Conext™ Gateway

Modbus Interface Specification (502)
Li-Ion Battery Management System

990-91344B
Sep 28, 2021

Schneider Electric

Exclusion for Documentation

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Document Number: 990-91344B   Rev B   **Date:** Sep 28, 2021

Contact Information

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Revision History

Rev	Date	Description of Change
A	Feb 13, 2020	v1.06 Firmware Release
B	Sep 28, 2021	Extend BMS BATT State

Document Applicability

This Modbus map applies to the following products:

Product ID	Product Description

⚠WARNING

UNINTENDED OPERATION

The use of this product with Modbus communications requires expertise in the design, operation, and programming of the device. Only qualified personnel should program, install, alter, and commission this product. Unless specified, information on safety, specifications, installation and operation is as shown in the primary documentation received with the product. Qualified personnel must be familiar with that information before proceeding. When writing values to the device, you must ensure other persons are not working with the device.

Failure to follow these instructions can result in death or serious injury, and/or equipment damage.

⚠WARNING

LOSS OF CONTROL

Do not assign the same address to two Modbus devices. The entire serial bus may behave unexpectedly if the master device cannot communicate with all the slave devices on the bus.

Failure to follow these instructions can result in death or serious injury, and/or equipment damage.

Overview

This document describes the structure of the Modbus register address map, which is used to configure, control, and monitor the device. Use this document in conjunction with the device Owner's Guide. The information in this document is intended for use only by qualified personnel who have a detailed technical understanding of the Modbus protocol. The Modbus map is divided into rows of Modbus registers. Each row indicates the Modbus register address, its name, data type, access type, units, scale, offset, and applicable notes as required. External Modbus master devices, such as the Schneider Electric M340 PLC, can read and write the Modbus registers to configure, control, or monitor the device remotely.

Writing Modbus Registers

Modbus does not provide an error response when data written to a Modbus register is out of range or invalid. To confirm that a Modbus register is correctly written, you should read it back and compare it with the expected value. For descriptions of settings and their valid values, refer to the product's Owner's Guide.

Supported Modbus Data Types

Data Type	Description
uint16	unsigned 16-bit integer [0,65535]
sint16	signed 16-bit integer [-32768,32767]
uint32	unsigned 32-bit integer [0,4294967295]
sint32	signed 32-bit integer [-2147483648,2147483647]
str<nn>	packed 8-bit character string, where <nn> is the length of characters in the string. Two characters are packed into each Modbus register. Example: str20 = 20-character string (packed into 10 Modbus registers) str16 = 16-character string (packed into 8 Modbus registers)

Modbus Device Addressing

The Modbus slave address registers are automatically assigned on a first come, first served basis. The first detected device is assigned to the start of the address range. Subsequently added devices are assigned the next available address in the range.

Once assigned, the modbus slave address is associated to the serial number of the device, ensuring the consistency of the modbus address for the lifetime of the installation.

If Modbus slave addresses need to be changed, the Conext Gateway can be reset to its factory defaults and devices added one by one to establish the desired modbus address mapping.

ModbusTCP port	502
Modbus Slave Address Range	[230 .. 234]

Modbus Register Addressing

The Register Number is the 1-based register identifier. Some 3rd party Modbus tools require 1-based register addressing.

The Register Address is the zero-based register address representing the register address as it is transmitted on-the-wire inside the Modbus data frame.

Modbus Error Response

The Modbus Server will respond with a 02 ILLEGAL DATA ADDRESS error if an attempt is made to read/write registers which don't exist or if a request is made to read only part of a 32-bit register. This error will also be thrown if a read/write address range contains a data point which does not exist, or if the read/write address range starts or ends halfway through a 32-bit word.

A blank row in the Modbus Register map indicates a boundary between sets of contiguous registers. Multi-register reads/writes across these boundaries will result in a 02 ILLEGAL DATA ADDRESS error

Modbus Cybersecurity Considerations

⚠WARNING
CYBERSECURITY RISK: POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY Always secure the Local Area Network on which the Conext Gateway is connected. Modbus TCP must NEVER be routed over a public network. Use cybersecurity best practices to help prevent unauthorized access. **Failure to follow these instructions can result in unintended access to sensitive or secure customer data, permanent loss of data, and equipment damage.**

Modbus TCP is a legacy protocol in widespread use within the Solar industry. It is appreciated by system operators due to its simplicity and ease of use in control and monitoring applications. However, Modbus TCP is an insecure protocol which does not provide any data security, encryption, or authentication.

