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# Modbus Map: Conext™ Freedom SW Device

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Revision A.4

## WARNING

### UNINTENDED OPERATION

The use of this product with Modbus communications requires expertise in the design, operation, and programming of the device. Only qualified persons should program, install, alter, and commission this product.

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 Freedom SW. The information in this document is intended for use only by qualified persons 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.

## Document Applicability

The Conext Freedom SW Device Modbus map applies to the following products, as listed in Table 1.

**Table 1** Applicable Products

Product ID	Product Description
815-2012	Freedom SW 2012-120V
815-2024	Freedom SW 2024-120V
815-2524-02	Freedom SW 2524-230V
815-3012	Freedom SW 3012-120V
815-3024	Freedom SW 3024-120V
815-3524-02	Freedom SW 3524-230V

## Supported Modbus Data Types

Table 2 lists the supported data types.

**Table 2** Modbus Data Types

Data Type	Description
uint16	unsigned 16-bit integer [0,65535]
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)

## 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 user manual.

## Section 1: Conext Freedom SW Device Modbus Map

**Table 3** Configuration and Status Registers

Modbus Address	Name	Type	read/write (r/w)	Units	Scale	Offset	Notes
0x0000	Device Name	str16	rw				
0x000A	FGA Number	str20	r				

**Table 3** Configuration and Status Registers

Modbus Address	Name	Type	read/write (r/w)	Units	Scale	Offset	Notes
0x0014	Unique ID Number	str20	r				
0x001E	Firmware Version	str20	r				
0x0028	Modbus Address	uint16	rw		1.0	0.0	
0x0029	Device Number	uint16	rw		1.0	0.0	
0x002A	System Instance	uint16	rw		1.0	0.0	
0x002B	Hardware Serial Number	str20	r				
0x0035	Configuration Status	uint16	r		1.0	0.0	0=Refreshing 1=Done
0x0036	Configuration Refresh Counter	uint32	r		1.0	0.0	
0x0040	Device State	uint16	r		1.0	0.0	See section 2
0x0041	Device Present	uint16	r		1.0	0.0	0=Inactive (all data invalid) 1=Active (data valid)
0x0042	Inverter Enabled	uint16	r		1.0	0.0	0=Disabled 1=Enabled
0x0043	Charger Enabled	uint16	r		1.0	0.0	0=Disabled 1=Enabled
0x0044	Active Faults Flag	uint16	r		1.0	0.0	0=No Faults 1=Unit has active Faults
0x0045	Active Warnings Flag	uint16	r		1.0	0.0	0=No Warnings 1=Unit has active Warnings
0x0046	Charge Mode Status	uint16	r		1.0	0.0	0=Stand alone 1=Primary 2=Secondary
0x0047	Fault Bitmap 0	uint16	r		1.0	0.0	See section 3
0x0048	Fault Bitmap 1	uint16	r		1.0	0.0	See section 4
0x0049	Fault Bitmap 2	uint16	r		1.0	0.0	See section 5
0x004A	Warning Bitmap 0	uint16	r		1.0	0.0	See section 6
0x004B	Inverter Status	uint16	r		1.0	0.0	See section 7
0x004C	Configuration Errors	uint32	r		1.0	0.0	
0x004E	Battery Voltage	uint32	r	V	0.001	0.0	
0x0050	Battery Current	sint32	r	A	0.001	0.0	
0x0052	Battery Power	sint32	r	W	1.0	0.0	
0x0054	Battery Temperature	uint16	r	deg C	0.01	-273.0	
0x0055	Charger Status	uint16	r		1.0	0.0	See section 8
0x0056	Invert DC Current	uint32	r	A	0.001	0.0	
0x0058	Invert DC Power	uint32	r	W	1.0	0.0	
0x005A	Charge DC Current	uint32	r	A	0.001	0.0	
0x005C	Charge DC Power	uint32	r	W	1.0	0.0	

