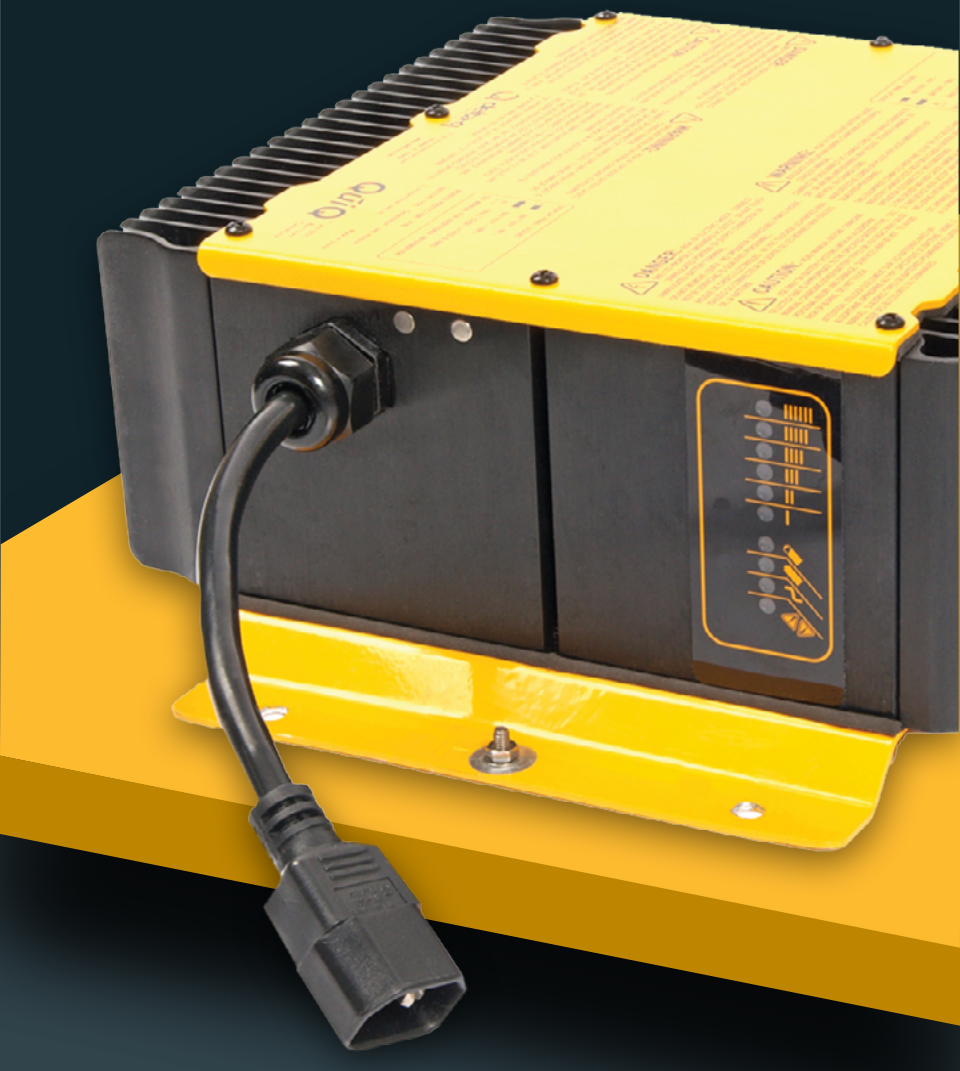
delta-q TECHNOLOGIES



QUIQ SERIES

INSTALLATION & TROUBLESHOOTING GUIDE

NOTE TO THE READER

Use table of contents links to make the document easier to search.

Use the link in the bottom left corner to return to the table.

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GETTING STARTED

Before installing your Delta-Q Technologies battery, please review and follow these safety guidelines.

HIGH VOLTAGE SAFETY

WARNING: This product produces hazardous output voltages under normal operation. Exercise extreme care when working with the equipment and the batteries.

WARNING: DO NOT open or disassemble the charger. No user-serviceable parts are contained inside the unit. Do not operate the charger if the AC supply cord is damaged or if the charger has received a sharp blow, been dropped, or otherwise damaged in any way. Refer all repair work to qualified personnel. Not for use by children.

ELECTRICAL SAFETY INFORMATION

DANGER: Risk of electric shock. Connect charger power cord to an AC outlet that has been properly installed and grounded in accordance with all local codes and ordinances. A grounded AC outlet is required to reduce the risk of electric shock—do not use ground adapters or modify the plug. Do not touch uninsulated portions of the output connector or uninsulated battery terminals. Disconnect the AC supply before making or breaking the connections to the battery. On versions of the charger with connectors, using mating connectors of different manufacturers may void regulatory certifications and result in a hazardous situation. Always use mating connectors approved by the connector manufacturer.

BATTERY SAFETY INFORMATION

WARNING: Only use the charger with a charging profile that is appropriate to the specific battery type. Other usage may cause personal injury and damage. Lead acid batteries may generate explosive hydrogen gas during normal charging. Keep sparks, flames, and smoking materials away from batteries. Do not operate charger in a closed-in area or an area with restricted ventilation. Never charge a frozen or non-rechargeable battery. Study all battery manufacturers' specific precautions such as recommended rates of charge and removing or not removing cell caps while charging. Use care to prevent personal objects or metal tools from contacting terminals of the batteries. Severe burns can result.

INSTALLATION SAFETY INFORMATION

DANGER: Charger outputs and battery voltages pose an energy and/or shock hazard under normal use. These units must be installed in the host equipment in such a manner that the output cable and battery connections are only accessible with the use of a tool by qualified personnel.

