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APPLICATION NOTE NUMBER 23
REMOTE TEMPERATURE COMPENSATION AND HOW TO INSTALL THE SENSOR

Introduction

Battery temperature compensation is recommended by all battery manufacturers to maximize battery performance and life. Temperature compensation is a system that varies the output voltage of the charger depending on inputs from a temperature sensor. Batteries require a higher charging voltage to achieve full charge when cold and a lower charging voltage to prevent overcharge when very warm. The location of the temperature compensation sensor is critical for proper charging. For installations where the charger and battery are always at nearly the same ambient temperature, *local* temp comp (temperature sensor located inside the charger enclosure) is effective and simple. In contrast, *remote* temp comp (temperature sensor located at the battery, remote from the charger) is the required solution when the battery and charger are at different ambient temperatures. Battery blanket heaters are frequently used during winter in cold climates to keep starting batteries from freezing and improve cranking performance. In cold temperatures, chargers with *local* temperature compensation increase output voltage because their onboard temperature sensor is cold. This causes the warm battery to be overcharged, causing more rapid water loss ("boiling") and shortened battery life. Remote temperature compensation is required for ultracapacitor charging, any site employing battery blankets, and should be used in applications where battery and charger are located in different ambient conditions. The following describes connecting a remote temperature sensor (RTS) for such applications. See the appropriate charger user manual for further temperature compensation information.
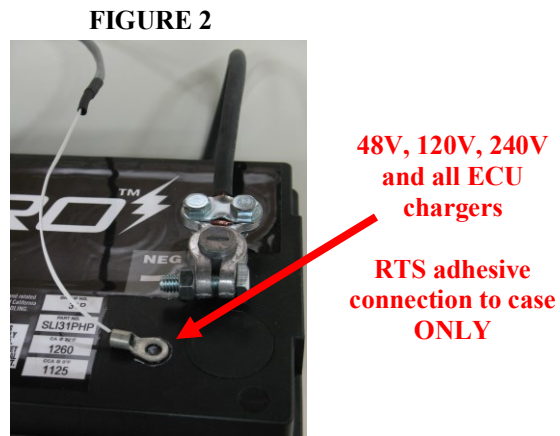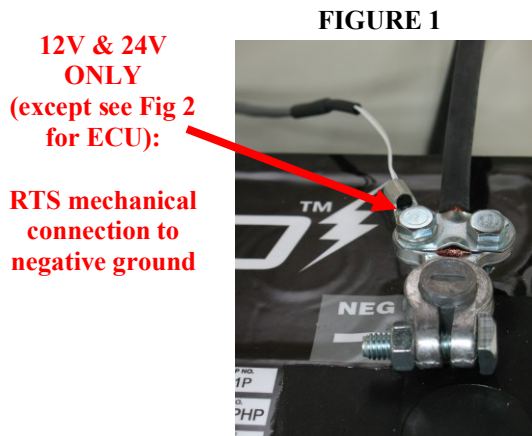
Table of Contents

RTS Installation at Battery

Secure RTS at battery/ultracapacitor.

    A.   12 or 24V systems (two options):

        1.   Connect the RTS to a *grounded* battery/ultracapacitor terminal using the battery/ultracapacitor clamp bolt as shown in Figure 1, OR

        2.   Connect the RTS to the battery/ultracapacitor case as shown in Figure 2. When securing to the case, use an adhesive/glue properly rated for the application material and temperature, such as Super Glue®.

    B.   48V, 120V, 240V systems and all ECU chargers:

        Connect the RTS only to the battery/ultracapacitor case as shown in Figure 2. When securing to the case, use an adhesive/glue properly rated for the application material and temperature, such as Super Glue®.

FIGURE 1   **FIGURE 2**

12V & 24V ONLY (except see Fig 2 for ECU):

RTS mechanical connection to negative ground

48V, 120V, 240V and all ECU chargers

RTS adhesive connection to case ONLY

Note: In systems with more than two batteries/ultracapacitors, attach the RTS to the case of the middle battery/ultracapacitor, which is normally the hottest battery/ultracapacitor and the best representation of overall battery/ultracapacitor temperature.

