

Conext™ Gateway

Modbus Interface Specification (503)

Conext™ Battery Monitor

990-6278A

Feb 13, 2020



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Contact Information

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Revision History

Rev	Date	Description of Change
A	Feb 13, 2020	v1.06 Firmware Release

Document Applicability

This Modbus map applies to the following products:

Product ID	Product Description
865-1080-01	Battery Monitor

⚠ 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	503
Modbus Slave Address Range	[190 .. 209]

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 Conext™ Battery Monitor

Reg. No.	Reg. Addr.	Name	Type	R/W	Units	Scale	Offset	Notes
1	0x0000	Device Name	str16	r				
9	0x0008	reserved	uint16	r				
10	0x0009	reserved	uint16	r				
11	0x000A	FGA Number	str20	r				
21	0x0014	Unique ID Number	uint32	r				
31	0x001E	Firmware Version	uint32	r				
41	0x0028	Modbus Slave Address (Port 503)	uint16	rw		1.0	0.0	
42	0x0029	Device Number	uint16	r		1.0	0.0	
43	0x002A	System Instance	uint16	r		1.0	0.0	
44	0x002B	Hardware Serial Number	str20	r				
65	0x0040	Device State	uint16	r		1.0	0.0	See section 2.1
66	0x0041	Device Present	uint16	r		1.0	0.0	0=Inactive (all data invalid) 1=Active (data valid)
67	0x0042	Configuration Errors	uint32	r		1.0	0.0	
69	0x0044	DC Source ID	uint32	r		1.0	0.0	See section 2.7
71	0x0046	Battery Voltage	uint32	r	V	0.001	0.0	
73	0x0048	Battery Current	sint32	r	A	0.001	0.0	
75	0x004A	Battery Temperature	uint32	r	degC	0.01	-273.0	
77	0x004C	Battery State of Charge	uint32	r	%	1.0	0.0	
79	0x004E	Battery State of Health	uint32	r	%	1.0	0.0	
81	0x0050	Battery Percent Over Charge	uint32	r	%	1.0	0.0	
83	0x0052	Battery Midpoint 1 Voltage	uint32	r	V	0.001	0.0	
85	0x0054	Battery Midpoint 2 Voltage	uint32	r	V	0.001	0.0	
87	0x0056	Battery Midpoint 3 Voltage	uint32	r	V	0.001	0.0	
89	0x0058	Battery Capacity Remaining	uint32	r	Ah	1.0	0.0	

Reg. No.	Reg. Addr.	Name	Type	R/W	Units	Scale	Offset	Notes
91	0x005A	Battery Capacity Removed	uint32	r	Ah	1.0	0.0	
93	0x005C	Battery BTS Present	uint32	r		1.0	0.0	See section 2.3
95	0x005E	Battery Time To Full	uint32	r	Min	1.0	0.0	
97	0x0060	Battery Time To Discharge	uint32	r	Min	1.0	0.0	
99	0x0062	Battery Hours In Float	uint32	r	Hr	0.1	0.0	
101	0x0064	Battery Last Equalize	uint32	r	Days	1.0	0.0	
103	0x0066	Battery Average Discharge	sint16	r	Ah	1.0	0.0	
104	0x0067	Battery Average Discharge Percent	sint16	r	%	0.01	0.0	
105	0x0068	Battery Deepest Discharge	sint16	r	Ah	1.0	0.0	
106	0x0069	Battery Deepest Discharge Percent	sint16	r	%	0.01	0.0	
107	0x006A	Battery Capacity Removed	uint32	r	Ah	1.0	0.0	
109	0x006C	Battery Capacity Returned	uint32	r	Ah	1.0	0.0	
111	0x006E	Battery Number of Charge Cycles	uint16	r		1.0	0.0	
112	0x006F	Battery Number of Synchronizations	uint16	r		1.0	0.0	
113	0x0070	Battery Number of Discharges	uint16	r		1.0	0.0	
119	0x0076	Nominal Temperature	uint16	rw	degC	0.01	-273.0	
120	0x0077	Temperature unit	uint16	rw		1.0	0.0	0=Imperial 1=Metric
121	0x0078	Temperature Coefficient	uint16	rw	Ah/degC	0.01	0.0	
122	0x0079	Nominal Discharge Rate	uint16	rw	Hr	1.0	0.0	
123	0x007A	Self Discharge Rate	uint16	rw	%	0.1	0.0	
124	0x007B	Shunt Amp Rating	uint16	rw	A	1.0	0.0	See section 2.4
125	0x007C	Shunt Voltage Rating	uint16	rw	mV	1.0	0.0	0=50 1=60

