Bulletin 700-SH

- 40 A (resistive) Max. Continuous Load (Output) Current with Heat Sink
- 264V AC or 528V AC Max. Load Voltage Range Options
- 5…24V DC, 100…120V AC, 200…240V AC Control Input Voltage
- LED Indicator for Input/Logic ON/OFF Status Monitoring
- Built-in Varistor to Absorb Most Surges
- Protective Cover for Added Safety (Meets VDE 106 Finger Safe Standard)

Table Of Contents

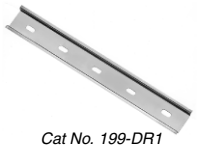
Product Selection 51
Accessories 52
Specifications 53
Approximate Dimensions 56
Basic Application Considerations 57

Product Selection

	Input-to-Output Isolation Method	Zero Cross Function	LED Indicator	Rated Output (Load) Max. Current and Voltage Range ❶	Rated Input Control Voltage	Cat. No.	Factory-Stocked Item (Single Pack)
	Phototriac	Yes	Yes	5 A @ 24…240V AC	5…24V DC	700-SH05GZ25	✔
	Photocoupler				100…120V AC	700-SH05GA12	✔
					200…240V AC	700-SH05GA22	✔
	Phototriac			10 A @ 24…240V AC	5…24V DC	700-SH10GZ25	✔
	Photocoupler				100…120V AC	700-SH10GA12	✔
					200…240V AC	700-SH10GA22	✔
				10 A @ 200…480V AC	5…24V DC	700-SH10HZ25	✔
	Phototriac			25 A @ 24…240V AC	5…24V DC	700-SH25GZ25	✔
	Photocoupler				100…120V AC	700-SH25GA12	✔
					200…240V AC	700-SH25GA22	✔
	Photocoupler			25 A @ 200…480V AC	5…24V DC	700-SH25HZ25	✔
	Phototriac			40 A @ 24…240V AC	5…24V DC	700-SH40GZ25	✔
	Photocoupler				100…120V AC	700-SH40GA12	✔
					200…240V AC	700-SH40GA22	✔
				40 A @ 200…480V AC	5…24V DC	700-SH40HZ25	✔

❶ Maximum load current when mounted on a heat sink

Accessories

	Description	Pkg. Qty	Cat. No.	Factory-Stocked Item
Cat No. 700-S10	**Heat Sink— Panel or DIN Rail Mount ❶**	1	700-S10	✔
Cat No. 700-S20	**Heat Sink— Panel or DIN Rail Mount ❶**	1	700-S20	✔
Cat No. 700-S30	**Heat Sink— Panel or DIN Rail Mount ❶**	1	700-S30	✔
 *Cat No. 199-DR1*	**DIN Rail Mounting Pack** Standard 35 x 7.5 mm DIN Rail, 1 meter long, 10 rails per package. Order must be for 10 rails or multiples of 10.	10	199-DR1	✔

❶ For information regarding selection of the proper heat sink for your application, refer to "Heat Sink Size Vs. Load Current" graph on page 54 or "Load Current Vs. Ambient Temperature Characteristics" on page 55.

Control/Input Ratings					
Cat. No.	Rated Control Voltage	Operating Control Voltage Range	Impedance ❶	Control Voltage Levels	
				Pick-up Voltage	Drop-out Voltage
700-SH_ _G…	5...24V DC	4...32V DC	15 mA max ❷	4V DC max.	1V DC min.
	100...120V AC	75...132V AC	36 kΩ +/-20%	75V AC max. ❸	20V AC min. ❸
	200...240V AC	150…264V AC	72 kΩ +/-20%	150V AC max. ❸	40V AC min. ❸
700-SH_ _ H…	5...24V DC	4…32V DC	5 mA max. ❷	4V DC max.	1V DC min.