**Table 3** Configuration and Status Registers

Modbus Address	Name	Type	read/write (r/w)	Units	Scale	Offset	Notes
0x005E	Charge DC Power Percentage	uint16	r	%	1.0	0.0	
0x005F	AC1 Frequency	uint16	r	Hz	0.01	0.0	
0x0060	AC1 Voltage	uint32	r	V	0.001	0.0	
0x0062	AC1 Input Current	uint32	r	A	0.001	0.0	
0x0064	AC1 Input Power	uint32	r	W	1.0	0.0	
0x0066	AC1 Input Power - Apparent	uint32	r	VA	1.0	0.0	
0x0070	AC1 Voltage Qualified	uint16	r		1.0	0.0	See section 9
0x0071	AC1 Frequency Qualified	uint16	r		1.0	0.0	See section 10
0x0072	AC1 Qualified Duration	uint32	r	s	1.0	0.0	
0x0078	Load AC Voltage	uint32	r	V	0.001	0.0	
0x0082	Load AC Current	uint32	r	A	0.001	0.0	
0x0084	Load AC Power	uint32	r	W	1.0	0.0	
0x008A	Load AC Power - Apparent	uint32	r	VA	1.0	0.0	
0x008C	Load AC Frequency	uint16	r	Hz	0.01	0.0	
0x0090	Energy From Battery This Hour	uint32	r	kWh	0.001	0.0	
0x0092	Battery Discharge Active This Hour	uint32	r	s	1.0	0.0	
0x0094	Energy From Battery Today	uint32	r	kWh	0.001	0.0	
0x0096	Battery Discharge Active Today	uint32	r	s	1.0	0.0	
0x0098	Energy From Battery This Week	uint32	r	kWh	0.001	0.0	
0x009A	Battery Discharge Active This Week	uint32	r	s	1.0	0.0	
0x009C	Energy From Battery This Month	uint32	r	kWh	0.001	0.0	
0x009E	Battery Discharge Active This Month	uint32	r	s	1.0	0.0	
0x00A0	Energy From Battery This Year	uint32	r	kWh	0.001	0.0	
0x00A2	Battery Discharge Active This Year	uint32	r	s	1.0	0.0	
0x00A4	Energy From Battery Lifetime	uint32	r	kWh	0.001	0.0	

**Table 3** Configuration and Status Registers

Modbus Address	Name	Type	read/write (r/w)	Units	Scale	Offset	Notes
0x00A6	Battery Discharge Active Lifetime	uint32	r	s	1.0	0.0	
0x00A8	Energy To Battery This Hour	uint32	r	kWh	0.001	0.0	
0x00AA	Battery Charge Active This Hour	uint32	r	s	1.0	0.0	
0x00AC	Energy To Battery Today	uint32	r	kWh	0.001	0.0	
0x00AE	Battery Charge Active Today	uint32	r	s	1.0	0.0	
0x00B0	Energy To Battery This Week	uint32	r	kWh	0.001	0.0	
0x00B2	Battery Charge Active This Week	uint32	r	s	1.0	0.0	
0x00B4	Energy To Battery This Month	uint32	r	kWh	0.001	0.0	
0x00B6	Battery Charge Active This Month	uint32	r	s	1.0	0.0	
0x00B8	Energy To Battery This Year	uint32	r	kWh	0.001	0.0	
0x00BA	Battery Charge Active This Year	uint32	r	s	1.0	0.0	
0x00BC	Energy To Battery Lifetime	uint32	r	kWh	0.001	0.0	
0x00BE	Battery Charge Active Lifetime	uint32	r	s	1.0	0.0	
0x00C0	AC1 Input Energy This Hour	uint32	r	kWh	0.001	0.0	
0x00C2	AC1 Input Active This Hour	uint32	r	s	1.0	0.0	
0x00C4	AC1 Input Energy Today	uint32	r	kWh	0.001	0.0	
0x00C6	AC1 Input Active Today	uint32	r	s	1.0	0.0	
0x00C8	AC1 Input Energy This Week	uint32	r	kWh	0.001	0.0	
0x00CA	AC1 Input Active This Week	uint32	r	s	1.0	0.0	
0x00CC	AC1 Input Energy This Month	uint32	r	kWh	0.001	0.0	
0x00CE	AC1 Input Active This Month	uint32	r	s	1.0	0.0	
0x00D0	AC1 Input Energy This Year	uint32	r	kWh	0.001	0.0	
0x00D2	AC1 Input Active This Year	uint32	r	s	1.0	0.0	

