BELKTRONIX

Electric Vehicle DC-DC Installation and Wiring Guide

Initial Release 11/12/06

Revised 1/6/14

Rev 2.0

Document Revision History

- 1.0 Initial release
- 1.1 Revised 4” fan to 80mm fan, changed text to match labels, fan info & wiring text
- 1.2 Added detailed mounting information and instructions for the DC-DC
- 1.3 Added more clarity for wiring sizes and precharge schematic.
- 1.4 Added pictorial view of DC-DC mounting bracket and restructured detailed install
- 1.5 Added pre-charge jumper illustrations prior to fuse install
- 1.6 Defined Pre/Post contactor connections, softstart options & connection
- 1.7 Clarified connection points for remote enable
- 1.8 Renamed OUT for +DCOUT, -DCOUT
- 1.9 Updated a few drawings for clarity and edited a few text descriptions
- 2.0 Fixed labeling to match DC-DC, added precharge method for remote enable models

System Wiring

DANGER: Working with HIGH VOLTAGE Systems can be FATAL.

Follow Guidelines. Maximize Caution. Avoid Distractions.

- The following slides show Pre and Post contactor connections based on option selected (Auto-Start, Soft-Start and/or Remote Enable)
- Each wiring task is illustrated to make it easy to follow, point to point.
- Route low signal wiring away from high current wires.
- A 3 Traction Battery string is illustrated in the diagrams, your system will have more. For custom voltages, contact factory for voltage limits.
- See page 7 regarding pre-charging during the installation process.
- The external 80mm cooling fan is supplied by the user. Use fan to match battery voltage, supply on/off control. Avoid low CFM fans (super quiet type).
- Enable DC-DC converter after DCIN is powered (Remote Enable option).
- For maintenance with Remote Enable option (no Soft-Start) use the Pre-Charge jumper prior to reconnecting DCIN (See Page 7).

Hardware Information

DANGER – USE CAUTION WORKING WITH HIGH VOLTAGE AND CURRENT!

Extra hands may be needed for this installation, if mounting holes are out of reach.
Use safe wiring practices and recommended fuse ratings.

Items included with DC-DC for installation:

(2) ¼-20 Bolts
(2) ¼-20 Serrated shoulder nuts
(1) 8.7” Mounting Bracket, fin mounted
(2-4) 0.250 Female insulated Fast-on terminals
(2) ¼ Ring Lugs, 12-10Ga.

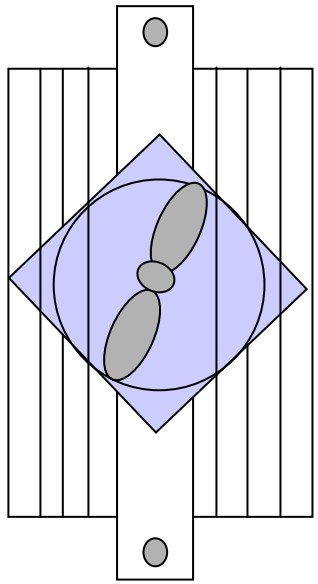
Items Required:

10Ga Wire
18Ga Wire
Fuse Holders
Fuses (1) 10A 250V. (1) 60A Automotive
Proper crimping tool required for Crimp lugs and Fast-on Terminals. Available at automotive stores.

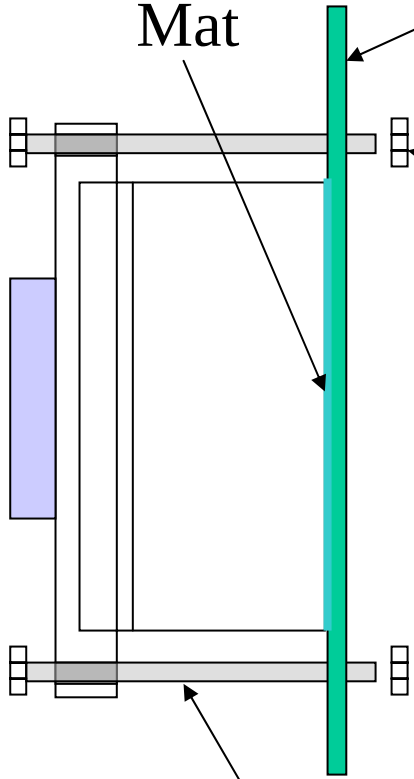
Mounting Diagrams

(Fan shown optional)

