Branch Series: Multi-Circuit (Branch) Meter

- Manual -

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WARNING

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Failure to follow these instructions may cause serious injury or death

- Do not use this product for life safety applications.
- Do not install this product in hazardous or classified locations.
- Only qualified trade installers should install, program, maintain and test system incorporated therein. Installer is responsible for compliance of all applicable codes.
- Read, understand, and follow instructions thoroughly.
- The Standard CTs associated with this product must be mounted inside a suitable fire and electrical enclosure. For safe electrical work practices, see NFPA 70E in the USA or applicable local standards and codes.
- Replace all doors, covers, and protective devices before powering the equipment.
- Product may use multiple voltage/power sources. Disconnect ALL sources before servicing.
- Use a properly rated voltage sensing device to confirm that power is off. DO NOT depend on this product for voltage indication.
- The installer is responsible for conformance to all applicable codes.
- For use with Listed Energy Monitoring Current Transformers.
- Use Copper Conductors Only
- Per IEC 61010-1 section 8.2.2 “impact test”, this product tested with energy of 2J (reduced from 5J) code: IK07

WARNING

Failure to follow these instructions may cause injury, death or equipment damage.

- If product is used in a manner not specified by the manufacturer, the protection provided by the product may be impaired. No responsibility is assumed by the manufacturer for any consequences arising out of the use of this material.

LIMITATION OF LIABILITY Senva’s liability, whether in contract, in tort, under any warranty, in negligence or otherwise shall not exceed the amount of the purchase price paid by the purchaser for the product. Under no circumstances shall Senva be liable for special or consequential damages.

System Overview

The Core Module Multi-Circuit Monitoring System is designed to measure the current, voltage, and energy consumption on and other critical power parameters on up to 96 circuits. Current transformers are connected via a variety of Interface Boards optimized for different applications that connect to the Core Module via network cables. Each Interface Card monitors up to 24 circuits and the Core Module hosts up to four interface cards. The Core Module can communicate via Modbus TCP/IP, Modbus RTU as well as provides access to real time and logged data via an on board web server. Logged data can reside directly on the Core Module or on SD storage card with up to 32 GB capacity. The Core Module also monitors two digital inputs and provides two digital outputs.

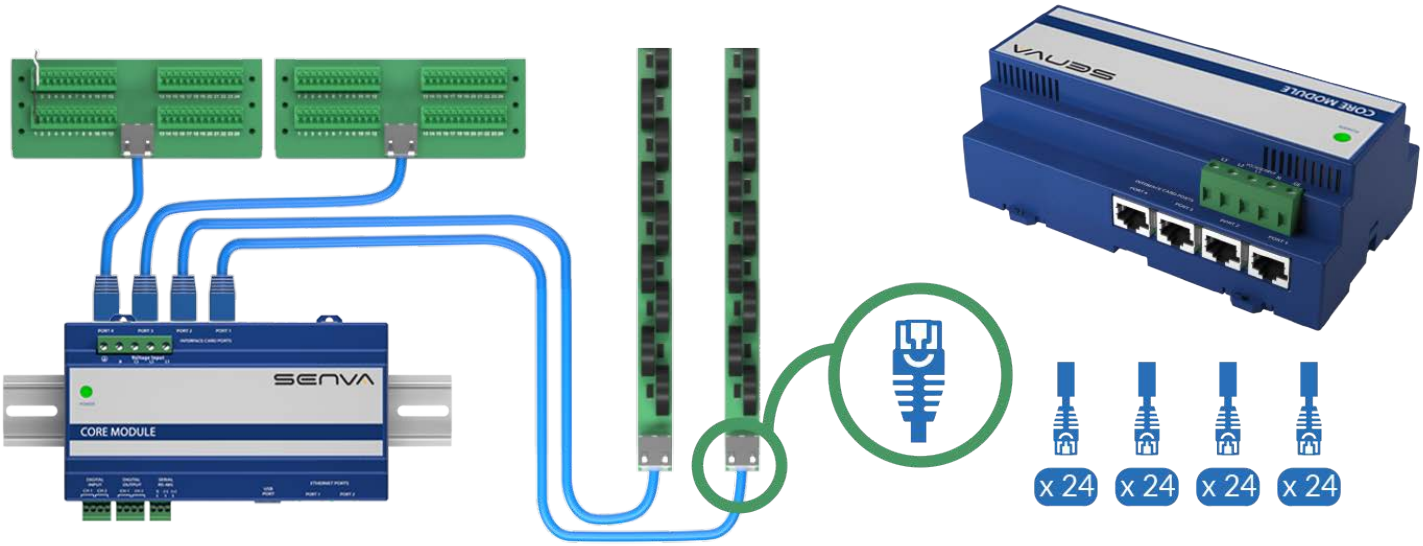


Figure 1. Interface Boards connect to the Smart Ports on the Core Module using network cables

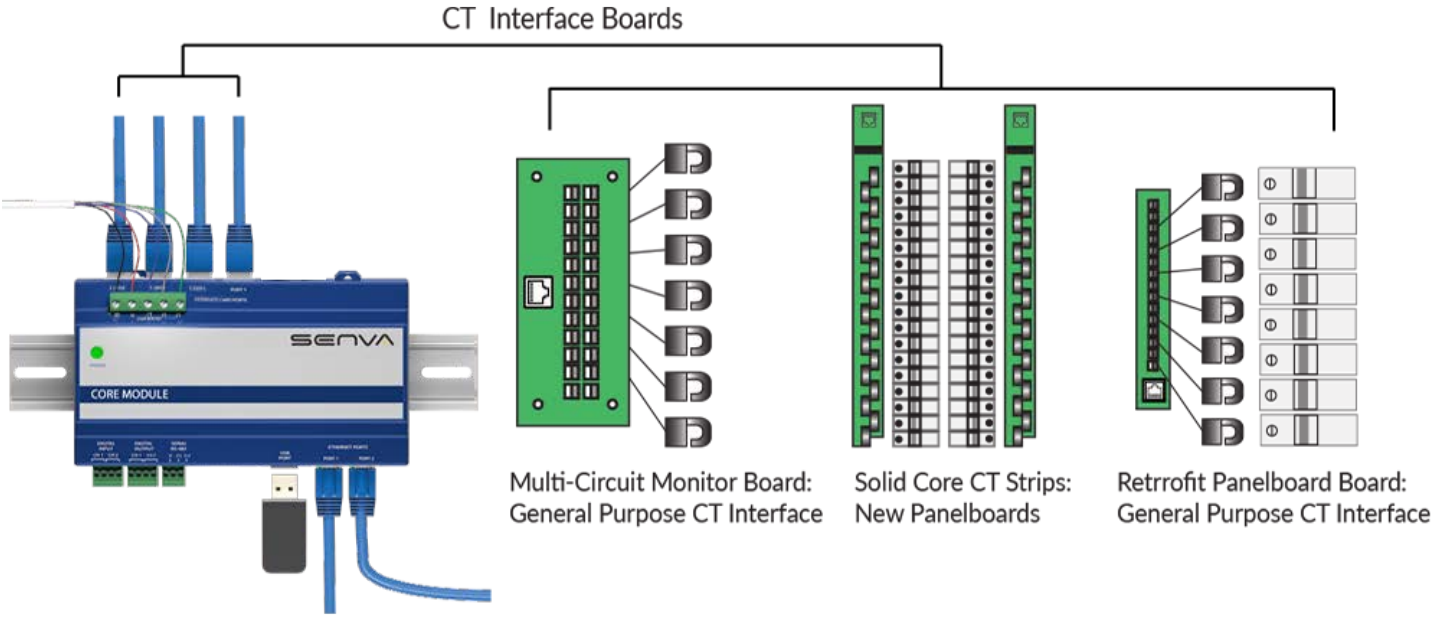


Figure 2. The Core Module connects to three different application specific CT Interface Boards

Specification

VOLTAGE INPUTS	
Measurement Voltage/Control Power	90 to 300 VAC line-to-neutral, 50/60 Hz
DC Control Power	12-24 VDC nominal (only available on models with DC input power supply)
Overload Protection	Internally fused (0.5 A @ 300 VAC)
Current Consumption	<0.1A @ 277 VAC
ACCURACY and MONITORING	
Power/Energy	IEC 62053-21 Class 1, ANSI C12.1-2008 System Accuracy (including branch CTs)(1% system accuracy includes both the Core Module and branch current sensors)
Voltage	±0.5% of reading 90 to 277 VAC line-to-neutral
Current	±0.5% of reading
Minimum On Current	50 mA
Channel Capacity	Up to 96 channels/circuits
COMMUNICATIONS	
Data protocols	Modbus TCP/IP (Ethernet), Modbus RTU (RS-485 2 wire), HTML (web server)
Ethernet ports	2 x RJ-45 10/100 Mbit
USB port	USB 2.0 Type A
Web server	HTML via standard browser
ETHERNET COMMUNICATION	
Physical Interface	RJ45 connector with 10/100 Mbit Ethernet
Protocols Supported	Modbus TCP/IP
SERIAL COMMUNICATION	
Physical Interface	2-wire RS-485
Serial Protocols Supported	Modbus RTU
Address Range	0-255
Baud Rate	9600, 19200, 38400
Parity	Modbus RTU: NONE (fixed)

VOLTAGE INPUTS	
Communication Format	8 data-bits, 1 start-bit, 1 stop-bit
Termination	3 pole connector
Wire Size	up to 16 AWG
DIGITAL I/O	
Digital Input	Dry Contact (N.O.) with 5V @ 10mA source
Digital Output	30VDC / 0.1A maximum
WIRE SIZE RANGE	
Voltage Connection	24 to 12 AWG
I/O and Serial Connections	22 to 16 AWG
Aux. Terminals on CT Interface Boards	26 to 16 AWG
TERMINAL BLOCK TORQUE	
Voltage Connection	4.4 to 5.3 in-lb (0.5 to 0.6 N-m)
I/O and Serial Connections	3.5 to 4.4 in-lb (0.4 to 0.5 N-m)
Aux. Terminals on CT Interface Boards	1.9 to 2.2 in-lb (0.22 to 0.26 N-m)
MECHANICAL	
Network Cable	8 conductor network cable with insulation rated for neighboring conductors and terminated with RJ45 connectors
OPERATING CONDITIONS	
Operating Temperature Range	0° to 60 °C (32 to 140 °F)(<95% RH non-condensing)
Storage Temperature Range	-40° to 70 °C (-40 to 158 °F)
Altitude of Operation	2000 m max.
COMPLIANCE INFORMATION	
Agency Approvals	UL61010 IEC/EN61010-1, CE
Installation Category[1]	Cat III, pollution degree 2[2]
Conducted and Radiated Emissions	FCC part 15 Class A, EN55011/EN61000-6-4 Class A (heavy industrial)
Conducted and Radiated Immunity	EN 61000-6-2 and EN 61326-1

[1] For indoor use only.

[2] A Pollution Degree 2 environment must control conductive pollution and the possibility of condensation or high humidity. Consideration must be given to the enclosure, the correct use of ventilation, thermal properties of the equipment and the relationship with the environment.

Monitored Parameters and Feature Sets

Monitored Parameter	Circuit Level	Input Level[1]
Current per phase	X	X
Max. current per phase	X	X
Avg. Current per phase	X	X
Current demand per phase	X	X
Max. current demand per phase	X	X
Current phase angle	X	X
Voltage phase angle	X	X
Real power (kW) per phase	X	X
Real power (kW) demand per phase	X	X
Real power (kW) demand max	X	X
Energy (kWh) per phase	X	X
Power factor	X	X
Power factor vector	X	X
Apparent Power (kVA)	X	X
Reactive Power (kVA)	X	X
THDI	X	X
THDV	X	X
Voltage, L-L and average		X
Voltage, L-N and average		X
Voltage, L-N and per phase		X
Waveform capture	X	X
Breaker trip detection[2]	X	X
Presence of Voltage[3]	X	X
ITIC/CBEMA Violation	X	X

Monitored Parameter	Circuit Level	Input Level[1]
Ground Current[4]	X	X

[1] Input level data can be calculated by summing up branch CT measurements or directly measured using CTs.

