Conext™ Core XC Series, 0G-XC-BB Grid-Tied Photovoltaic Inverter:

Using Modbus Application Note

AP-XC-095
Revision A

Overview

Modbus is a simple and robust open communication protocol used to provide interoperability between products from many different vendors. The purpose of this Application Note is to provide a brief overview of the Modbus hardware and software support on Conext Core XC Series inverters used with grid tie systems so that you can quickly and easily interface the inverter with any third-party Modbus devices.

The inverter performs Modbus communications according to the Modbus Application Protocol v1.1b. It is assumed that you are familiar with the Modbus protocol and with serial communications in general.

The Vigilohm® IM400 insulation monitoring device, if installed, is configured as a Modbus slave and has its own Modbus address and a separate Modbus map. For more information, see *Vigilohm IM400 Device Modbus Map on page 31*.

⚠ WARNING

LOSS OF CONTROL

The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. An example of a critical control function is emergency stop.

Separate or redundant control paths must be provided for critical control functions.

System control paths may include communication links. Consideration must be given to the implications of anticipated transmission delays or failures of the link.

Each implementation of Modbus control over a Conext Core XC Series inverter must be individually and thoroughly tested for proper operation before being placed into service.

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

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Inverter Modbus Specifications

The Conext Core XC Series meets the following Modbus specifications:

- The inverter is capable of communicating via the RS-485 serial communication standard. The RS-485 medium allows for multiple devices on the same serial bus network.
- The inverter's serial interface meets the specifications outlined in the *Modbus over Serial Line Specification and Implementation Guide*, version 1.02.
- All communications on the network conform to a master/slave scheme. In this scheme, information and data are transferred between a Modbus master device and up to 247 slave devices.

⚠ 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, serious injury, or equipment damage.

- The master device initiates and controls all information transfer on the Modbus serial bus network.
- A slave device never initiates a communication sequence, and must remain silent unless addressed specifically by the master.
- The Conext Core XC Series is a Modbus slave device.
- All packets transmitted by the master are requests. All packets transmitted by a slave are responses.
- At most, one slave can respond to a single request from a master.
- Each Modbus network only has one master.

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- The Modbus protocol supports RTU and ASCII protocols. The Conext Core XC Series supports only the Modbus/RTU protocol.

Related Documents

The following related documents are available from www.modbus.org:

- *MODBUS Read Device Identification Extension* (FC 43/14), RFC TR_026, version 0.8
- *MODBUS Application Protocol Specification*, version 1.1b
- *MODBUS Over Serial Line Specification and Implementation Guide*, version 1.02

RS-485 Communication Parameters

The RS-485 Modbus interface for the Conext Core XC Series uses the communication parameters listed in *Table 1*. All Conext Core XC Series devices must be configured to use the same communication parameters.

Table 1 RS-485 communication parameters

Parameter	Default Value	Other Values
Baud rate*	19200	4800 9600 19200 38400 57600
Data bits	8	
Stop bits	1	2
Parity	Even	None, Odd, Even

* If the Vigilohm IM400 device is installed, do not configure the devices in the Conext Core XC Series for 57600 baud. The IM400 only supports up to 38400 baud. For details about the physical setup for remote communications, see the *Conext Core XC Series Grid Tie Photovoltaic Inverter, 0G-XC-BB, Planning and Installation Manual (document number 990-5738)*.

For details about the physical setup for remote communications, see the *Conext Core XC Series Grid Tie Photovoltaic Inverter, 0G-XC-BB, Planning and Installation Manual (document number 990-5738)*.

Configuring the RS-485 Communication Parameters

The RS-485 communication parameters must match the settings on the Modbus master or on the computer program used to communicate with the inverter.

Note: Refer to the Modbus master device's documentation to determine how to set its communication parameters.

All RS-485 communication settings can be configuring using the front panel user interface on the Conext Core XC Series inverter.

To configure the RS-485 communication parameters:

1. From the home screen, scroll to **2 Language, Time, Interface**, scroll to **Comm. Interface,** and then select **Parameter Control Station**.
   The Parameter Control Station is a feature on the front panel user interface that determines whether device settings will be accessed through the front panel user interface or through the Modbus interface.
2. Scroll to highlight **1 Panel Control**, and then press the center of the scroll wheel to apply the change.
3. Select **Modbus Address**, and then set the correct address.
4. Select Modbus baud rate and set the correct baud rate.

5. Press F4 to return to the home screen.
6. Power cycle the inverter by turning the ON/OFF switch (QF2) to the OFF position, waiting a few minutes, and then turning QF2 to the ON position.

Modbus Logical Layer

The Modbus functions that the Conext Core XC Series supports are listed in *Table 2*.

Table 2 Modbus functions supported by the inverter

Function	Meaning	Action
03	Read Holding Registers	Obtains the current value in one or more holding registers of the inverter.
16	Write Multiple Registers	Places specific values into a series of consecutive holding registers of the inverter. The holding registers that can be written to the inverter are shown in the register map in Table 12.
08	Diagnostics	Only sub-function code 00 is supported (Read Query Data).
43	Read Device Identification	Only mandatory fields are supported: Vendor Name: Schneider Electric Product Code: XC-AIC15P FWMajorMinor Ver: Application Firmware Revision (e.g. 0104)

Invalid Registers

Some registers in the inverter Modbus are not mapped and are invalid. For example, the next register after 0x17F4 is 0x17F8. Unmapped registers such as 0x17F5 through to 0x17F7 do not store information.

When an invalid register is read from, the inverter responds with `0xFFFF` in the data field but it does not return an error code. This feature allows blocks of registers to be read with no errors, even if the blocks contain invalid registers.

When an invalid register is written to, the inverter responds with an `Invalid Address` exception.

Modbus Error Responses

If the inverter receives a Modbus request that it cannot handle, it returns an exception response informing the Modbus master of the nature of the error. The Modbus Error Response message has two fields which differentiate it from a normal response:

Function Code Field

In a normal response, the inverter echoes the function code of the original request in the function code field of the response. All function codes have a most-significant bit (MSB) of 0 (their values are all below 0x80).

In an exception response, the inverter sets the MSB of the function code to 1. This makes the function code value in an exception response exactly 0x80 higher than the value would be for a normal response.

For example, a normal response of 0x03 (Read Holding Registers) would become 0x83 (Unable to Read Holding Registers).

Data Field

In an error response, the inverter uses the data field of the response packet to return an error code to the Modbus master. The error codes that are supported are listed in *Table 3*.

Table 3 Modbus error codes

Error Code	Error Name	Description
01	Illegal Function	The inverter does not support the function code specified in the Modbus Request Packet.
02	Illegal Address	The address range specified in the Modbus Request Packet contains an illegal register address.
04	Diagnostics	Only sub-function code 00 is supported (Read Query Data).
43	Slave Device Failure	An unrecoverable error occurred while the server (or slave) was attempting to perform the requested action.