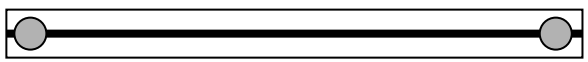
Top View



Side View



Bottom side bracket view



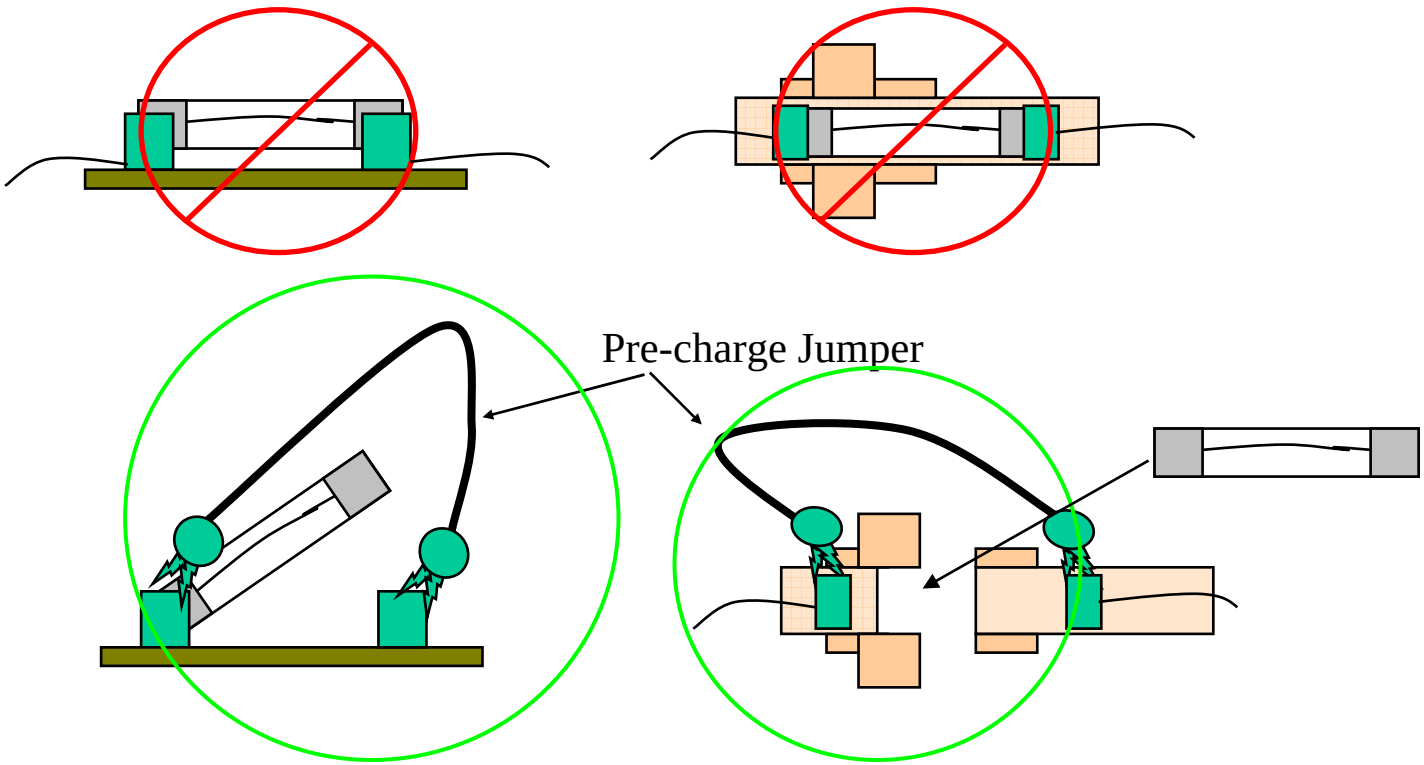
Detailed Mechanical Installation

- The 8.7” rectangular aluminum mounting bracket slides over the centermost fin of the DC-DC with the 2 fan mounting holes facing up. The ends are ¼ through holes for mounting the threaded rods to the mounting surface.
- Locate a flat area in engine compartment which is away from direct exposure to outside elements (i.e. front grill).
- Use aluminum mounting bracket as a template and mark holes to be drilled on vehicle chassis.
- Align DC-DC with fins facing you vertically if no external fan is used. Horizontal OK with fan.