IQ Charger

Remote temperature sensing is available in the first-generation IQ charger when an optional CommsGenius communications board is included. Remote temperature sensing is included on the main control circuit board of all second-generation IQ chargers.

1. Connect RTS to charger. The temperature sensor is not polarity sensitive.
   - First-generation IQ with CommsGenius - attach the sensor to the two-position connector provided with the CommsGenius communications board by inserting RTS wire ends in connector and tightening screws. The two-position connector attaches to the mating socket on the CommsGenius communications board. Use the cable clips on the CommsGenius communications board bracket to support the cable and connector. See Figures 3 and 4.
   - Second-generation IQ – connect remote sensor leads to terminal block TB2 on the control circuit board. See Figure 5.
2. Route sensor wiring through a conduit opening at the top of the chassis, keeping the conductors at least ¼ inch (6 mm) away from DC wiring, AC wiring, and circuit boards.
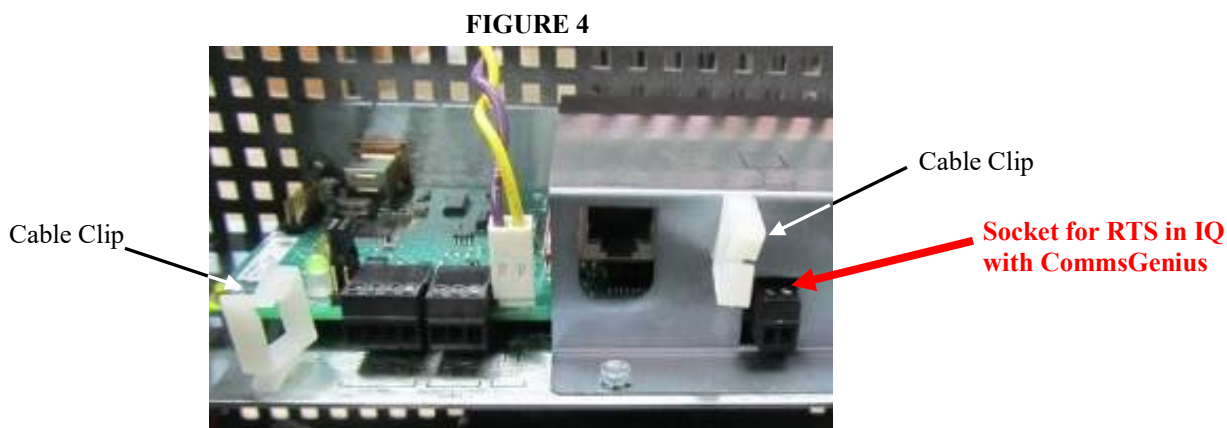
FIGURE 3