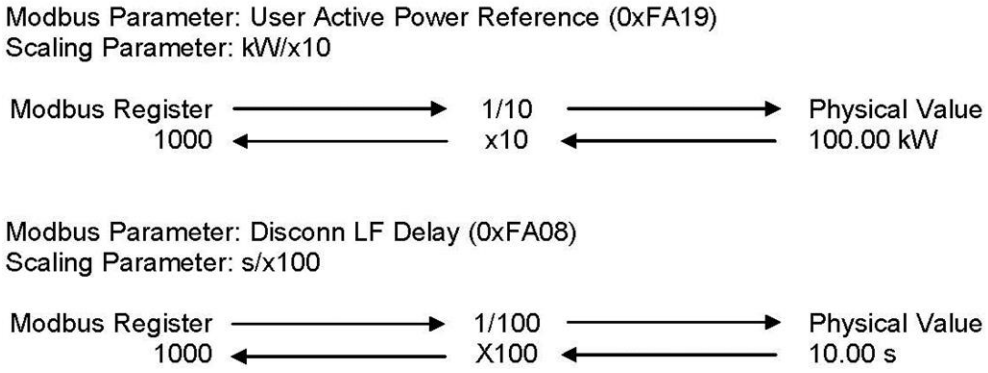
Reading Scaling Parameter Values

All numbers that are sent or received using Modbus communication are integers. The Modbus registers use a scaling factor so that numbers can be sent and received that are smaller than 1.

For example, if the unit scale is `x10`, you would divide the Modbus register value by 10 to convert it to a real world value.

Some of the parameters in this document use a scaling method to read and report parameter values, for example:

Figure 1Parameter scaling examples



Operational Mode State Codes (0x1700)

Register 0x1700 is a 16-bit code where:

- MS-Byte contains the Enable Mode of the system (Modbus Register 0xEFFC).
- LS-Byte contains the state for that Enable Mode.

Register 0x1700 has the characteristics listed in *Table 4*.

Table 4 Register 0x1700

Enable Code	Enable Operational State	Code
PV Mode	Offline	0x0000
	Reconnecting	0x0001
	Online	0x0002
CP Mode	Offline	0x0100
	Reconnecting	0x0101
	Online	0x0102
PVCQ Mode	Offline	0x0200
	Reconnecting	0x0201
	Online	0x0202

Log Files

The Conext Core XC Series record events in the following log files: data log, event log, service log, and oscillography log.

Logging Function

This section describes how to configure logging using the available Modbus registers (Logger Mode, Logger State, and Log Request) and how to retrieve log files.

To set up the logging function:

1. Set the Logger Mode register to 1, 2, 3, or 4 to enable reading of the one of the logs. For details, see *Table 6*.
2. Write the index of the record to be read to the Log Request Index register. For details, see *Log Request and Log Response Registers on page 10*.
3. Poll the Log Response Index register. When this index equals the Log Request Index, the data is available in the particular buffer registers. For details, see *Log Request and Log Response Registers on page 10*.
4. Read the buffer registers of the corresponding log.
5. Set the Logger Mode register to 0 to resume logging.

Note: The inverter stops logging data when the Logger Mode register is set to any value other than 0 (Log mode). Ensure that the Logger Mode register is returned to 0 after the log files have been retrieved.

Logger Mode Register

Logging can be configured in different modes using the Logger Mode register. By default, the Logger Mode register is set to Log Mode, in which it continues to log events.

Table 5 Logger Mode register

Address	Name	Access	Units [Range]
0x4705	Logger mode	Read/Write	Uint16, [0...5]

In order to extract log files from the inverter, the Logger Mode register must be set to one of the available “read” modes, as listed in *Table 6*. In these modes, logging is stopped.

Table 6 Logger Mode values

Logger Mode Value	Name	Action
0	Log Mode	Events are logged. The inverter stops logging data when the Logger Mode register is set to any value other than 0.
1	Read Data Log	On request, the Data Log is read.
2	Read Event Log	On request, the Event Log is read for all events.
3	Read Service Log	On request, the Event Log is read for service events only.
4	Read Oscillography buffer	On request, the Oscillography Log is read.
5	Config Mode	Allow setting of RTC time.

Logger State Register

The state of logging can be read with the Logger State Register.

Table 7 Logger State register

Address	Name	Access	Units
0x4706	Logger state	Read Only	Uint16

The Logger State register is a bit field. A set bit (where bit = 1) indicates that the status is true. The available logging states are listed in *Table 8*.

Table 8 Logger state bit indicators

Bit	Status
0	Board not ready (init not finished, communication error)
1	Log mode active
2	Read mode active
3	Config mode active
8	RTC battery low warning

Bit	Status
9	CRC error detected when reading NVRAM data (that is, the data in the current record is corrupt)
10	Any other RTC error

Registers For Number of Log Records

The actual number of records stored in a log can be determined by reading the registers listed in *Table 9*.

Table 9 Registers that read number of log records

Address	Name	Maximum Number
0x4700	Number of Data Log Records	1861
0x4701	Number of Event Log Records	8192
0x4702	Number of Fault Log Records	910

No register exists to read the number of oscillography records—there are always 500 oscillography records.

Log Request and Log Response Registers

The reading of logs can be configured using the Log Request Index and Log Response Index registers.

Table 10 Log Request and Log Response registers

Address		Access	Units [Range]
0x4703	Log Request Index	Read/Write	Uint16, [0...Idx_max]
0x4704	Log Response Index	Read Only	Uint16, [0...Idx_max]

Log Request Index

The Log Request Index register is limited to the maximum number of records in the event log. When the Logger Mode register is written, the Log Request Index register must be reset to `0`. The Log Request Index register is only writeable when the Logger Mode register is configured to one of the read modes.

- Index `0` means that nothing is to be read from the Logger.
- Index `1` means that the most recent record of the event log is to be read.

Log Response Index

The value in the Log Response Index register is set to the same value as the Log Request Index as soon as the data is available in the corresponding buffer registers. This register should be polled until the expected value is read.

Timestamps

The event, service and data logs contain timestamps. Timestamps can be converted to time using the following formula:

(TimestampHigh * 65536) + TimestampLow + (Timestamp ms / 1000)

Setting Unit Time

The unit time is set by writing to a 32-bits register 0xFA21 - 0xFA22.

To set unit time:

1. Set Logger mode (4705) to 5 (config mode)—see *Table 6 on page 9*.
2. Write the new time in seconds (timestamp) to 0xFA21 - 0xFA22.
3. Set the Logger Mode register to 0 to resume logging.

Note: The inverter stops logging data when the Logger Mode register is set to any value other than 0 (Log mode). Ensure that the Logger Mode register is returned to 0 after the log files have been retrieved.

Data Logs

Data logs contain measurement and state information that is used for troubleshooting. By default, this information is logged every 5 minutes. Only Schneider Electric personnel may change this rate.

Data logs can be obtained by reading the registers listed in *Table 11*.