[2] Processor based feature different from presence of voltage detection

[3] Optional feature

[4] Requires optional ground current CT connected to auxiliary CT input

Product Selection

Core Module Monitoring Systems	
CM02SV	Enhanced Core Module, 90-300 VAC L-N, 50/60 Hz (combined sensing and power supply input); supports 277V L-N / 480V 4W with neutral sources and 240 VAC / 415V 4W sources; use alternate models for 3W sources that do not have a neutral
CM02SV-480	Enhanced Core Module, 160-480 VAC L-L / 0.1A, 50 Hz (combined sensing and power supply input); used for 3W applications where neutral is not available
CM02SV-DC	Enhanced Core Module with 12-24VDC control power required; supports 3W and 4W sources; 90-300 VAC L-N / 160-480VAC L-L, 50/60 Hz sensing voltage
CTS-ENCL1	NEMA 1 Core Module Enclosure
Busway Strips	
CTS403-F	3 channel tap-off monitor for remote CTs (end feed and retrofit)
CTS203E	3 channel tap-off monitor with PC mounted 100 A solid core CTs and presence of voltage sensing
CTS406-F	6 channel tap-off monitor for remote CTs (end feed and retrofit)
CTS206E	6 channel tap-off monitor with PC mounted 100 A solid core CTs and presence of voltage sensing
Solid Core CT Strip monitoring system for installations on new panelboards	
All systems include 10mm x 100 A solid core CTs and + 3 auxiliary CT terminals per strip for main input CTs	
0.75” c-c CT strips	
CTS021A	Standard 0.75” CT center 1 x 21 100A solid core CT strip
CTS021B	Enhanced 0.75” CT center 1 x 21 100A solid core CT strip with presence of voltage detection
1.0” c-c CT strips	
CTS121A	Standard 1.0” CT center 1 x 21 100A solid core CT strip
CTS121B	Enhanced 1.0” CT center 1 x 21 100A solid core CT strip with presence of voltage detection

Core Module Monitoring Systems	
18mm c-c CT strips	
CTS218A	Standard 18mm CT center 1 x 18 100A solid core CT strip
CTS218B	Enhanced 18mm CT center 1 x 18 100A solid core CT strip with presence of voltage detection
CTS221A	Standard 18mm CT center 1 x 21 100A solid core CT strip
CTS221B	Enhanced 18mm CT center 1 x 21 100A solid core CT strip with presence of voltage detection
CTS223A	Enhanced 18mm CT center 1 x 23 100A solid core CT strip
CTS223B	Enhanced 18mm CT center 1 x 23 100A solid core CT strip with presence of voltage detection
Retrofit Panelboard CT Interface Module (Floating Strip CT interface module) and Core Module monitor	
Floating Strip CT interface boards reside in raceway and interface with 10mm x 75 A or 100 A split core CTs using plug-in quick connects; each	
CTS321A	24-channel Floating Strip split core CT interface board; utilizes branch CTs with connectors
CTSC01050	50 A x 10mm window split core current transformer, 250mm 300V AWG24 lead with Molex connector
CTSC01075	75 A x 10mm window split core current transformer, 250mm 300V AWG24 lead with Molex connector
ICTSC010100	100 A x 16mm window split core current transformer, 250mm 300V AWG24 lead with Molex connector
Multi-Circuit Monitoring Systems and Core Module monitor	
The Multi-Circuit Monitoring system supports up to 4 x 24 CT Interface Cards (96 circuits) and accommodates any 0.333 Vout current transformers.	
IOC24A1	24 Channel Digital Input Card
CTC24A1	24 channel Multi-Circuit Monitoring CT interface board
Current Transformers see Current Transformer selection guide for details	

Connector Overview

Figure 3. Connector Overview

1. Ethernet Ports: The Core Module is equipped with two Ethernet ports to facilitate easy daisy chaining of network connections. Either port may be used for network connectivity. The ports utilize standard RJ45 connectors.
    - Ethernet Port LED Status Indicators
    - Green LED is on, there is 10/100/100Mbps traffic
    - Orange LED is on, the port is being connected, but no data is being transferred
    - Orange LED is blinking, data is being transferred
2. USB Port (Type A): The USB port can be used both as a data interface port as well as hosting a data logging USB drive on Enhanced Core Modules. The USB port can be used to configure the Core Module using a USB thumb drive with up to 64GB in capacity the configuration file. See the “Configuration” section for details.
3. Serial Port: (RS-485 Modbus RTU 2 wire)
4. Digital Input: Two isolated dry contact digital inputs
5. Digital Output: Two isolated dry contact digital outputs rated at 30 V x 0.1 A.
6. Interface Module ports (RJ45); for CT and auxiliary cards
7. Voltage Input Terminal Block

Core Module Installation

WARNING	Disconnect power to the panel or equipment on which the monitor is being installed before starting the installation.

The Core Module can be housed in existing enclosures where permitted by code or inside standard electrical enclosures. Be sure that the mounting area allows for adequate wire bending radiuses per local and national electrical codes.

The Core Module is installed by mounting on standard 35mm DIN rail. The enclosure can be mounted in any orientation. Secure the DIN rail using a mechanical fastener such as sheet metal screw or bolt to a secure surface.

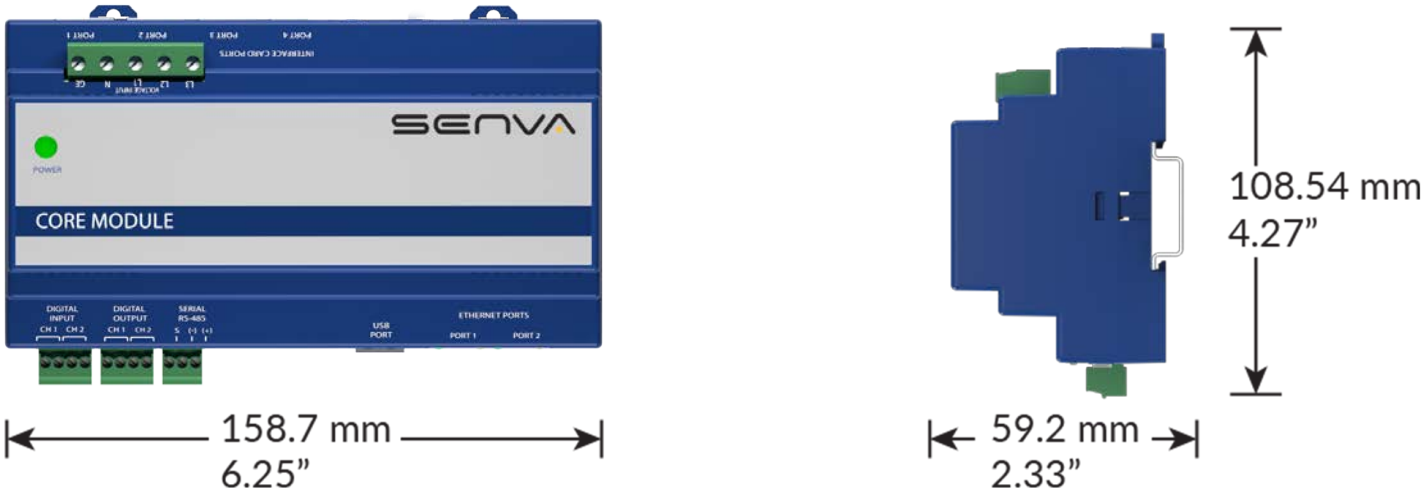


Figure 4. Core Module dimensions

Mount the enclosure on the DIN rail by lifting up circlips and placing enclosure over the rail as shown. Once rail is in place push the circlips down to secure the enclosure in place.

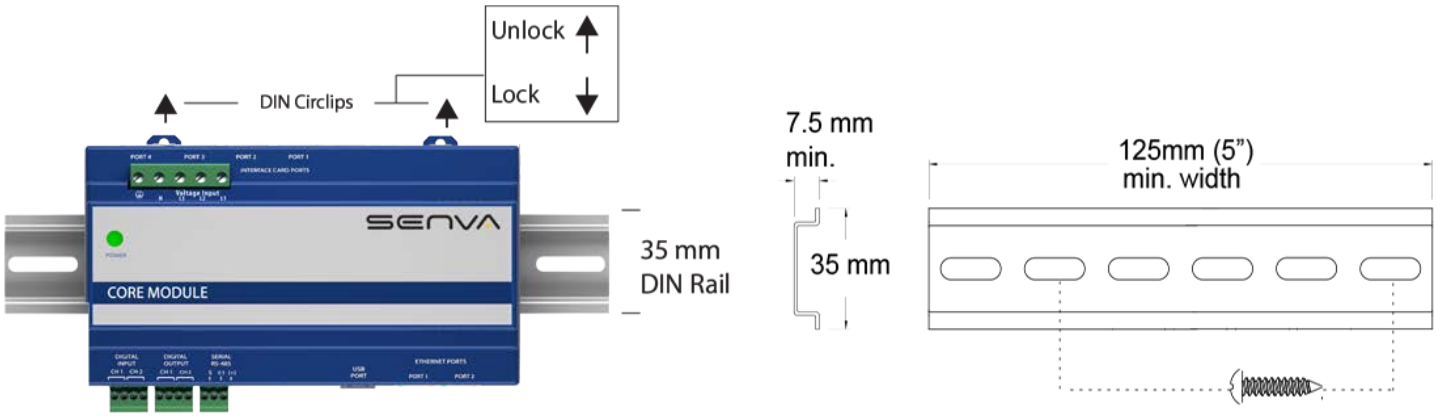


Figure 5. Core Module Installation

Connection of Interface Boards

CAUTION

Note that the when the Ethernet cable is run in the same raceway or conduit area it must have insulation rated to the correct voltages and listings required. For applications up to 240 VAC the insulation must be rated to 300 VAC. For 480 VAC applications use 600 VAC insulation. The appropriate cables can be provided by Senva. Ethernet cable may also be routed in appropriately rated flexible tubing.

There are different application specific Current Transformer Interface Boards that connect to Smart Ports on the Core Module using network cable.

Cables are eight conductor network (Ethernet) cables with RJ45 connector terminations; cables must have insulation voltages rated for the environment. Cable runs between the Core Module and Interface Card can be up to 50'. For distances longer consult factory for details.

Cables can also be field constructed from network cable and terminated with RJ45 connectors. Always make sure that pin to cable connections on both sides of the cable match when making custom cables.

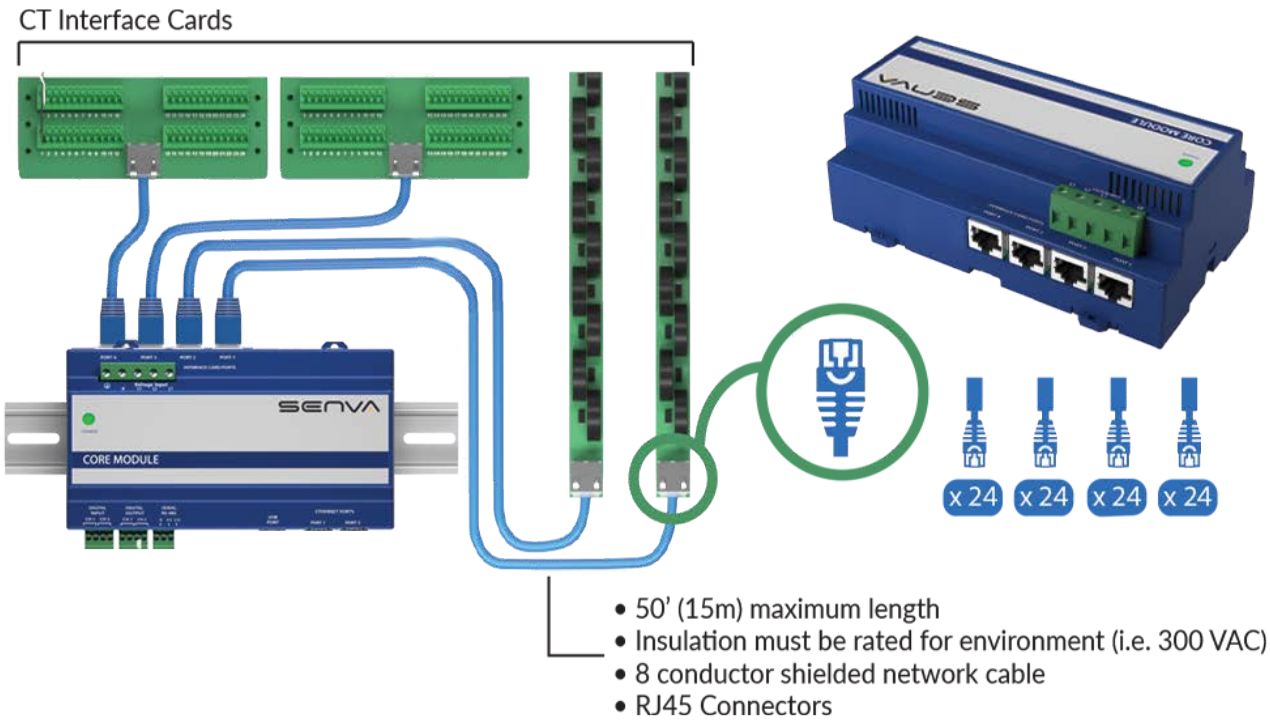


Figure 6. Interface Card Wiring to Core Module

There are four Smart Port receptacles on the Core Module. It is critical the correct Smart Port receptacle is assigned to the correct CT Interface Board as it will affect how circuit numbers are referenced.

