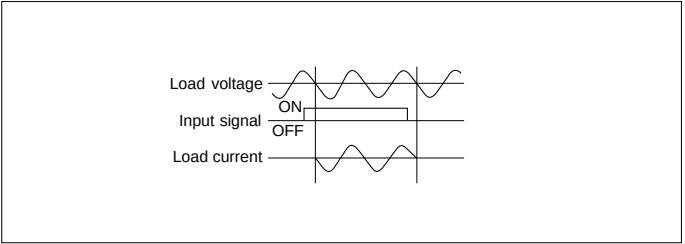
Item		Type	Zero-cross type	Remarks
Operate time, max.			(1/2 cycle of voltage sine wave) + 1 ms	
Release time, max.			(1/2 cycle of voltage sine wave) + 1 ms	
Insulation resistance, min., Initial			100 MΩ between input, output and case	by 500 V DC
Breakdown voltage			1,500 V AC between input, output and case	For 1 min.
Vibration resistance	Functional		10 to 55 Hz at double amplitude of 2 mm	10 minutes for X, Y, Z axes
	Destructive		10 to 55 Hz at double amplitude of 2 mm	1 hour for X, Y, Z axes
Shock resistance	Functional		Min. 980 m/s ² {100 G}	4 time each for X, Y, Z axes
	Destructive		Min. 980 m/s ² {100 G}	5 time each 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 and Turn-OFF)	

OPERATING PRINCIPLE

Internal circuit



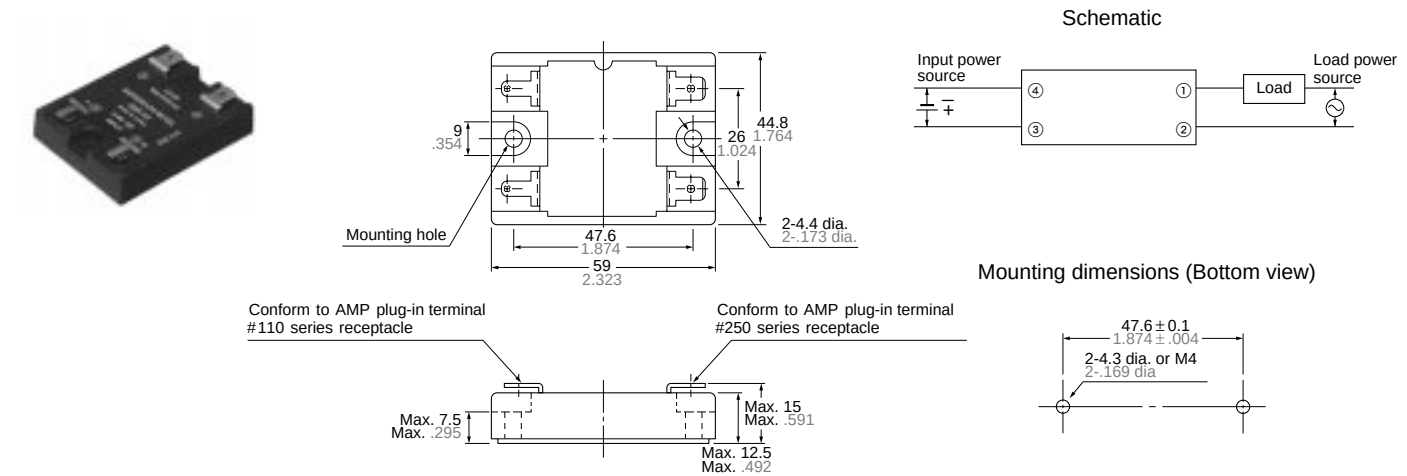
Wave form of input and output (Resistive load)