Table 11 Data log registers

Address	Name	Access	Units/Range
0x4811	Timestamp High	Read Only	uint16, most significant bit in Unix format (starting on 01.01.1970)
0x4812	Timestamp Low	Read Only	uint16, least significant bit in Unix format (starting on 01.01.1970
0x4813	kWh Energy High	Read Only	Uint32, kWh/x10
0x4814	kWh Energy Low	Read Only	Uint32, kWh/x10
0x4815	Grid AC voltage phase A to phase B, RMS	Read Only	Sint16, 0.1V
0x4816	Grid AC voltage phase B to phase C, RMS	Read Only	Sint16, 0.1V
0x4817	Grid AC voltage phase C to phase A, RMS	Read Only	Sint16, 0.1V
0x4818	Inverter AC Current Phase A, RMS	Read Only	Sint16, 0.1A
0x4819	Inverter AC Current Phase B, RMS	Read Only	Sint16, 0.1A
0x481A	Inverter AC Current Phase C, RMS	Read Only	Sint16, 0.1A
0x481B	Grid frequency	Read Only	Sint16, 0.1Hz

Address	Name	Access	Units/Range
0x481C	Real power	Read Only	Sint16, kW
0x481D	Reactive power	Read Only	Sint16, kVAr
0x481E	DC bus voltage	Read Only	Sint16, 0.1V
0x481F	PV voltage	Read Only	Sint16, 0.1V
0x4820	PV current	Read Only	Sint16, 0.1A
0x4821	PV Power	Read Only	Sint16, 0.1A
0x4822	Ground Current	Read Only	Sint16, 0.1A
0x4823	Normalized thermal numbers	Read Only	Uint16,%, [1....112]
0x4824	*App-Info1 on page 14*	Read Only	Uint16
0x4825	*App-Info2 on page 14*	Read Only	Uint16
0x4826	*App-Info3 on page 15*	Read Only	Uint18
0x4827	*App-Info4 on page 15*	Read Only	Uint16
0x4828	DC Voltage Reference	Read Only	Sint16, 0.1V
0x4829	Power reference	Read Only	Sint16, kW
0x482A	Reactive power reference	Read Only	Sint16, kVAr
0x482B	Power board temperature by slave 1 (paralleling mode)	Read Only	Sint16, °C/x10
0x482C	Heatsink temperature (average) by slave 2 (paralleling mode)	Read Only	Sint16, °C/x10
0x482D	Highest priority event code	Read Only	Uint16
0x482E	Power Point Shifting Flag	Read Only	Uint16 0.1V

Oscillography Logs

Oscillography logs contain 500 sets of measurement and state information that are captured at 1ms. Of these 500 data sets, 250 sets are captured before the last service event and 250 after the last service event.

Oscillography logs can be obtained by reading the registers listed in *Table 12*.

Table 12 Oscillography log registers

Address	Name	Access	Units/Range
0x4646	Oscillography Item 1 (Vab)	Read Only	Sint16, 0.1V
0x4647	Oscillography Item 2 (Vbc)	Read Only	Sint16, 0.1V
0x4648	Oscillography Item 3 (Vca)	Read Only	Sint16, 0.1V

Address	Name	Access	Units/Range
0x4649	Oscillography Item 4 (Ia)	Read Only	Sint16, 0.1A
0x464A	Oscillography Item 5 (Ib)	Read Only	Sint16, 0.1A
0x464B	Oscillography Item 6 (Ic)	Read Only	Sint16, 0.1A
0x464C	Oscillography Item 7 (Vpv)	Read Only	Sint16, 0.1V
0x464D	Oscillography Item 8 (Ipv)	Read Only	Sint16, 0.1A
0x464E	Oscillography Item 9 (Ignd)	Read Only	Sint16, 0.1A
0x464F	Oscillography Item 10 (Vdc)	Read Only	Sint16, 0.1V
0x4650	Oscillography Item 11 (*App-Info1 on page 14*)	Read Only	Uint16
0x4651	Oscillography Item 12 (*App-Info2 on page 14*)	Read Only	Uint16
0x4652	Oscillography Item 13 (*App-Info3 on page 15*)	Read Only	Uint16
0x4653	Oscillography Item 14 (*App-Info4 on page 15*)	Read Only	Uint16
0x4654	Oscillography Item 15; reserved	Read Only	Uint16
0x4655	Oscillography Item 16; reserved	Read Only	Uint16
0x4656	Oscillography Item 17; reserved	Read Only	Uint16

Event Logs

All inverter events, including service events, are stored in the event logs. All events are stored whenever they occur, at a maximum rate of four events every 1.5ms. Event logs are time-stamped with a resolution of one millisecond.

The event log can store a maximum of four simultaneous events (where 0 is not an event code). If fewer than 4 events happen at the same time, valid events are non-zero and invalid events are zero.

The event log content can be obtained by reading the registers listed in *Table 13*.

Table 13 Event log registers

Address	Name	Access	Units/Range
0x4720	Timestamp High	Read Only	Uint32, Unix format (starting on 01.01.1970)
0x4721	Timestamp Low	Read Only	Uint32, Unix format (starting on 01.01.1970)
0x4722	Timestamp ms	Read Only	Uint16, ms, [0..999]
0x4723	Event 1	Read Only	Uint16
0x4724	Event 2	Read Only	Uint16

Address	Name	Access	Units/Range
0x4725	Event 3	Read Only	Uint16
0x4726	Event 4	Read Only	Uint16

Service Logs

Service events are a special case of the more general term “events”. Service events are stored in the service log whenever they occur, at a maximum rate of four service events every 1.5 ms. Service logs are time-stamped with a resolution of one millisecond.

The service log can store a maximum of four simultaneous events (where 0 is not an event code). If fewer than 4 events happen at the same time, valid events are non-zero and invalid events are zero.

The service log content can be obtained by reading the registers listed in *Table 14*.

Table 14 Service log registers

Address	Name	Access	Units/Range
0x4740	Timestamp High	Read Only	Uint32, Unix format (starting on 01.01.1970)
0x4741	Timestamp Low	Read Only	Uint32, Unix format (starting on 01.01.1970)
0x4742	Timestamp ms	Read Only	Uint16, ms, [0..999]
0x4743	Fault	Read Only	Uint16

App-Info

App-Info defines information from the data logs and oscillography on the Application (APP) board.

App-Info1

App-Info1 has the same codes as Register 0x1700 (see *Operational Mode State Codes (0x1700) on page 8*).

App-Info2

App-Info2 has the characteristics listed in *Table 15*.

Table 15 App-Info2

Bit	Info	Definition
0	System State (Same as Modbus register 0x1827 - System State)	0 = Initialization 1 = Disable 2 = Enable 3 = Service
1		
2		
3		
4 to 15	unused	

App-Info3

Unused.

App-Info4

App-Info4 has the characteristics listed in *Table 16* and must be interpreted 0 to 15 (left to right). Bit 0 is the most-significant bit (MSB) and Bit 15 is the least-significant bit (LSB).