MECHANICAL INSTALLATION

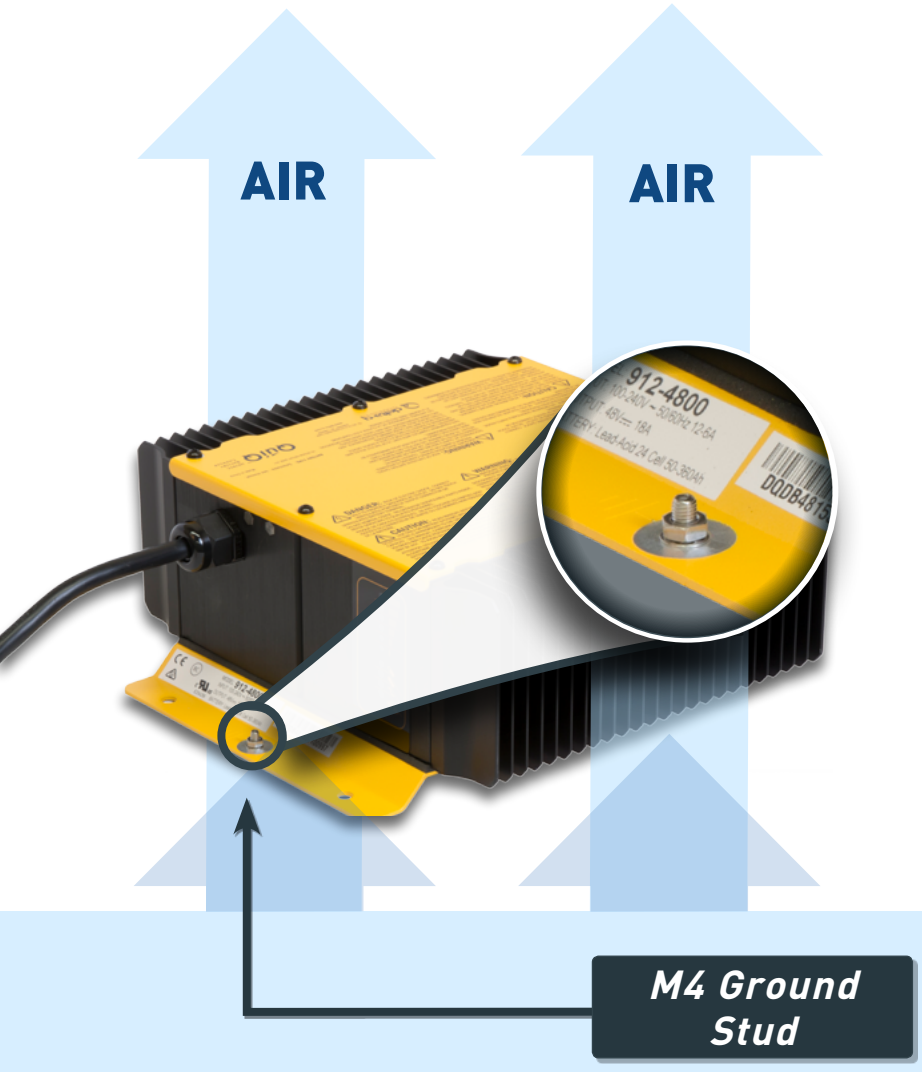
Proper mechanical installation of the QuiQ charger is essential to its effective operation.

ENVIRONMENT

Locate the charger with adequate ventilation. Ideally, it will be mounted horizontally with airflow from below as per the arrows in the illustration below. See Mounting Instructions for more options.

The QuiQ Series charger case is an IP66 enclosure. It is well protected against fine dust (IEC60529 IP6x), and capable of operation in heavy seas, temporary flooding, and heavy water streams (IEC60529 IPx6). The input cord IEC60320 connector is rated IP20 at this time. It is suitable for indoor use only and must always be kept clean and dry. Use of heat shrink over the mated connection is strongly suggested for general use.

Delta-Q Technologies offers an AC cord that will seal the connection to IP66. Contact the manufacturer of your vehicle/machine or the distributor of the charger for more details. During charging, the surface of the charger may become warm, especially in higher ambient temperatures. This is normal. Install so risk of human contact with hot surfaces is reduced.

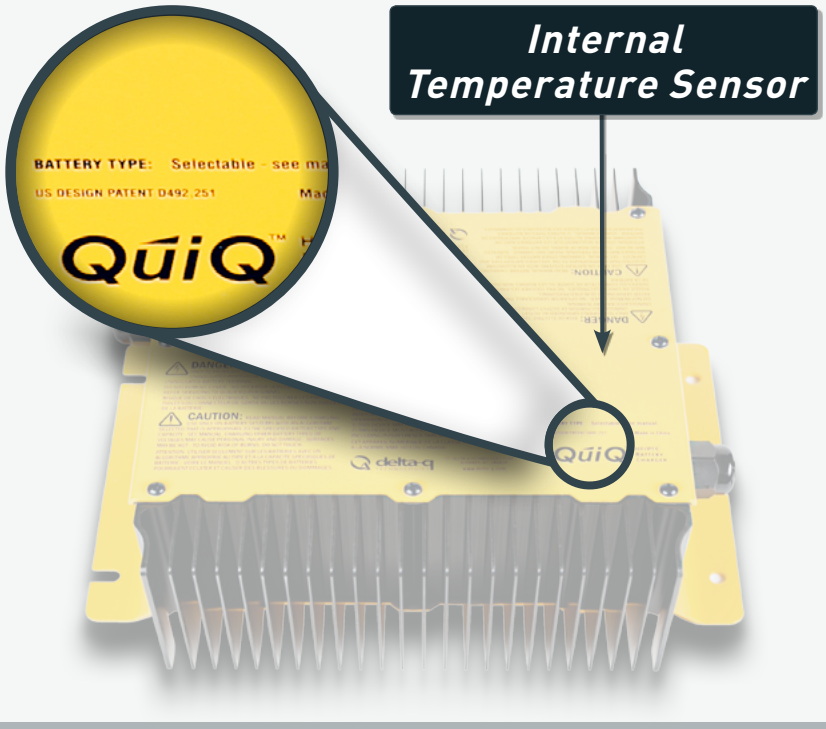


Proper Mechanical Installation

MOUNTING INSTRUCTIONS

Mount the charger by the mounting plate using appropriate fasteners (i.e., locking ¼" or M6 bolts), and all of the mounting slots provided. If mounting in an enclosed area, test the charger and monitor it for reduced power operation. If mounting the charger vertically, there are two considerations: charger performance and charger life. The charger's internal temperature sensor is located approximately 2.5cm (1") behind the DC output cord strain relief. For performance closest to horizontal installation: Place the DC output at the lower end of the charger to delay thermal cutback, maximize charger output, but potentially cause higher temperatures inside the charger.

For potentially better life: Keeping the temperature sensor higher will result in earlier thermal cutback of power, minimizing internal temperatures and minimizing potential component failures. However, there is no data to demonstrate the amount of lifetime savings that may be gained by using this orientation over the above.