The circuit designation assigned by the monitor will vary with the Interface Board type. Consult the section on this manual for the specific CT interface cards to determine the correct Smart Port to CT interface card relationship. Native circuit numbers may be changed using the Dynamic Circuit (True Circuit) display configuration tool.

The chart below shows a generalized relationship between the Smart Port and CT Interface Card.

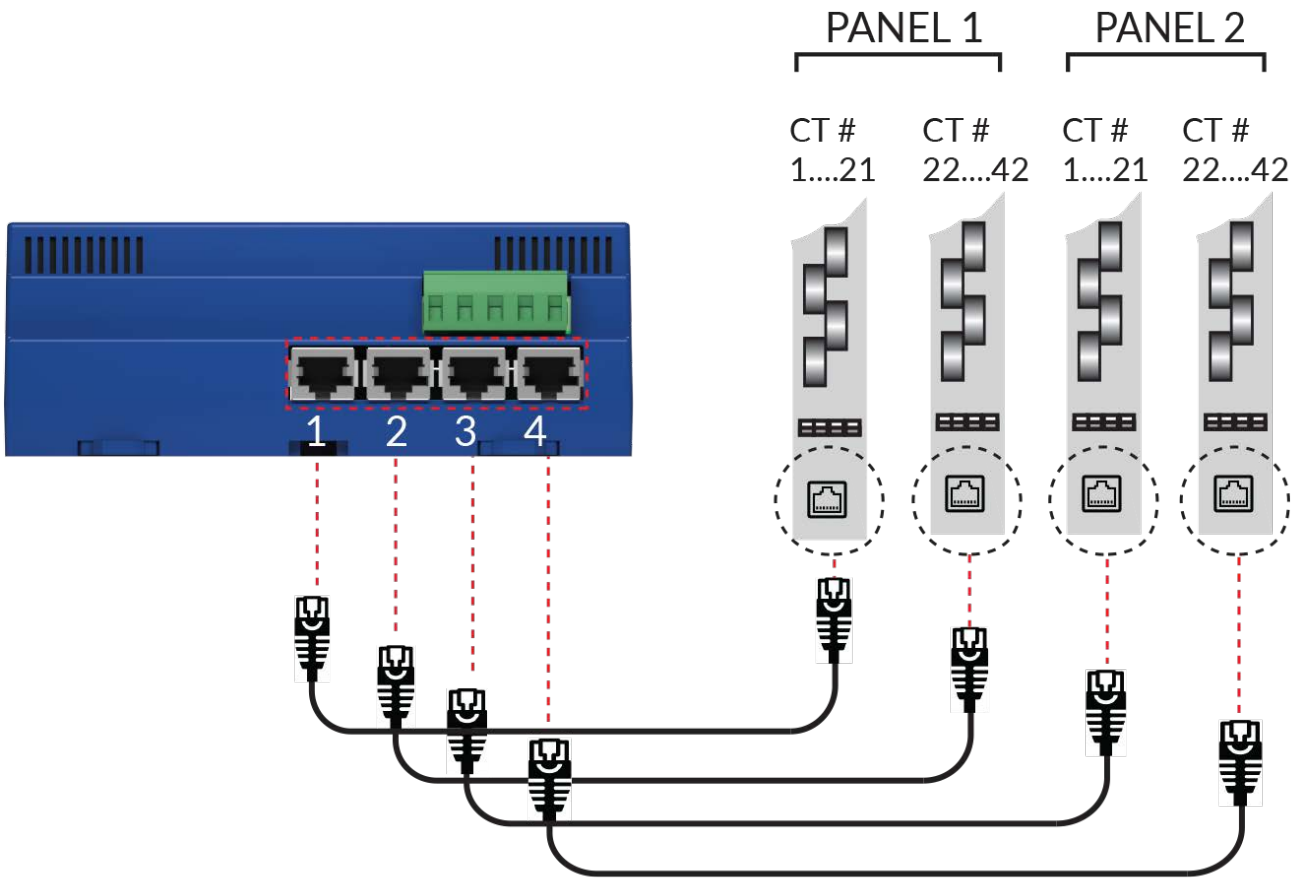


Figure 7. Solid Core CT Strip Configuration

PORT	CIRCUIT DESIGNATOR ON INTERFACE BOARD																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
2	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
3	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
4	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
	CIRCUIT ASSIGMENT / CHANNEL DESCRIPTION																							

External Boards

Multi-Circuit Monitor Interface Board Installation

WARNING

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- While removing or installing panels and covers, assure that they do not contact an energized bus.
- NEVER bypass external fusing.
- NEVER short the secondary of a potential transformer.
- Before closing covers and doors, carefully inspect the work area and remove any tools, wire scraps or other objects that may have been left inside the equipment.

Failure to follow these instructions will result in death or serious injury.

Multi Circuit Monitor Card Installation

The Multi Circuit Monitor Interface Board is typically mounted as closed to the location where the CTs are placed to minimize CT wiring distance. The board is installed by mounting it on a standard 35mm DIN rail strip which can be affixed mechanically using screws or bolts, or using VHB tape to affix the DIN rail.

Current Transformer Types

The interface board is designed to used 0.33V output CTs provided by Senva. Other 0.33V CTs will also work but Senva does not warranty the performance if third party CTs are used. DO NOT USE unburdened i.e. current output CTs, as these will destroy the board as well as can produce lethal voltages during installation. When using the Enhanced Core Monitor. CTs types (i.e. solid core and split core) and current ranges (i.e. 10 A – 5000 A) may be mixed on any circuit so long as the correct current specification is entered on the configuration chart.

Figure 8. Current Transformer Types

Installation and Placement of Current Transformers

Connect the current transformers (CT's) into to the CT terminal block as shown below. Observe the wiring polarity

with the white or positive wire of the CT connecting to the top terminal blocks and black or negative to the bottom terminal blocks as shown below. Prior to inserting the CT wires ensure that at least 8mm (¼") of CT conductor is uninsulated before inserting into the terminal. Gently pull the conductor after insertion to ensure that is secured by the cage connector. If the conductor needs to be removed from the terminal push the lever on top of the terminal gently pull the conductor when the lever is depressed.

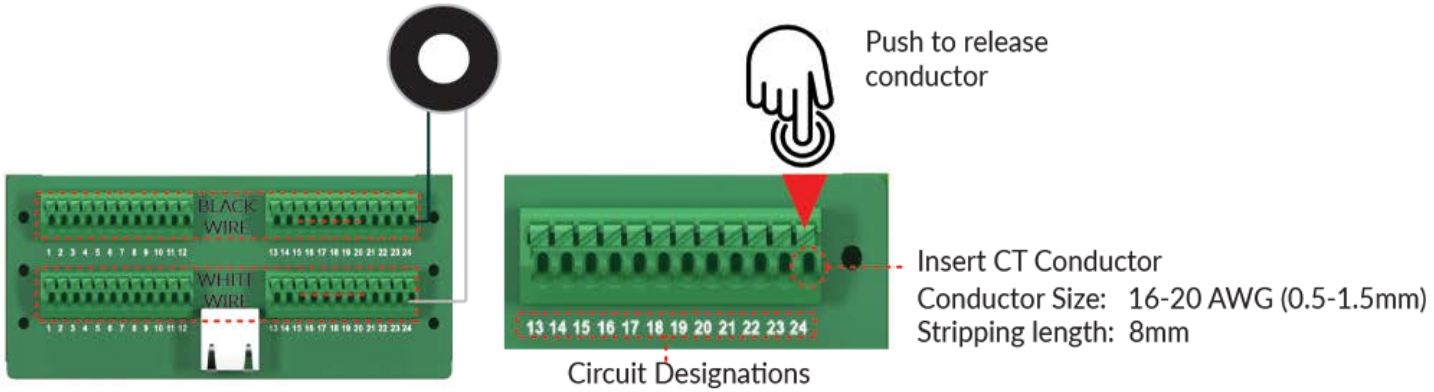
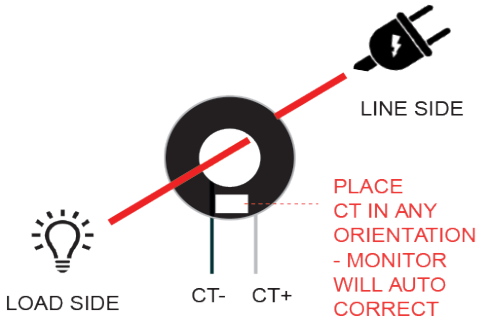


Figure 9. Current Transformer Installation

Auto-CT Orientation and Polarity Correction

Senva monitors feature an auto CT connection and orientation system. This means that the orientation of the CT relative to the load and line side does not matter. If CTs are backwards oriented and produce a negative reading, this will automatically be corrected by the monitor. Likewise, if CT cables are wired opposite to their polarity, the meter will detect the error and auto-correct.



Cable Ports and Circuit Designation

It is critical the correct Smart Port receptacle is connected to the correct CT Interface Board. The circuit number expressed by the monitor will be determined by the port the Interface Board is plugged into. Native circuit numbers may be changed using the Dynamic Circuit (True Circuit) display configuration tool. The chart below shows a relationship between the Smart Port and CT Interface Card based on the Schneider Emulation point map.

VIRTUAL METER ID		CIRCUIT DESIGNATION ON INTERFACE BOARD																							
	PORT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Slave ID "X"	1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	AUX 1	AUX 2	AUX 3
	2	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	AUX 4	N/A	N/A
Slave ID "X+1"	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	AUX 1	AUX 2	AUX 3
	4	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	NEUTRAL	N/A	N/A
		CIRCUIT ASSIGNMENT / CHANNEL DESCRIPTION ON REGISTER MAP																							

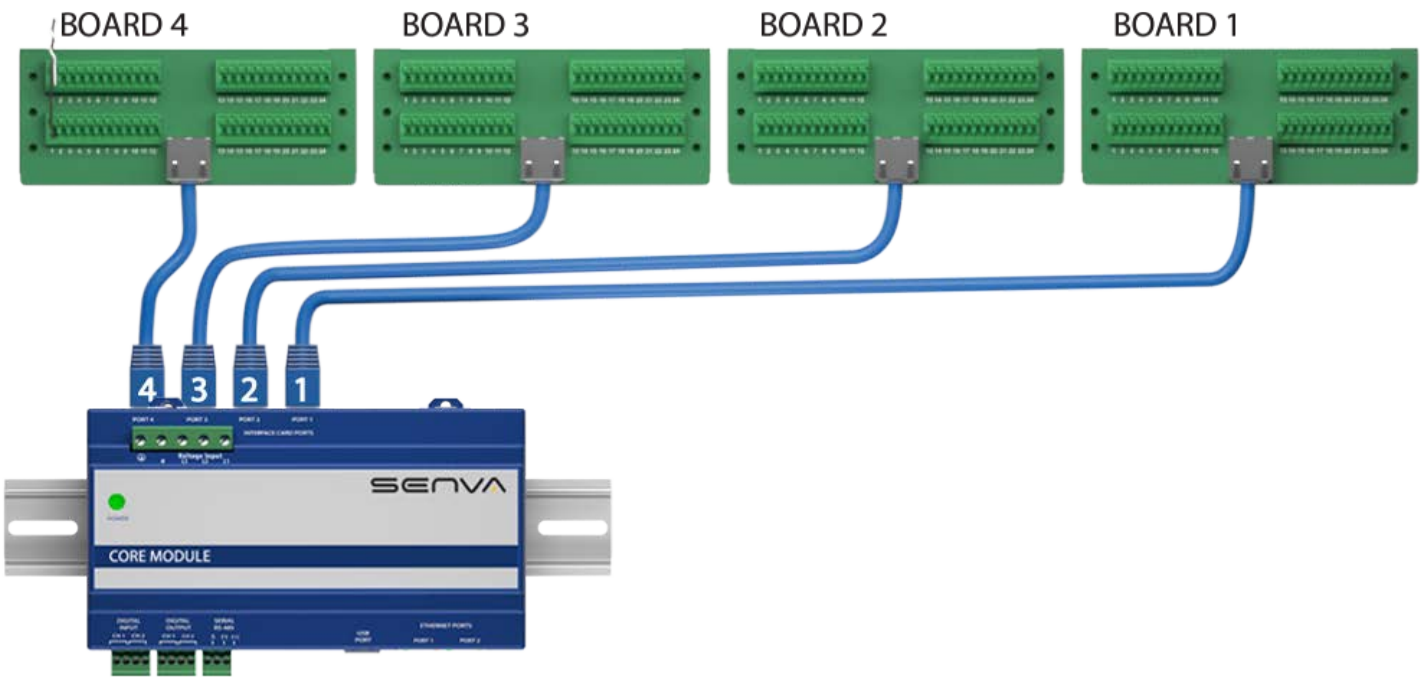


Figure 10. Current Transformer Interface Card Wiring

Discovery of CT Interface Card by the Core Module

Once the CT Interface Card(s) are plugged into the Core Module and the module is energized, they will automatically be discovered upon power up of the Core Module. A green LED on the CT strip that will indicate if it is discovered and communicating. To be properly communicating the LED will be pulsing at a 1Hz rate.