Load/Output Ratings							
Cat. No.	Applicable Load						
	Rated Load Voltage	Load Voltage Range	Continuous Load		Current (Resistive)		Max. Inrush Current❺
			With Heat Sink (A) ❹		Without Heat Sink (A) ❹		
	—	—	Min.	Max.	Min.	Max.	
700-SH05G…	24…240V AC	19 …264V AC	0.1 A	5 A	0.1 A	3 A	60 A (@50/60 Hz, 1 cycle)
700-SH10G…			0.1 A	10 A	0.1 A	4 A	150 A (@50/60 Hz, 1 cycle)
700-SH10H…	200…480V AC	180…528 VAC	0.2 A	10 A	0.2 A	4 A	
700-SH25G…	24…240V AC	19…264V AC	0.1 A	25 A	0.1 A	4 A	220 A (@ 50/60 Hz, 1 cycle)
700-SH25H…	200…480V AC	180…528V AC	0.2 A	25 A	0.2 A	4 A	
700-SH40G…	24…240V AC	19…264V AC	0.1 A	40 A	0.1 A	6 A	440 A (@ 50/60 Hz, 1 cycle)
700-SH40H…	200…480V AC	180…528V AC	0.2 A	40 A	0.2 A	6 A	

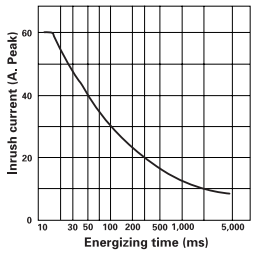
❶ The input impedance is measured at the maximum value of the rated supply voltage.
❷ With a constant current input system, SSR impedance varies with a change in input voltage.
❸ Refer to graphs, “Temperature Characteristics…” and “Must Release Voltage” on page 54 for further details.
❹ When specified heat sink is used. Refer to accessories, page 52 for applicable heat sinks. For more details, refer to graphs “Load Current Vs. Ambient Temperature Characteristics” on page 55, and the “Heat Sink vs. Load Current” graph on page 54.
❺ If the SSR operation is continuous ON/OFF, this value should be reduced by 50%. Refer to “Inrush Current Resistivity” graphs on page 54 for more details.

Characteristics			
Cat. No.	**700-SH05G, -SH10G, SH25G**	**700-SH40G**	**700-SH10H, -SH25H, SH40H**
Load Switching Method/ Device	Triac		Thyristor
Pick-up Time	1/2 of load power source + 1 ms max. (DC input) 3/2 of load power source + 1 ms max. (AC input)		
Drop-out Time	1/2 of load power source + 1 ms max. (DC input) 3/2 of load power source + 1 ms max. (AC input)		
Output ON Voltage Drop	1.6 V (RMS) max		1.8 V (RMS) max
Output Leakage Current	5 mA max (at 100V AC)		10 mA max. (@ 200V AC)
	10 mA max (at 200V AC)		20 mA max. (@ 400V AC)
Output V_{DRM}, V_{CEO} (V)	600	600	1200
Output di/dt (A/uS)	-SHO5G = 100, -SHO10G, -SH25G= 50	50	100
Output dv/dt (V/uS)	-SHO5G = 200, -SHO10G, -SH25G= 100	100	300
Output I^2t (A^2S)	-SHO5G = 24.5, -SHO10G=112.5 -SH25G= 260	1260	260, SH40 = 1800
Output Tj °C Max.	125		
Insulation Resistance	100 MΩ min (at 500 VDC)		
Dielectric Strength	2,500V AC, 50/60 Hz for 1 minute		
Vibration Resistance (max.)	10…55 Hz, 1.5 mm double amplitude (10 G)		
Shock Resistance (max.)	1,000 m/s^2 (100 G)		
Ambient Temperature	Operating: -30°C…80°C (-22°F…176°F) with no icing or condensation		
	Storage: -30°C…100°C (-22°F…212°F) with no icing or condensation		
Ambient Humidity	Operating: 45%…85% (no condensation)		
Standards ❶	UL508, CSA C22.2, CE, TÜV		
Weight	Approx. 60g	Approx. 70g	Approx. 80g

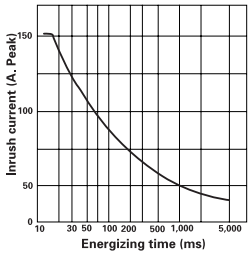
❶ Cat. No. 700-SH_ _ _HZ25 not CE or TÜV approved.

Inrush Current Resistivity❷

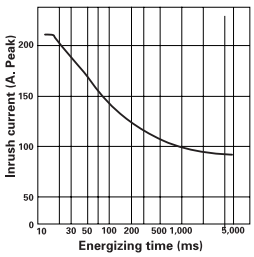
700-SH05G...