FIGURE 4

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111064   Rev E   2

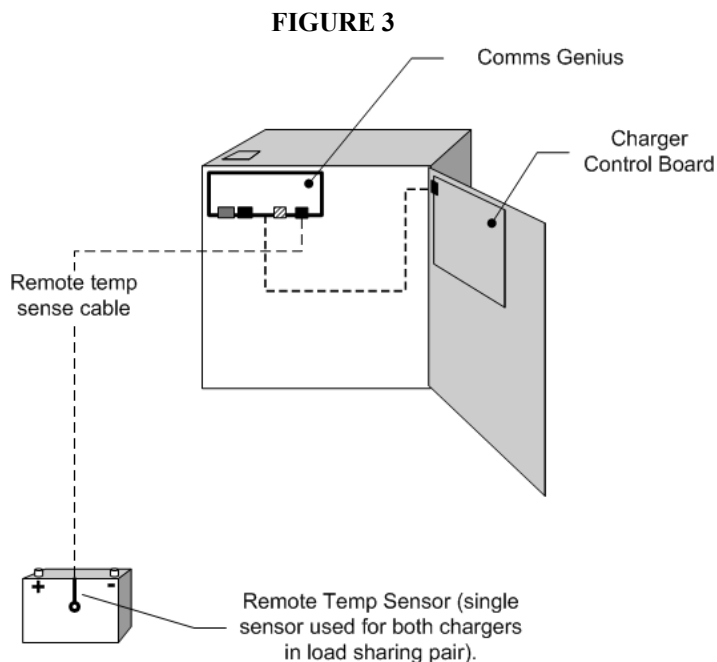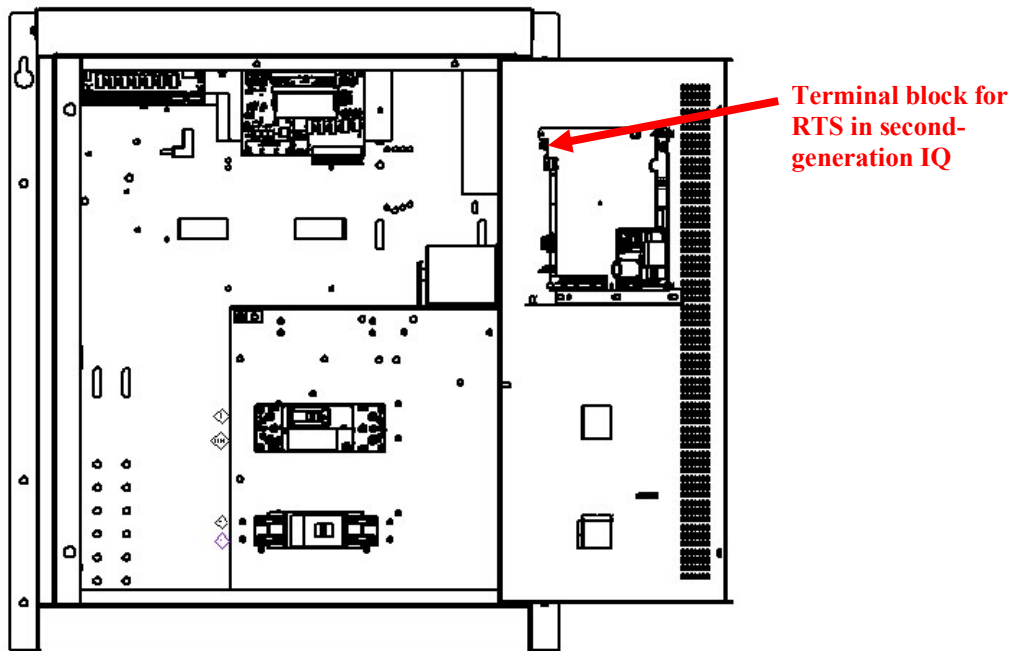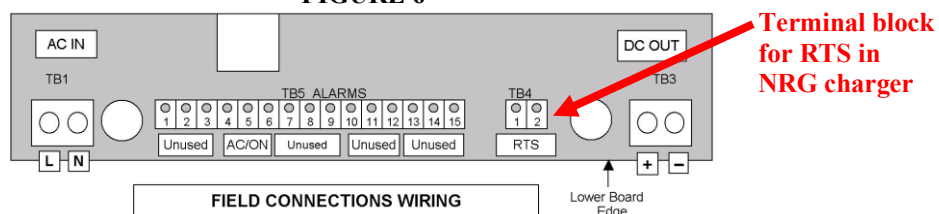**FIGURE 5**

Terminal block for RTS in second-generation IQ

NRG Charger

1. Remove the internal sensor (thermistor) from TB4 on the circuit board.
2. Connect the remote sensor leads to TB4. The sensor is not polarity sensitive.
3. Route sensor wiring through the plastic bushing below TB5, keeping the conductors at least ¼ inch (6 mm) away from DC wiring, AC wiring, and the circuit board.

FIGURE 6

Terminal block for RTS in NRG charger

MicroGenius 150 Charger

1. Remove the internal sensor (thermistor) from TB2 on the circuit board (if present).
2. Connect the remote sensor leads to TB2. The temperature sensor is not polarity sensitive.
3. Route sensor wiring through the center conduit opening at bottom of charger, keeping the conductors at least ¼ inch (6 mm) away from DC wiring, AC wiring, and the circuit board.