Mounting Example

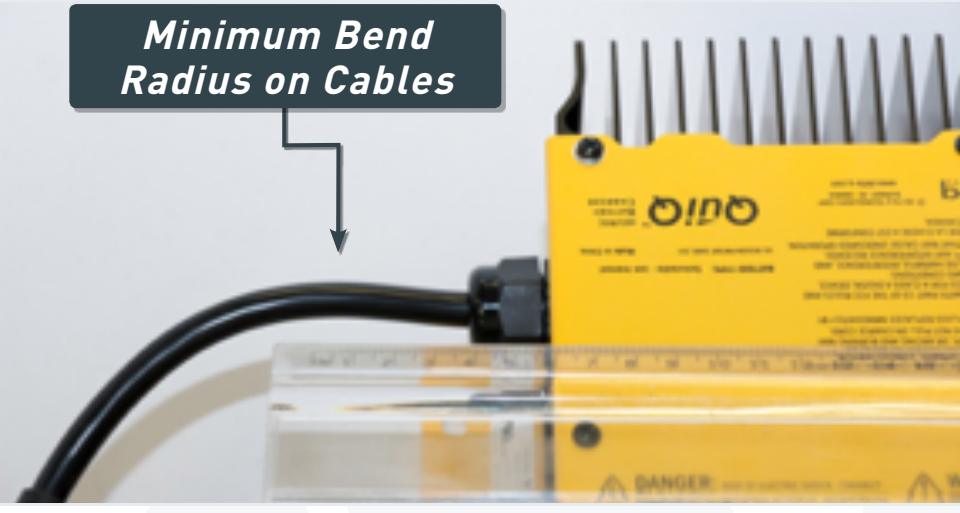
SAFETY

For UL2202 1st Edition safety compliance in electric vehicle applications, a 12AWG green bonding wire must be attached from the M4 stud located on the charger (see page 6) to the vehicle frame. This is for electric shock safety. The recommended torque is 1.6±0.1N-m. Alternatively, M6 star washers can be used on the mounting holes to "bite" through the paint on the base plate to make electrical contact. The recommended torque for this is 7.0N-m±0.2N-m. If used in an electric vehicle application, UL2202 1st Edition and the National Electrical Code (NEC) requires the charger's AC plug be located at least 18" above the ground and the display should be visible to the user.

NOTE: UL2202 1st Edition has been obsoleted. This information is provided only for reference. Typical maximum surface temperature of the QuiQ charger is 60°C (140°F).

VIBRATION

QuiQ Series chargers are designed to UL2202 1st Edition and the vibration test specified within. It is not intended for heavy-duty vehicle applications.



Minimum Bend Radius on Cables (60mm - 2.36")

CABLE STRAIN

High strain on the AC Input Cord combined with heating and cooling over time may cause one or more conductors in the cord to break and the charger to fail. The recommended minimum bend radius on all cables leaving the charger is 60mm (2.36”). This is illustrated below on the AC input cord.

If it is necessary to clamp the AC cord to the machine, it is recommended to clamp the AC attachment cord that is brought to the QuiQ charger’s AC input, not the QuiQ Series charger’s AC input cord itself. This is to isolate any possible wear or damage to the easily replaceable attachment cord, and not the charger.

An illustration of this appears below:


CLAMP
this side
only
To
Charger
DO NOT
CLAMP
this side

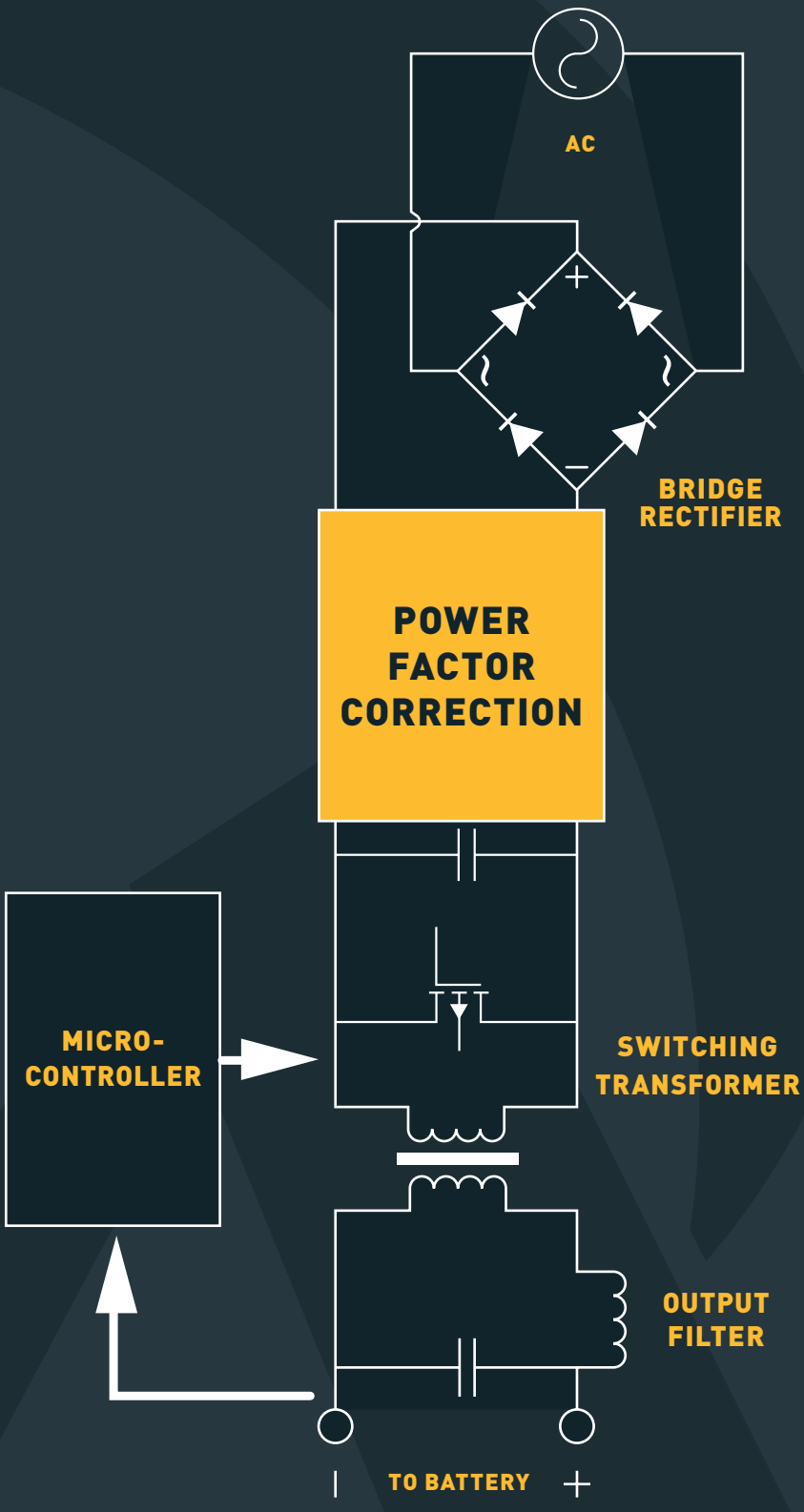
ELECTRICAL INSTALLATION

As QuiQ Series chargers are available in dozens of different output configurations, pay close attention to the specific configuration of your charger and follow the information below for maximum performance from your installation.