Table 16 App-Info4

Bit	Acronym	Description	Definition
0	unused	N/A	N/A
1	unused	N/A	N/A
2	LI1	AC_CircuitBreaker_NotReadyToClose	0 = ReadyToClose
3	LI2	AC_CircuitBreaker_NoTrip	0 = Trip
4	LI3	AC_CircuitBreaker_Closed	1 = CB Closed
5	LI4	CabinetDoorClosed	1 = door closed
6	LI5	LocalEnable	1 = Local enable
7	LI6	RemoteEnable (Hardware)	1 = Remote enable
8	LI7	DC_CircuitBreaker_NotReadyToClose	0 = ReadyToClose
9	LI8	DC_CircuitBreaker_NoTrip	0 = Trip
10	LI9	DC_CircuitBreaker_Closed	1 = CB Closed
11	LI10	FanBlock	1 = OK
12	LI11	AC_Caps	1 = OK (managed by External fault -> NC)
13	LI12	MSContactorOpen	Parallel state 2
14	LI13	IsolationFault	1 = OK (managed by External fault -> NC)
15	LI14	CombineIN	Parallel state 2

Conext Core XC Series Modbus Map

Register addresses in the Modbus map are zero based and are specified in hexadecimal notation. These addresses correspond directly with the address field specified in the Modbus Request Packet, making it easier to troubleshoot when capturing data “over-the-wire”.

If you need to enter these address values into the data definition file of a Modbus master device that is expecting a register number, you must convert the address to decimal (base 10) format and add 1 to the address, see *Reading Scaling Parameter Values on page 7*.

Read-Only Monitoring Registers

Read-only monitoring registers capture the changing status of the inverter, as described in *Table 17*.

Table 17 Read-only monitoring registers

Register Address Hexadecimal	Register Name	Register Unit/Scale	Type	Firmware Versions
0x1-0x9	Product Model Designation	N/A	uchar8	v1.07 and later
0xA-0x13	Finished Goods Assembly Number	N/A	uchar8	v1.07 and later
0x14-0x1D	Product Serial Number	N/A	uchar8	v1.07 and later
0x0802-0x0803	kWh Energy Produced	kWhr/x10	uint32	v1.07 and later
0x0804-0x0805	Energy Today	kWhr/x1	uint32	v1.07 and later
0x081E-0x081F	Operating Hours	Hours/x1	uint32	v1.07 and later
0x1700	Operational Mode State (For details, see *Operational Mode State Codes (0x1700) on page 8*.)	Enum	uint16	v1.07 and later
0x1701	Temperature Power Board	C/x10	sint16	v1.07 and later
0x1702	Temperature Heatsink 1	C/x10	sint16	v1.07 and later
0x1703	Temperature Heatsink 2	C/x10	sint16	v1.07 and later
0x1704	Temperature Heatsink 3	C/x10	sint16	v1.07 and later
0x1705	Grid Current	Arms/x10	sint16	v1.07 and later
0x17F1	Apparent Power	kVA/x10	uint16	v1.07 and later
0x17F4	Reactive Power	kVAr/x10	sint16	v1.07 and later
0x17F8	Grid Voltage V12	Vrms/x10	sint16	v1.07 and later
0x17F9	Grid Voltage V23	Vrms/x10	sint16	v1.07 and later
0x17FA	Grid Voltage V31	Vrms/x10	sint16	v1.07 and later
0x17FB	Grid Current Line 1	Arms/x10	sint16	v1.07 and later
0x17FC	Grid Current Line 2	Arms/x10	sint16	v1.07 and later
0x17FD	Grid Current Line 3	Arms/x10	sint16	v1.07 and later
0x17FE	Active Power	kW/x10	sint16	v1.07 and later
0x17FF	PV Voltage	VDC/x10	sint16	v1.07 and later
0x1800	PV Current	ADC/x10	sint16	v1.07 and later
0x1801	PV Power	kW/x10	sint16	v1.07 and later
0x1802	Grid Frequency	Hz/x10	sint16	v1.07 and later
0x1803	Grid Frequency (Hi Res)	Hz/x100	sint16	v3.01 and later
0x180D	DC Voltage	VDC/x10	sint16	v1.07 and later
0x180E	Thermal Loading	%/x10	uint16	v1.07 and later
0x1818	Phase A Frequency	Hz/x10	uint16	v1.07 and later
0x1819	Phase B Frequency	Hz/x10	uint16	v1.07 and later
0x181A	Phase C Frequency	Hz/x10	uint16	v1.07 and later

Register Address Hexadecimal	Register Name	Register Unit/Scale	Type	Firmware Versions
0x181B	Phase A Real Power	kW/x10	sint16	v1.07 and later
0x181C	Phase B Real Power	kW/x10	sint16	v1.07 and later
0x181D	Phase C Real Power	kW/x10	sint16	v1.07 and later
0x181E	Phase A Reactive Power	kVAr/x10	sint16	v1.07 and later
0x181F	Phase B Reactive Power	kVAr/x10	sint16	v1.07 and later
0x1820	Phase C Reactive Power	kVAr/x10	sint16	v1.07 and later
0x1821	Phase A Apparent Power	kVA/x10	uint16	v1.07 and later
0x1822	Phase B Apparent Power	kVA/x10	uint16	v1.07 and later
0x1823	Phase C Apparent Power	kVA/x10	uint16	v1.07 and later
0x1826	Event Code (For a list of event codes, see *Conext Core XC Series Grid Tie Photovoltaic Inverter, 0G-XC-BB, Operation Manual (document number 990-5737)*.)	Enum	uint16	v1.07 and later
0x1827	System State 0 = INITIALIZING 1 = DISABLE 2 = ENABLE 3 = SERVICE	Enum [0,1,2,3]	uint16	v1.07 and later
0x1828	Alarm Code	Enum	uint16	v1.07 and later
0x408E	Disconnect Profile	Enum	uint16	v3.02 and later
0x408F	P-analog Filter Time	s/x100	uint16	v3.02 and later
0x4090	Q-analog Filter Time	s/x100	uint16	v3.02 and later
0x4098	Modbus User P Readout	kW/x10	uint16	v5.00 and later
0x4099	Modbus User Q Readout	kVAr/x10	uint16	v5.00 and later
0x409A	Analog P Signal Readout	mA/x10	uint16	v3.02 and later
0x409B	Analog Q Signal Readout	mA/x10	uint16	v3.02 and later
0xFB08	DC Cap Surge Accum	Min/x1	uint16	v1.07 and later
0xFB31	DC Switch Open Count	N/A	uint16	v1.07 and later
0xFB32	AC Switch Open Count	N/A	uint16	v1.07 and later
0xFBDA	Fan Speed	V/x10	uint16	v1.07 and later

User-Accessible Configuration Registers

User-accessible configuration registers can be changed by the user and are not password protected. The registers are described in *Table 18*. When you change a register value marked with * in *Table 18*, you must reset the system (that is, turn the inverter off and then on) before the change takes effect.

