

EV Power Smart Precharger Manual



OVERVIEW

Inverters and DC electric motor controllers typically have a large internal capacitor bank on their input with very low ESR (Equivalent Series Resistance). As such they require inrush protection when first powering up to prevent a large current spike which can damage external components such as contactors welding closed or fuses blowing.

The **EV-Power Smart Precharger** is designed to offer a 2-stage soft start for motor controllers, limiting inrush current via a resistive circuit to charge up the internal capacitors before automatically closing the main contactor when the process is complete. It can also detect faults and safely discontinue precharge if it fails to start correctly (usually due to an external wiring fault), or fails to complete within 5 seconds (usually due to unexpected loads or short circuits after the main contactor).

SPECIFICATIONS

- Power supply: 8-18VDC (12V nominal, 3A max)
- Load Voltage 12-360V nominal.
- Self consumption current 7-15mA
- Coil switching current 12V 3A continuous max
- Dimensions enclosure 64 x 58 x 35mm
- Weight 100g
- Environmental 0 – 70°C

WIRING

The following diagram shows the typical wiring of the Smart Precharger with your main contactor.

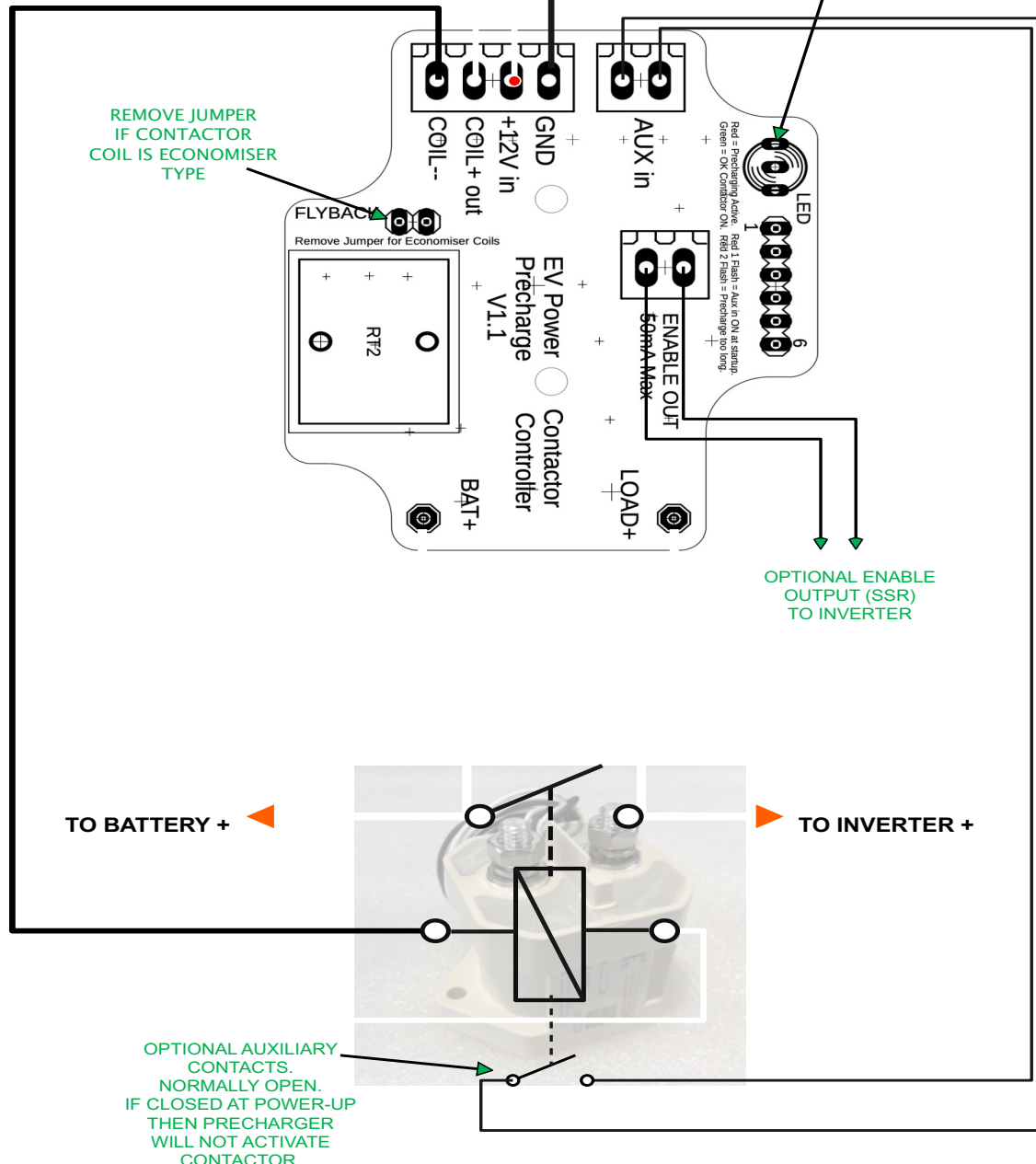
EV POWER REL-PRECHG WIRING

WHEN 12V POWER IS APPLIED THE
CONTROLLER WILL START PRECHARGE
AND ENGAGE THE CONTACTOR

12V
SUPPLY

LED INDICATOR

Red = Precharging Active.
Red 1 Flash = Aux in ON at startup.
Red 2 Flash = Precharge too long.
Green = OK Contactor ON.



There are connections to make as follows:

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- **SUPPLY 12V:** A key-switched 12V input to turn the device on .
- **SUPPLY GND:** Ground or 0V. Chassis Ground.
- **CONTACTOR +12V:** Connect on the “+” side of the coil. Take note of coil polarity shown on contactor, if any. NOTE: An internal flyback resistor is enabled via a jumper. Remove this jumper if the coil has an “economiser” circuit.
- **CONTACTOR GND:** Connect on the – side of the coil.
- **AUX:** Connect to the contactor auxiliary (normally open) contacts. To test for a welded contactor at startup. Note that this is an optional input for extra safety. It can only be implemented with contactors that have Normally Open (ie closed when contactor is active) auxiliary contacts for the purpose.