AC INPUT

The AC input of QuiQ Series chargers use the standard IEC60320/C14 Connector.

The QuiQ Series charger's AC input is designed to accept a nominal 85-265VAC (QuiQ 1500: 100-265 VAC) 45-65Hz input to accommodate worldwide operation. It is a standard filtered, full-wave, bridge-rectified input, as illustrated below:


AC
BRIDGE RECTIFIER
POWER FACTOR CORRECTION
MICRO-CONTROLLER
SWITCHING TRANSFORMER
OUTPUT FILTER
TO BATTERY

AC Input

NOTES:

Turn-on input voltage is 85VAC (QuiQ 1000) and 110VAC (QuiQ 1500).

Turn-off input voltage is 80VAC (QuiQ 1000) and 100VAC (QuiQ 1500).

Charger may handle a much wider range of input frequencies. Contact Delta-Q Technologies if a non-standard frequency input is anticipated.

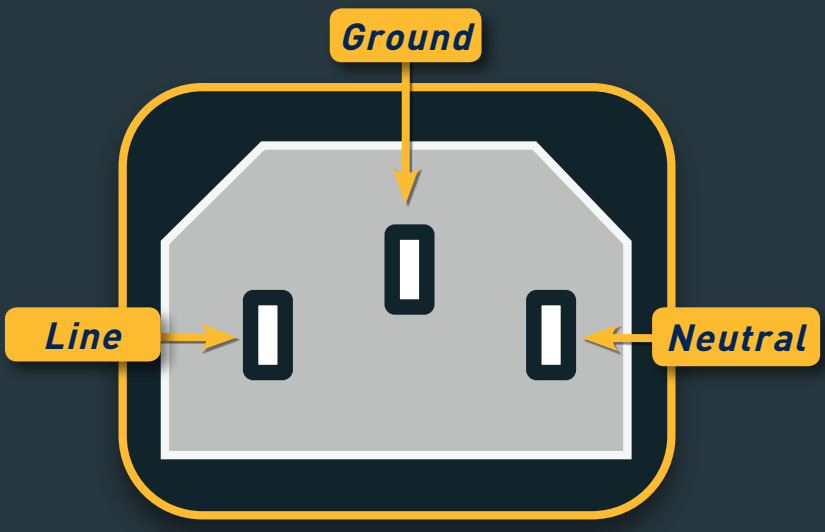
A Class A Ground Fault Circuit Interrupter (GFCI) is recommended for use with the charger if there is a risk of electric shock while handling the charger.

The QuiQ Series charger has been tested with a number of portable AC power generators. DQDB and newer chargers can be used with virtually any generator rated 2kW or higher. Lower rated generators may also work as ratings vary widely, test the charger under load with

the generator before putting it into service. Older chargers should be used with a sine-wave inverter generator only.

QuiQ 1500 will reduce power to 1200W if AC voltage falls below 180VAC.

QuiQ 1500 will resume maximum power if AC voltage rises above 189VAC.



Connector Pin Configuration

PIN	COLOR	DESC.	MINIMUM WIRE
L	Brown	AC Line	14 AWG/2.5mm2
G	Green/Yellow	AC Ground	
N	Blue	AC Neutral	

NOTE: Recommended Extension Cords (110VAC): 10AWG/6.0mm2: max length of 30m (100ft) 14AWG/2.5 mm2: max length of 15m (50ft) 16AWG/1.5 mm2: max length of 7.5m (25ft)

INTERLOCKS

There are two types of interlocks and both interlocks have their own relay.

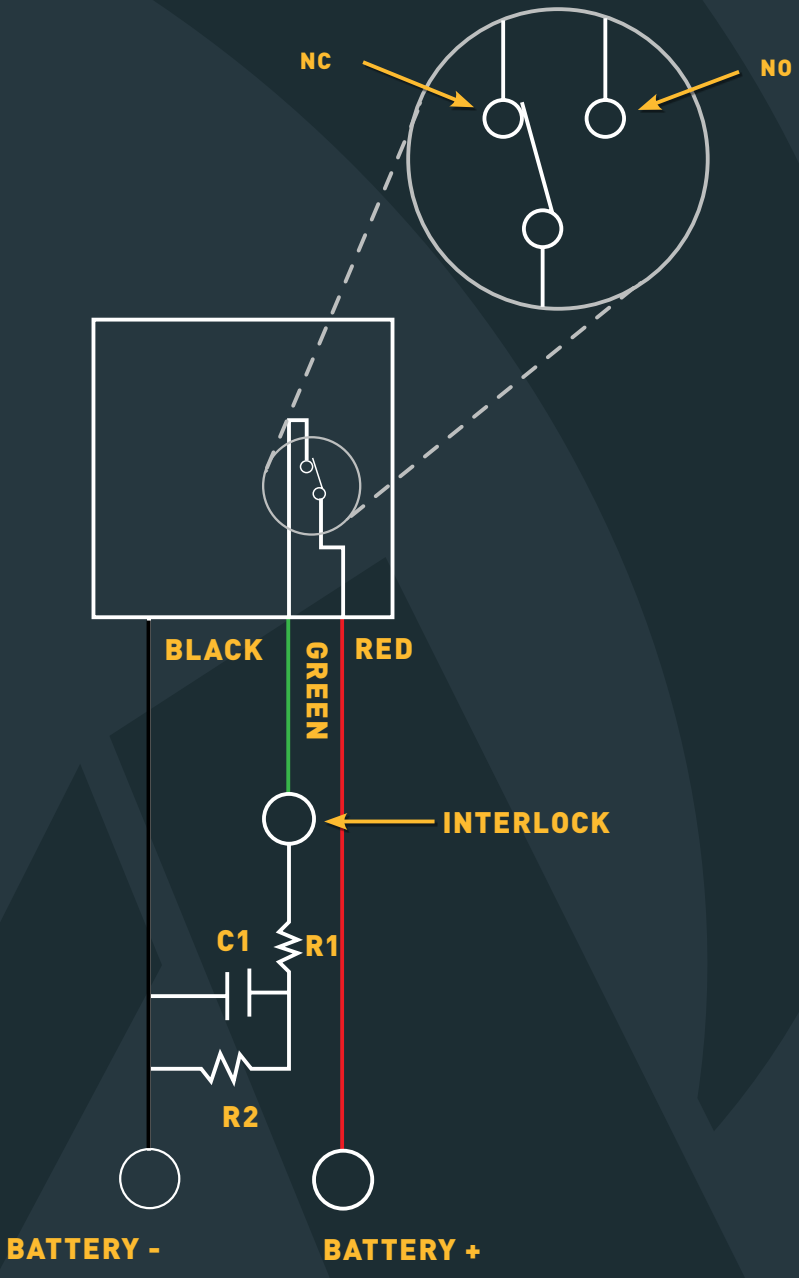
STANDARD INTERLOCK

- One wire interlock
- Referenced to battery negative
- Green wire on standard cable
- Toggling can depend on installed algorithm
- Use a recommended wetting circuit