- Drill through with ¼ drill (blind holes require proper drill/tap to use with ¼-20 thread).
- Run bolts through mounting holes and secure on backside with serrated shoulder nuts.
- Secure rubber mat to mounting surface with tape, place DC-DC onto rubber mat and hold in place.
- Insert topside bracket (bracket slot facing heatsink) onto centermost heatsink fin, sliding over threaded rods.
- Tighten bolts onto bracket. Be sure DC-DC is secure. External Fan is needed if high output power or high ambient temperatures are needed.
- See following sections regarding precharge, it may be needed on the input or output of the DC-DC
- Wire up battery ground paths to DC-DC first. Hold ring lugs securely while tightening to DC-DC high current posts.
- Use correct connection method of wiring Pre or Post contactor for DCIN wiring.
- Ready-up positive wires to DC-DC but do not install yet. Cover exposed terminals.
- For POS output post, Pre-charge with resistor lead for 30 seconds, then connect ring terminal and secure tight.
- Wire up remote enable to switched 12V (if equipped). You can use this to power the fan as well.
- Unit is ready to run when power is at DCIN terminals on the DC-DC and remote switch is enabled (if equipped).
- Softstart option will automatically enable the DC-DC internally after approximately 20 seconds.

To prevent large sparks & blown fuses!

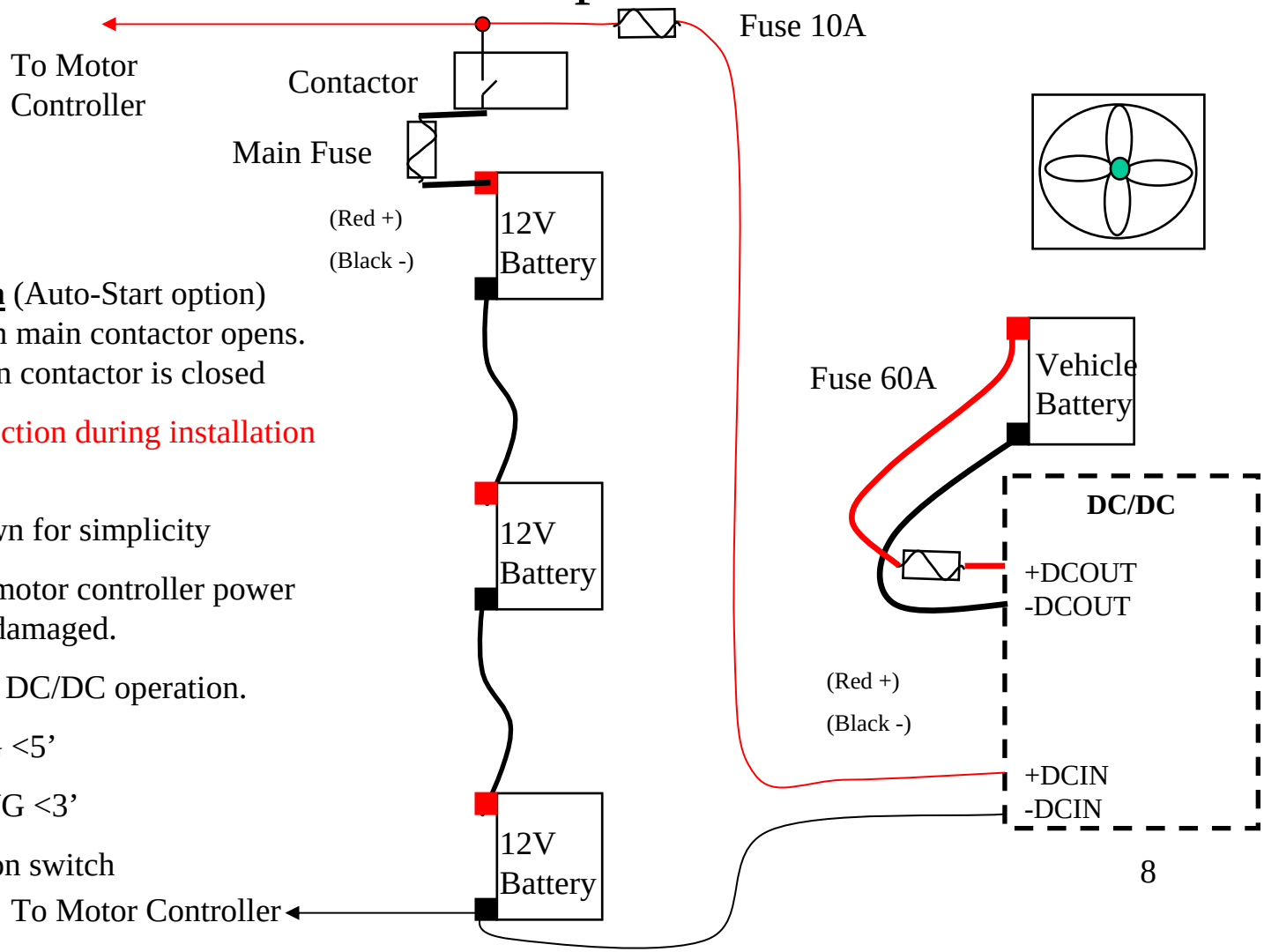
During installation, PRECHARGE FIRST, before installing fuses!

