

# Automatic Precharger v1.0

## Mini Manual



### 1. Introduction

Motor controllers for electric vehicles typically have a large internal capacitance with very low ESR (equivalent series resistance). As such they require inrush protection when first turned on to prevent a large current spike which can damage components – most commonly, welding contactors shut.

This device offers automatic staged precharging, first enabling a resistive pathway to slowly (1-2 seconds) charge the controller before the main contactor closes.



### 2. Physical Overview

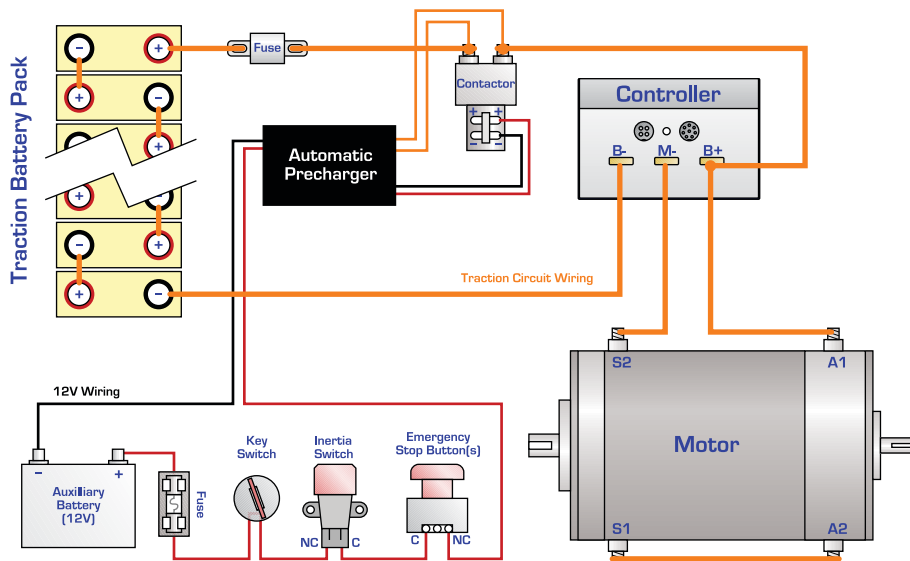


### 3. Wiring

The device has 6 wires to connect:

- Red/black input: Connect your key-switched 12V input power.
- 2x Orange HV: Connect these to the contactor's HV terminals. They are non-polarised (connect either way around).
- Red/black output: Connect these to the contactor's coil. The output is internally fused at 2A, and includes coil spike suppression (from coil inductance back-EMF).

The diagram below shows a recommended wiring diagram for the device:



## 1. Tech Note about Precharging

Prechargers can only work if there are no continuous loads on the output side of the main contactor. Your main contactor should *only* be switching power to the motor controller. Other loads such as DC/DC, 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 does not require a second precharge).

This device is based on a simple analogue design with no error detection or precharge timeout. As such if there are permanent loads downstream from the main contactor, precharge will continue indefinitely which may result in damage to this device's internal resistors and/or relay. However, replacing blown precharge resistors or relays is far less expensive than welded contactors or other damaged components.

## 2. Specifications

- Contactor coil voltage: 12VDC nominal
- HV range: 24-160VDC (non-polarised connections)
- Typical precharge time: 1-2 seconds
- Maximum contactor coil current: 2A
- Reverse input voltage protection, overcurrent protection
- Built-in coil spike suppression