SIGNAL INTERLOCK

- Three wire interlock
- Floating reference
- Three wires are found in the Deutsch connector (DT06-08SA) in the QuiQ ICON
- Toggling will always happen with connection/disconnection of AC power

WETTING CIRCUIT

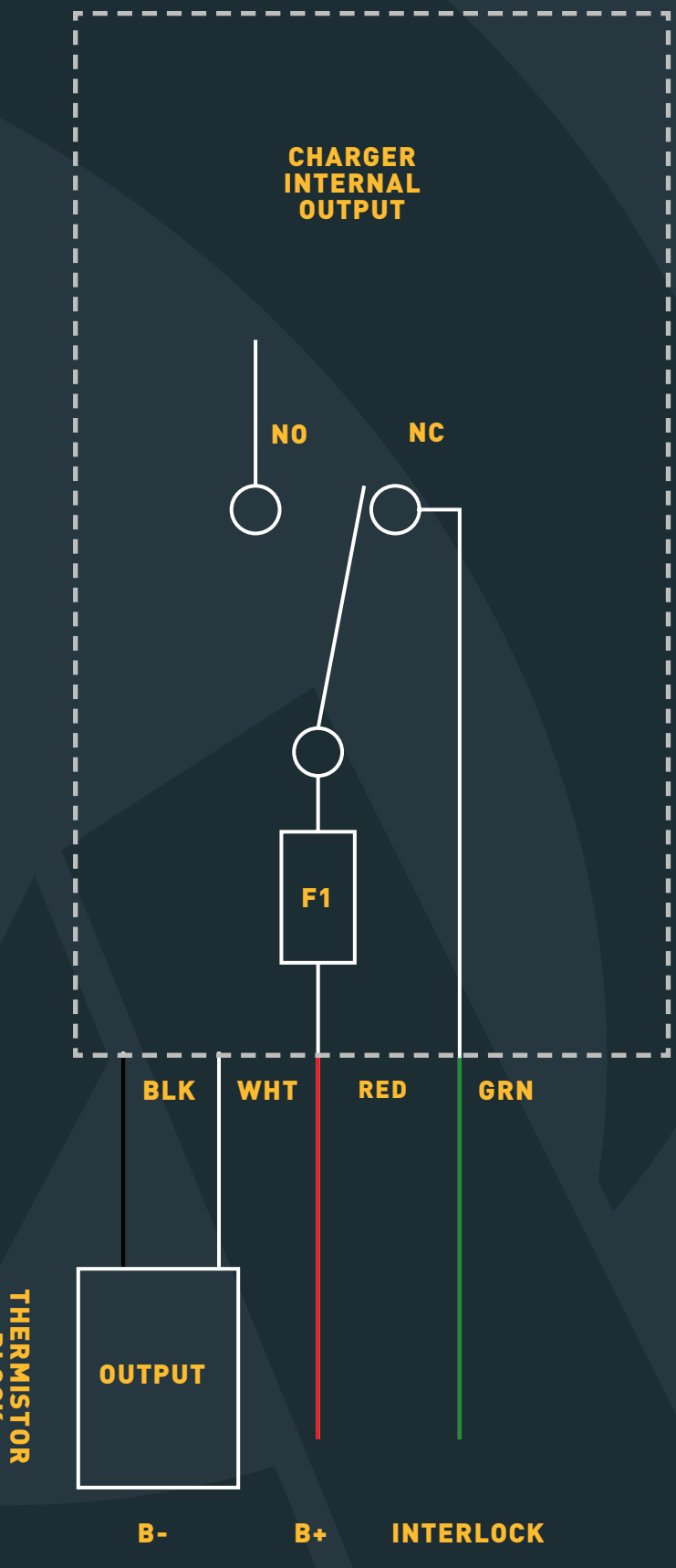


Wetting Circuit DC Output

DC OUTPUT (V)	24	36	48	72	84	96
R1 (Ω)	10	15	20	29	33	39
C1 (uF)	47	47	22	22	22	22
C1 (V)	50	63	100	125	150	180
R2 (Ω)	100	100	220	220	220	220

STANDARD DC OUTPUT

Simplified internal diagram of the charger's output connections.


CHARGER
INTERNAL
OUTPUT
NO
NC
F1
BLK
WHT
RED
GRN
THERMISTOR
BLOCK
OUTPUT
B-
B+
INTERLOCK

WIRE COLOR	TERMINATION	DESC.	WIRE SIZE
Red	3/8” Ring Terminal	Battery Positive	12AWG/ 3.3mm2
Black	3/8” Ring Terminal via Thermistor Block	Battery Negative	12AWG/ 3.3mm2
White	Overmoulded Thermistor Block	Temperature Sensor Signal	12AWG/ 3.3mm2
Green	Female ¼” Spade Terminal (ships shrouded)	Standard Interlock	12AWG/ 3.3mm2