Not Required on DCIN side with Auto-Start or Soft-Start option!



DC-DC Power & Signal Wiring

Auto-Start* Option



<u>Post Contactor Connection</u> (Auto-Start option)
The DC-DC is isolated when main contactor opens. Automatically starts up when contactor is closed

*Pre-charge DC OUT connection during installation (see page 7)

Traction Pack String, 3 shown for simplicity

Do not connect DCIN with motor controller power connections or unit may be damaged.

Vehicle Battery required for DC/DC operation.

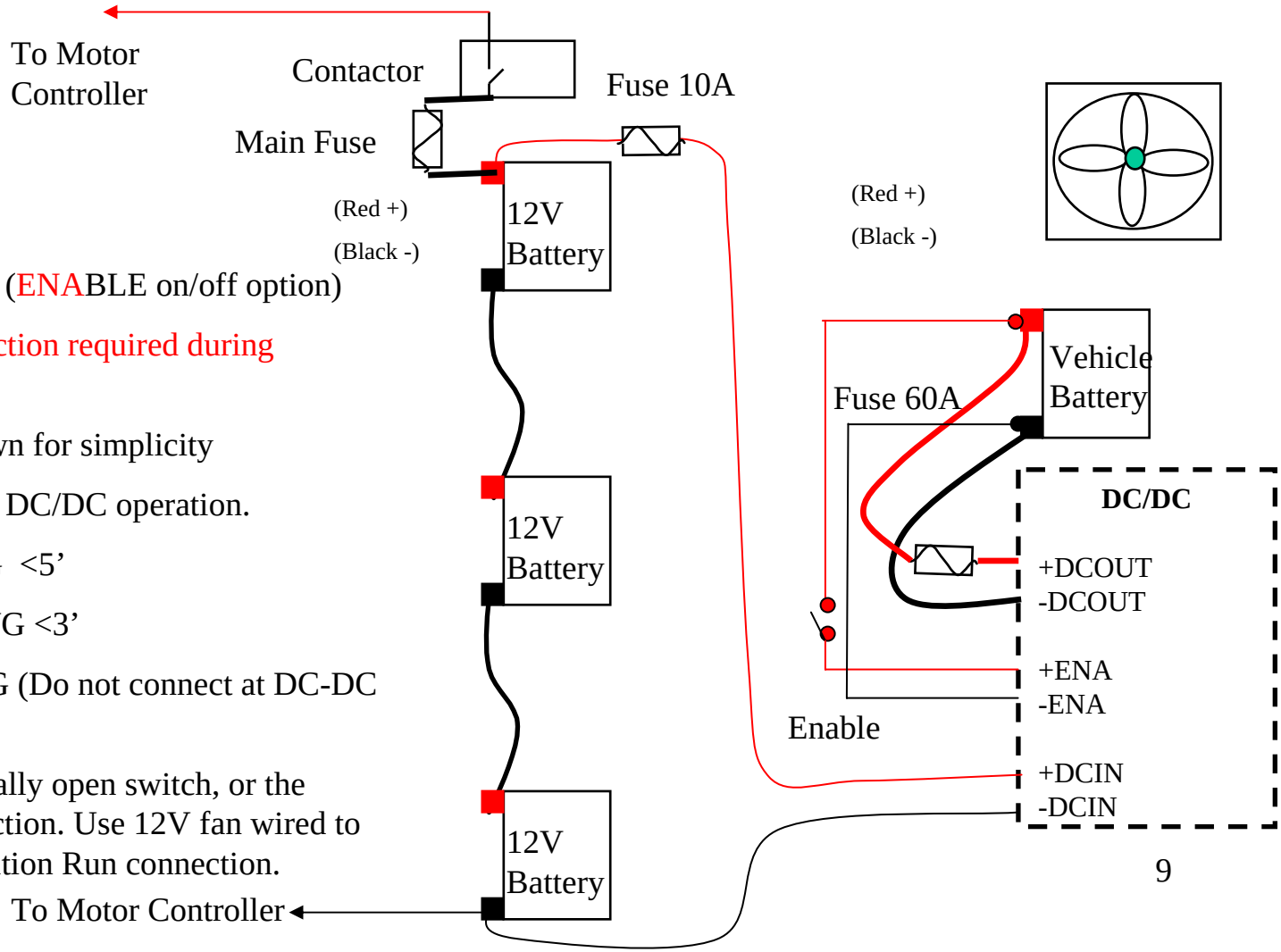
DC Input wire size 18 AWG <5’

DC Output wire size 10 AWG <3’

Use 12V fan wired to Ignition switch

DC-DC Power & Signal Wiring

Soft-Start* option with Remote Enable



<u>Pre-Contactor Connection</u> (ENABLE on/off option)

*Pre-charge DCOUT connection required during installation (see page 7)

Traction Pack String, 3 shown for simplicity

Vehicle Battery required for DC/DC operation.

DC Input wire size 18 AWG <5'

