

# Solid State Relay – SSR

## TRIPHASIC 40, 80 AND 90 A - INSTRUCTIONS MANUAL – V1.0x E

### FEATURES

The Solid State Relays (SSR) are electronic devices used for switching resistive or 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 1/2 of mains period (or 8.3 ms for the 60 hz mains).

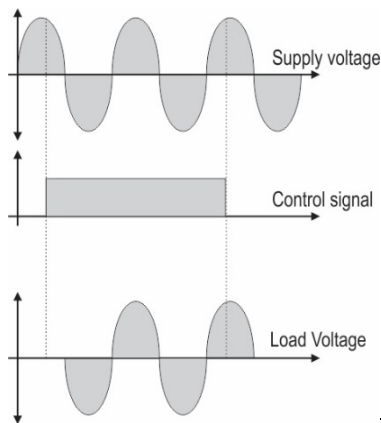


Fig. 1 – Electrical voltage on a resistive load

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.

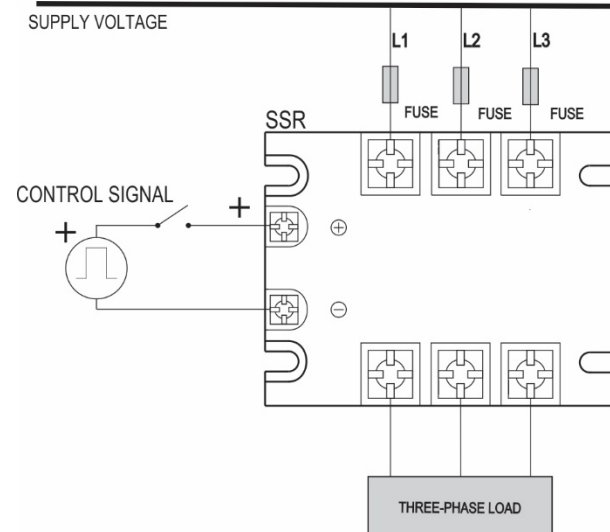


Fig. 2 – Electrical connections – Command and Load Signal

### 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.

$$R_{thsa} = \frac{80^{\circ}\text{C} - T_{amb}}{3 (I_L \times V_{ssr})}$$

Where:  
 $R_{thsa}$  = Thermal resistance heat sink to ambient  
 $T_{amb}$  = Maximum ambient temperature  
 $I_L$  = Load current  
 $V_{ssr}$  = Voltage drop when the SSR is ON.  
 80°C is the maximum temperature allowed for the SSR.

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.

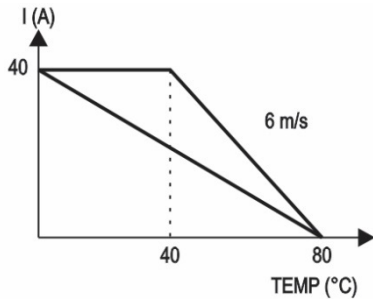


Fig. 3 - SSR3-4840 with sink NDP3-120 mm

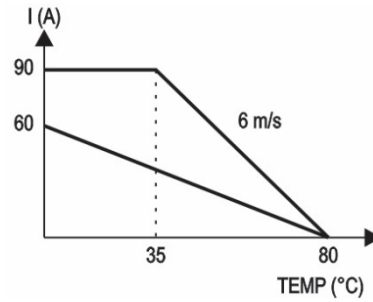
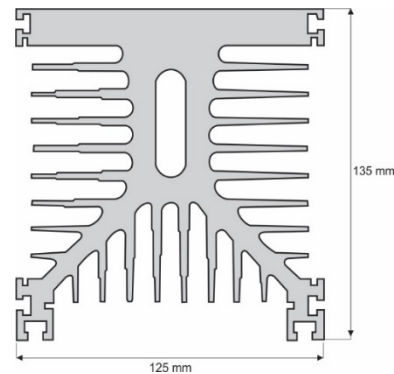


Fig. 4 - SSR3-4890 with sink NDP3-220 mm

The indicated Novus heatsink models are:

- SSR3-4840: NDP3-120 mm / (P/N 8825000100)  
Rthha= 0.52 °C/W  
Rthha= 0.175 °C/W (with fan 6 m/s)
- SSR3-4890: NDP3-220 mm / (P/N 8825000220)  
Rthha= 0.35 °C/W  
Rthha= 0.125 °C/W (with fan 6 m/s)

The respective specifications of use are:



## SPECIFICATIONS

Parameter	Unit	Model		
		SSR3-4840	SSR3-4880	SSR3-4890*
Load current (IL)	A	40	80	90
Load voltage	Vcc	40 to 530	40 to 530	40 to 530
Turn-on voltage (V <sub>SSR</sub> )	V	< 1.5	< 1.5	< 1.5
Leakage current	mA	< 1	< 1	< 1
Frequency	Hz	47 to 63	47 to 63	47 to 63
Dv/dt	V/μs	300	300	300
Control voltage	Vcc	4 to 32	4 to 32	4 to 32
Control current	mA	15 to 20	15 to 20	15 to 20
Switching time	ms	< 10	< 10	< 10
Control method		Zero cross trigger	Zero cross trigger	Zero cross trigger
Isolation	V	> 2000	> 2000	> 2000
Operating temperature	°C	-40 to 80	-40 to 80	-40 to 80
Weight	g	397	430	431
Status Indicator		LED	LED	LED
Certifications		CE, UKCA and UL		CE, UKCA

\* Model without UL certification

Table 1 – Specifications

## DIMENSIONS

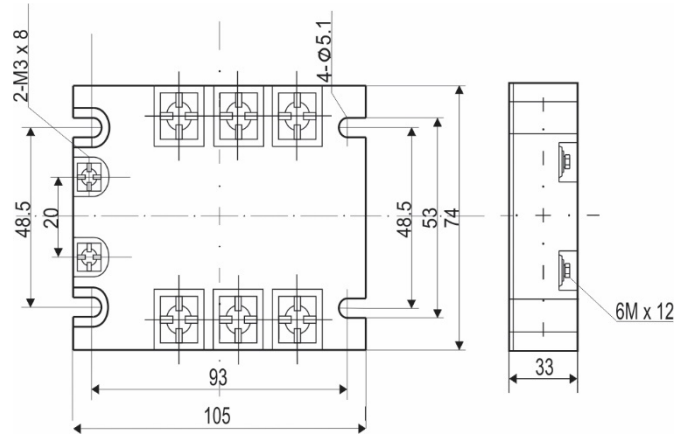


Fig. 5 – SSR dimensions

## WARRANTY

The warranty conditions are set forth on our website [www.novusautomation.com/warranty](http://www.novusautomation.com/warranty).