- **BAT+ and LOAD+:** Connect to the power terminals of your contactor. The **BAT+** should go to the battery side, and the **LOAD+** connected to the inverter.
- **ENABLE OUT:** this is dry contact typer switched output that is active after the contactor is engaged. Some inverters have an input that this can connect to, so the inverter can only operate once the contactor has been engaged.

Ensure that your wiring has sufficient insulation rating for the voltage. For sufficient current rating and mechanical strength, we recommend around 18AWG / 1sqmm size.

The supply to the precharger must be fused. It is recommended to install a fuse on the precharger supply rated at 5 amps.

OPERATION

If your wiring is correct, when voltage is applied to the 12V input, you should see a red light on the board, indicating that precharge is in progress.

Once precharge completes successfully (determined by the voltage differential across the contactor being around 6V for the LV, 15V for the HV), the red light swaps to a green light and the contactor will engage.

If an error was detected, such as precharge takes too long or if AUX input is at GND at startup, the precharger will not engage the contactor coil. It must then be power cycled to work again.

LED Indicator:

Solid Red = Precharge in progress (max ~5 seconds)

1 Red Flash = Aux Input is grounded at startup. Welded contactor.

2 Red Flashes = Pre-charge timeout (approx 10 seconds).

Green = All OK, contactor is active.

TECH NOTE ABOUT PRECHARGING

Prechargers can only work correctly if there are no other continuous loads on the output side of the main contactor, only the inverter. By far the most common reason for precharge time-outs is some device after the precharger drawing power continuously while it is trying to precharge. Your main contactor should *only* be switching power to the inverter. Other loads such as DC/DC converters, chargers etc should be wired in before the main contactor. If you do not wish to have these in circuit permanently, a second contactor is recommended (typically these do not require precharge).

TECHNICAL SUPPORT

If you have any queries not covered by this manual, feel free to contact us via our contact page. ev-power.com.au