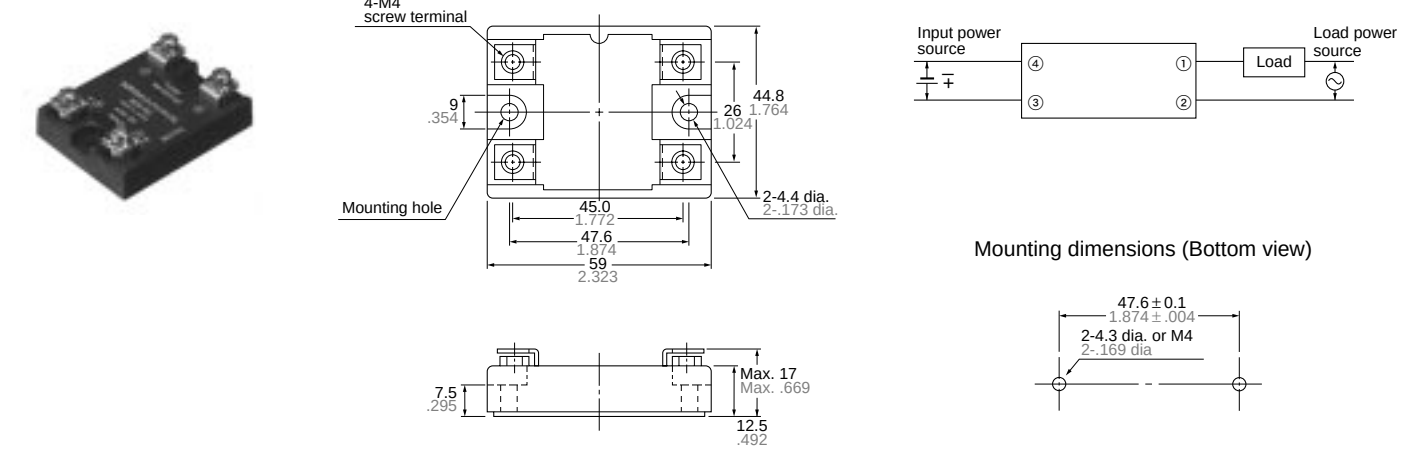
DIMENSIONS

Plug-in terminal

mm inch



Screw terminal



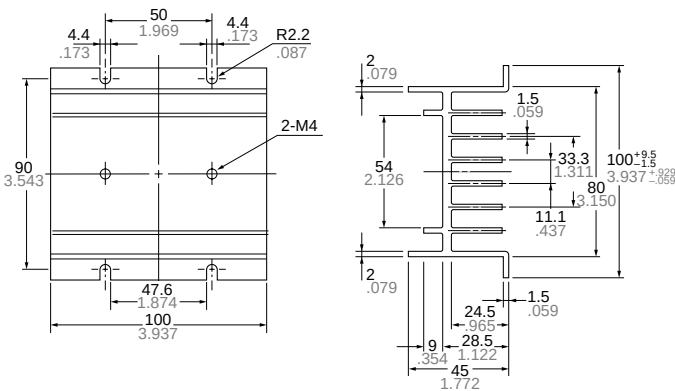
AQ-R SOLID STATE RELAY ACCESSORIES

mm inch

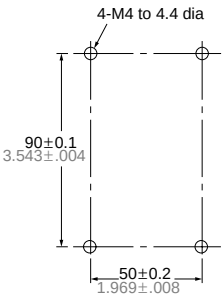
AQP-HS-20A
Heat sink



AQP-HS-20A



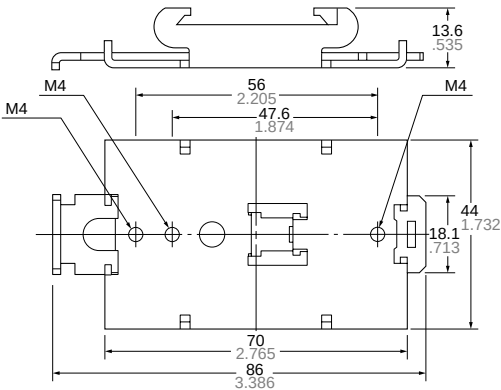
Mounting dimension (Bottom view)



