Application Note

Monitoring a Murphy TTD with a RANGER

OVERVIEW

The Murphy TTD controller is commonly used to monitor generator engines, providing run status and any fault conditions. The TTD controllers can be monitored through the local display, or over local Modbus. Thus monitoring generators in remote locations proves challenging. Using the RANGER with the built-in Modbus expansion card provides an easy-to-use IoT solution for monitoring the generator status, GPS location, and automated status and alarm flags if a generator has an issue. This application note will show an example on how to configure a RANGER to read data from the TTD.

REQUIREMENTS

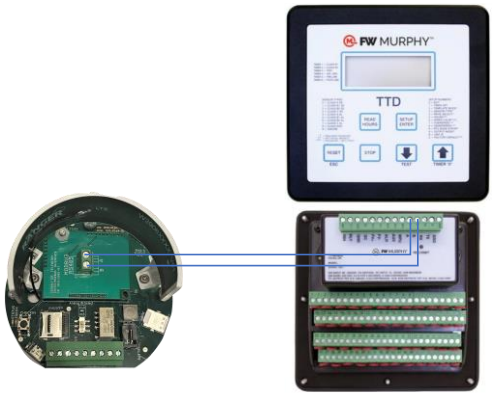
The following assumes that you have a RANGER with the Modbus expansion card installed that is associated with your SignalFire Cloud account. You will also need to have SignalFire RANGER ToolKit software installed and a micro-USB cable. The RANGER must have **firmware v0.1.15-modbus or higher**, and the **RANGER ToolKit must be v1.0.13.00** or higher.

CONNECTIONS AND CONFIGURATION

Wire the RS485 Modbus port A and B terminals on the TTD to the Sentinel Modbus daughter card A and B terminals using a twisted pair.

Plug your computer into the RANGER with the micro-USB cable and connect with the RANGER ToolKit to begin programming the Modbus registers. This process can also be accomplished over the Cloud but is not as convenient.

Go to the Modbus tab in the ToolKit and configure the baud rate and UART settings such that they match the TTD controller. Default settings are 9600 baud, 8 data bits, no parity bit, and 1 stop bit (8N1). Murphy recommends a request delay of 125ms.



