MESA Modbus Support

Nuvation BMS™ implements the SunSpec battery models defined in the Modular Energy Storage Architecture (MESA) as the top-level Modbus interface to the product. These specifications are available for download at http://mesastandards.org/mesa-downloads/. Currently, the draft 3 version is implemented.

A good introduction to system-level MESA concepts can be found here: http://mesastandards.org/downloads/MESA-PCS-Specification_D2.pdf.

Modbus Protocol Support

Nuvation BMS™ supports the following Modbus protocols.

Modbus RTU

This protocol is used in serial communications. The Stack Controller or Grid Battery Controller support connecting over the RS485 port. The default configuration is as follows:

- Baudrate: 38400
- Parity: even
- Data bits: 8
- Stop bits: 1

The device address must be configured via the modbus RTU component. For the Stack Controller the component is "*sc_modbus_rtu*". For the Grid Battery Controller the component is "*gbc_modbus_rtu*".

Modbus TCP

This protocol is used for communications over TCP/IP networks. The Stack Controller and Grid Battery Controller support connecting over port 502.

Supported Models

The MESA standards contain a number of 'models' that can be implemented by vendors to describe a storage device at various levels of detail. The models implemented by Nuvation BMS™ are described below.

Detailed register maps are provided by the standard in an Excel spreadsheet format here: http://mesastandards.org/wp-content/uploads/2015/10/Energy-Storage-Information-Models_D3-2015-10-26-Update.xlsx.

Common Model

This model primarily contains information to identify the device (e.g. manufacturer, model, serial number) as well as the version of software running on the device. A full description of the Common Model can be found in the SunSpec specification bundle.

S801

This model describes an energy storage device at the highest possible level. State of charge and overall alarm and warning states are found here. All mandatory points are implemented. The Modbus address of this model is 40070.

S802

This model describes a battery storage device. Critical operational information included at this level are charge and discharge current limits. All mandatory points are implemented. The Modbus address of this model is 40094.

S803

This model describes a lithium-ion battery in detail. Voltage, temperature, and current statistics are available at the pack and stack level within this model. All mandatory and most optional points are implemented. The Modbus address of this model is 40116.

End Model

This model marks the end of the implemented Modbus address space.

Accessing MESA Models

MESA models are located contiguously in the Modbus address space starting at a base address of 40000. The Common Model is always located first in this space. The End Model is always last in order and is used to denote the end of MESA Modbus registers. Each model located between these two has a numeric

identifier as well as a length. A handy tool that can be used to explore the MESA Modbus registers for Nuvation BMS™ is *modpoll.exe*. It is available for free download at http://www.modbusdriver.com/modpoll.html.

Using the tool, the Common Model can be polled from a Stack Controller or Grid Battery Controller using the following command (assuming the device has an IP address of 192.168.1.21)

```
modpoll.exe -m tcp -0 -r 40000 -c 70 192.168.1.21

modpoll 3.4 - FieldTalk(tm) Modbus(R) Master Simulator
Copyright (c) 2002-2013 proconX Pty Ltd
Visit http://www.modbusdriver.com for Modbus libraries and tools.

Protocol configuration: MODBUS/TCP
Slave configuration...: address = 1, start reference = 40000 (PDU), count = 70
Communication.........: 192.168.1.21, port 502, t/o 1.00 s, poll rate 1000 ms
Data type.............: 16-bit register, output (holding) register table

-- Polling slave... (Ctrl-C to stop)
[40000]: 21365
[40001]: 28243
[40002]: 1
[40003]: 66
.
.
.
[40068]: 4660
[40069]: -32768
```

As another example, the complete S802 model for a system with one stack could be polled using the following command:

```
modpoll.exe -m tcp -0 -r 40094 -c 22 192.168.1.21

modpoll 3.4 - FieldTalk(tm) Modbus(R) Master Simulator
Copyright (c) 2002-2013 proconX Pty Ltd
Visit http://www.modbusdriver.com for Modbus libraries and tools.

Protocol configuration: MODBUS/TCP
Slave configuration...: address = 1, start reference = 40094 (PDU), count = 22
Communication.........: 192.168.1.21, port 502, t/o 1.00 s, poll rate 1000 ms
Data type.............: 16-bit register, output (holding) register table

-- Polling slave... (Ctrl-C to stop)
[40094]: 802
[40095]: 20
.
```

```
.
.
[40114]: -2
[40115]: -32768
```

To access the common model using Modbus RTU (assuming Nuvation BMS ™ is connected to serial port COM1 and its address is 0x1):

```
modpoll.exe -m rtu -0 -r 40000 -c 70 -b 38400 COM1

modpoll 3.4 - FieldTalk(tm) Modbus(R) Master Simulator
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Visit http://www.modbusdriver.com for Modbus libraries and tools.

Protocol configuration: Modbus RTU
Slave configuration...: address = 1, start reference = 40000 (PDU), count = 70
Communication.........: COM1, 38400, 8, 1, even, t/o 1.00 s, poll rate 1000 ms
Data type.............: 16-bit register, output (holding) register table

-- Polling slave... (Ctrl-C to stop)
[40000]: 21365
[40001]: 28243
[40002]: 1
[40003]: 66
.
.
.
[40068]: 4660
[40069]: -32768
```