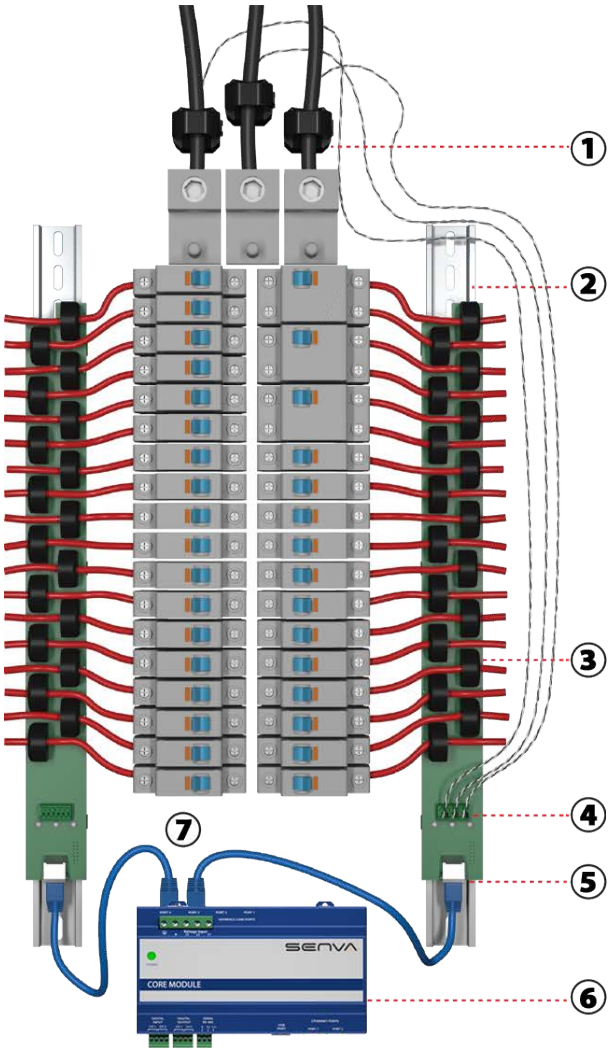
IMPORTANT	CT Strips and Cards can only be discovered upon power up of the Core Module. Plugging in a new Strip or Card when the Core Module is energized will require power cycling of the Core Module.

Figure 11. Confirming communication and operation of Interface Card

Solid Core CT Strips Interface Board Installation

Solid core CT strips are used for new installations on panelboards. There are two versions of the CT strip designed to match specific breaker spacing and pole count; an 18mm x 18 CT strip and 0.75” x 21 CT. Make sure that the strip selected matches the panelboard specifications.

Branch Circuit Monitor Installation Overview



1. MAIN INPUT CTS: MAIN INPUT CTS CAN BE CONNECTED TO CT AUXILIARY TERMINAL BLOCKS

2. DIN RAIL / MOUNTING BRACKET: USED TO SECURE CT STRIP TO THE PANEL.

3. SOLID CORE CTS: SOLID CORE CTS ARE RATED FOR 100 A AND HAVE A 10MM WINDOW DIAMETER

4. AUXILIARY CT TERMINAL BLOCK: MONITORS UP TO THREE AUXILIARY CTS PER STRIP, TYPICALLY USED TO MONITOR MAIN INPUT CIRCUITS AND GROUND CURRENT.

5. SMART PORT JACK: RJ45 CONNECTOR USED TO INTERFACE THE CT STRIP WITH THE CORE MODULE.

6. CORE MODULE: HOSTS UP TO FOUR CT STRIPS OR TWO PANELS.

7. NETWORK CABLE: USED TO CONNECT SMART PORTS TO CT STRIPS.

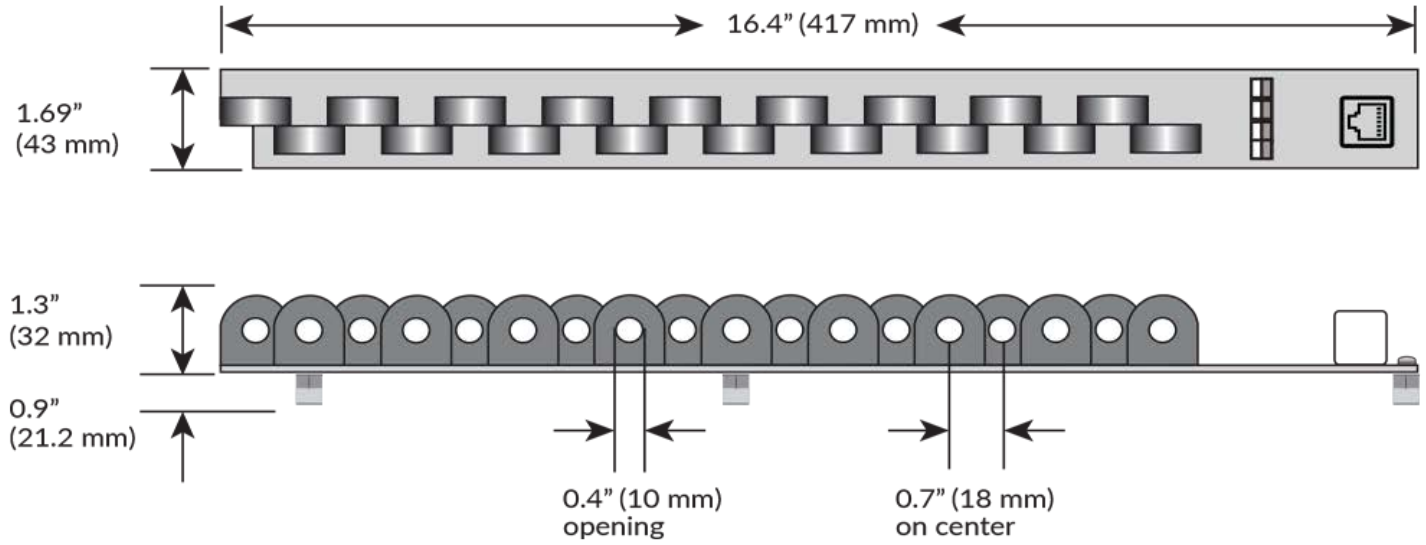


Figure 12. 18mm CT strip dimensions

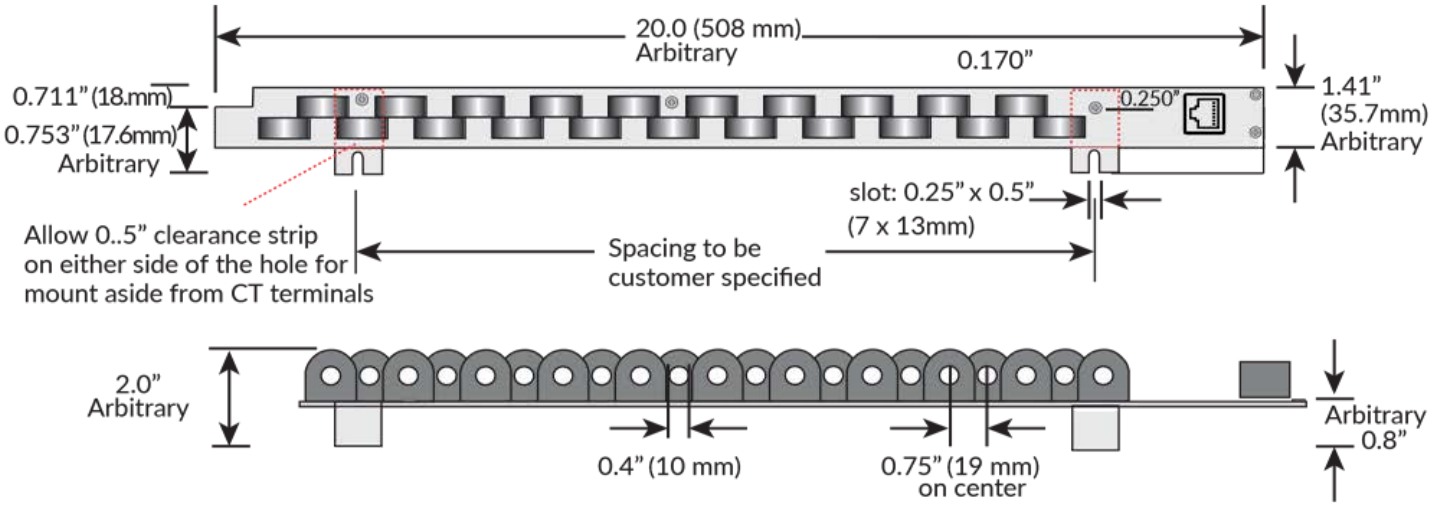


Figure 13. 0.75" CT strip dimensions

Placement and Orientation of Solid Core CT Strips

CT strips can be installed in a number of configurations designed to match the panelboard layout and pole numbering. Position and orient the CT strips in one of the configurations shown in the diagrams below. Note the orientation by the location of RJ45 cable jack. It is critical that each CT strip be connected to the correct Interface Card Port on the module. See the required port to CT strip relationship shown below. Failure to do so will result in incorrect assignment of the circuits.