**Table 3** Configuration and Status Registers

Modbus Address	Name	Type	read/write (r/w)	Units	Scale	Offset	Notes
0x00D4	AC1 Input Energy Lifetime	uint32	r	kWh	0.001	0.0	
0x00D6	AC1 Input Active Lifetime	uint32	r	s	1.0	0.0	
0x00D8	Load Output Energy This Hour	uint32	r	kWh	0.001	0.0	
0x00DA	Load Output Active This Hour	uint32	r	s	1.0	0.0	
0x00DC	Load Output Energy Today	uint32	r	kWh	0.001	0.0	
0x00DE	Load Output Active Today	uint32	r	s	1.0	0.0	
0x00E0	Load Output Energy This Week	uint32	r	kWh	0.001	0.0	
0x00E2	Load Output Active This Week	uint32	r	s	1.0	0.0	
0x00E4	Load Output Energy This Month	uint32	r	kWh	0.001	0.0	
0x00E6	Load Output Active This Month	uint32	r	s	1.0	0.0	
0x00E8	Load Output Energy This Year	uint32	r	kWh	0.001	0.0	
0x00EA	Load Output Active This Year	uint32	r	s	1.0	0.0	
0x00EC	Load Output Energy Lifetime	uint32	r	kWh	0.001	0.0	
0x00EE	Load Output Active Lifetime	uint32	r	s	1.0	0.0	
0x00F0	Inverter Enable/Disable	uint16	rw		1.0	0.0	0=Disable 1=Enable
0x00F1	Charger Enable/Disable	uint16	rw		1.0	0.0	0=Disable 1=Enable
0x00F2	Force Charger State	uint16	rw		1.0	0.0	1=Bulk 2=Float 3=No Float
0x00F3	Operating Mode	uint16	rw		1.0	0.0	2=Standby 3=Operating
0x00F4	Reset	uint16	rw		1.0	0.0	0=Reboot 2=Reset to Factory
0x00F5	Clear	uint16	rw		1.0	0.0	See section 11
0x00F6	Search Mode	uint16	rw		1.0	0.0	0=Disable 1=Enable
0x00F7	Inverter Mode	uint16	rw		1.0	0.0	See section 12
0x00F8	Charge Cycle	uint16	rw		1.0	0.0	1=3 Stage 2=2 Stage
0x00F9	Maximum Charge Rate	uint16	rw	%	1.0	0.0	
0x00FA	Equalize Now	uint16	rw		1.0	0.0	0=Disable 1=Enable