Table 3-1

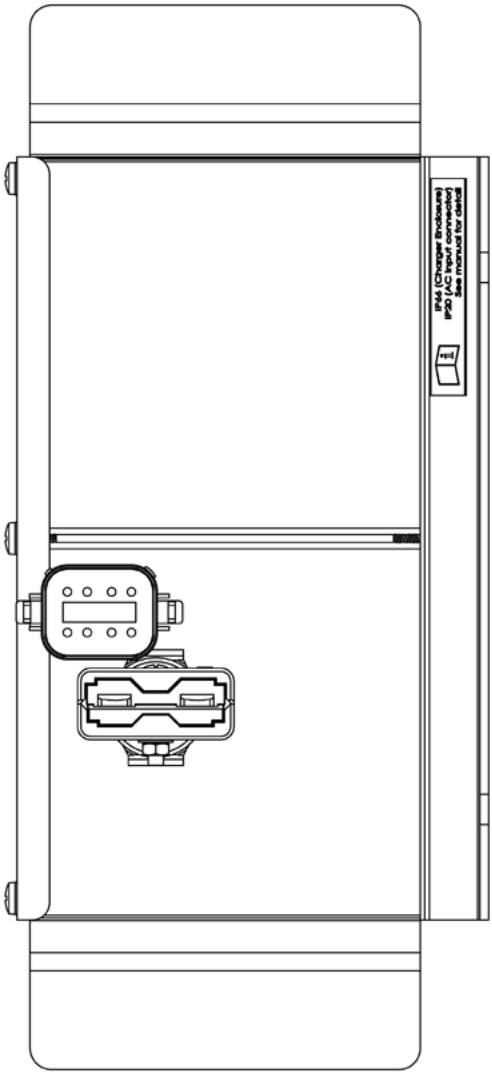
WIRE COLOR	NOTES
Red	It is recommended to install an appropriate size fuse from the battery terminal to the vehicle system. This may also prevent damage to the charger.
Black	**Important:** Connect the ring terminal with overmould directly to the battery negative post; if not, the sensor will not have accurate battery temperature information and charge performance may be affected.
White	If this cable end is damaged, or if the negative wire needs to be separated from the thermistor, a Thermistor Repair Kit (Part Number 900-0002) is available.
Green	Internally connected to Battery Positive when charger is not connected to AC power. **Important:** Install a 1A fuse inline to avoid damage to the internal relay. Do not allow this wire to contact Battery Negative. **NOTE:** On 24V-72V units, the standard interlock will be set to B+ even when the charger is connected to AC Power when the charger is in Fault State 1, 2, or 6.

Table 3-2

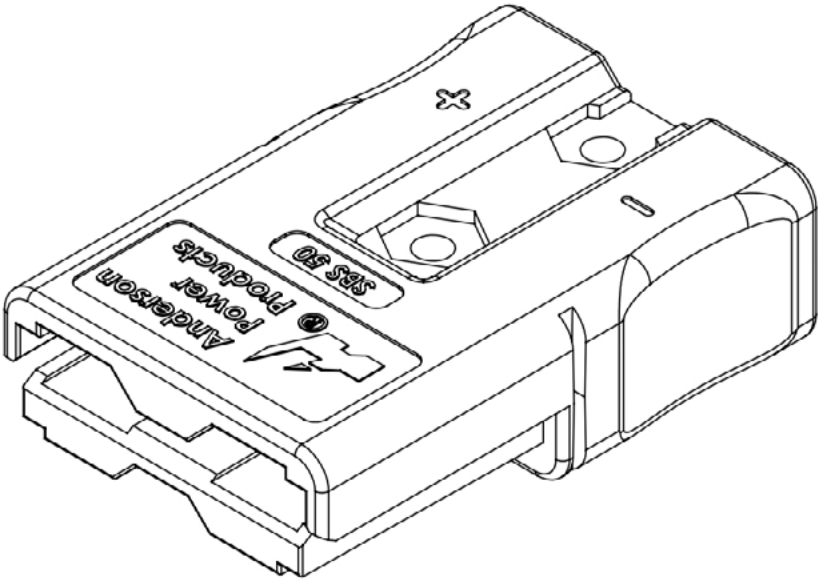
INLINE CONNECTOR (ICON) DC OUTPUT

PART NUMBERS

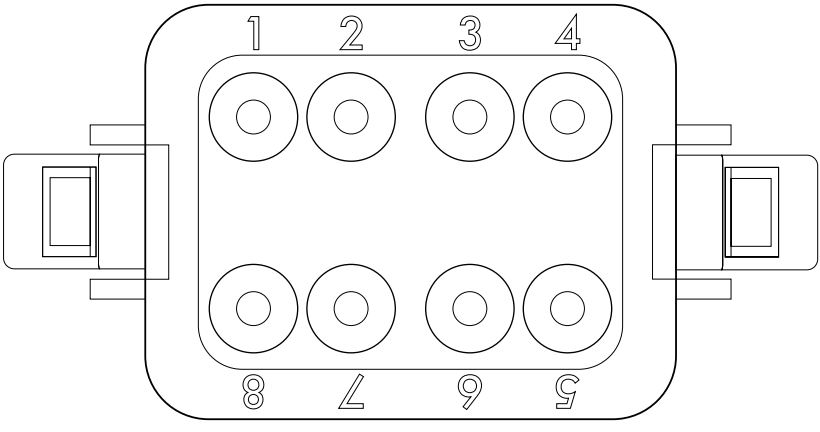
912-2454, 912-3654, 912-4854, 912-7254, 912-9654, 914-4854-01, and 914-7254-01.



24V/36V/48V/72V/84V/96V QuiQ Model



Anderson Power Connector



Deutsch DT06-08SA Signal Connector

CONN PIN	WIRE DIAMETER (AWG)	DESC.
1	14-20	Temp Sense+
2	14-20	Temp Sense-
3	14-20	Signal Interlock NC
4	14-20	Signal Interlock COM
5	14-20	Signal Interlock NO
6	14-20	LED +
7	14-20	LED -
8		NOT USED

Pin Configuration for Signal Connector (Deutsch DT05-08SA) Table 4-1

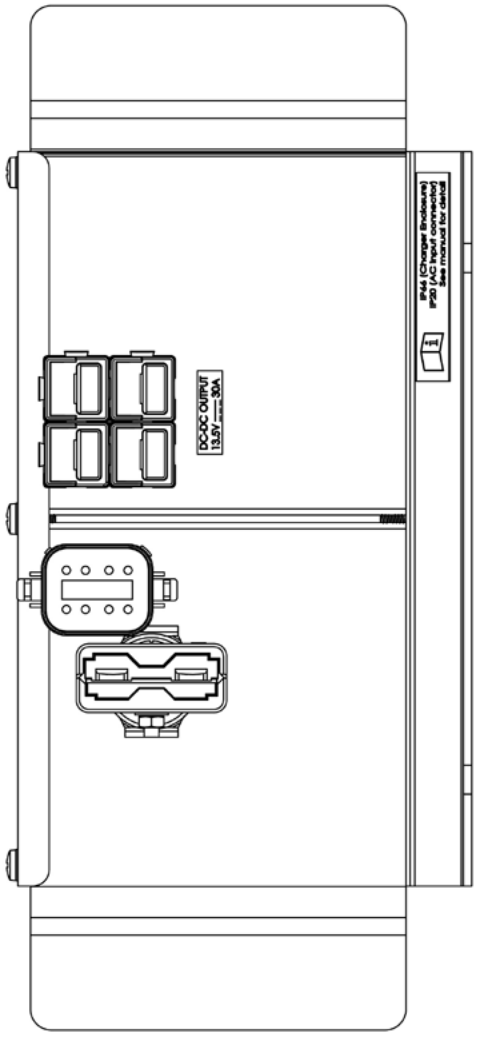
CONN PIN	NOTES
1	Connect to NTC 10k 5% Thermistor. **IMPORTANT:** If using a temperature-sensing algorithm, connect to Battery Negative or Temp Sense Negative if not installed. **CAUTION:** Ensure B+ and B- polarity are correct before connecting this pin otherwise this input may be damaged.
2	Internally connected to battery negative
3	Normally Closed
4	Common, 1A maximum. Inline 1A fuse installation recommended.
5	Normally Open
6	Red Cathode, 4.5 mA
7	Green Cathode, 4.5 mA
8	Install sealing plug 114017