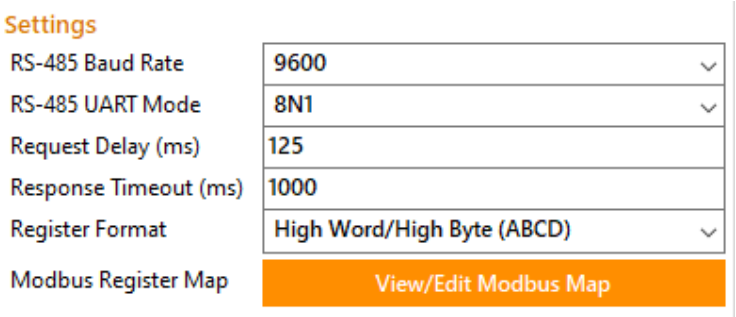
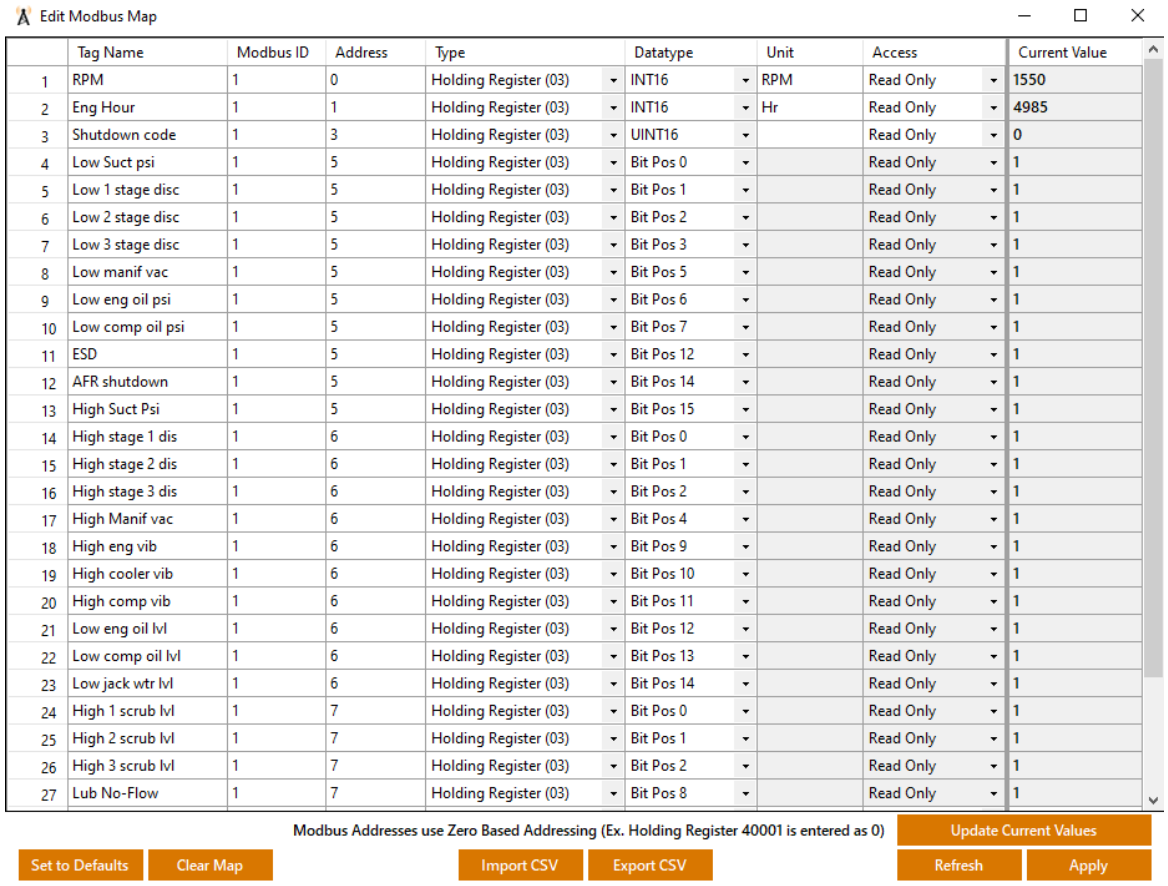


Figure 1: Modbus UART settings

Next, click "View/Edit Modbus Map" to configure the registers for the RANGER to read from the TTD. The TTD input status are only provided in bit-packed registers. The RANGER supports reporting of the individual bits in a bit packed register starting with RANGER firmware v0.1.15-modbus.

A bit-packed register is one where every bit is an independent digital True/False flag, unlike a typical register where all 16 bits add up to a single value. Rather than having 16 full registers for digital I/O that can only be a 1 or 0 anyways, a single 16-bit register can provide the exact same information where each bit corresponds to a different status or alarm value. Reading the value as an integer isn't very useful unless properly interpreted. For example, a bit-packed status register returning a value of 26 doesn't mean anything, but when broken down into binary, it says the 2nd, 4th, and 5th bits are True, and each of those has its own meaning.

Figure 2 shows an example Modbus map that can be used with the TTD; in this example the engine RPMs, engine run hours, and shutdown code are being read. In addition, registers 5, 6, and 7 which are the bit packed input status registers are also being read. For bit-packed registers, in the datatype field the user selects the bit position of within the 16-bit register and assigns a name for each Boolean datapoint. Each bit is treated as a separate datapoint individually monitored with its own tile and graph trend, and can be used as the source for alarms on the SignalFire Cloud.