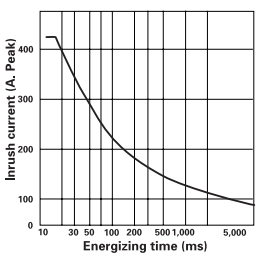
700-SH10G... SH10H...



700-SH25G... SH25H...

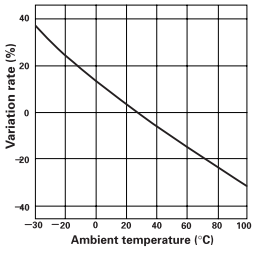


700-SH40G... SH40H...



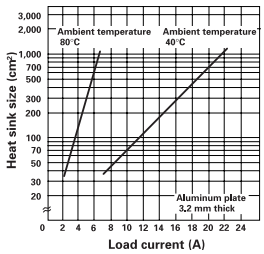
Temperature Characteristics (with Must Operate Voltage and Must Release Voltage)

700-SH_ _G...



Heat Sink Size vs. Load Current

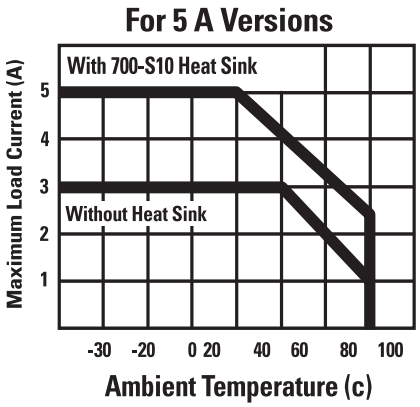
700-SH 25G... ❸

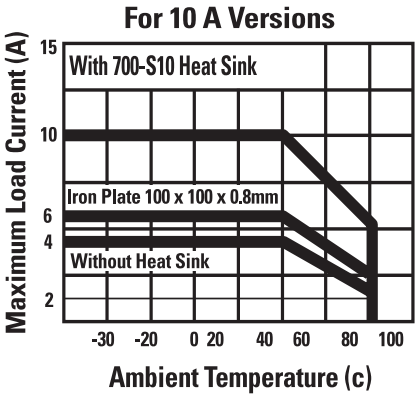


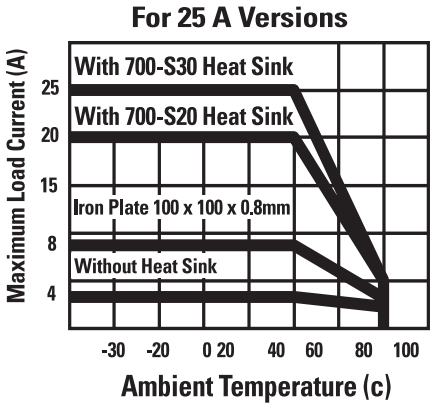
❷ Inrush current resistivity is the ability of an SSR to withstand a large surge current for a short period of time. Surges are considered non-repetitive (max. repeatability once every 2…5 seconds). Keep the inrush current to half the rated value if it occurs repetitively. Exceeding the non-repetitive inrush current will damage the SSR.

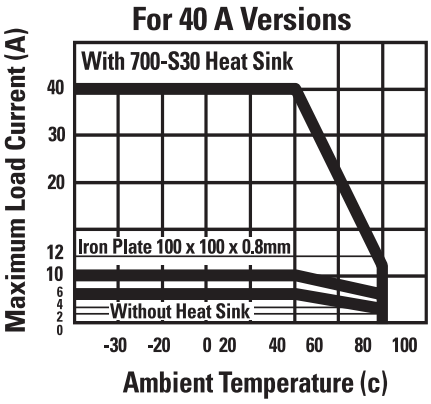
❸ The heat sink size refers to the combined area of the sides of the heat sink that radiate heat. For example, when a current of 18 A is allowed to flow through the SSR at 40°C, the graph shows that the heat sink size is about 450 cm^2. Therefore, if the heat sink is square, one side of the heat sink must be 15 cm (15^2 x 2 = 450) or longer.