Pin Configuration for Signal Connector (Deutsch DT05-08SA) Table 4-2

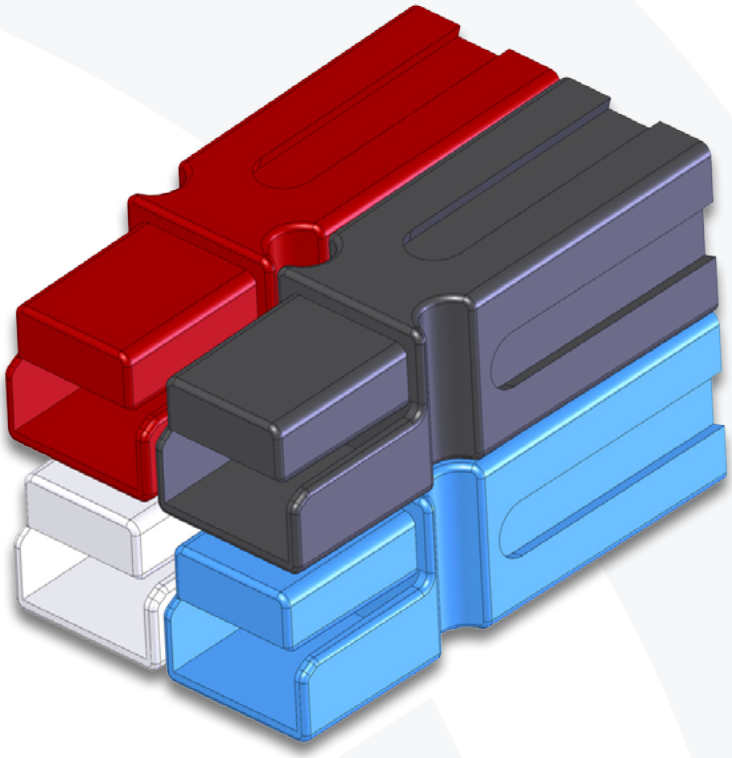
QUIQ-DCI MODELS DC OUTPUTS

Part numbers

922-4854, 922-7254, and 922-9654 have the same DC output/Deutsch connectors are our Inline Connector charger. QuiQ-dci has an extra output connector. (12V DC-DC output with Anderson Power Connectors).



48V/72V/96V QuiQ-dci Model



Anderson Power
(PP75 Series) 114958G1

CONN PIN	WIRE DIAMETER (AWG)	DESC.
Black	10-12	12V Ground
Blue	10-16	Switched Output Enable (Input)
Red	10-12	12V Unswitched Output
White	10-12	Switched Output

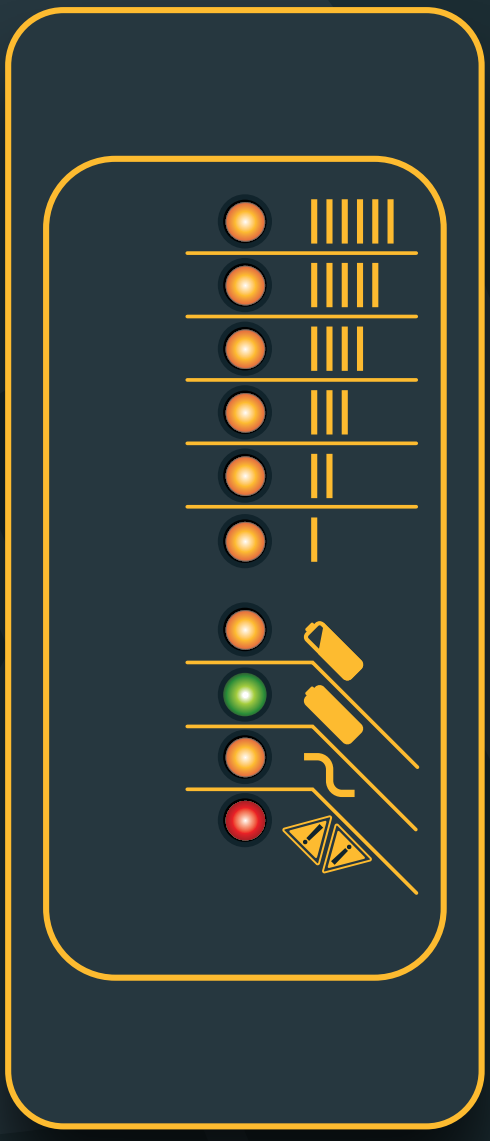
CONN PIN	NOTES
Black	
Blue	8-17 VDC on this pin activates the 12V switched output pins
Red	Always active 13.5V output
White	13.5V output activated by the switched output enable

Pin Configuration for Signal Connector (Deutsch DT05-08SA)

QUIQ CHARGER
TROUBLESHOOTING

INDICATIONS ON THE CHARGER 10-LED DISPLAY

LED indications following “Power-On Self Test”:



SYMBOL	AMETER (AMBER)	
	SOLID	Display approximate scale of current output during charging. Also indicates algorithm #1-6 for 11 seconds if no battery is connected.
	FLASHING	High internal charger temperature. Current output reduced. Provide better airflow to the charger. Try placing the charger to a cooler location or open the machine panel that may be restricting airflow. Confirm that dirt or mud is not blocking the cooling fins of the charger. Clean the charger. Rinse charger with low-pressure hose if needed.

SYMBOL	80% CHARGE (AMBER)	
	SOLID	Bulk charge phase complete, 80% charged. In Absorption phase.
	FLASHING	Indicates selected algorithm number by a number of flashes when no battery connected.

SYMBOL	100% CHARGE (GREEN)	
	SOLID 	Charging complete. Charger in Maintenance Mode.
	FLASHING 	Absorption phase complete. In Finish phase.