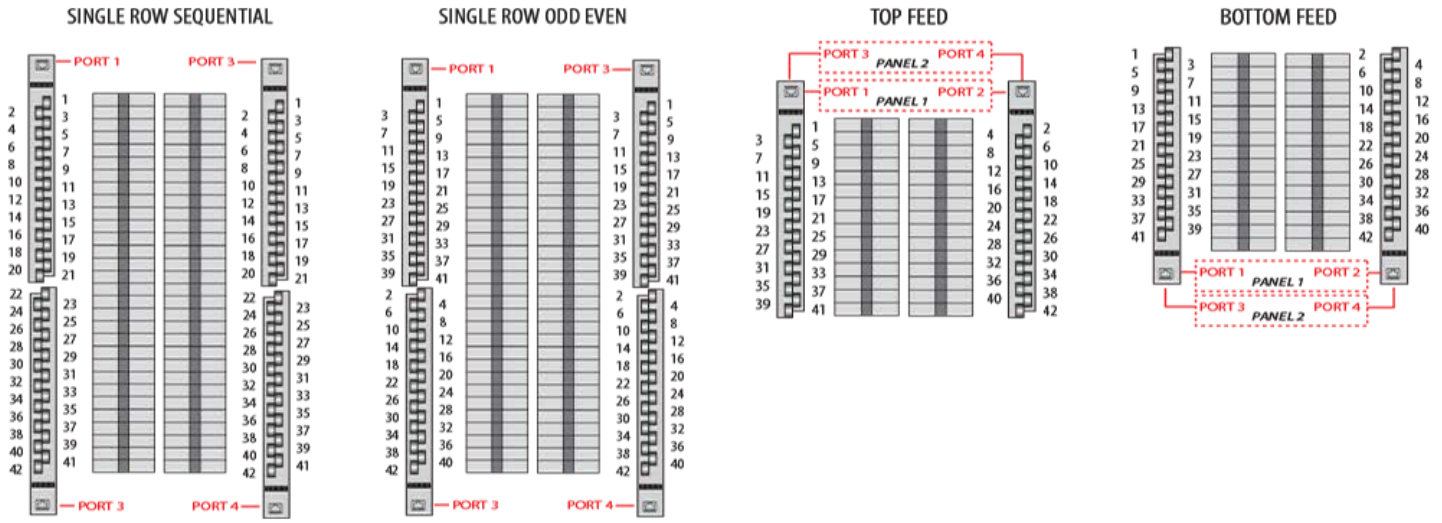


Figure 14. 0.75" CT strip numbering schemes

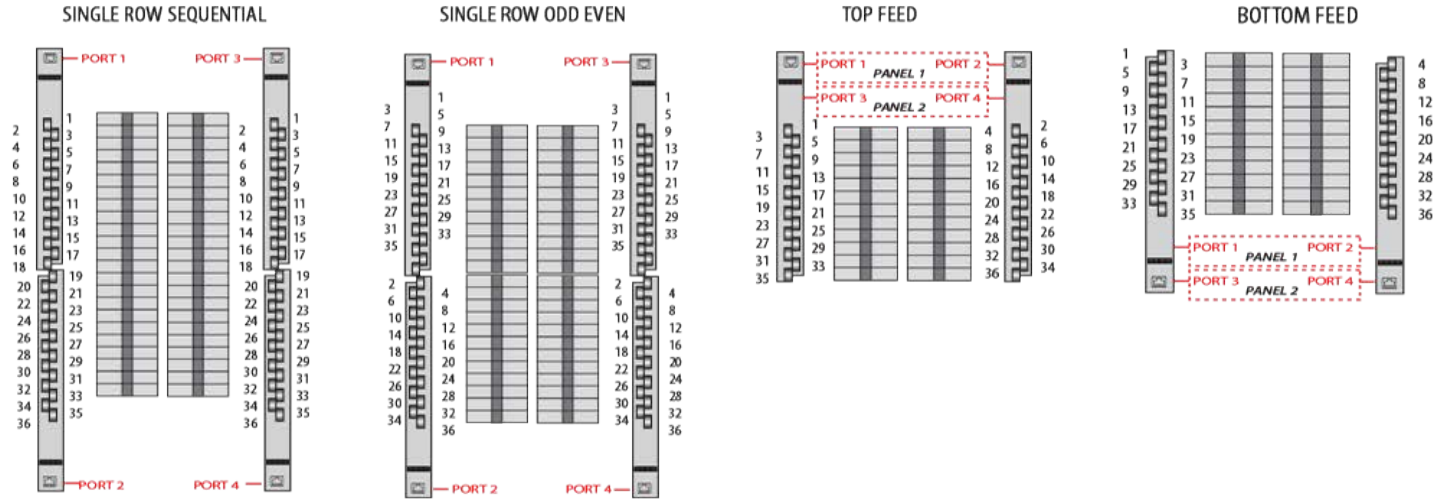


Figure 15. 18mm CT strip numbering schemes

Mounting Instructions: 18mm Strip

The 18mm Solid Core CT strip is mounted using standard 35mm DIN rail. Each strip is supplied with 3 DIN clips to fasten to the rail. Once the strip is secured to the DIN rail ensure that CT windows are correctly aligned with circuit breaker conductor terminals. Avoid placing the strips too close to the circuit breaker and allow a minimum of 1” (25mm) from the circuit breaker terminal to the edge of the CT strip. Once correctly positioned connect the strip to the Smart Port Interface using network cable designated for the approved voltage range (300-600 VAC). Always ensure that the specific CT strip is connected to the correct Smart Port as shown in Figure 18.

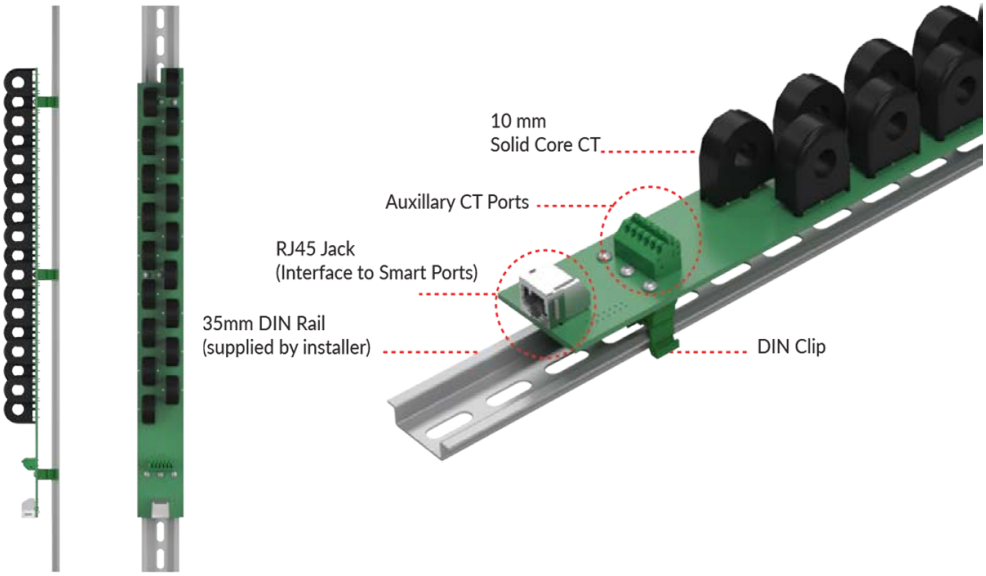


Figure 16. 18mm CT strip topology

Mounting Instructions: 0.75” CT Strip

The 0.75” Solid Core CT strip is mounted using the attached steel Z bracket that is mechanically fastened to the panelboard substrate via two key slots. Ensure that CT windows are correctly aligned with circuit breaker conductor terminals. Avoid placing the strips too close to the circuit breaker and allow a minimum of 1” (25mm) from the circuit breaker terminal to the edge of the CT strip. Once correctly positioned connect the strip to the Smart Port Interface using network cable designated for the approved voltage range (300-600 VAC). Always ensure that the specific CT strip is connected to the correct Smart Port as shown in Figure 18.

Connection of Auxiliary CT Terminals

WARNING	Failure to use 0.33V CTs will damage the CT Strip and can also result in serious injury or death as unburdened / current output CTs can result in lethal voltages.

Each CT strip is equipped with three auxiliary CT terminals designed to support CTs for panel main input monitoring. The inputs are designed exclusively for 0.33 V output CTs. Note that the assignment of channels to the CT Strip Auxillary terminal block will vary with the specific register map being used.

Always connect phase currents from the input source to the auxiliary terminals on a single CT strip designated with auxiliary CT terminal block numbered 1. Failure to do so will result in incorrect current and power calculations for the main input circuit. Observe the polarity of the CT wires as noted in figure 20.

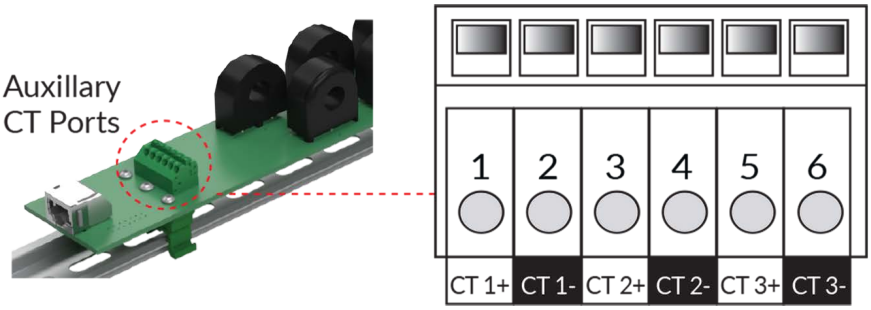


Figure 17. CT strip CT auxiliary ports

Table 1. Schnieder BCMs Point Map Emulation Connection

CT Strip (Smart Port #I)	CT Terminal 1-2	CT Terminal 3-4	CT Terminal 5-6	Panel
1	L1	L2	L3	1
2	Neutral	N/A	N/A	
3	L1	L2	L3	2
4	Neutral	N/A	N/A	

Table 2. Senva BCMs Point Map Connection

CT Strip (Smart Port #I)	CT Terminal 1-2	CT Terminal 3-4	CT Terminal 5-6	Panel
1	L1	L2	L3	1
2	Neutral	Aux 1	Aux 2	
3	L1	L2	L3	2
4	Neutral	Aux 1	Aux 2	

Connection of CT Strips to Smart Ports

NOTE Always use the correctly rated insulation on the network cables. This is typically 300 V rated cable for 240 VAC applications and 600 V rated insulation for 277/480 VAC applications.

Always observe the sequence of connection of the CT strips to the Smart Ports. See Placement and Orientation of Solid Core CT Strips for number of ports and panelboards.

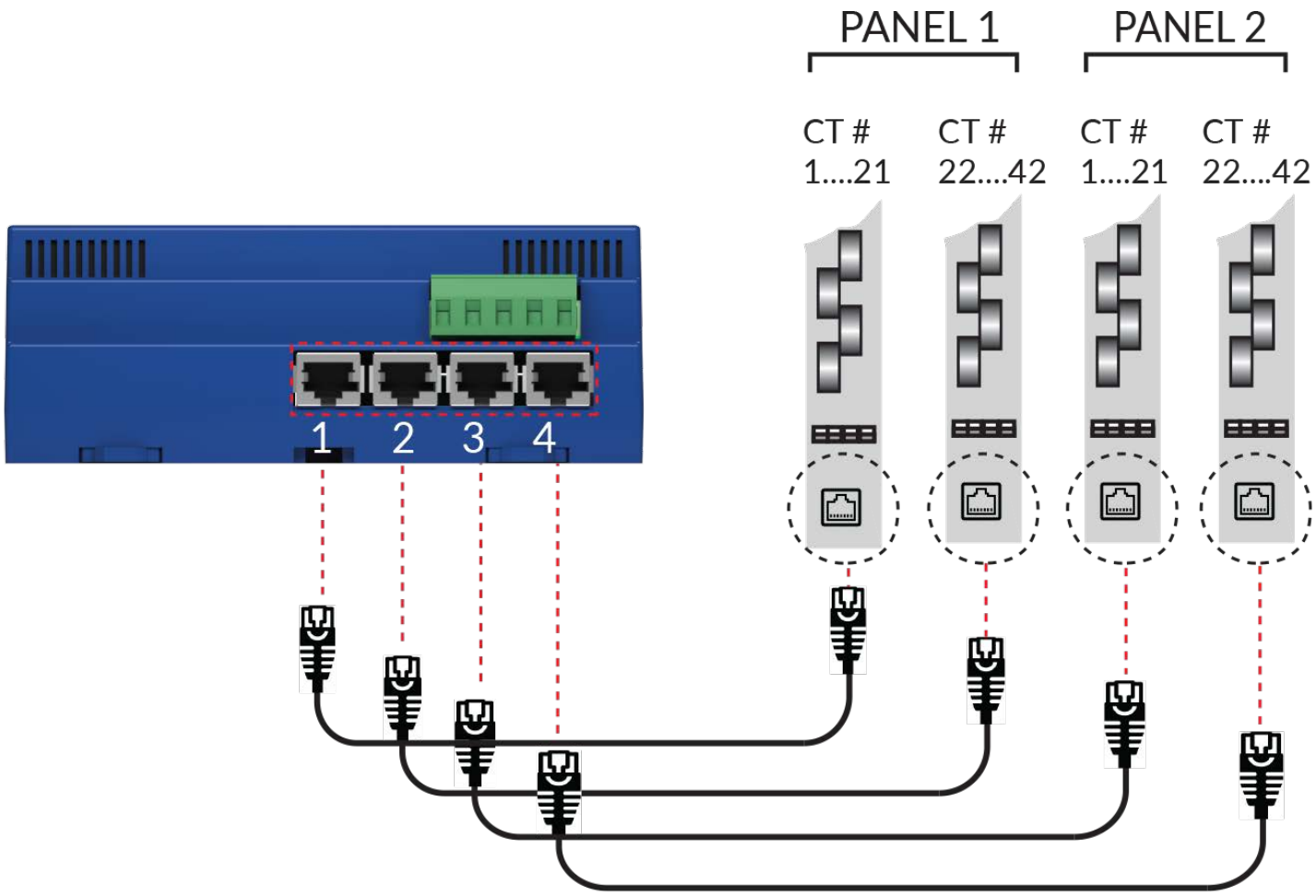


Figure 18. Port ordering sequence

Discovery of CT Strips by the Core Module

Once the CT Strips are plugged into the Core Module and the module is energized, they will automatically be discovered upon powering up the Core Module. A green LED on the CT strip will indicate if it is discovered and communicating. To communicate properly, the LED will be pulsing at a 1Hz rate.