You must disable the inverter (locally or remotely) before most registers can be changed. Only registers marked with ** in *Table 18* can be changed while the inverter is enabled.

To change register values remotely using Modbus:

1. Change parameter control from the front panel user interface to Modbus by writing 2 (Modbus) to register 0xE0E0 (see *Table 18*).
2. Disable the inverter by writing 1 (remote shutdown) to register 0xEFFE (see *Table 18*).
3. Make changes to the register values as required.
4. When all the changes are completed write 1 to register 0xE0E1 to save the changes into nonvolatile memory and return parameter control back to the front panel user interface by writing 1 (panel control) to register 0xE0E0.
5. Enable the inverter by writing 0 (remote start) to register 0xEFFE.

You can only enable the inverter remotely when it is in remote shutdown state and no error condition exists.

To change register values locally using the front panel user interface:

1. Turn the ENABLE STATE/DISABLE STATE switch (S11) to the DISABLE STATE position.
2. Press the center of the scroll wheel to view the main menu.
3. Select **2 Language, Time, Interface > Comm. Interface > Parameter Control Station**, and confirm that the value is **1 Panel Control**. If the value is incorrect, change it.
   Note: Turn the scroll wheel to move up and down in the menu. To select a menu option or apply an entered value, press the center of the scroll wheel. For detailed instructions about using the front panel user interface, see the *Conext Core XC Series Grid Tie Photovoltaic Inverter, 0G-XC-BB, Operation Manual (document number 990-5737)*.
4. Press F4 to exit to the Home screen.
5. Press the center of the scroll wheel to view the main menu.
6. Select the menu options as required (for example, **3 Grid Settings**) to view parameters and make changes. For details about the user-accessible registers, see *Table 18*.
7. When all the required changes are complete, press F4 to exit to the Home screen.
8. Close the plastic shield over the front panel user interface
9. Turn the ENABLE STATE/DISABLE STATE switch (S11) to the ENABLE STATE position.

Table 18 User-accessible configuration registers

Register Address Hexadecimal	Register Default Value	Register Max Value	Register Min Value	Register Name	Register R (Read)/W (Write)	Register Units/Scale	Type	Firmware Versions
0x4097	0	3	0	Analog Error Suppressed 0 = OFF 1 = Suppress P Error 2 = Suppress Q Error 3 = Suppress P and Q Error	R/W	Enum [0,1,2,3]	uint16	v1.07 and later
0x40BB	0	1	0	P(f), Slew Rate Type 0 = Reset Based on Nominal 1 = Reset Based on Snapshot	R/W	Enum [0,1]	uint16	v5.02 and later
0x8003*	247	247	1	Modbus Unit ID	R/W	#/x1	uint16	v1.07 and later
0x8010	32	40	24	Baud Rate 24: 4800 baud 28: 9600 baud 32: 19200 baud 36: 38400 baud 40: 57600 baud Do not use 57600 baud if the Vigilohm IM400 device is installed. The IM400 only supports up to 38400 baud.	R/W	Enum [24,28,32,36, 40] Each device in the Conext Core XC Series must be configured to use the same baud rate.	uint16	v1.07 and later
0xE0E0	1	N/A	N/A	Parameter Control Station 1 = PANEL CONTROL 2 = MODBUS	R/W	Enum [1,2]	uint16	v1.07 and later
0xE0E1	N/A	N/A	N/A	Commit Modbus Settings 1 = COMMIT	W Only	Enum [1]	uint16	v1.07 and later

Register Address Hexadecimal	Register Default Value	Register Max Value	Register Min Value	Register Name	Register R (Read)/W (Write)	Register Units/Scale	Type	Firmware Versions
0xEFFE	N/A	N/A	N/A	Remote Disable/Enable 0 = REMOTE START (if the unit was in remote shutdown state) 1 = REMOTE SHUTDOWN If a device is disabled, all means to disable it must be cleared before the device can go online.	W Only	Enum [0,1]	uint16	v1.07 and later
0xEFFF	Only qualified level 1 users who have the correct Service Code can write to this register.			Clear Service Mode	W Only	[1234]	uint16	v1.07 and later
0xF803	800	800	600	Max Tracking Volt	R/W	V/x1	uint16	v1.07 and later
0xF804	400	700	400	Min Tracking Volt	R/W	V/x1	uint16	v1.07 and later
0xF9F6	0	N/A	N/A	P(f) Control Function 0 = OFF 1 = P(F) TYPE 1 2 = P(F) TYPE 2	R/W	Enum [0,1,2]	uint16	v1.07 and later
0xF9FA	110	140	100	Reconn HV Threshold	R/W	%/x1	uint16	v1.07 and later
0xF9FB**	0	45	-45	User Phase Angle Ref	R/W	Deg/x1	sint16	v1.07 and later
0xFA02	3000	4000	0	PV noP Disconn Delay	R/W	sec/x1	uint16	v1.07 and later
0xFA05	100	65535	0	Disconn HV Delay	R/W	ms/x1	uint16	v1.07 and later
0xFA06	2000	65535	0	Disconn LV Delay	R/W	ms/x1	uint16	v1.07 and later

Register Address Hexadecimal	Register Default Value	Register Max Value	Register Min Value	Register Name	Register R (Read)/W (Write)	Register Units/Scale	Type	Firmware Versions
0xFA07	100	65535	0	Disconn HF Delay	R/W	ms/x1	uint16	v1.07 and later
0xFA08	0.10s (10)	655.35s (65535)	0s (0)	Disconn LF Delay	R/W	sec/x100	uint16	v3.02 and later
0xFA09	20	1800	0	Grid Reconnection Delay	R/W	sec/x1	uint16	v1.07 and later
0xFA0A	1200	3600	0	PV Reconn Delay	R/W	sec/x1	uint16	v1.07 and later
0xFA0D **	0	800	0	User PV Voltage Ref	R/W	V/x1	uint16	v1.07 and later
0xFA0E	400		400	PV OC Start Voltage	R/W	V/x1	uint16	v1.07 and later
0xFA12	3	10	2	MPPT Occurrence Factor	R/W	N/A	uint16	v1.07 and later
0xFA13	2.0V (20)	5.0V (50)	0.1V (1)	Perturb Voltage Step	R/W	V/x10	uint16	v1.07 and later
0xFA15	400	min(700, PV OC Start Voltage)	400	LP PV Voltage Reference	R/W	V/x1	uint16	v1.07 and later
0xFA16	2	10	1	LP Threshold	R/W	%/x1	uint16	v1.07 and later
0xFA17	1.0% (10)	5.0% (50)	0.5% (5)	PV noP Disconn Threshold	R/W	%/x10	uint16	v1.07 and later
0xFA19**	(P_{out_rated}) 540.0kW (5400) 630.0kW (6300) 680.0kW (6800)	Conf Active Power Limit	0.0 (0)	User Active Power Limit Maximum value is limited by the value of 0xFB9B “Conf. Active Power Limit”.	R/W	kW/x10	sint16	v1.07 and later[1]