SYMBOL	AC ON (AMBER)	
	SOLID 	AC Power good.
	FLASHING 	AC Voltage below 105VAC. Check AC voltage and extension cord length (max length 30m (100') at 10AWG (6.0mm²) or 7.5m (25') at 16AWG (1.5mm²)).

SYMBOL	FAULT (RED)	
	FLASHING 	Charger error. Count the number of red flashes between pauses and refer to "Fault Indications" below.

FAULT INDICATIONS

As discussed, add note about flashing timings to ensure charger isn't resetting and flashing #1 multiple times.

Note: The number of red flashes between pauses for the Fault LED, and refer to table below. The blinking rate is 0.2s on, 0.2s off, and 1.2s between repeats.

FAULT LED
HIGH BATTERY VOLTAGE DETECTED
Flashes (Red): ☀
Starting voltage above 2.5V/cell or voltage during charge rose above 2.7V/cell (algorithm dependent). • Check that the battery charger voltage is consistent with the battery pack voltage. • Check for wiring errors. • Occasionally a new, fully charged battery pack may cause this condition. Use this pack before charging it again. • Disconnect any other sources during charging.

- If this problem does not clear after the battery voltage is measured to be less than 2.5V per cell, contact the manufacturer of your vehicle/ machine or the distributor of the charger for servicing.
- This fault will automatically clear and the charger will restart charging when the voltage drops to within operating range.

LOW BATTERY VOLTAGE DETECTED

Flashes (Red): 

Starting voltage below 0.5V/cell

- Check that the battery charger voltage is consistent with the battery pack voltage.
- Check the battery and connections to the battery.
- If this problem does not clear after the battery voltage is measured to be higher than 1V per cell and all connections are good, contact the manufacturer of your vehicle/ machine or the distributor of the charger for servicing.
- This fault will automatically clear when the oltage returns within range.

CHARGE TIMEOUT

Flashes (Red): 

Indicates the battery failed to charge within the time allowed by the charge algorithm. This could occur if the battery is of larger capacity than the algorithm is intended for. In unusual cases, it could mean charger output is reduced due to high ambient temperature. It can also occur if the battery is damaged, old, or in poor condition.

- Check the battery for damage such as shorted cells and insufficient water. Try the charger on a good battery.
- Check for sufficient cooling air around charger. If ambient temperature is over 35°C, consider using a fan to move air to keep the charger cool.
- If the same fault occurs on a good battery, check the connections to the battery, connections to the AC power source, and AC voltage level.
- Confirm that the nominal battery pack voltage is the same as the battery charger voltage.
- If a charger displays this fault on a battery

pack, and the pack is of questionable status, reset the charger by disconnecting AC power for 30 seconds, and then reconnect the AC to start a new charge cycle. After a few charge cycles, this problem could stop occurring as the pack recovers.

- This fault must be cleared manually by unplugging the AC power and waiting 30 seconds before reconnecting the AC power.

CHECK BATTERY

Flashes (Red): 

This fault indicates the battery pack could not be trickle charged up to the minimum level required for the normal charge cycle to be started.

- Check that none of the battery pack connections between modules are reversed or incorrectly connected.
- Check that one or more cells in the battery are not shorted.
- Confirm that the nominal battery pack voltage is the same as the battery charger voltage.

- Try the charger on a good battery.
- This fault most likely occurs, when the battery pack is in poor condition. Try to recover the pack with a charger that can charge the individual batteries – such as an automotive charger. Be sure to set this charger to the appropriate voltage – 6V per 6V battery, 12V per 12V string/battery.

OVER-TEMPERATURE

Flashes (Red): 

This fault indicates the charger has become too hot during operation and has shut down. As opposed to the flashing describe above, this fault indicates an even higher temperature was reached inside the charger. Though not damaging to the charger, charging may not be possible under these conditions.

- Install the charger in a cooler location or increase airflow to the cooling fins.
- This fault indication will not clear automatically, but the charger will restart charging automatically when the temperature drops. The fault indication must be cleared manually by unplugging the AC power and waiting 30 seconds before reconnecting the AC.

QUIQ INTERNAL FAULT

Flashes (Red): 

This fault indicates that the batteries will not accept charge current, or an internal fault has been detected in the charger. This fault will nearly always be set within the first 30 seconds of operation.

- Try to clear the fault by unplugging AC power, and waiting 30 seconds before reconnecting the AC.
- Check all battery connections and look for a high resistance connection. This fault is most likely due to a fault in the battery such as a bad battery connection, an open cell, or insufficient water. External contactors disconnecting the charger from the battery may also cause this fault.
- Other electrical hardware such as contactors, switches, etc. which are badly wired may also cause this fault.
- This fault will occur if internal DC fuse inside the charger is blown. If the Interlock wire(Green) is ever shorted to ground, this fuse will blow. To check the fuse, disconnect the charger from AC and DC source and measure the resistance

between the Interlock wire and charger positive (red wire). the fuse has blown If an open circuit is measured.

- If this fault occurs after battery charging has started, confirm that AC power was not interrupted and that all battery connections are good.
- If none of the above was able to clear the fault, an internal fault within the charger has occurred, contact the manufacturer of your vehicle/ machine or the distributor of the charger for servicing.

QUIQ-DCI CHARGER /CONVERTER TROUBLESHOOTING

SYMPTOMS

NO OR LOW OUTPUT

- Input voltage out of range:
  - » 35 – 87V for the 48V model
  - » 50 – 130V for the 72V model
- Unit overheating – increase cooling air flow
- Short circuit detected
- Poor connections – Inspect connections
- Converter damaged

NO SWITCHED OUTPUT

- Switched input voltage out of range:
  - » < 8V or >17V
- Switching input circuit damaged by high voltage
- Poor connections – Inspect connections

TURN-ON OR TURN-OFF DELAY GREATER THAN 3 SECONDS

- Switched input circuit variability – no action required

WIRING OR CONNECTORS OVERHEATING

- Wire gauge too small (minimum 18AWG)
- More than 18A is drawn from a single connector

OTHER CONDITIONS

AC ON LED LIT, CHARGER WON'T START CHARGING.

The charger has detected a condition that does not allow it to charge.

- QuiQ: This condition is generally corrected by resetting the charger by removing AC power for 30 seconds and reconnecting it.

CHARGER OPERATES AT LOW CURRENT ONLY

Delta-Q charge algorithms only operate at a low current, usually 2-5A if the battery voltage is less than 2.0V/cell. This is to slowly recharge an over-discharged battery to avoid damaging it.

- Check the battery pack voltage, if it is <2.0V/cell then this low current is normal.

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(PN: 710-0009 Rev 7 Date: 28/10/2019

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