Load Current vs. Ambient Temperature Characteristics❶❷





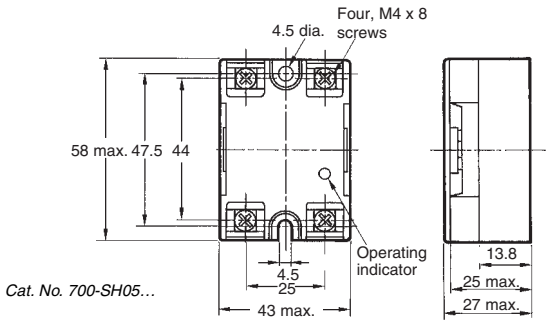




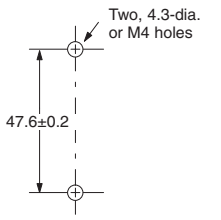
❶ For the above 5 graphs, the line “with iron plate measuring 100 x 100 x 0.8” means the SSR is mounted directly to an iron plate of at least this size.
❷ All graphs assume conductive grease is being used. Refer to page 56 for details of using conductive grease.

Mounting Considerations❶❷❸❹❺

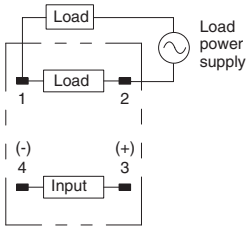
All units are in millimeters unless otherwise indicated. Dimensions are not intended for manufacturing purposes.

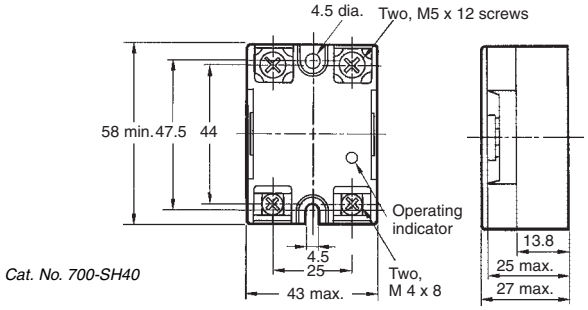


Mounting Holes

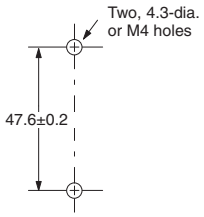


Terminal Arrangement/ Internal Connections (Top View)



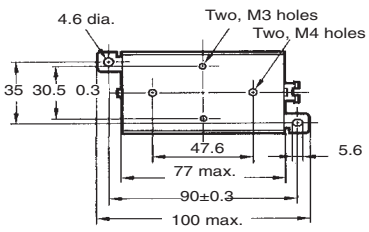


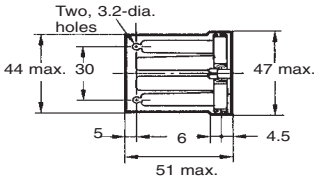
Mounting Holes



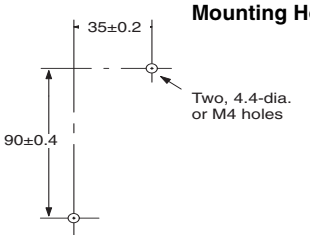
❶ The proper mounting orientation of the heat sink is so the heat fins run perpendicular to the floor (vertical) to maximize ventilation flow.
❷ If the fins do not run perpendicular to the floor, a 30% current derating is required.
❸ When attaching a heat sink to Bulletin 700-SH, apply heat conductive grease on the heat sink to maximize heat transfer between the SSR and the heat sink. Recommended types: Silicon based, Toshiba YG6240; Non-silicon based, AOS company type 53300.
❹ Tighten the SSR panel/heat sink mounting screws to a torque of 0.78…0.98 Nm (6.9…8.7 lb-in).
❺ Tighten the SSR terminal wiring screws as follows M4: 0.98…1.37 Nm (8.67…12.12 lb-in.), M5: 1.57…2.35 Nm (13.89…20.8 lb-in.)