FIGURE 7

Terminal block for RTS in MicroGenius 150 charger

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111064   Rev E   3

MicroGenius 2 Charger

1. Connect the remote sensor leads to TB900. The temperature sensor is not polarity sensitive.
2. Route sensor wiring through the center conduit opening at bottom of charger, keeping the conductors at least ¼ inch (6 mm) away from DC wiring, AC wiring, and the circuit board.
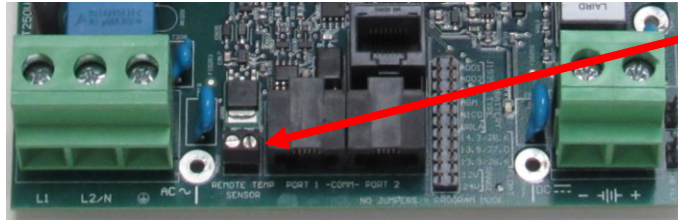
FIGURE 8

Terminal block for RTS in MicroGenius 2 charger

MicroGenius S2 Charger

1. Connect the remote sensor leads to J101 for single output chargers. Connect two separate remote sensor leads to J101 and J102 for dual output chargers. The temperature sensor is not polarity sensitive.
2. Route sensor wiring through the center conduit opening at bottom of charger, keeping the conductors at least ¼ inch (6 mm) away from DC wiring, AC wiring, and the circuit board.

FIGURE 9

Terminal blocks for RTS in MicroGenius S2 charger

MicroGenius S4 Charger

1. Connect the remote sensor leads to J104 for single output chargers. Connect separate remote sensor leads to J100, J102, J104 and J106 for outputs A through D, respectively, on multiple output chargers. The temperature sensor is not polarity sensitive.
2. Route sensor wiring through the center conduit opening at bottom of charger, keeping the conductors at least ¼ inch (6 mm) away from DC wiring, AC wiring, and the circuit board.
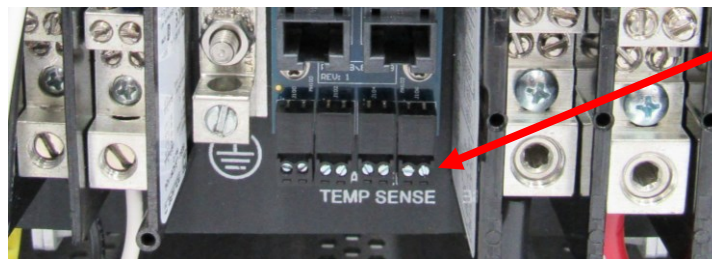
FIGURE 10

Terminal blocks for RTS in MicroGenius S4 charger

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ECU Charger:

1. Remove the internal sensor (thermistor) from TB1 on the Control Board.
2. Connect the remote sensor leads to TB1, positions 1 and 2. The temperature sensor is not polarity sensitive.
3. Route sensor wiring as directly as possible from Control Board to the conduit opening on the top left of charger enclosure, keeping the conductors at least ¼ inch (6 mm) away from DC wiring, AC wiring, and the circuit boards.