Register Address Hexadecimal	Register Default Value	Register Max Value	Register Min Value	Register Name	Register R (Read)/W (Write)	Register Units/Scale	Type	Firmware Versions
0xFA1B **	0.0kV (0)	+Conf Reactive Power Limit	-Conf Reactive Power Limit	User Reactive Power Reference Maximum value is limited by the value of 0xFB9C "Conf. Reactive Power Limit".	R/W	kVAr/x10	sint16	v1.07 and later
0xFA1C	4	10	1	PV noP Disconn Delay Factor	R/W	N/A	uint16	v1.07 and later
0xFA1D **	540kVA (5400) 630kVA (6300) 680kVA (6800)	Conf Apparent Power Limit	0.0 (0)	User Apparent Power Limit Maximum value is limited by the value of 0xFB9A "Conf. Apparent Power Limit".	R/W	kVA/x10	uint16	v1.07 and later
0xFA1E **	100	100	5	User Phase Current Limit	R/W	%/x1	uint16	v1.07 and later
0xFA20	0	N/A	N/A	Language 0 = ENGLISH 1 = GERMAN 2 = SPANISH 3 = FRENCH 4 =ITALIAN 6 = CUSTOM1 7 = CUSTOM2	R/W	Enum [0,1,2,3,4,5,6,7]	uint16	v1.07 and later
0xFA21, 0xFA22	0	N/A	N/A	Time (UTC) See *"Read-Only Configuration Registers" on page 28*.	R/W	sec/x1	sint32	v1.07 and later
0xFA24	1	N/A	N/A	Voltage Support Function 0 = OFF 1 = ON	R/W	Enum [0,1]	uint16	v1.07 and later
0xFA28	50.05Hz (5005)	64.00Hz (6400)	47.00Hz (4700)	P(f) Control, Reset Freq High	R/W	Hz/x100	uint16	v1.07 and later

Register Address Hexadecimal	Register Default Value	Register Max Value	Register Min Value	Register Name	Register R (Read)/W (Write)	Register Units/Scale	Type	Firmware Versions
0xFA29	50.2Hz (502)	70.0Hz (700)	50.0Hz (500)	P(f) Control, Corner Freq	R/W	Hz/x10	uint16	v1.07 and later
0xFA2F	5	6000	1	LP Transition Delay	R/W	sec/x1	uint16	v1.07 and later
0xFA30	0	N/A	N/A	Sweep Enable 1 = ENABLE 0 = DISABLE	R/W	Enum [0,1]	uint16	v1.07 and later
0xFA31	3600	10000	120	Sweep Occurrence	R/W	sec/x1	uint16	v1.07 and later
0xFA32	5.0s (50)	60.0s (600)	0.5s (5)	Sweep Duration	R/W	sec/x10	uint16	v1.07 and later
0xFA33	1	N/A	N/A	MPPT Type 0 = TYPE 0 (zero order approx of trend) 1 = TYPE 1 (first order)	R/W	Enum [0,1]	uint16	v1.07 and later
0xFA34	40	160	1	P(f) Control, Slope	R/W	%/Hz/x1	uint16	v1.07 and later
0xFA35	0	20000	20	Power Ref. Ramp Time	R/W	ms/x1	uint16	v1.07 and later
0xFA39	3000	65535	0	Disconn very HV Delay	R/W	ms/x1	uint16	v1.07 and later
0xFA3C	1000	65535	0	Disconn very LV Delay	R/W	ms/x1	uint16	v1.07 and later
0xFA3F	3000	65535	0	Disconn very LF Delay	R/W	ms/x1	uint16	v1.07 and later
0xFA42	3000	65535	0	Disconn very HF Delay	R/W	ms/x1	uint16	v1.07 and later
0xFA43	49.00Hz (4900)	60.00Hz (6000)	40.00Hz (4000)	Reconn LF Threshold	R/W	Hz/x100	uint16	v1.07 and later
0xFA44	50.5Hz (5050)	70.00Hz (7000)	50.00Hz (5000)	Reconn HF Threshold	R/W	Hz/x100	uint16	v1.07 and later
0xFA45	95	100	60	Reconn LV Threshold	R/W	%/x1	uint16	v1.07 and later

Register Address Hexadecimal	Register Default Value	Register Max Value	Register Min Value	Register Name	Register R (Read)/W (Write)	Register Units/Scale	Type	Firmware Versions
0xFA46	0	1800	0	Reconn Power Ramp Time	R/W	sec/x1	uint16	v1.07 and later
0xFA47		0	59,999	Service Code	W Only			v1.07 and later
0xFA48	0	N/A	N/A	Power Reference Selection 0 = MODBUS 1 = ANALOG INPUT	R/W	Enum[0,1]	uint16	v1.07 and later
0xFA49	0.0 (0)	10.0 (100)	0.0 (0)	Voltage Support Factor	R/W	Integer/x10	uint16	v5.00 and later
0xFA4A	N/A	65335	0	Access Code	W Only	Integer	uint16	v1.07 and later
0xFA4B	2500	10000	100	MPPT Offset Factor	R/W	Integer	uint16	v1.07 and later
0xFA4C	1000	5000	0	MPPT Offset Maximum	R/W	W/x1	uint16	v1.07 and later
0xFA4D	50	5000	0	MPPT Offset Minimum	R/W	W/x1	uint16	v1.07 and later
0xFA4E	300	2000	200	MPPT Sampling Interval	R/W	ms/x1	uint16	v1.07 and later
0xFA4F	0.01 (1)	1.00 (100)	0.00 (0)	MPPT Reset Factor	R/W	integer/x100	uint16	v1.07 and later
0xFA50	N/A	N/A	N/A	MPPT Sweep Trigger 1= START SWEEP	W Only	Enum [1]	uint16	v1.07 and later
0xFA51	400	700	400	Sweep Start Voltage	R/W	V/x1	uint16	v1.07 and later
0xFA52	800	800	600	Sweep Stop Voltage	R/W	V/x1	uint16	v1.07 and later
0xFA53	0	100	0	Sweep Range Voltage	R/W	V/x1	uint16	v1.07 and later
0xFA58	120	1800	0	P(f) Control, Reset Time	R/W	sec/x1	uint16	v1.07 and later
0xFA59	90	120	0	V-Support Low Threshold	R/W	%/x1	uint16	v1.07 and later