IMPORTANT CT Strips and Cards can only be discovered upon power up of the Core Module. Plugging in a new Strip or Card when the Core Module is energized will require power cycling of the

Core Module.

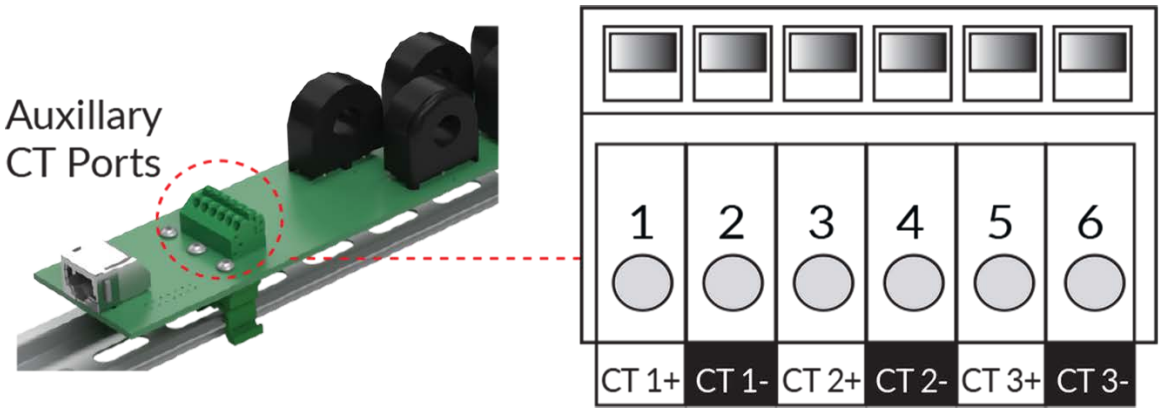


Figure 19. CT strip LED status indication

Voltage Input and Electrical Connections

WARNING

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- While removing or installing panels and covers, assure that they do not contact an energized bus.
- NEVER bypass external fusing.
- NEVER short the secondary of a potential transformer.
- Before closing covers and doors, carefully inspect the work area and remove any tools, wire scraps or other objects that may have been left inside the equipment.

Failure to follow these instructions will result in death or serious injury.

The Core Module must be connected to the voltage source being monitored. The Voltage Input terminal serves as the both power source to the monitor and voltage sensing. All phases that are to be monitored must be connected. The current consumption of the monitor will not exceed 0.2 A at any operational voltage. The monitor is fused internally but additional fusing may be required per local and national codes. Inline fuses are available from Senva.

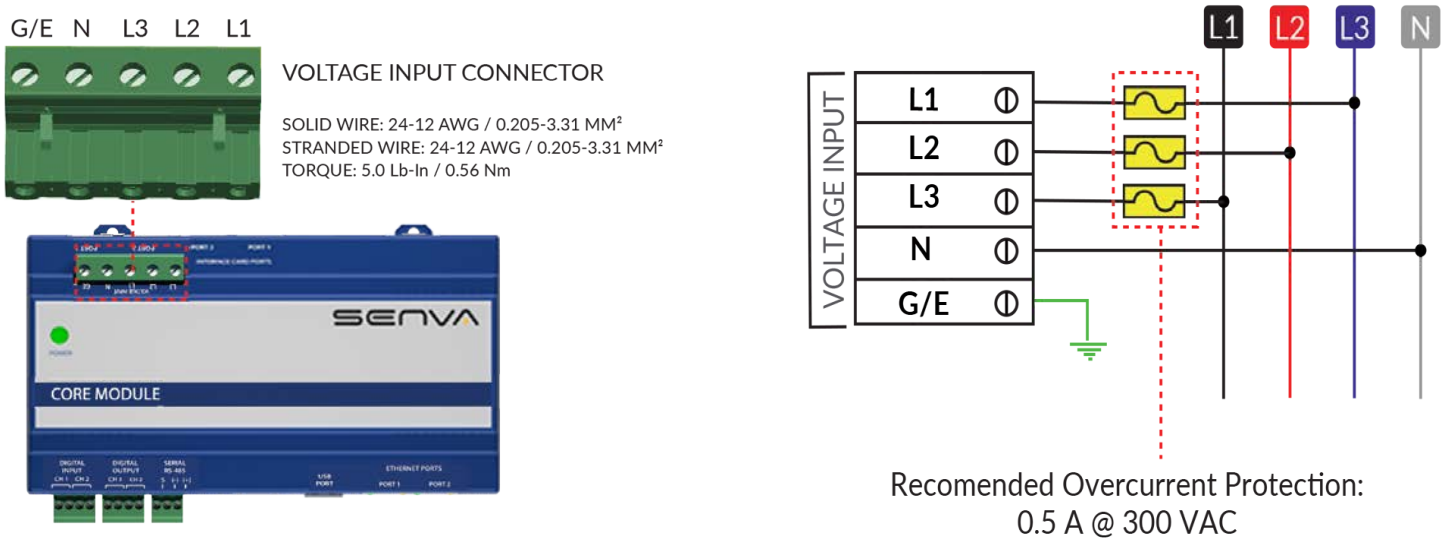


Figure 20. Core Module voltage connection wiring

ACCEPTABLE WIRING CONFIGURATIONS

The monitor may be connected to any wiring configuration shown below except for corner grounded delta circuits.

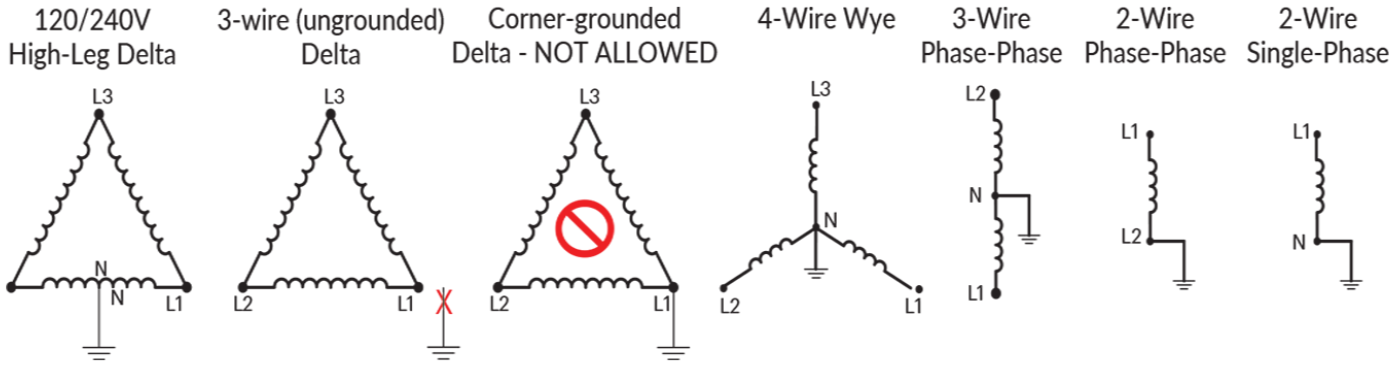


Figure 21. Core Module acceptable wiring configurations

Configuration of Core Module Settings

Configuration Methods

The Core Module can be configured in three different ways:

1. Using the onboard Web Console (Configuring via The Onboard Web Console) by directly accessing the Core Module over an Ethernet connection with a standard HTML browser via IP access to the Core Module. Either through a network or directly to a computer via the Ethernet connection.
2. Using a CSV File, the included Flash Drive, a computer, and the BCM USB Interface/Slot ([Configuring via a CSV File and the included USB Device]).
3. Writing to Modbus or BACnet registers

Channel: is one circuit or one branch.

Meter: is a collection of channels to monitor as one circuit, ie 3-phase system is three channels.

True Meter: is a meter where all channels are physical circuits.

Virutal Meter: is a meter made up of true meters. Example would be aggregating a building where each true meter is a tenant. A data center could use a virtual meter to aggregate a row of server racks where each true meter is a single rack.

Channel	True Meter#:	True Meter Name:	Voltage Phase:	Breaker Size:	CT Size:
1:	1	Meter 1 Test	Line 1	100	100
2:	1	Meter 1 Test	Line 2	100	100
3:	1	Meter 1 Test	Line 3	100	100
4:	2	True Meter 2	Line 1	100	100
5:	2	True Meter 2	Line 2	100	100
6:	2	True Meter 2	Line 3	100	100

Save Settings

Figure 22. True Meter Example

Configuring via The Onboard Web Console

The onboard web console may be used for changing settings and giving a real time view of device readings. This allows it to be used for confirmation of proper operation. Steps for connecting to the Web Console (Splash Page) are below:

1. Connect either Ethernet port of the Core Module to either an accessible network or directly to the Ethernet port of a PC.
   a. Some PCs configured with security features may not permit direct connection of an end user device.
2. Using a PC and an established web browser. Type in the current IP address of the Core Module and press enter (default IP address is **192.168.5.77**).

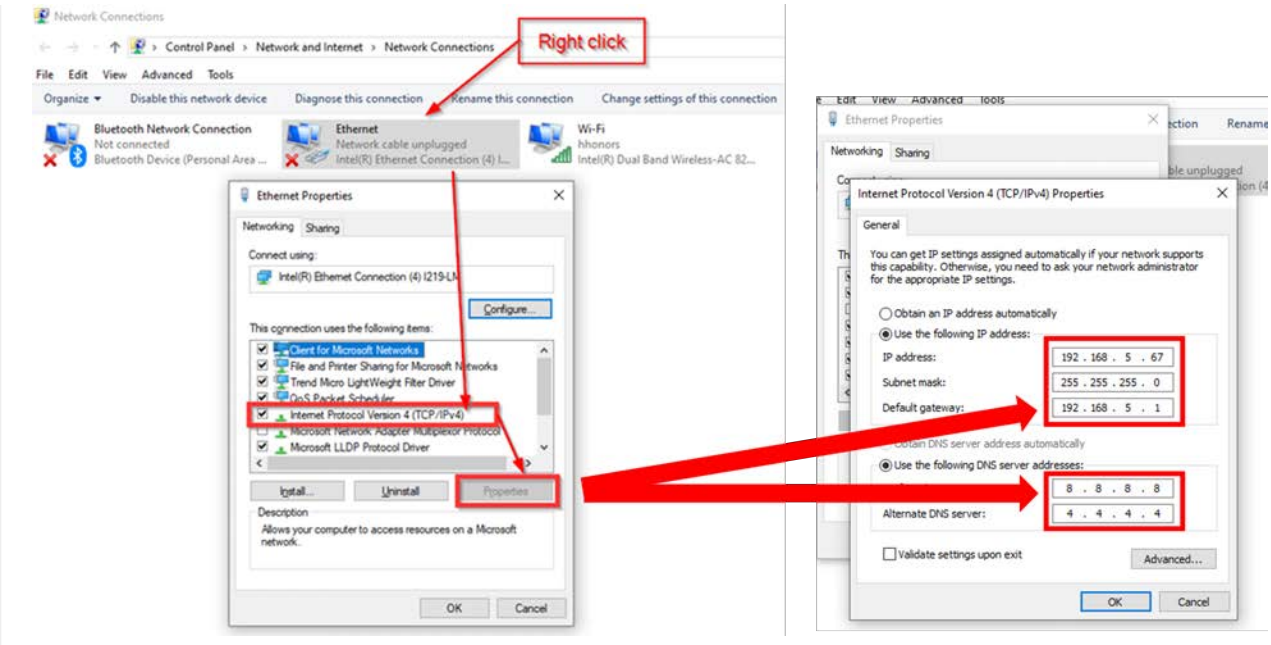
NOTE

Troubleshooting Tips

a. The IP address can be changed without using the web interface, by changing it using the CSV file or Modbus RTU (RS485) methods. Explained in the later configuration options.

b. If the web console of the Core Module does not appear, ping the IP address using the windows command line prompt “ping 192.168.5.77” to confirm the communications link

c. If having trouble connecting to the BCM via a computer. Set the computer’s Network settings to be the same but with a different but similar IP address. If using the BCM’s default settings, change the computer’s values to (*Net Mask* to 255.255.255.0) and (*IP Address* to 192.168.5.1). The picture below shows how to do so on a Windows computer, after navigating to the "Control Panel\Network and Internet\Network Connections."