Anyone with access to the local area network on which the Conext Gateway is connected can monitor and control the power conversion devices attached to the Conext Gateway.

Modbus TCP should only be used on trusted, private, and highly secure local area networks for local control and monitoring applications only. Failure to properly secure the Local Area Network on which the Conext Gateway is connected can allow a remote attacker to compromise your power system installation.

1   Register Map for Li-Ion Battery Management System

Start Marker

Modbus Address	Name	Type	R/W	Units	Scale	Offset	Notes
40000	Start Marker	uint32	r		1	0	

Common Base Model

Modbus Address	Name	Type	R/W	Units	Scale	Offset	Notes
40002	Common Base Model ID	uint16	r		1.0	0.0	
40003	Common Base Model Length	uint16	r		1.0	0.0	
40004	Manufacturer Name	str32	r				
40020	Manufacturer Name	str32	r				
40036	Options	str16	r				
40044	Software Version	str16	r				
40052	Serial Number	str32	r				
40068	Modbus Address	uint16	rw		1.0	0.0	
40069	Pad	uint16	r		1.0	0.0	

Battery Base Model

Modbus Address	Name	Type	R/W	Units	Scale	Offset	Notes
40070	Battery Base Model ID	uint16	r		1.0	0.0	
40071	Battery Base Model Length	uint16	r		1.0	0.0	
40072	Full Charge Capacity	uint16	r	mAh	1.0	0.0	
40073	Nameplate Energy Capacity	uint16	r		1.0	0.0	
40074	Nameplate Max Charge Rate	uint16	r		1.0	0.0	
40075	Namplate Max Discharge Rate	uint16	r		1.0	0.0	
40076	Self Discharge Rate	uint16	r	%	1.0	0.0	
40077	Nameplate Max Soc	uint16	r	%	1.0	0.0	
40078	Nameplate Min SoC	uint16	r	%	1.0	0.0	

Modbus Address	Name	Type	R/W	Units	Scale	Offset	Notes
40079	SOC Reserve Maximum	uint16	r	%	1.0	0.0	
40080	SOC Reserve Minimum	uint16	r	%	1.0	0.0	
40081	State of Charge	uint16	r	%	1.0	0.0	
40082	Depth of Discharge	uint16	r	%	1.0	0.0	
40083	State of Health	uint16	r	%	1.0	0.0	
40084	Full Charge Cycle Count	uint32	r		1.0	0.0	
40086	Charge Status	uint16	r		1.0	0.0	
40087	Control Mode	uint16	r		1.0	0.0	0=Remote Control 1=Local Control
40088	Battery Heartbeat	uint16	r		1.0	0.0	
40089	Controller Heartbeat	uint16	rw		1.0	0.0	
40090	Alarm Reset	uint16	r		1.0	0.0	
40091	Battery Type	uint16	r		1.0	0.0	See section 2.1
40092	Battery State	uint16	r		1.0	0.0	See section 2.2
40093	State	uint16	r		1.0	0.0	See section 2.3
40094	Warranty Date	uint32	r		1.0	0.0	
40096	Alarm Event Map 1	uint32	r		1.0	0.0	See section 2.4
40098	Vendor Event 2 Bitfield	uint32	r		1.0	0.0	
40100	Fault Status Bitmap 0	uint32	r		1.0	0.0	
40102	Warning Status Bitmap 0	uint32	r		1.0	0.0	
40104	Voltage	uint16	r	V	0.001	0.0	
40105	Max Battery Voltage	uint16	r	V	0.01	0.0	
40106	Min Battery Voltage	uint16	r	V	0.01	0.0	
40107	Maximum Cell Voltage	uint16	r	V	0.001	0.0	
40108	Max Cell Voltage String	uint16	r	V	0.01	0.0	
40109	Max Cell Voltage Module	uint16	r	V	0.01	0.0	
40110	Minimum Cell Voltage	uint16	r	V	0.001	0.0	
40111	Min Cell Voltage String	uint16	r	V	0.01	0.0	
40112	Min Cell Voltage Module	uint16	r	V	0.01	0.0	
40113	Average Cell Voltage	uint16	r	V	0.01	0.0	
40114	Current	sint16	r	A	0.001	0.0	
40115	Max Charge Current	uint16	r	A	0.01	0.0	