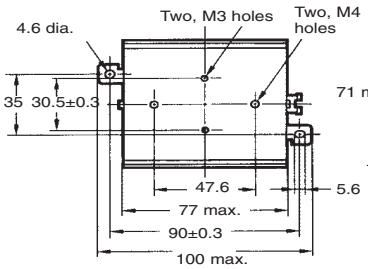
Heat Sinks❻ ❼

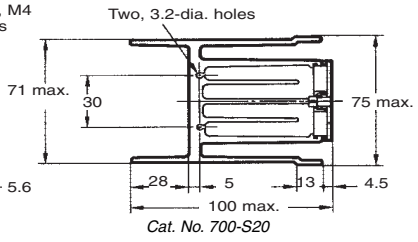




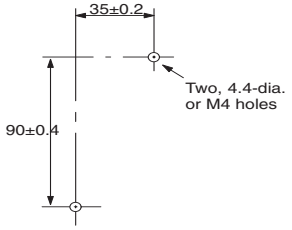
Mounting Holes

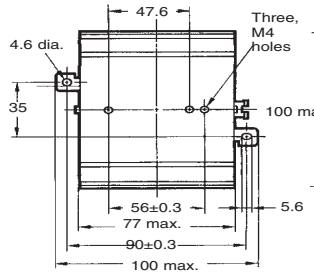


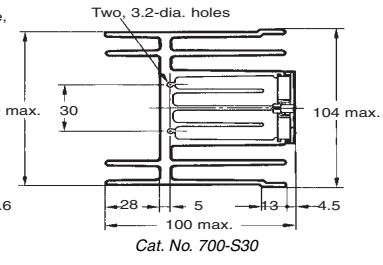




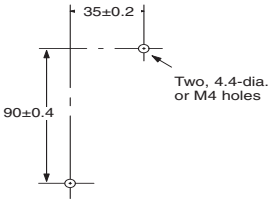
Mounting Holes







Mounting Holes



❻ Tighten the heat sink mounting screws (M4) to a torque of 0.98…1.37 Nm (8.67…12.12 lb-in).
❼ Heat sink weight: cat. nos. 700-S10 = 200 g, 700-S20 = 400 g, 700-S30 = 560 g

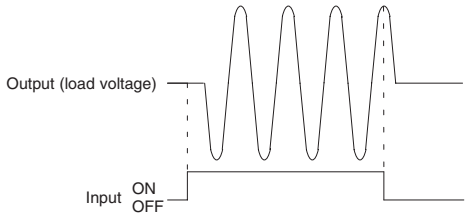
Load Connection

- **For an AC load, use a power supply rated at 50 or 60 Hz. The maximum operating frequency is 10 Hz.**
- **The Bulletin 700-SH has a built-in varistor for surge/inrush protection of AC loads. If additional suppression is required, connect an external varistor across the load device terminals. Select a varistor which meets the load voltage condition outlined in the table below.**

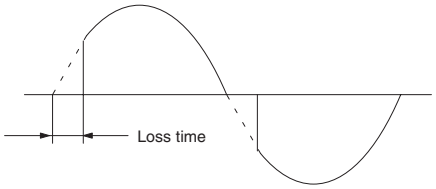
Load Voltage	Varistor Voltage	Varistor Surge Resistance
100…120V AC	240…270 V	1000 A min.
200…240V AC	440…470V	
380…480V AC	820…1000V	

Zero Cross Function

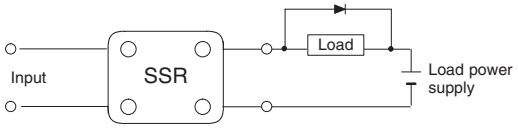
A SSR with a zero cross function operates when an AC load voltage reaches the zero point or its vicinity. This reduces clicking noises when the load is switched, and minimizes the influence of an inductive load, such as a lamp, heater, or motor, on the power supply because the inrush current of the load is reduced. This can also minimize the scale of the inrush current protection circuit.



At a low applied voltage, such as 24V AC, the load current is not fully supplied. When the unit is switched ON, the voltage required to power the unit deprives the output signal of the necessary voltage level and thus creates loss time. The lower the load voltage is, the greater the loss time is. This condition, however, will not create any serious problems.



For a DC inductive load, a diode should be connected parallel to the load to absorb the counter electromotive force (OFF) of the load.



Note: For additional details when using Solid-State Relays, refer to pub. 700-AT001A--EN-E, “Solid-State Relay Application Guide" available at www.theautomationbookstore.com.