Login

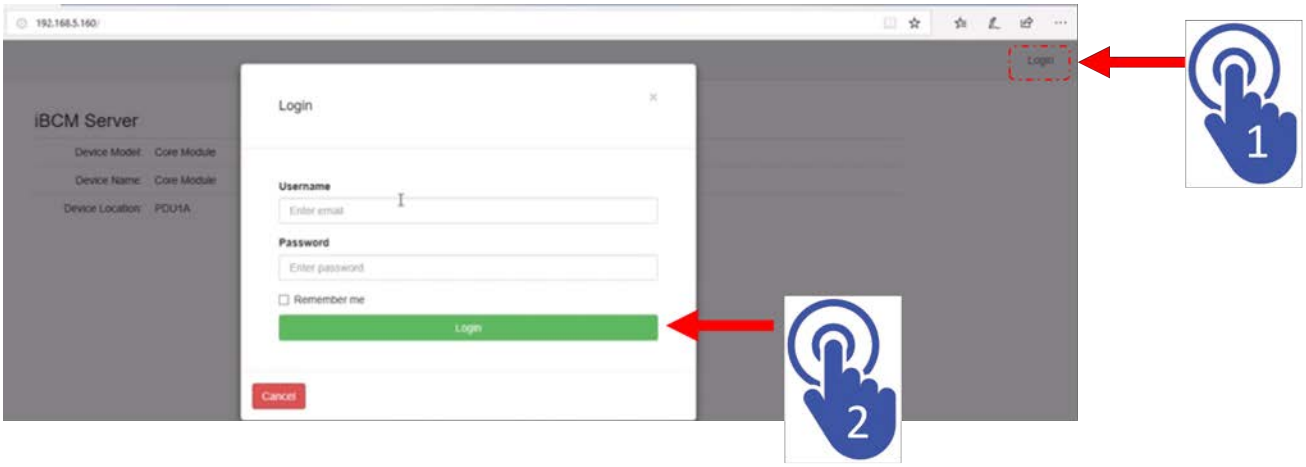
Once the Web Console/Splash Page is up on a computer. It will show the Main Status page/tab. If the user tries changing a setting, or navigating to another tab. A log in prompt will appear.

NOTE

Username and password can be changed, but default credentials are:

Username: admin

Password: admin

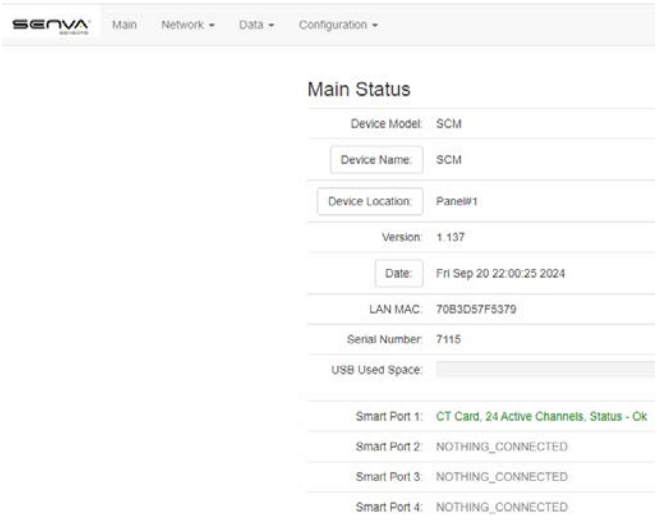


Tabs Overview

The top bar of the web console is a menu with four tabs. Most tabs have sub tabs with multiple options. They will now be broken down into detail.

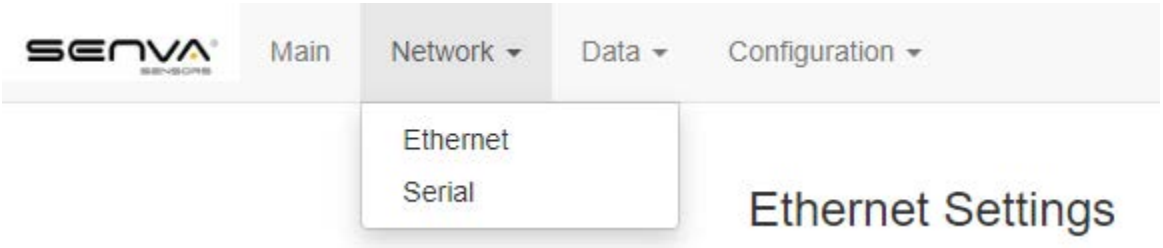
Main (Tab 1)

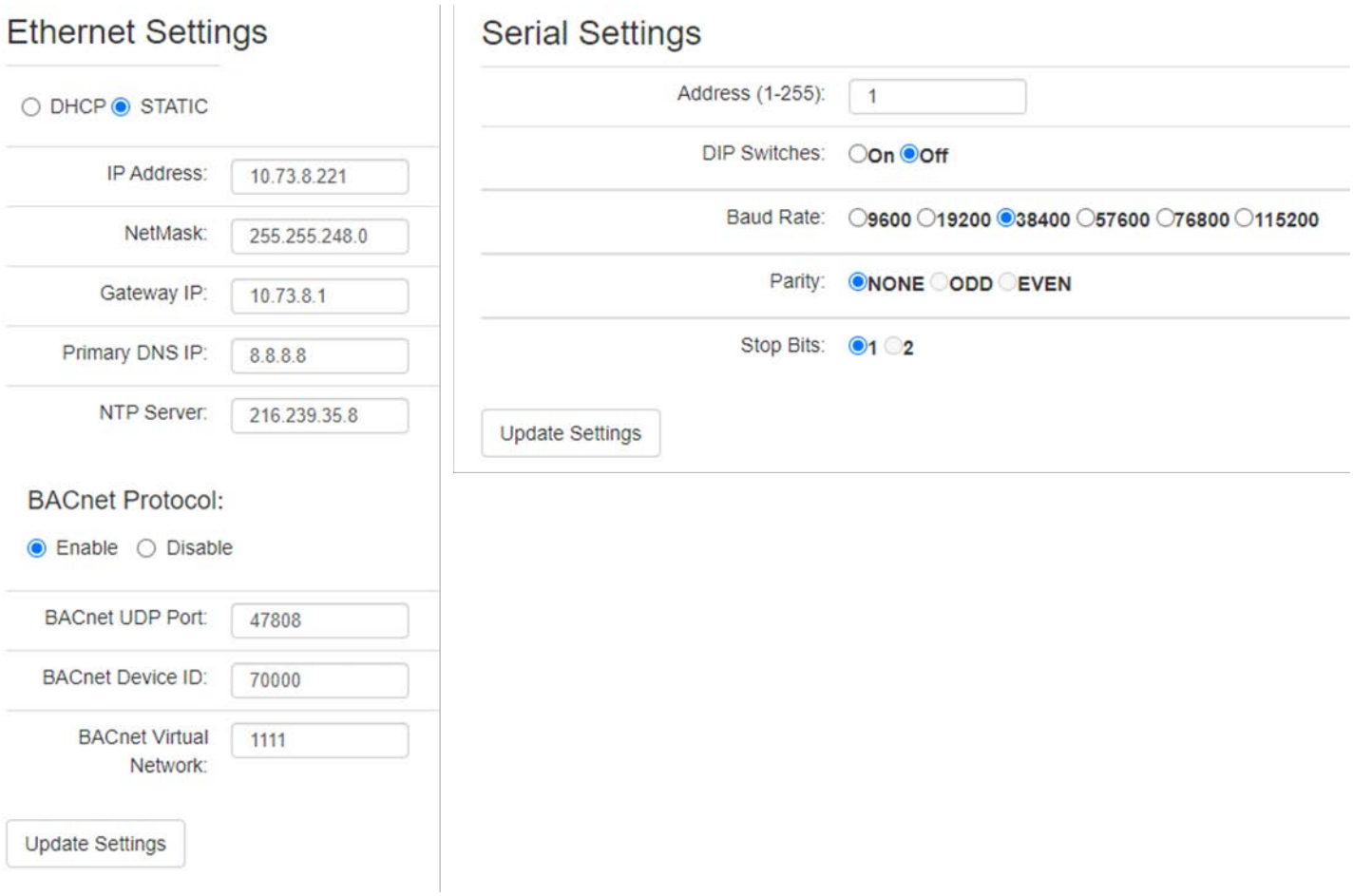
The **Main Status** page lists the following Core Module parameters: Device Name, Device Location, Firmware Version, Date, MAC Address, Serial Number. It also shows the details of anything connected to the Smart Ports, eg. CT strips or Interface Cards. Please note that the parameters with an outline around the text are buttons. Pressing the button will allow the user to change the parameter.



Network (Tab 2)

The Network tab has two menu options, **Ethernet** and **Serial** which define the respective communication ports. Make the appropriate modifications depending on your network settings. *Serial Settings* will control Modbus RTU (RS485) settings. *Ethernet Settings* will control Network, BACnet IP, and Modbus TCP/IP settings.

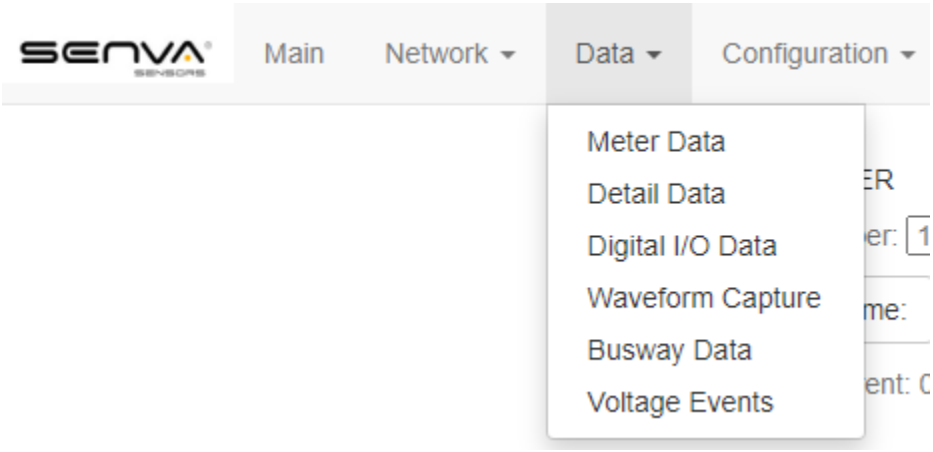




To save the settings click on the “Update Settings” hyperlink at the bottom of the page then click apply changes.

Data (Tab 3)

The **Data** tab provides access to real time data from the core module. Menu options include: Meter Data, Detail Data, Digital I/O Data, Waveform Capture, Busway Data, and Voltage Events.



