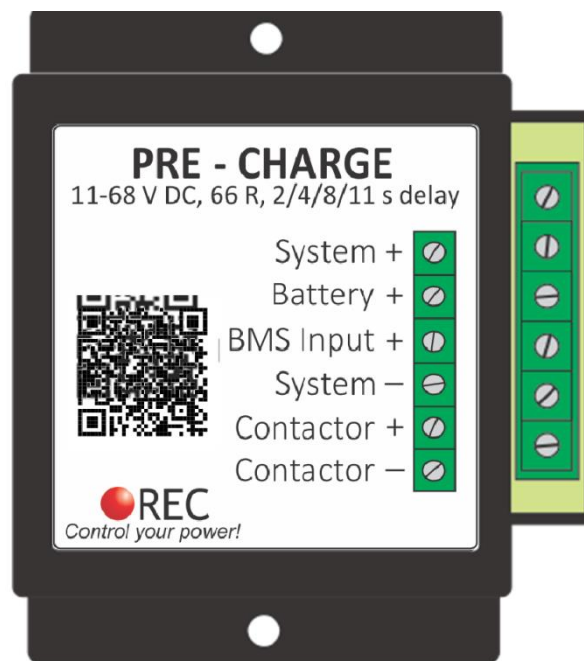


# REC PRE-CHARGE UNIT with time-set



 **REC**  
*Control your power!*

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## **Features:**

- robust and small design
- low power consumption @ 11-68 V DC
- 2/4/8/12 s delay
- integrated 66  $\Omega$  power resistor
- 2 A open collector contactor coil drive
- reverse polarity protection
- over-voltage protection
- one-year warranty

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## General description of the PRE-CHARGE UNIT:

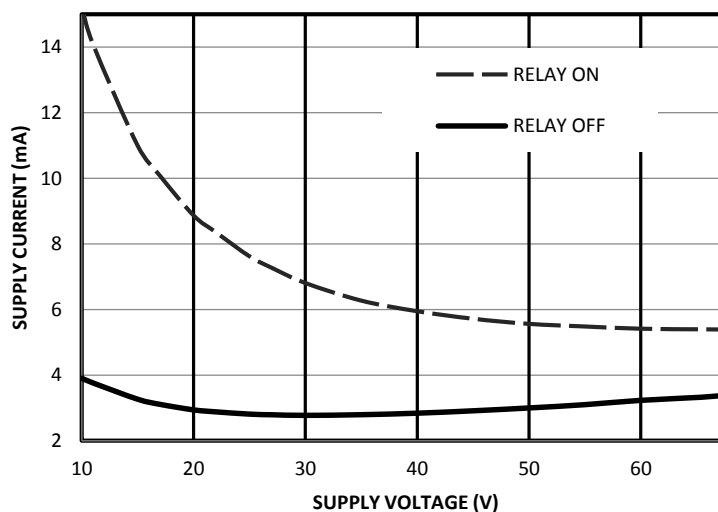
High input capacitance systems such as inverters, dc-dc converters, etc. can be exposed to large inrush currents during the initial power up procedure. If appropriate measures are not employed, these currents can overly stress or even damage the system components. The pre-charge unit eliminates high inrush currents by charging the input capacitor before the main contactor switches on, prolonging lifespan of the contactor and other components dramatically.

**Table 1:** Pre-charge parameter table.

Parameter	Value	Unit
Operating voltage range	11-68	V
Pre-charge resistor	66	$\Omega$
Contactor coil fuse (slow)	2	A
Contactor delay time (default)	4	s
Contactor +	11-68	V
Contactor -	Open collector	n.a.
Weight	80	g
Dimensions	81.1 x 81.8 x 31.4	mm

**Table 2:** Wiring description.

Cable color	Connection
White	Vcc
Brown	Vss
Yellow	Input signal
Green	Set coil negative
Gray	Reset coil negative
Pink	Set/reset coil positive