Register Address Hexadecimal	Register Default Value	Register Max Value	Register Min Value	Register Name	Register R (Read)/W (Write)	Register Units/Scale	Type	Firmware Versions
0xFA5A	110	30	150	V-Support High Threshold	R/W	%/x1	uint16	v1.07 and later
0xFB4A	20	200	0	GFD Reconn Delay	R/W	min/x1	uint16	v1.07 and later
0xFB4B	5	10	0	GFD Max Daily Count	R/W	count	uint16	v3.02 and later
0xFB58	0	2	0	Vac-Regulation	R/W	0=OFF 1=Q(V) 2=Phi(P)	uint16	v1.09 and later
0xFB59	110	140	60	Q(V), V2s	R/W	%/x1	uint16	v1.09 and later
0xFB5A	108	140	60	Q(V), V1s	R/W	%/x1	uint16	v1.09 and later
0xFB5B	92	140	60	Q(V), V1i	R/W	%/x1	uint16	v1.09 and later
0xFB5C	90	140	60	Q(V), V2i	R/W	%/x1	uint16	v1.09 and later
0xFB5E	50	100	20	Phi(P), Pb	R/W	%/x1	uint16	v1.09 and later
0xFB5F	0.90 (90)	0.99 (99)	0.01 (1)	Phi(P), PFc	R/W	1/x100	uint16	v1.09 and later
0xFB60	105	140	60	Phi(P), Vlock in	R/W	%/x1	uint16	v1.09 and later
0xFB61	100	140	60	Phi(P), Vlock out	R/W	%/x1	uint16	v1.09 and later
0xFB62	6000.0min (60000)	6000.0min (60000)	0.5min (5)	Power Ramp Rate	R/W	%/min/x10	uint16	v1.09 and later
0xFB64	10	3600	0	Reconnect Start Delay	R/W	sec/x1	uint16	v1.09 and later

Register Address Hexadecimal	Register Default Value	Register Max Value	Register Min Value	Register Name	Register R (Read)/W (Write)	Register Units/Scale	Type	Firmware Versions
0xFB65	0	N/A	N/A	Reconnect Power Ramp Type 0 = GRID ERROR (ramping is only triggered by grid errors) 1 = GLOBAL (ramping occurs during inverter transition from offline to online)	R/W	Enum [0,1]	uint16	v1.09 and later
0xFB66	20	100	0	Q(V), P Lock in	R/W	%/x1	uint16	v1.09 and later
0xFB67	5	100	0	Q(V), P Lock out	R/W	%/x1	uint16	v1.09 and later
0xFB68	0.20s (20)	600.00s (60000)	0.00s (0)	P Lock in Delay	R/W	sec/x100	uint16	v1.09 and later
0xFB69	0.20s (20)	600.00s (6000)	0.00s (0)	P Lock out Delay	R/W	sec/x100	uint16	v1.09 and later
0xFB6A	140	140	80	OVSPD, Voltage Threshold	R/W	%/x1	uint16	v1.09 and later
0xFB6B	100	100	5	OVSPD, Power Limit	R/W	%/x1	uint16	v1.09 and later
0xFB6C	10min (100)	655.35min (65535)	0.1min (1)	OVSPD, Ramp Down Rate	R/W	%/min/x10	uint16	v1.09 and later
0xFB6D	10min (100)	655.35min (65535)	0.1min (1)	OVSPD, Ramp Up Rate	R/W	%/min/x10	uint16	v1.09 and later
0xFB6E	48.00Hz (4800)	70.00Hz (7000)	40.00Hz (4000)	P(f)2, A Frequency	R/W	Hz/x100	uint16	v1.09 and later
0xFB6F	49.80Hz (4980)	70.00Hz (7000)	40.00Hz (4000)	P(f)2, B Frequency	R/W	Hz/x100	uint16	v1.09 and later
0xFB70	50.20Hz (5020)	70.00Hz (7000)	40.00Hz (4000)	P(f)2, C Frequency	R/W	Hz/x100	uint16	v1.09 and later
0xFB71	52.00Hz (5200)	70.00Hz (7000)	40.00Hz (4000)	P(f)2, D Frequency	R/W	Hz/x100	uint16	v1.09 and later
0xFB72	100.0% (1000)	100.0% (1000)	5.0% (50)	P(f)2, A Power	R/W	%/x10	uint16	v1.09 and later

Register Address Hexadecimal	Register Default Value	Register Max Value	Register Min Value	Register Name	Register R (Read)/W (Write)	Register Units/Scale	Type	Firmware Versions
0xFB73	95.0% (950)	100.0% (1000)	5.0% (50)	P(f)2, B Power	R/W	%/x10	uint16	v1.09 and later
0xFB74	95.0% (950)	100.0% (1000)	5.0% (50)	P(f)2, C Power	R/W	%/x10	uint16	v1.09 and later
0xFB75	35.0% (350)	100.0% (1000)	5.0% (50)	P(f)2, D Power	R/W	%/x10	uint16	v1.09 and later
0xFB76	0	1	0	P(f)2, P Snapshot 0=OFF 1=ON	R/W	Enum [0,1]	uint16	v1.09 and later
0xFB77	50.10Hz (5010)	70.00Hz (7000)	40.00Hz (4000)	P(f)2, F Lock in	R/W	Hz/x100	uint16	v1.09 and later
0xFB78	50.00Hz (5000)	70.00Hz (7000)	40.00Hz (4000)	P(f)2, F Lock out	R/W	Hz/x100	uint16	v1.09 and later
0xFB79	200	10000	0	P(f)2, F Lock in Delay	R/W	ms/x1	uint16	v1.09 and later
0xFB7A	200	10000	0	P(f)2, F Lock out Delay	R/W	ms/x1	uint16	v1.09 and later
0xFB94	850	900	0	Max DC Operating Voltage	R/W	V/x1	uint16	v1.07 and later
0xFB95	15	1440	0	PV OC Recovery Delay	R/W	min/x1	uint16	v1.07 and later
0xFB96	50.05Hz (5005)	64.00Hz (6400)	47.00Hz (4700)	P(f) Control, Reset Freq Low	R/W	Hz/x100	uint16	v1.07 and later
0xFB97	0	900	0	P(f) Control, Reset Delay	R/W	sec/x1	uint16	v1.07 and later
0xFB9D	0	1	0	CQ Mode 0=OFF 1=ON	R/W	Enum [0,1]	uint16	v1.07 and later
0xFB9E	N/A	N/A	N/A	Software Reset	R/W	Enum [1,1]	uint16	v1.07 and later
0xFBE0	100	100	0	Q(V) Qmax AVR	R/W	%/x1	sint16	v3.00 and later

* After the register value is changed, the system must be reset.

** The register value can be changed while the inverter is enabled.

Read-Only Configuration Registers

The read-only configuration registers are listed in *Table 19*. These registers are not accessible to users.