**Table 3** Configuration and Status Registers

Modbus Address	Name	Type	read/write (r/w)	Units	Scale	Offset	Notes
0x00FB	Charger Override Enable/Disable	uint16	rw		1.0	0.0	0=Disable 1=Enable
0x00FC	Default Battery Temperature	uint16	rw		1.0	0.0	0=Cold 1=Warm 2=Hot
0x00FD	Battery Type	uint16	rw		1.0	0.0	See section 13
0x00FE	Nominal Battery Voltage	uint32	r	V	0.001	0.0	
0x0100	Battery Bank Capacity	uint16	rw	Ah	1.0	0.0	
0x0101	Battery Temperature Coefficient	uint16	rw	mV/ deg C	-1.0	0.0	
0x0102	Recharge Voltage	uint32	rw	V	0.001	0.0	
0x0104	Low Battery Cut Out	uint32	rw	V	0.001	0.0	
0x0106	Low Battery Cut Out Delay	uint16	rw	s	0.01	0.0	
0x0107	AC1 Breaker Size	uint16	rw	A	0.01	0.0	
0x0108	High Battery Cut Out	uint32	rw	V	0.001	0.0	
0x010A	Maximum Search Watts	uint16	rw	W	1.0	0.0	
0x010B	Search Delay	uint16	rw	s	0.01	0.0	
0x010C	Equalize Voltage Set Point	uint32	rw	V	0.001	0.0	
0x010E	Equalize Support	uint16	rw		1.0	0.0	0=Equalization Not Allowed 1=Equalization Allowed
0x0110	Bulk/Boost Voltage Set Point	uint32	rw	V	0.001	0.0	
0x0112	Absorption Voltage Set Point	uint32	rw	V	0.001	0.0	
0x0114	Absorption Time	uint16	rw	min	0.016 667	0.0	
0x0116	Float Voltage Set Point	uint32	rw	V	0.001	0.0	
0x011E	AC1 Low Voltage	uint32	rw	V	0.001	0.0	
0x0120	AC Qualify Time	uint16	rw	s	0.01	0.0	
0x0122	AC1 High Voltage	uint32	rw	V	0.001	0.0	
0x0124	AC1 Low Frequency	uint16	rw	Hz	0.01	0.0	
0x0125	AC1 High Frequency	uint16	rw	Hz	0.01	0.0	
0x0126	Identify Enable	uint16	rw		1.0	0.0	0=Disable 1=Enable

**Table 3** Configuration and Status Registers

Modbus Address	Name	Type	read/write (r/w)	Units	Scale	Offset	Notes
0x0128	Generator Support Enable	uint16	rw		1.0	0.0	0=Disable 1=Enable
0x012A	Generator Support Amps	uint32	rw	A	0.001	0.0	
0x012C	Refresh Configuration Data	uint16	rw		1.0	0.0	1=Refresh
0x012D	AC Output Association (Loads)	uint16	rw		1.0	0.0	See section 14
0x012E	AC Input Association (Generator )	uint16	rw		1.0	0.0	See section 15
0x012F	DC Association (Battery)	uint16	rw		1.0	0.0	See section 16

\* All L2 Modbus registers return 0 values for single phase SKUs.

## Section 2: Conext Freedom SW Operating State

Device State can report one of the following values:

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

## Section 3: Fault Bitmap 0

Fault Bitmap 0 can report one or more of the following values:

- bit0=F01:AC Output Under-Voltage
- bit1=F02:AC Output Over-Voltage
- bit2=F17:AC Backfeed (L1)
- bit3=F18:AC Backfeed (L2)
- bit4=F44:Battery Over-Temperature
- bit5=F46:Reserved
- bit6=F47:DC Under-Voltage (Immediate)
- bit7=F48:DC Under-Voltage
- bit8=F49:DC Over-Voltage
- bit9=F52:EEPROM Error (Cal Fail)
- bit10=F53:EEPROM Error (Config Fail)



- bit11=F54:Reserved
- bit12=F55:EEPROM Error (Log Fail)
- bit13=F56:EEPROM Error (Strings Fail)
- bit14=F57:FET1 Over-Temperature
- bit15=F58:FET2 Over-Temperature

## Section 4: Fault Bitmap 1

Fault Bitmap 1 can report one or more of the following values:

- bit0=F59:Reserved
- bit1=F60:Reserved
- bit2=F61:Reserved
- bit3=F62:Reserved
- bit4=F63:Power Board Temperature Unreadable
- bit5=F64:AC Overload
- bit6=F67:Reserved
- bit7=F68:Transformer Over-Temperature
- bit8=F69:Reserved
- bit9=F70:Unique Device Number Needed
- bit10=F71:Too Many Masters
- bit11=F72:Check AC Associations
- bit12=F73:Transformer Temperature Unreadable
- bit13=F74:Other Unit Invert Fault
- bit14=F75:Master Inverter Lost
- bit15=F76:No Masters