**Figure 1 :** Supply current vs. supply voltage

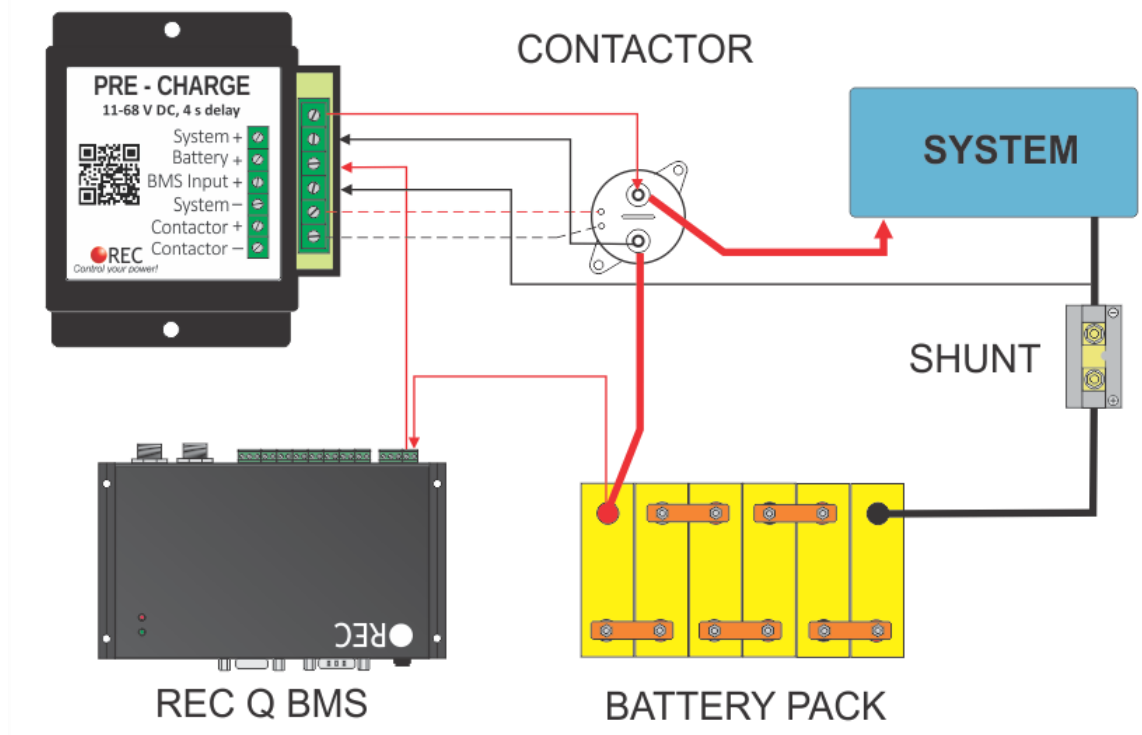
### Typical System Overview:

Figure 2 shows the integration of the pre-charge unit in a typical power system. Only the connections relevant to the pre-charge unit operation are shown. The connection scheme is described in table 2.

**Table 3:** Pre-charge pin description.

Pin	Tab	Description
1	System +	Connects to system side of the contactor
2	Battery +	Connects to battery side of the contactor
3	BMS Input +	Connects to positive battery terminal via BMS internal relay
4	System -	Connects to system ground.
5	Contactor +	Connects to positive contactor coil
6	Contactor -	Connects to negative contactor coil

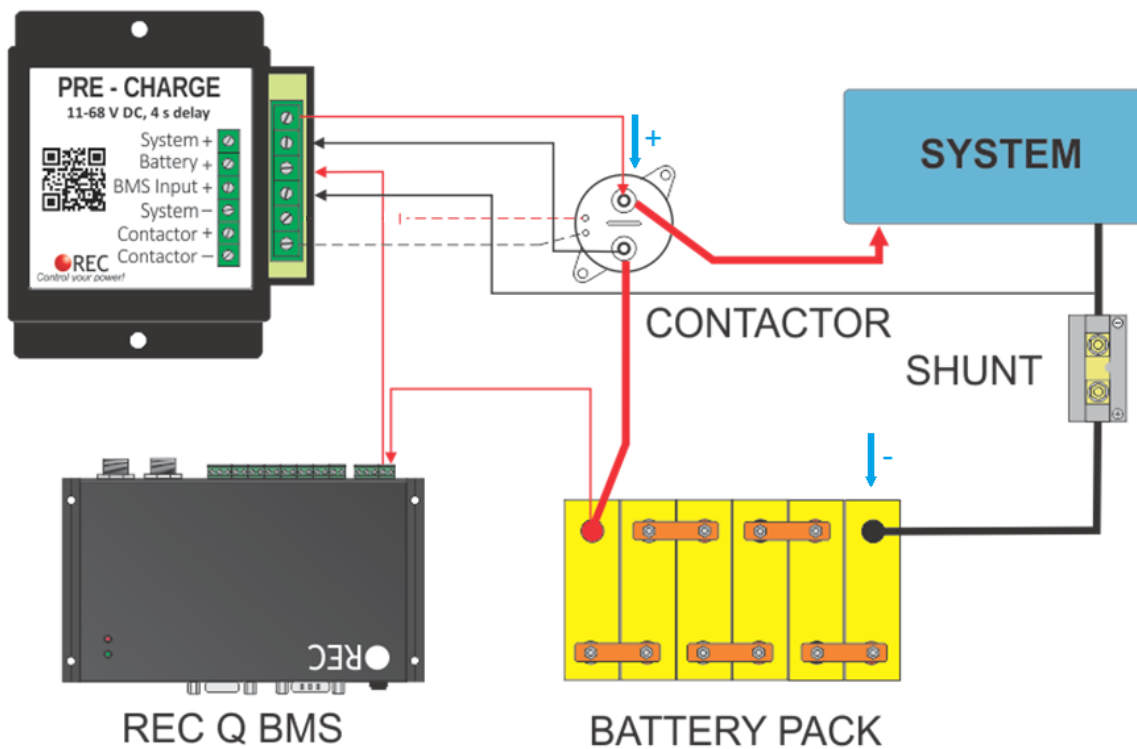
The power system consists of a contactor (NO), a battery pack, a current shunt, a PRE-CHARGE unit, a REC Q BMS unit and a high input capacitance system (SYSTEM). At system start up the REC Q BMS activates the charging procedure by powering the pre-charge unit. The pre-charge unit closes the power circuit through its internal relay (RELAY ON). The inrush current flows entirely through the pre-charge 66 Ω internal resistor. After set delay the transient current should decrease to a safe value. The pre-charge energizes the contactor coil through open collector circuit and after 1 second opens the internal relay (RELAY OFF). All of the system current now passes through the contactor. Normal system operation is achieved.