Modbus Address	Name	Type	R/W	Units	Scale	Offset	Notes
40116	Max Discharge Current	uint16	r	A	0.01	0.0	
40117	Battery Power	sint16	r	W	1.0	0.0	
40118	Inverter State Request	uint16	r		1.0	0.0	See section 2.5
40119	Battery Power Request	sint16	r	W	1.0	0.0	
40120	Set Operation	uint16	r		1.0	0.0	1=Connect 2=Disconnect
40121	Inverter State	uint16	r		1.0	0.0	See section 2.6
40122	AHRtg Scale Factor	sint16	r		1.0	0.0	
40123	WHRtg Scale Factor	sint16	r		1.0	0.0	
40124	WChaDisChaMax Scale Factor	sint16	r		1.0	0.0	
40125	DisChaRte Scale Factor	sint16	r		1.0	0.0	
40126	SoC Scale Factor	sint16	r		1.0	0.0	
40127	DoD Scale Factor	sint16	r		1.0	0.0	
40128	SoH Scale Factor	sint16	r		1.0	0.0	
40129	V Scale Factor	sint16	r		1.0	0.0	
40130	CellV Scale Factor	sint16	r		1.0	0.0	
40131	A Scale Factor	sint16	r		1.0	0.0	
40132	AMax Scale Factor	sint16	r		1.0	0.0	
40133	W Scale Factor	sint16	r		1.0	0.0	

BMS Custom Map

Modbus Address	Name	Type	R/W	Units	Scale	Offset	Notes
40134	BMS Custom Map ID	uint16	r				
40135	BMS Custom Map Length	uint16	r				
40136	Temperature	sint16	r	degC	0.01	-273.0	
40137	Minimum Cell Temperature	sint16	r	degC	0.01	0.0	
40138	Cell Temperature Scale Factor	sint16	r		1.0	0.0	
40139	Request Bitmap	uint16	r		1.0	0.0	

End Marker

Modbus Address	Name	Type	R/W	Units	Scale	Offset	Notes
40140	End Marker	uint16	r		1	0	
40141	End Marker 0	uint16	r		1	0	

2 Data Point Enumerations

2.1 Battery Type

0=Unknown
1=Lead-Acid
2=Nickel-Metal Hydrate
3=Nickel-Cadmium
4=Lithium-Ion
5=Carbon-Zinc
6=Zinc Chloride
7=Alkaline
8=Rechargeable Alkaline
9=Sodium-Sulfur
10=Flow
99=Other

2.2 Battery State

1=Disconnected
2=Initializing
3=Connected
4=Standby
5=SoC Protection
6=Suspending
99=Fault

2.3   Vendor Specific Battery State

0=SelfCheck
1=Soft-Starting
2=Standby
3=Charging
4=Discharging
5=Fault
6=Connect
7=ShutDown
8=Idle
9=Online
10=Offline
255=NotApplicable

2.4   Battery Events

bit0=CommunicationError
bit1=OverTemperatureAlarm
bit2=OverTemperatureWarning
bit3=UnderTemperatureAlarm
bit4=UnderTemperatureWarning
bit5=OverChargeCurrentAlarm
bit6=OverChargeCurrentWarning
bit7=OverDischargeCurrentAlarm
bit8=OverDischargeCurrentWarning
bit9=OverVoltageAlarm
bit10=OverVoltageWarning
bit11=UnderVoltageAlarm
bit12=UnderVoltageWarning
bit13=UnderStateofChargeMinAlarm
bit14=UnderStateofChargeMinWarning
bit15=OverStateofChargeMaxAlarm
bit16=OverStateofChargeMaxWarning
bit17=VoltageImbalanceWarning
bit18=TemperatureImbalanceAlarm
bit19=TemperatureImbalanceWarning
bit20=ContactorError
bit21=FanError
bit22=GroundFaultError

bit23=OpenDoorError
bit24=CurrentImbalanceWarning
bit25=OtherBatteryAlarm
bit26=OtherBatteryWarning
bit27=Reserved
bit28=ConfiguationAlarm
bit29=ConfiguationWarning

2.5   Request Inverter State

0=No Request
1=Start Inverter
2=Stop Inverter

2.6   Set Inverter State

1=Inverter is Stopped
2=Inverter is in Standby
3=Inverter is Started