## Section 5: Fault Bitmap 2

Fault Bitmap 2 can report one or more of the following values:

- bit0=F77:Reserved
- bit1=F79:Battery Sensor Short
- bit2=F85:Power Board Over-Temperature
- bit3=F86:Dead Battery Detected
- bit4=F87:Multi-Unit Frequency Error
- bit5=F88:MPPT Ground Fault
- bit6=F93:Wrong Battery Temperature Sensor

## Section 6: Warning Bitmap

Warning Bitmap can report one or more of the following values:

- bit0=W48:DC Under Voltage
- bit1=W69:AGS Not Connected

## Section 7: Conext Freedom SW Invert Status

Invert Status can report one of the following values:

- 1024=Invert
- 1025=AC Pass Through
- 1026=APS Only
- 1027=Load Sense
- 1028=Inverter Disabled
- 1029=Load Sense Ready
- 1030=Engaging Inverter
- 1031=Invert Fault
- 1032=Inverter Standby
- 1033=Grid-Tied
- 1034=Grid Support
- 1035=Gen Support
- 1036=Sell-to-Grid
- 1037=Load Shaving
- 1038=Grid Frequency Stabilization

## Section 8: Conext Freedom SW Charger Status

Charger Status can report one of the following values:

- 768=Not Charging
- 769=Bulk
- 770=Absorption
- 771=Overcharge
- 772=Equalize
- 773=Float
- 774=No Float
- 775=Constant VI
- 776=Charger Disabled
- 777=Qualifying AC
- 778=Qualifying APS
- 779=Engaging Charger
- 780=Charge Fault
- 781=Charger Suspend
- 782=AC Good
- 783=APS Good
- 784=AC Fault
- 785=Charge
- 786=Absorption Exit Pending
- 787=Ground Fault
- 788=AC Good Pending

## Section 9: AC1 Voltage Qualification States

AC1 Voltage Qualified can report one of the following values:

- 0=Not Qualifying
- 1=Qualifying
- 2=Missing
- 3=Too Low
- 4=Too High
- 5=Qualification Good

## Section 10: AC1 Frequency Qualification States

AC1 Frequency Qualified can report one of the following values:

- 0=Not Qualifying
- 1=Qualifying
- 2=Missing
- 3=Too Low
- 4=Too High
- 5=Qualification Good

## Section 11: Clear Command

The Clear command clears the fault, warning, event, and communication logs. Configure Clear using one of the following values:

- 1=Fault Log
- 2=Active Faults
- 4=Warning Log
- 8=Active Warnings
- 16=State Event Log
- 32=Communication Statistics
- 64=Statistics
- 128=User Statistics
- 255=All

## Section 12: Conext Freedom SW Inverter Configuration

Configure Inverter Mode using one of the following values:

- 0=Invalid
- 11=Master
- 12=Slave
- 25=L2 Master

## Section 13: Battery Type

Configure Battery Type using one of the following values:

- 0=Flooded
- 1=Gel
- 2=AGM
- 3=Custom

## Section 14: AC Output Association

Configure AC Output Association (Loads) using one of the following values:

- 51=AC Load 1
- 52=AC Load 2
- 53=AC Load 3
- 54=AC Load 4
- 55=AC Load 5
- 56=AC Load 6
- 57=AC Load 7
- 58=AC Load 8
- 59=AC Load 9
- 60=AC Load 10

## Section 15: AC Input Association

Configure AC Input Association (Generator) using one of the following values:

- 1=None
- 3=Shore1
- 19=Generator 1
- 67=Grid 1

## Section 16: DC Input Output Association

Configure DC Association (Battery) using one of the following values:

- 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

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