**Figure 2:** Pre-charge system integration.

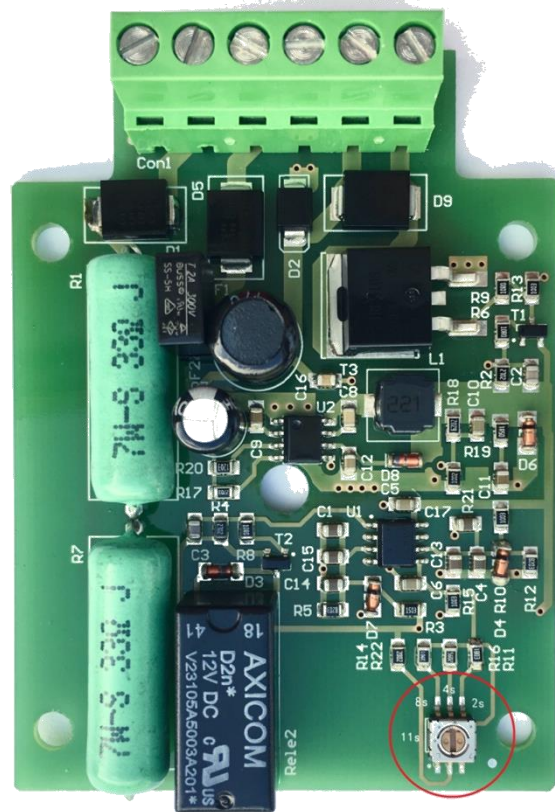
## Measuring/Setting Pre-charge Delay:

To set the pre-charge delay properly, system voltage should be measured at the end of pre-charge timer. Disconnect the Contactor + wire from the pre-charge unit to disable contactor engaging. Now turn on the BMS and measure system voltage. After the pre-charge timer the voltage should rise to at least 80 % of the battery voltage. If the voltage stays below, increase the pre-charge delay. Some of the inverters/controllers on the system side may start to work with low voltage and their power consumption prevent system voltage to rise.



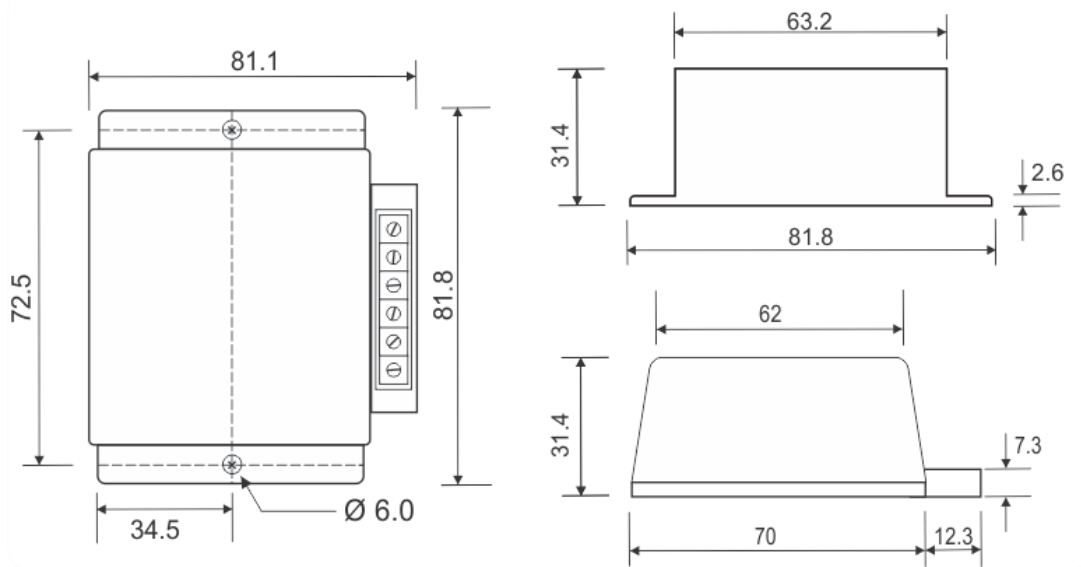
**Figure 2:** System voltage measuring procedure.

By default, the pre-charge timer is set to 4 seconds delay. If the pre-charge delay needs to be prolonged, disconnect all wires from the unit and open the pre-charge unit by unscrewing 4 screws at the bottom side. There is a micro switch to set the delay on PCB. Rotate the switch to a desired position. 2, 4, 8 or 11 s delay may be selected.



**Figure 3:** Pre-charge delay micro switch selector.

**Dimensions drawings:**



**Figure 4:** Pre-charge unit dimensions.