Reg. No.	Reg. Addr.	Name	Type	R/W	Units	Scale	Offset	Notes
126	0x007D	Charge Efficiency Factor Mode	uint16	rw		1.0	0.0	0=Manual 1=Automatic
127	0x007E	Backlight mode	uint16	rw	s	1.0	0.0	See section 2.5
128	0x007F	Nominal Voltage	uint16	rw	V	1.0	0.0	0=12 1=24 2=48
129	0x0080	Setup lock	uint16	rw		1.0	0.0	0=Disabled 1=Enabled
130	0x0081	Time Remaining Averaging Filter	uint16	rw		1.0	0.0	0=Fastest 1=Faster 2=Fast
131	0x0082	Default Temperature	uint16	rw	degC	0.01	-273.0	
139	0x008A	Charger Float Voltage	uint16	rw	V	0.001	0.0	
140	0x008B	Charger Float Current	uint16	rw	%	0.1	0.0	
141	0x008C	Discharge Floor	uint16	rw	%	1.0	0.0	
142	0x008D	Auto Sync Time	uint16	rw	s	1.0	0.0	See section 2.6
143	0x008E	Auto Sync Sensitivity	uint16	rw		1.0	0.0	
144	0x008F	reserved	uint16	r				
145	0x0090	Nominal Voltage Deprecated	uint32	rw	V	0.001	0.0	
147	0x0092	Battery Capacity	uint16	rw	Ah	1.0	0.0	
148	0x0093	Peukert Exponent	uint16	rw		0.002	1.0	
149	0x0094	Charge Efficiency Factor	uint16	rw	%	1.0	0.0	
161	0x00A0	RS485 Address	uint16	r		1.0	0.0	
162	0x00A1	RS485 Baud Rate	uint16	r		1.0	0.0	0=9600 1=19200 2=38400 3=57600 4=115200
163	0x00A2	RS485 Parity	uint16	r		1.0	0.0	0=None 1=Odd 2=Even

Reg. No.	Reg. Addr.	Name	Type	R/W	Units	Scale	Offset	Notes
164	0x00A3	RS485 Stop Bits	uint16	r		1.0	0.0	1=1 2=2
165	0x00A4	Modbus Byte Order	uint16	r		1.0	0.0	0=LSB 1=MSB
173	0x00AC	Refresh Configuration Data	uint16	rw		1.0	0.0	1=Refresh
174	0x00AD	Synchronize Enable/Disable	uint16	rw		1.0	0.0	0=Disabled 1=Enabled
175	0x00AE	DC Association (Battery)	uint16	rw		1.0	0.0	See section 2.7
176	0x00AF	Identify Enable	uint16	rw		1.0	0.0	0=Disabled 1=Enabled

2 Data Point Enumerations

2.1 Operating State

The following operating states may be reported:

0=Hibernate
 1=Power Save
 2=Safe Mode
 3=Operating
 4=Diagnostic Mode
 5=Remote Power Off
 255=Data Not Available

2.2 DC Input/Output Source

The following associations are supported:

3=House Battery Bank 1
 4=House Battery Bank 2
 5=House Battery Bank 3
 6=House Battery Bank 4
 7=House Battery Bank 5

2.3 Battery BTS States

The BTS States can be one of the following:

0=No
1=Yes
2=Error
3=Unavailable

2.4 Shunt Ampere Rating

The following values are supported:

0=10
1=11
2=12
3=13
4=14
5=15
6=16
7=17
8=18
9=19
10=20
11=21
12=22
13=23
14=24
15=25
16=30
17=35
18=40
19=45
20=50
21=55
22=60
23=65
24=70
25=75
26=80
27=85
28=90

29=95
30=100
31=110
32=120
33=130
34=140
35=150
36=160
37=170
38=180
39=190
40=200
41=210
42=220
43=230
44=240
45=250
46=300
47=350
48=400
49=450
50=500
51=550
52=600
53=650
54=700
55=750
56=800
57=850
58=900
59=950
60=1000
61=1100
62=1200
63=1300
64=1400
65=1500
66=1600
67=1700
68=1800
69=1900
70=2000
71=2100
72=2200
73=2300

74=2400
75=2500
76=3000
77=3500
78=4000
79=4500
80=5000
81=5500
82=6000
83=6500
84=7000
85=7500
86=8000
87=8500
88=9000

2.5 Backlight Modes/Durations

The following values are supported:

0=Off
1=5
2=10
3=15
4=30
5=45
6=60
7=90
8=120
9=150
10=180
11=240
12=300
13=On
14=Automatic

2.6 Auto Syn Time Value

The following values are supported:

0=5
1=10

2=15
3=30
4=45
5=60
6=90
7=120
8=150
9=180
10=240
11=300

2.7 DC Input/Output Association

The following associations are supported:

3=House Battery Bank 1
4=House Battery Bank 2
5=House Battery Bank 3
6=House Battery Bank 4
7=House Battery Bank 5