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

AQP-DP
DIN rail mounting plate

AQP-DP

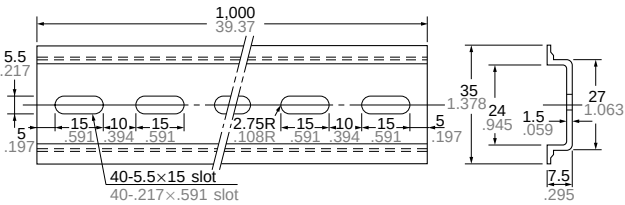


General tolerance: $\pm 0.5 \pm .020$

AT8-DLA1
Mounting rail



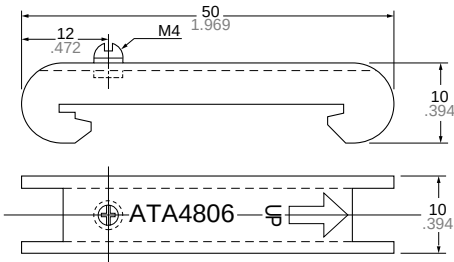
AT8-DLA1



ATA4806
Fastening plate

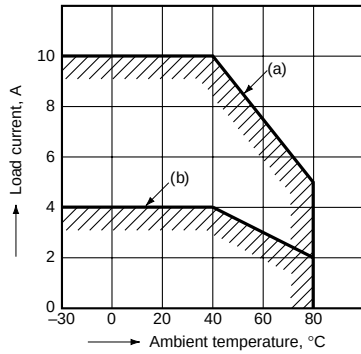


ATA4806

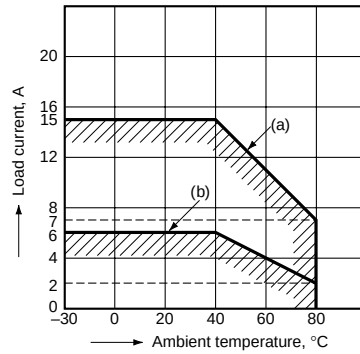


DATA

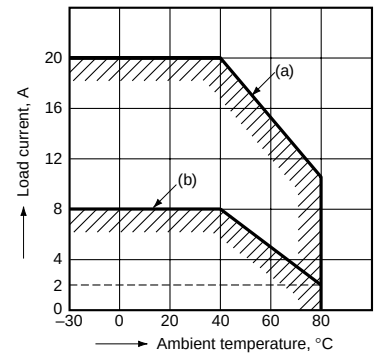
1. Load current vs. ambient temperature 10 A type



15 A type



20 A type

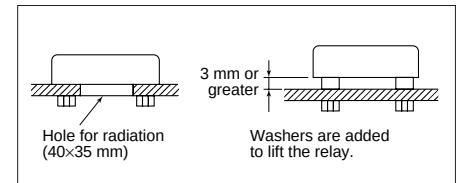


(a) With external heat sink

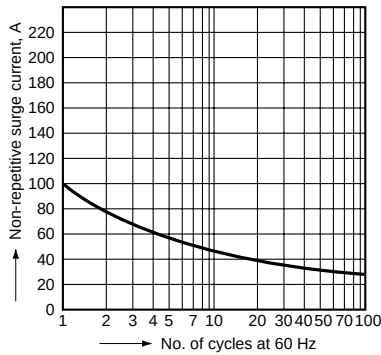
- A heat sink; optional heat sink (AQP-HS-20A) or a 150×150×3.2 mm aluminum sheet (painted black)
- The heat sink surface area is the required area for one solid-state relay.

(b) Without external heat sink

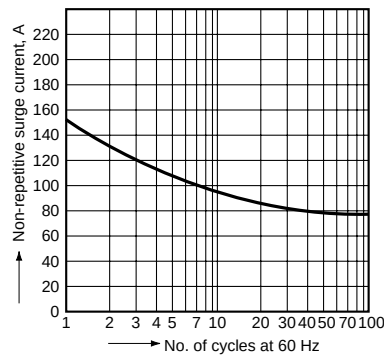
If the mounting surface is not metallic and a heat sink is not used, expose the bottom surface and plate surface to improve heat dissipation. The graphs show the characteristics when the relay is mounted as shown in the right figure.



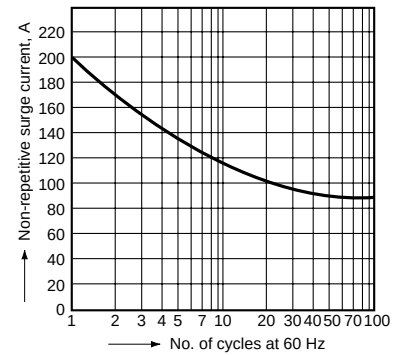
2-1. Non-repetitive surge current vs. carrying time (10 A type)



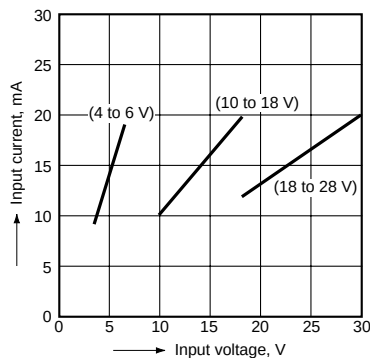
2-2. Non-repetitive surge current vs. carrying time (15 A type)



2-3. Non-repetitive surge current vs. carrying time (20 A type)



3. Input voltage vs. input current (10 A, 15 A, 20 A type)



NOTE

Regarding installation

DIN Rail Mounting

When the relay is mounted to a rail using the DIN mounting rail (optional), the rated capacity is limited to the characteristics of a relay without a heat sink attached.

For Cautions for Use