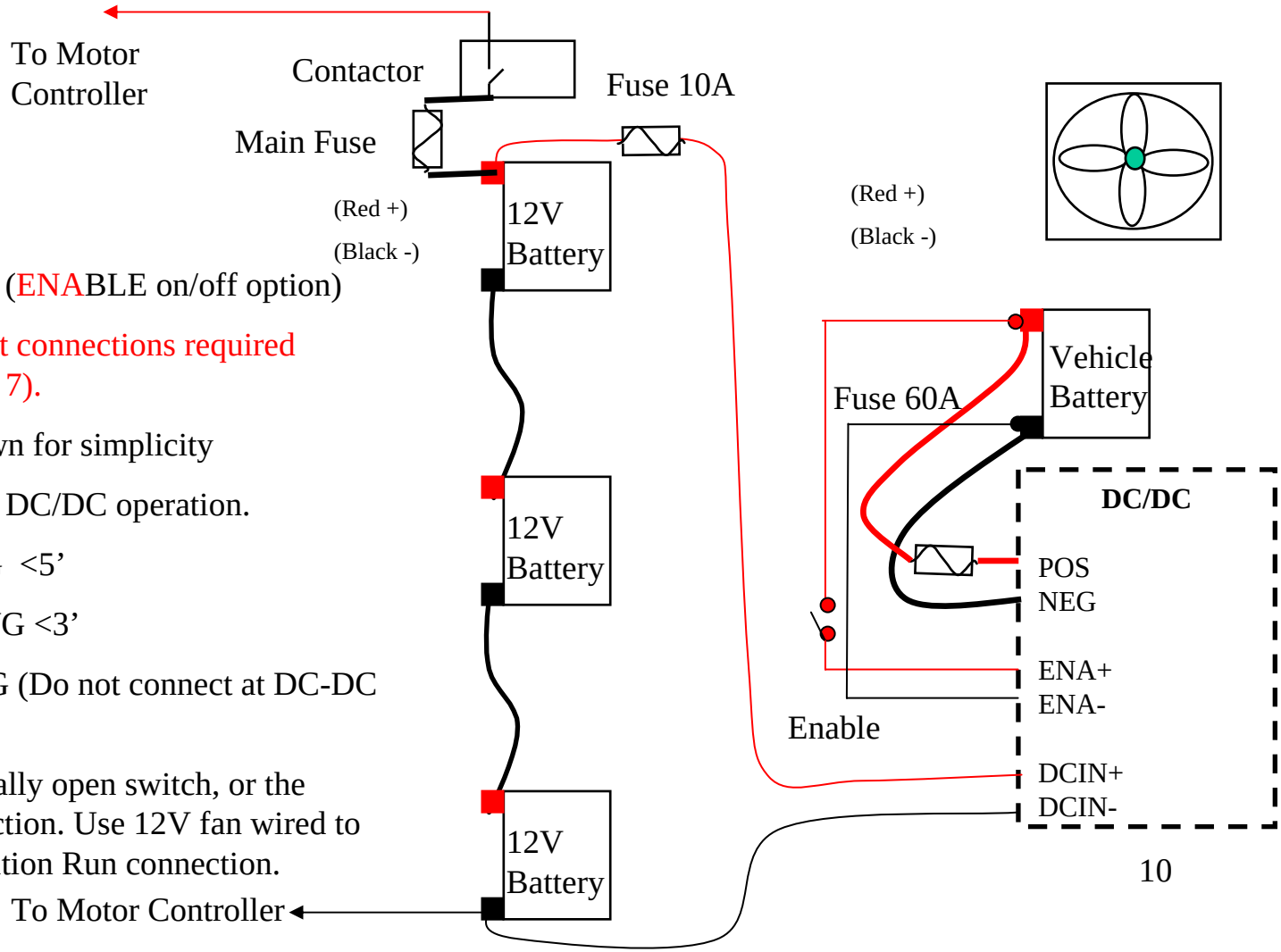
DC Output wire size 10 AWG <3'

ENABLE wire size 22 AWG (Do not connect at DC-DC output).

Enable can be a SPST normally open switch, or the Vehicle Ignition Run connection. Use 12V fan wired to SPST switch or Vehicle Ignition Run connection.

DC-DC Power & Signal Wiring

Remote Enable Only*



<u>Pre-Contactor Connection</u> (ENABLE on/off option)

*Pre-charge input and output connections required during installation (see page 7).

Traction Pack String, 3 shown for simplicity

Vehicle Battery required for DC/DC operation.

DC Input wire size 18 AWG <5’

DC Output wire size 10 AWG <3’

ENABLE wire size 22 AWG (Do not connect at DC-DC output).

Enable can be a SPST normally open switch, or the Vehicle Ignition Run connection. Use 12V fan wired to SPST switch or Vehicle Ignition Run connection.

External Controller Precharge

(Remote Enable models)

- If the controller has a external precharge configuration, it may be possible to precharge the DC-DC input as well. Consult the controller's manual on available startup time/current/limitations. If a external soft start circuit is not available, use the standard connection method illustrated.
- Be sure to enable the DC-DC after the main contactor has closed, otherwise it may not start up.
- If the input fuse blows, it could be due to controller ripple currents showing up at the DC-DC inputs. Add a series choke in series with the +DCIN terminal with at least a 220uH 5A continuous rating