Table 19 Read-only configuration registers

Register Address Hexadecimal	Register Name	Register Unit/Scale	Type	Firmware Versions
0x4009	Day Log Rate	Min/x1	uint16	v1.07 and later
0x400A	First Daytime Hour	Hours/x1	uint16	v1.07 and later
0x400B	Night Log Rate	Min/x1	uint16	v1.07 and later
0x400C	First Nighttime Hour	Hours/x1	uint16	v1.07 and later
0x405C	Grid Voltage 12 Gain Calibration	x1000	uint16	v2.03 and later
0x405D	Grid Voltage 23 Gain Calibration	x1000	uint16	v2.03 and later
0x405E	Grid Voltage 31 Gain Calibration	x1000	uint16	v2.03 and later
0x405F	Grid Voltage 12 Offset Calibration	V/x10	sint16	v2.03 and later
0x4060	Grid Voltage 23 Offset Calibration	V/x10	sint16	v2.03 and later
0x4061	Grid Voltage 31 Offset Calibration	V/x10	sint16	v2.03 and later
0x4062	Gain kVAr Inductive	$(V^2/kVAr*Hz)/x10$	uint16	v2.03 and later
0x4063	Gain kVAr Capacitive	$(V^2/kVAr*Hz)/x10$	uint16	v2.03 and later
0x4091	I1 Gain Cal	s/x1000	uint16	v3.02 and later
0x4092	I2 Gain Cal	s/x1000	uint16	v3.02 and later
0x4093	I3 Gain Cal	s/x1000	uint16	v3.02 and later
0x4094	I1 Offset Cal	s/x10	uint16	v3.02 and later
0x4095	I2 Offset Cal	s/x10	uint16	v3.02 and later
0x4096	I3 Offset Cal	s/x10	uint16	v3.02 and later
0x40B3	AI Disconn LF Threshold	Hz/x100	uint16	v5.02 and later
0x40B4	AI Disconn LF Delay	s/x100	uint16	v5.02 and later
0x40B5	AI LF Disconn Function	Enum [0,1]	uint16	v5.02 and later
0xF801	Rated Input (PV) Current	A/x1	uint16	v1.07 and later
0xF802	Maximum Input (PV) Voltage	VDC/x1	uint16	v1.07 and later
0xF805	Max PV OC Voltage	VDC/x1	uint16	v1.07 and later
0xF806	Max STC PV-SC Current	ADC/x1	uint16	v1.07 and later
0xF807	Rated Apparent Power	kVA/x10	uint16	v1.07 and later
0xF808	Rated Power at Unity PF	kW/x10	sint16	v1.07 and later
0xF809	Min Input (PV) Voltage	VDC/x1	uint16	v1.07 and later

Register Address Hexadecimal	Register Name	Register Unit/Scale	Type	Firmware Versions
0xF80A	Nominal L-to-L Voltage	Vrms/x1	uint16	v1.07 and later
0xF80B	Nominal Line Current	Arms/x1	uint16	v1.07 and later
0xF80C	Rated Reactive Power	kVAr/x10	sint16	v1.07 and later
0xFA0B	Disconn HV Threshold	%/x1	uint16	v1.07 and later
0xFA0C	Disconn LV Threshold	%/x1	uint16	v1.07 and later
0xFA0F	Disconn HF Threshold	Hz/x100	uint16	v1.07 and later
0xFA10	Disconn LF Threshold	Hz/x100	uint16	v1.07 and later
0xFA1A	Active Anti-Islanding Function 0 = OFF 1 = ON	Enum [0,1]	uint16	v1.07 and later
0xFA1F	Utility Region 0 = NONE 1 = CHINA MV-DG (A/I) 2 = CHINA MV-DG (G/S) 3 = P.O.12.3 4 = RD661/RD1663 5 = BDEW-MSRL/FGW TR8 6 = FRANCE ARRÊTÉ 23 AVRIL 2008 7 = IEEE 1547 (50 HZ) 8 = IEEE 1547 (60 Hz) 9 = USA MV-DG 10 = IEC61727 (50 Hz) 11 = IEC61727 (60 Hz) 12 = A70 13 = CEI 0-16 14 = ANRE CODE (RO) 255 = CUSTOM	Enum [0,1,2,3,4,5,6,7,8,9, 10,11,12,13,14,255]	uint16	v1.07 and later
0xFA36	System L-to-L Voltage	Vrms/x1	uint16	v1.07 and later
0xFA37	Disconn very HV Threshold	%/x1	uint16	v1.07 and later
0xFA3A	Disconn very LV Threshold	%/x1	uint16	v1.07 and later
0xFA3D	Disconn very LF Threshold	Hz/x100	uint16	v1.07 and later
0xFA40	Disconn very HF Threshold	Hz/x100	uint16	v1.07 and later
0xFB08	DC Cap Surge Accum	Min/x1	uint16	v1.07 and later
0xFB63	Min. Power Ramp Step	kW/x10	uint16	v1.09 and later

Register Address Hexadecimal	Register Name	Register Unit/Scale	Type	Firmware Versions
0xFB9F	Device Active Status 0x0001=AC Breaker Closed 0x0002=DC Switch Closed 0x0004=Fan in Test Mode	Enum	uint16	v1.07 and later
0xFB10	Voltage Envelope Threshold	%/x1	uint16	v1.07 and later
0xFB11	Voltage Envelope Delay	Samples/x1	uint16	v1.07 and later
0xFBA3	Countdown	/x1	uint16	v1.08 and later
0xFBD2	Max Daily Online Cycling	integer/x1	uint16	v2.03 and later

Vigilohm IM400 Device Modbus Map

The Vigilohm IM400 insulation monitoring device is configured as a Modbus slave with its own Modbus address. The RS-485 Modbus interface uses the communication parameters listed in *Table 20*.

All Conext Core XC Series devices must be configured to use the same communication parameters. To configure the communication parameters, from the home screen of the IM400 device, select **Menu > Settings > Modbus**.

Table 20 IM400 Device RS-485 communication parameters

Parameter	Default Value	Other Values
Address	1	1...247
Auto Config	OFF	ON/OFF
Baud rate	19200	4800 9600 19200 38400
Parity	Even	None Odd Even

The registers listed in *Table 21* allow you to monitor the status of the IM400 device. For complete details about the Modbus map for this device, see the *Vigilohm IM400 Insulation Monitoring Device User Manual*.

Table 21 IM400 read-only registers

Register Address Hexadecimal	Register Name	Description	Type
0x006D	Product status	0x00 Normal operation 0x01 Self-test 0x02 Insulation fault 0x03 Disconnected injection detected 0x04 Over-limit capacitance 0x05 inoperative product 0x07 Overvoltage	uint16
0x03E8	Resistance	Resistance (in W): When injection is inhibited, the value NaN (not a number) 0xFFC00000 is returned during a self-test	Float32

Register Address Hexadecimal	Register Name	Description	Type
0x03EA	Capacitance	Capacitance (in F): When injection is inhibited, the value NaN (not a number) 0xFFC00000 is returned during a self-test	Float32
0x03F0	Injection status	0 = injection activated 1 = injection deactivated	uint16
0x044C	Insulation alarm status	0 = no insulation alarm 1 = insulation alarm active 2 = preventive insulation alarm active 4 = transient insulation alarm 8 = insulation alarm acknowledged	uint16

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Product Number	_____
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