FIGURE 11
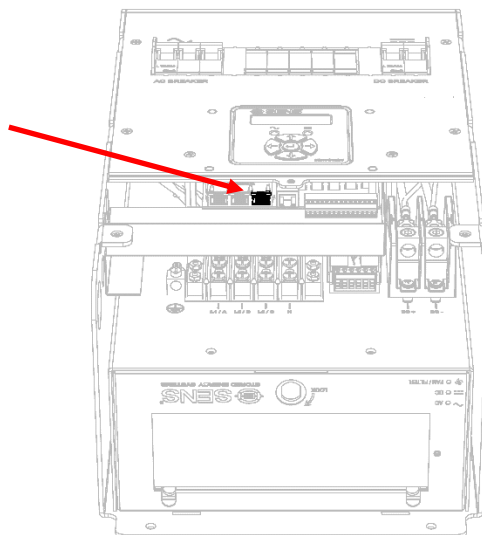

Terminal blocks for RTS in ECU charger
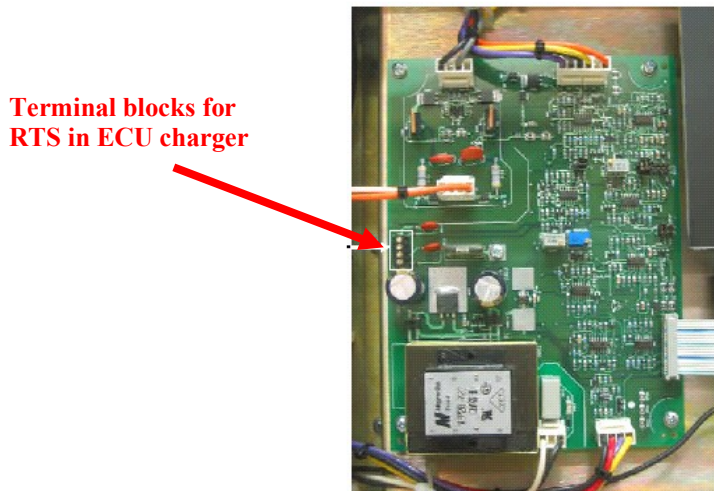
EnerGenius DC Compact

Remote temperature sensing is available with EnerGenius DC units when an optional Remote Battery Monitor is included. Connect the Remote Battery Monitor to the EnerGenius DC unit using a network cable, and RJ-45 splitter and terminators.

1. Connect an RJ-45 splitter to the **SENSbus** RJ-45 port on the charger
2. Place a factory installed 120-ohm terminator in one of the splitter positions
3. Connect a network cable from the Remote Battery Monitor to the splitter
4. Place a 120-ohm terminator in the open SENSbus RJ-45 port on the Remote Battery Monitor

FIGURE 12 – Compact SENSbus Connection

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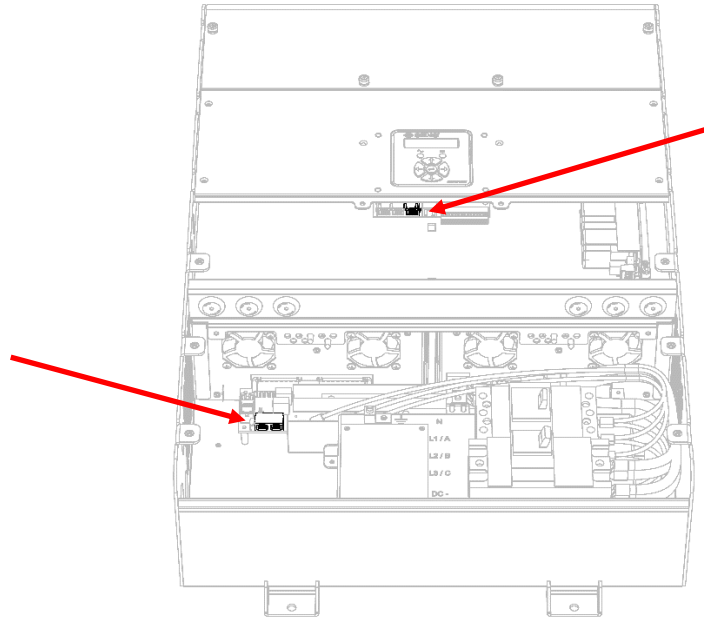
EnerGenius DC Wallbox

Remote temperature sensing is available with EnerGenius DC units when an optional Remote Battery Monitor is included. Connect the Remote Battery Monitor to the EnerGenius DC unit using a network cable and terminators.

1. Connect a network cable from the Remote Battery Monitor to the **SENSbus** RJ-45 port on the charger
2. Leave the factory installed 120-ohm terminator in another SENSbus port on the charger
3. Place a 120-ohm terminator in the open SENSbus RJ-45 port on the Remote Battery Monitor

FIGURE 13 – Wallbox SENSbus Connection

EnerGenius DC Cabinet

Remote temperature sensing is available with EnerGenius DC units when an optional Remote Battery Monitor is included. Connect the Remote Battery Monitor to the EnerGenius DC unit using a network cable and terminators.

1. Connect a network cable from the Remote Battery Monitor to the **SERVICE** RJ-45 port on the cabinet
2. Leave a factory installed 120-ohm terminator in the other SERVICE port on the cabinet
3. Place a 120-ohm terminator in the open SENSbus RJ-45 port on the Remote Battery Monitor

FIGURE 14 – Cabinet Service Connection

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