We Measure, We Control, We Record

Solid State Relay – SSR

SSR 100 / 150 / 200 / 300 A - INSTRUCTIONS MANUAL – V1.0x F

FEATURES

The Solid State Relays (SSR) are electronic devices used for switching resistive and inductive AC loads with many advantages over the conventional relays.

The device has an internal thyristor protection circuit (Snubber) and a Zero Crossing system, which allows switching on at zero Volt and off at zero Ampere. It also has optical isolation between INPUT and OUTPUT and a LED to indicate the on and off status.

OPERATION

A control voltage applied to the device input turns the ssr on, energizing the load. The conduction effectively occurs at the next zero crossing of the mains voltage. When the input signal is removed, the ssr turns off when the load reaches a current equal to zero. This means that the load switching may be delayed by ½ of mains period (or 8.3 ms for the 60 hz mains).

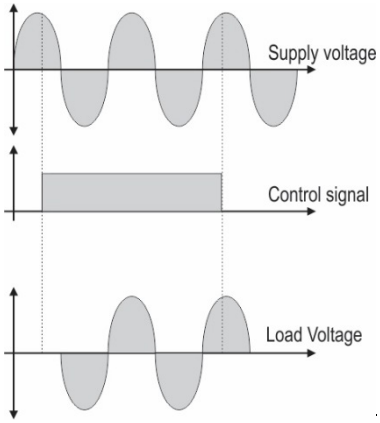

Fig. 1 – Electrical voltage on a resistive load

Turning the output ON and OFF only on the mains voltage zero crossing brings important performance advantages to the system: practically no EMI is generated during the load switching and the SSR is submitted to less severe switching conditions. On the other hand, the SSR is suitable to AC loads only (it cannot be used to switch DC loads).

This device CANNOT be used to command electrical charges in installations with DC voltage.

ELECTRICAL CONNECTIONS

The two connections needed for the installation of the SSR are the command signal and the load circuit. The load circuit must be protected by an ultra-fast fuse with a rate that matches the SSR nominal current specification. The SSR terminals must be firmly screwed and the wire gauge compatible with the output load.

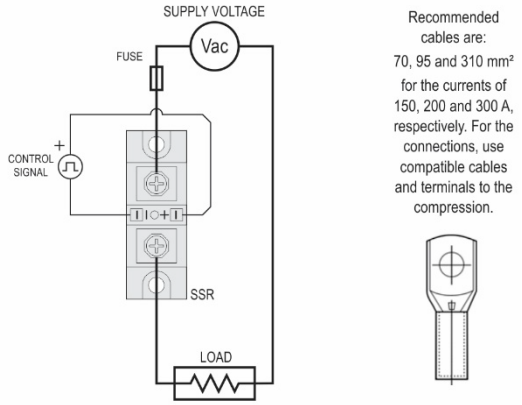

Fig. 2 – Electrical connections – Command and Load Signal

HEAT DISSIPATION

The SSR generates heat during its conduction. This heat must be dissipated to avoid SSR fail due to over-heat. The nominal SSR load specification assumes the use of a suitable heat sink. Without a heat sink the allowed load current is substantially reduced. The user may calculate the needed heat sink or make use of a heat sink suggested by NOVUS.

$$R_{thha} = \frac{75°C - T_{amb}}{I_L \times V_{ssr}}$$

Where:
R thha = Thermal resistance heat sink to ambient
T amb = Maximum ambient temperature
I L = Load current
V ssr = Voltage drop when the SSR is ON.
75°C is the maximum temperature allowed for the

For better heat transfer, a thermal conducting paste must be used between the SSR and the heat sink. The SSR along with its heat sink must be mounted in a vertical position such as to allow for air flow and thus a good heat exchange.

Notes:

1. The use of the Thermal Pad that comes with the SSR is optional. It is recommended for installations where the surface of the heatsink to receive the SSR is not perfectly flat or regular.

2. Make sure that the screws on the SSR terminals are properly tightened. Contact problems at these points influence the proper operation of the entire installation power system.

3. Prior validation tests are important to identify failures in the installation, especially overheating points.

The graphs below show the current carrying capacity of the SSR as a function of ambient temperature when mounted on the indicated heatsink and whether or not the fan is used.

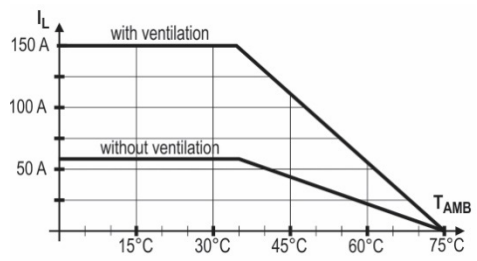

Fig. 3 – Sink NDP3-120 mm: R thha = 0.52 / 0.12 °C / W)