	Tag Name	Modbus ID	Address	Type	Datatype	Unit	Access	Current Value
1	RPM	1	0	Holding Register (03)	INT16	RPM	Read Only	1550
2	Eng Hour	1	1	Holding Register (03)	INT16	Hr	Read Only	4985
3	Shutdown code	1	3	Holding Register (03)	UINT16		Read Only	0
4	Low Suct psi	1	5	Holding Register (03)	Bit Pos 0		Read Only	1
5	Low 1 stage disc	1	5	Holding Register (03)	Bit Pos 1		Read Only	1
6	Low 2 stage disc	1	5	Holding Register (03)	Bit Pos 2		Read Only	1
7	Low 3 stage disc	1	5	Holding Register (03)	Bit Pos 3		Read Only	1
8	Low manif vac	1	5	Holding Register (03)	Bit Pos 5		Read Only	1
9	Low eng oil psi	1	5	Holding Register (03)	Bit Pos 6		Read Only	1
10	Low comp oil psi	1	5	Holding Register (03)	Bit Pos 7		Read Only	1
11	ESD	1	5	Holding Register (03)	Bit Pos 12		Read Only	1
12	AFR shutdown	1	5	Holding Register (03)	Bit Pos 14		Read Only	1
13	High Suct Psi	1	5	Holding Register (03)	Bit Pos 15		Read Only	1
14	High stage 1 dis	1	6	Holding Register (03)	Bit Pos 0		Read Only	1
15	High stage 2 dis	1	6	Holding Register (03)	Bit Pos 1		Read Only	1
16	High stage 3 dis	1	6	Holding Register (03)	Bit Pos 2		Read Only	1
17	High Manif vac	1	6	Holding Register (03)	Bit Pos 4		Read Only	1
18	High eng vib	1	6	Holding Register (03)	Bit Pos 9		Read Only	1
19	High cooler vib	1	6	Holding Register (03)	Bit Pos 10		Read Only	1
20	High comp vib	1	6	Holding Register (03)	Bit Pos 11		Read Only	1
21	Low eng oil lvl	1	6	Holding Register (03)	Bit Pos 12		Read Only	1
22	Low comp oil lvl	1	6	Holding Register (03)	Bit Pos 13		Read Only	1
23	Low jack wtr lvl	1	6	Holding Register (03)	Bit Pos 14		Read Only	1
24	High 1 scrub lvl	1	7	Holding Register (03)	Bit Pos 0		Read Only	1
25	High 2 scrub lvl	1	7	Holding Register (03)	Bit Pos 1		Read Only	1
26	High 3 scrub lvl	1	7	Holding Register (03)	Bit Pos 2		Read Only	1
27	Lub No-Flow	1	7	Holding Register (03)	Bit Pos 8		Read Only	1

Figure 2: Example Modbus map

Once the Modbus map is saved to the RANGER the readings will be read from the TTD and pushed to the SignalFire Cloud on the configured reporting interval.

The Modbus table shown in *Figure 2* is available for download here as a .csv file for easy import. Click on the "Import CSV" button and select the downloaded CSV, and then click "Apply". It can be edited as needed in the ToolKit or Cloud afterwards, or edited in the CSV file before importing.

The RANGER with Modbus also supports writing registers to the field device remotely. TTD registers that are read/write can be written to remotely, allowing configuration changes to the TTD such as changing timers or settings.

SIGNALFIRE CLOUD

The configured Modbus data will be visible on the SignalFire Cloud interface in the Modbus Register table as seen in *Figure 3*.

Clicking the 'Modify' button for a datapoint allows the user to enable and configure alarms and set values for any read/write registers.

The Modbus table allows the user to select important data and add it to the tile view by clicking the 'View As Tile' button corresponding to the data point. After the tile is created it can be edited to display the data as a gauge, open/close status or an alarm status indication.

