

# Remote Temperature Sensor Communication with OutBack Devices

## Objective of the application note

**Overview:** This note will summarize the sharing of the Remote Temperature Sensor (RTS) data through Outback's communications network.

## Scope/Introduction

The RTS provides temperature readings from the batteries to OutBack inverter/chargers and charge controllers. The devices utilize those readings to adjust charging targets by linearly increasing the voltage if the batteries are colder or decreasing the charging voltage if the batteries are hotter. In a system with multiple inverter/chargers and charge controllers, they connect to a proprietary communications network through a HUB so they can communicate for various reasons. One reason is to share the RTS data among all the inverter/chargers and charge controllers. This is essential so all devices can coordinate and properly charge a battery bank.

The RTS essentially is a 10k ohm resistor with a negative temperature coefficient. The internal resistance changes inversely based on temperature. The inverter/chargers and charge controllers adjust system charging voltage by  $-4$  mV per cell per degree above  $25^{\circ}$  or  $4$  mV per cell per degree below  $25^{\circ}$  Celsius based on the measured RTS resistance.

As an example: A 12-volt system has 6 cells in a battery and the room temperature being  $8^{\circ}\text{C}$  ( $-17^{\circ}\text{C}$  from the cross point of  $25^{\circ}\text{C}$ ). It can be calculated as follow:  $6 \times -0.004 \times -17 = 0.4$  Vdc. The charger will then compensate  $+0.4$  Vdc above the target.

## Inverter Only Systems

Although a HUB and MATE3 (or AXS Port) is required for stacking purposes, the FXR, Radian and "G" series inverter/chargers have the ability to share the RTS data to all sub-phase masters and slaves on their own. The "G" series inverter/chargers are pulse-width matched when charging or selling. Therefore, with FXR, Radian and "G" series inverter/chargers only the master in Port 1 needs to have an RTS. Classic off-grid FX models are the only inverters/charger series that cannot share the data among themselves; therefore each FX will need their own RTS connected for proper temperature compensation.

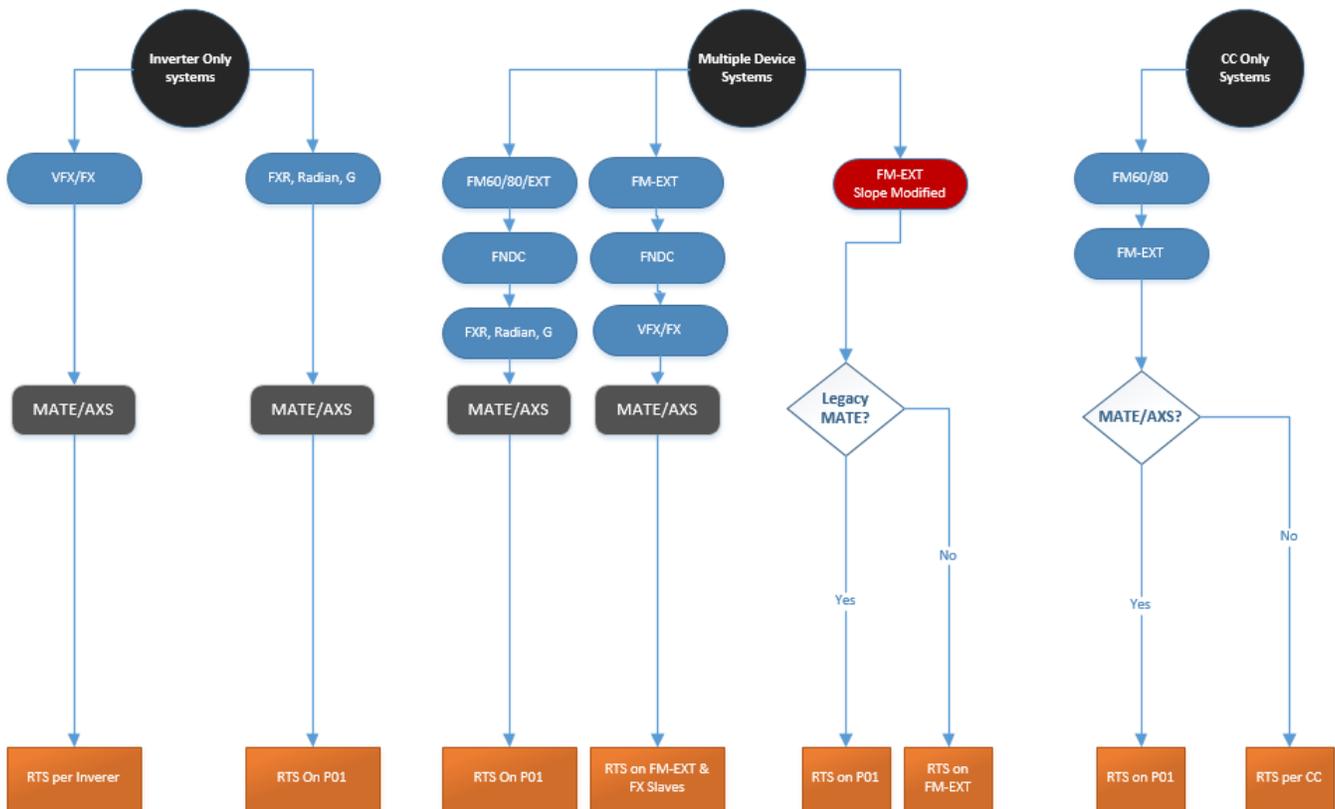
## Multiple Device Systems

Whenever devices such as charge controllers and a FLEXnet DC battery monitor are connected into a HUB communications manager: A system display product such MATE, MATE3, or AXS Port is required in order for the RTS values to be shared among all devices. Without the system display, the RTS value is not shared between devices. This also applies to systems in which only charge controllers are present and connected into a HUB product. The MATE or AXS Port will allow the RTS data to be shared among

## Application Note

all controllers when connected to the controller in Port 1. If no system display is present then each controller will require its own RTS.

If a FLEXmax Extreme charge controller is employed in a system and is programmed to a temperature slope other than the default value, the RTS must be connected to it. The MATE or AXS Port will choose that RTS value and communicate it to all the inverters. The exception is the off-grid FX series, where only the master will respond to the external input. In that case an RTS should be connected to the charge controller and also to all FX slave inverters (see flow chart).



## Application Note

### About OutBack Power Technologies

OutBack Power Technologies is a leader in advanced energy conversion technology. OutBack products include true sine wave inverter/chargers, maximum power point tracking charge controllers, and system communication components, as well as circuit breakers, batteries, accessories, and assembled systems.

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### Other

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