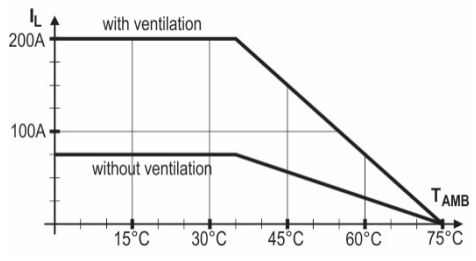

Fig. 4 – Sink NDP3-180 mm: R thha = 0.40 / 0.08 °C / W)

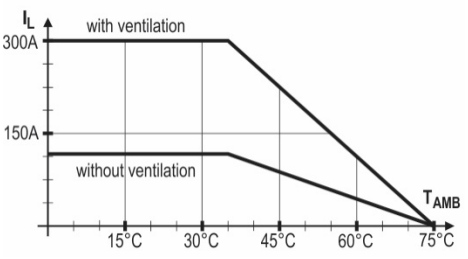

Fig. 5 – Sink NDP3-220 mm: R thha = 0.35 / 0.04 °C / W)

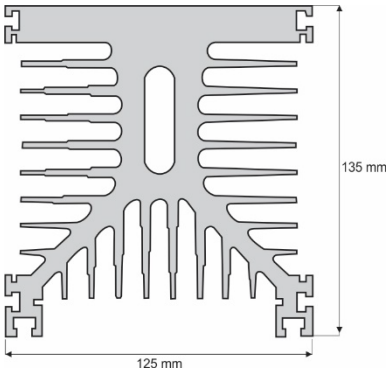

Fig. 6 – Sink NDP3-120 mm: R thha = 0.52 °C / W)

The length measurement of the NDP3 heatsink varies according to the nominal SSR current used:

SSR48100 - M	SSR48150 - M	SSR48200 - M	SSR48300 - M
120 mm	120 mm	180 mm	220 mm

The proper fan is also offered to the user. It has 127 and 220 Vac power and dimensions of 120x120 x 40 mm. The minimum air flow is 3 m / s.

OUTPUT SPECIFICATIONS

Parameter	Model			
	SSR 48100 - M	**SSR 48150 - M**	**SSR 48200 - M**	**SSR 48300 - M**
Description	**100**	**150**	**200**	**300**
Operating voltage (47-63 Hz) [Vrms]	40-480	40-480	40-480	40-480
Frequency (Hz)	47 to 63			
Transient overvoltage [Vpk]	1200	1200	1200	1200
Maximum off-state leakage current @ rated voltage [mArms]	8	8	8	8
Minimum off-state dv/dt @ maximum rated voltage [V/µs]	500	500	500	500
Maximum load current [Arms]	100	150	200	300
Minimum load current [Arms]	0.15	0.15	0.15	0.15
Maximum 1 cycle surge current (50/60 Hz) [Apk]	1050/1100	1528/1600	2100/2200	3056/3200
Maximum on-state voltage drop @ rated current [Vrms]	1,30	1.30	1.30	1.30
Thermal resistance junction to case (Rjc)[°C/W]	0.43	0.40	0.39	0.36
Maximum ½ cycle I^2t for fusing (50/60 Hz) [A^2 seg]	3751/3410	5626/5115	7502/6820	10230/11253
Minimum power factor (with maximum load)	0.5	0.5	0.5	0.5
Weight (typical) [g]	142	232	232	232

Table 1 – Output specifications

INPUT SPECIFICATIONS

Description	Parameter
Control voltage range	3-32 VDC
Maximum Reverse Voltage	-32
Minimum Turn-On Voltage	3.0 VDC
Minimum Turn-Off Voltage	1.0 VDC
Minimum Input Current a [mA]	7
Maximum Input Current [mA]	20
Maximum Turn-On Time [msec]	1/2 cycle
Maximum Turn-Off Time [msec]	1/2 cycle

Table 2 – Input specifications

GENERAL SPECIFICATIONS

Description	Parameter
Dielectric Strength, Input/Output/Base (50/60 Hz)	4000 vrms
Minimum Insulation Resistance (@ 500 VDC)	10^9 Ohm
Maximum Capacitance, Input/Output	8 pF
Ambient Operating Temperature Range	-40 to 80 °C
Ambient Storage Temperature Range	40 to 125 °C
Housing Material	UL E211125: 94 V-0
Terminal Material	Gilded
Baseplate Material	Copper
Certifications	CE, UKCA, UL

Table 3 – General specifications

DIMENSIONS

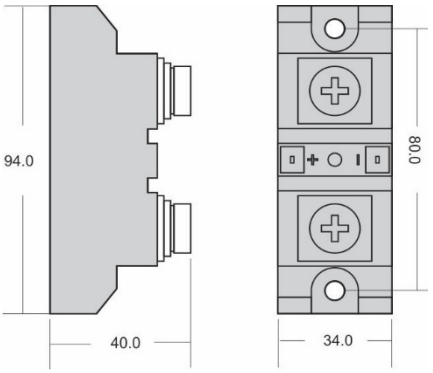

Fig. 7 – SSR dimensions

WARRANTY

The warranty conditions are set forth on our website www.novusautomation.com/warranty.