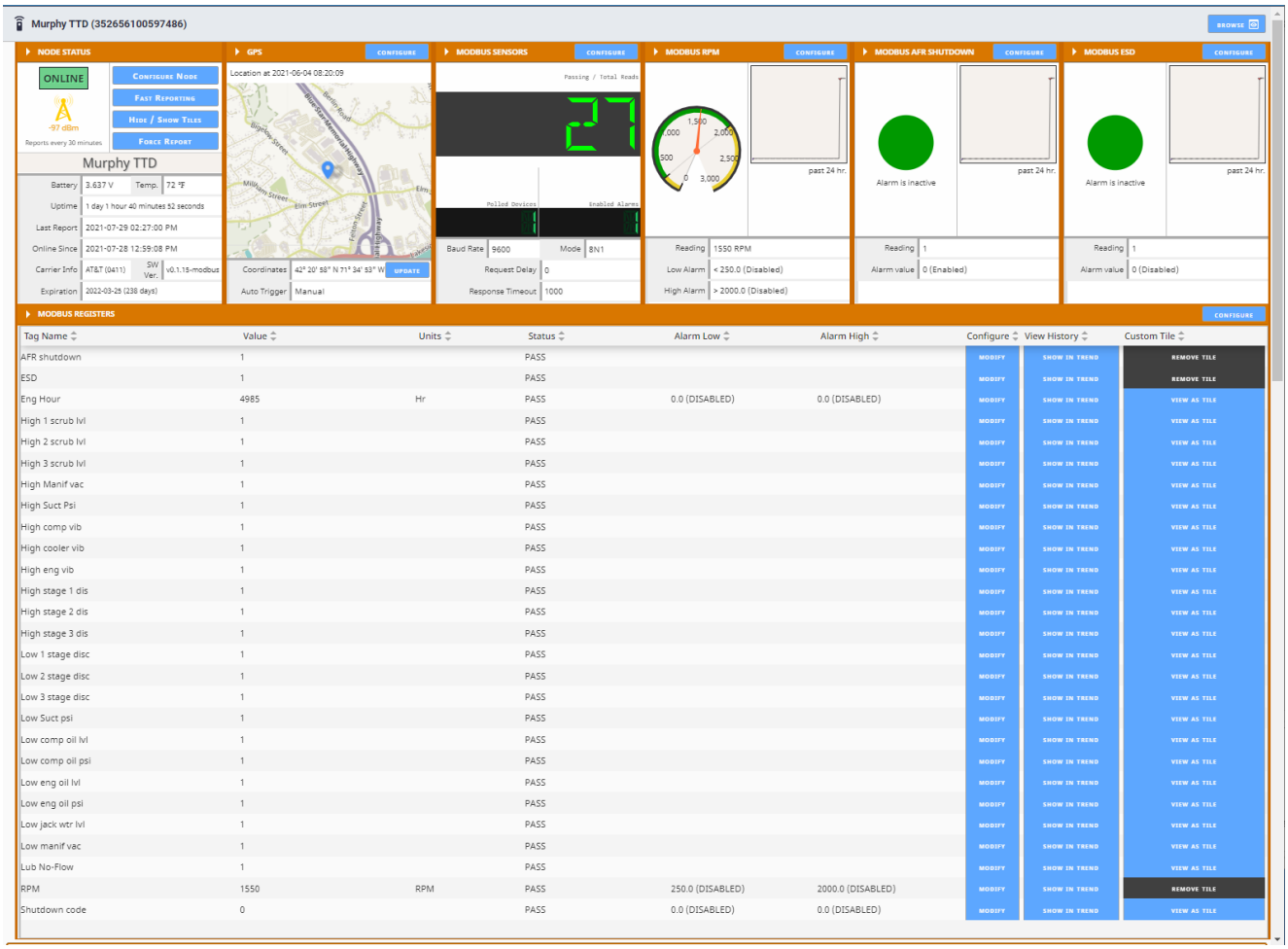


Figure 3: SignalFire Cloud Example