TRUE METER

Meter Number: 1

Circuit Name: Meter 1 Test

Neutral Current: 0.00

Alarm Settings

Breaker Size: 100

Percent Utilized: 0.00

Frequency: 60.03

VOLTAGE SUMMARY

Circuit 1: 120.27 THD: 1.04

Circuit 2: 120.64 THD: 1.01

Circuit 3: 120.84 THD: 1.16

Avg LN: 120.58 Avg THD: 1.07

Variable	Circuit 1	Circuit 2	Circuit 3	Avg/Tot
kWH:	2613.78	3.98	3.76	2621.53
Voltage Phase:	L1	L2	L3	3
Current:	0.00	0.00	0.00	0.00
kW:	0.00	0.00	0.00	0.00
kVA:	0.00	0.00	0.00	0.00
kVAR:	0.00	0.00	0.00	0.00
Power Factor:	0.00	0.00	0.00	0.00
Crest Factor:	0.00	0.00	0.00	0.00
THDI:	0.00	0.00	0.00	0.00

Figure 23. **Meter Data** *provides an overview of main input power. True Meters and Virtual Meters can be selected from the Meter Number drop down. Any circuit name can be changed with the 'Circuit Name' button. The Current Alarm Settings can be changed by clicking the 'Alarm Settings' button.*

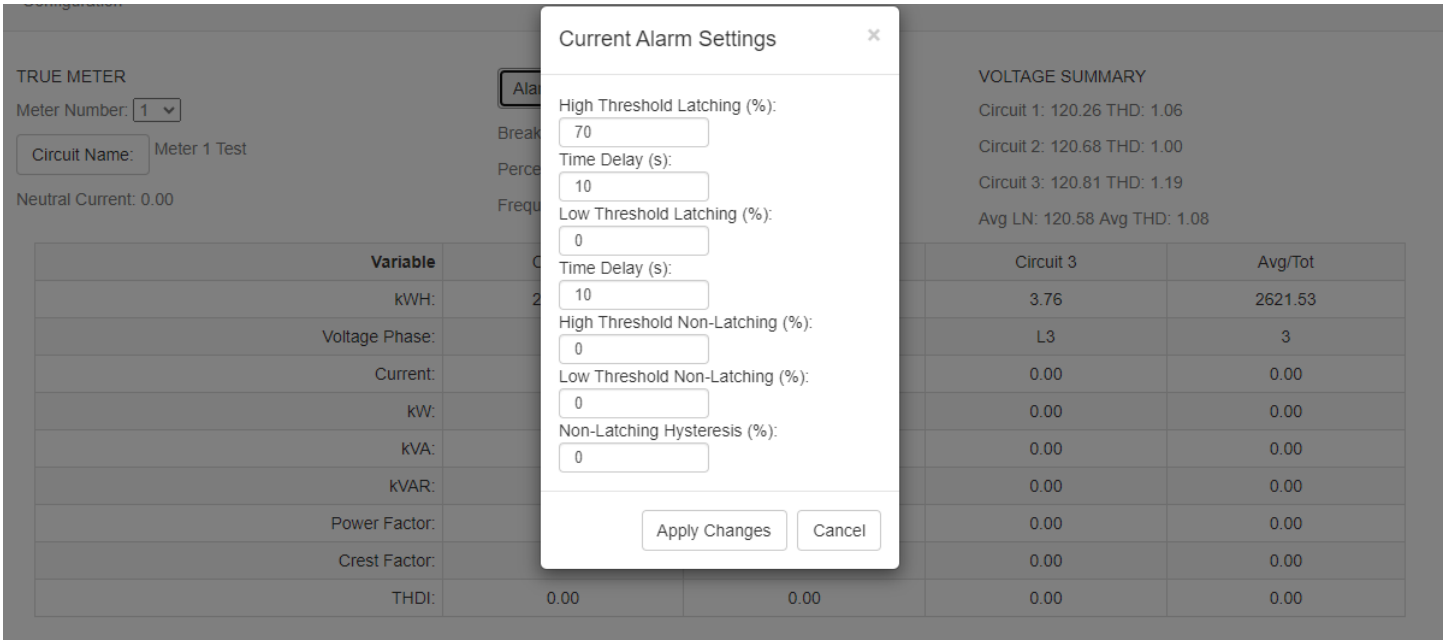
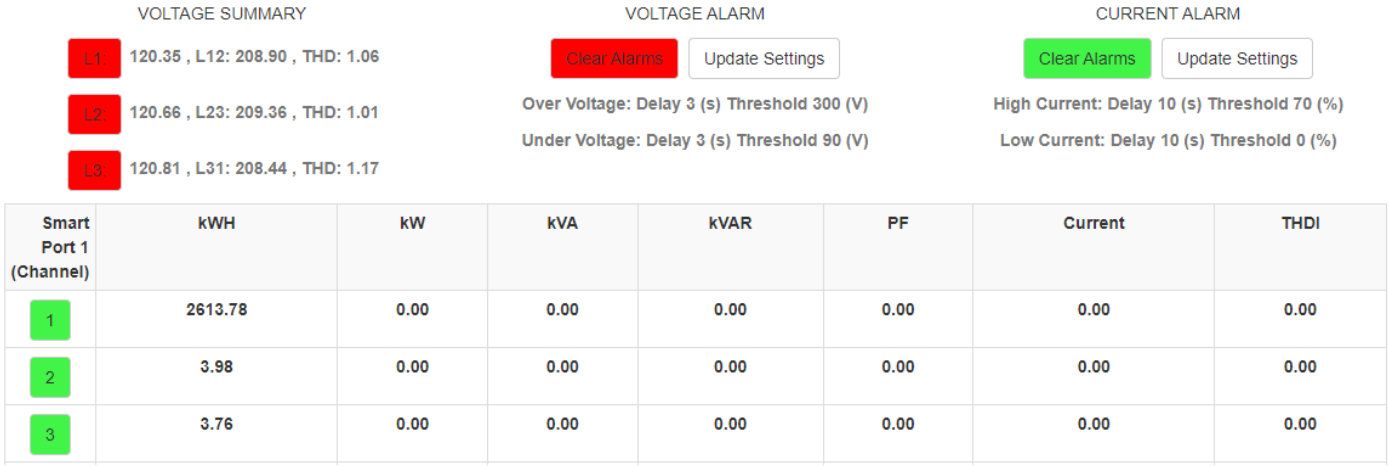


Figure 24. Example pop-up of the Current Alarm Settings.



Smart Port 1 (Channel)	kWH	kW	kVA	kVAR	PF	Current	THDI
1	2613.78	0.00	0.00	0.00	0.00	0.00	0.00
2	3.98	0.00	0.00	0.00	0.00	0.00	0.00
3	3.76	0.00	0.00	0.00	0.00	0.00	0.00

Figure 25. **Detail Data** *provides details on each circuit being monitored. The Current Alarm Settings, the same pop-up from the Meter Data tab, can be changed from this page by clicking the Current Alarm "Update Settings" button. The Voltage Alarm Settings can be changed by clicking on the Voltage Alarm "Update Settings" button.*

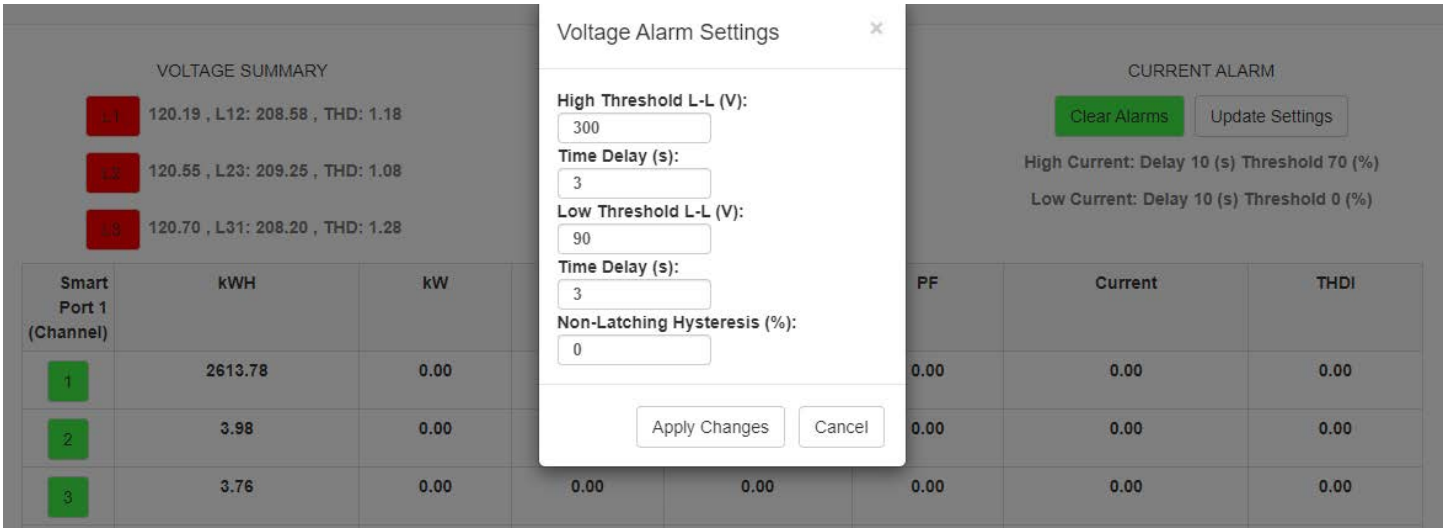


Figure 26. Example pop-up of the Voltage Alarm Settings.

Channel	Smart Port 1	Smart Port 2	Smart Port 3	Smart Port 4
1				
2				
3				

Figure 27. **Digital I/O Data** *provides details on any digital input interface cards. IOC24A1 (24-Channel Digital Input Card) is the only card that reports back I/O. The only outputs are those on the core module. The Channel 1 and Channel 2 buttons can be used to toggle the two Digital Outputs between Open and Closed. To toggle, click the Channel button, and then click Apply Changes.*

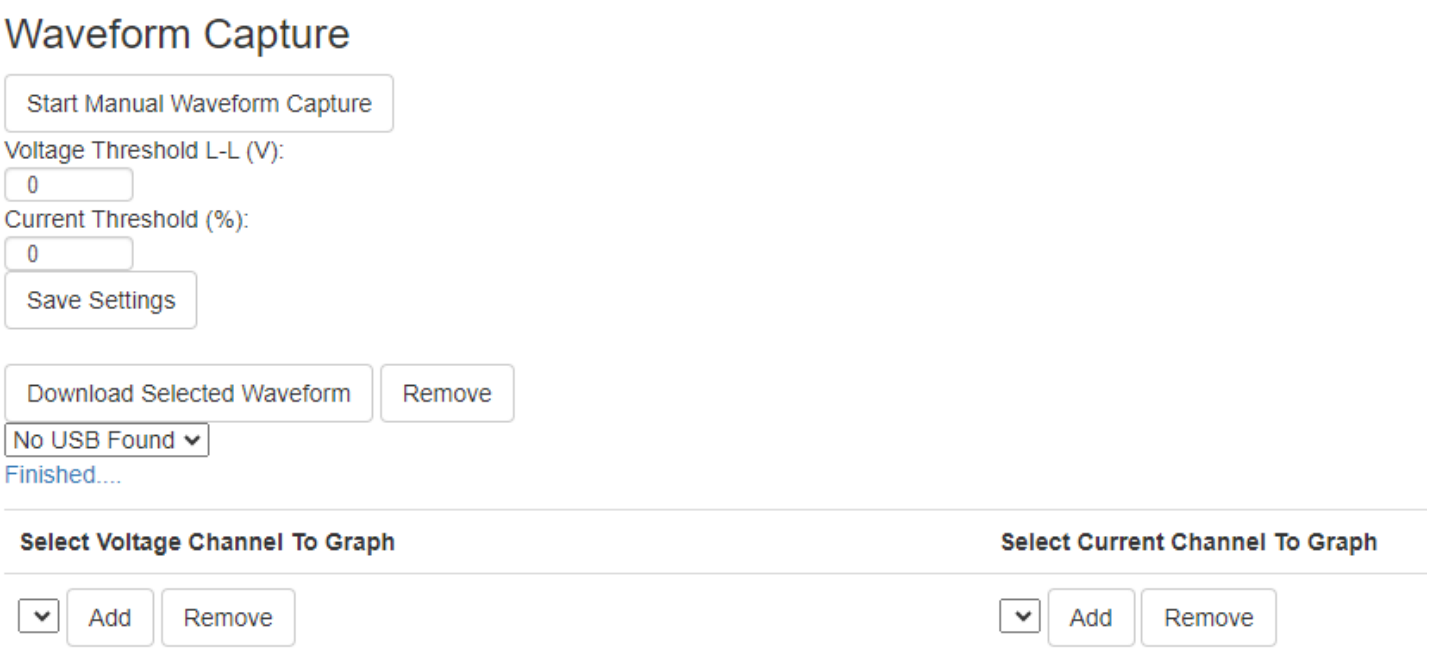


Figure 28. **Waveform Capture** *allows the user to start and export Waveform Captures onto a USB drive. The resulting data are waveforms for each channel that will be stored as a .CSV file. These can be viewed graphically using the waveform graphing template.*

Smart Port 1	Smart Port 2	Smart Port 3	Smart Port 4
SN: 10095397 Tapbox: Meters 1,2,3,4,5,6,7,8			

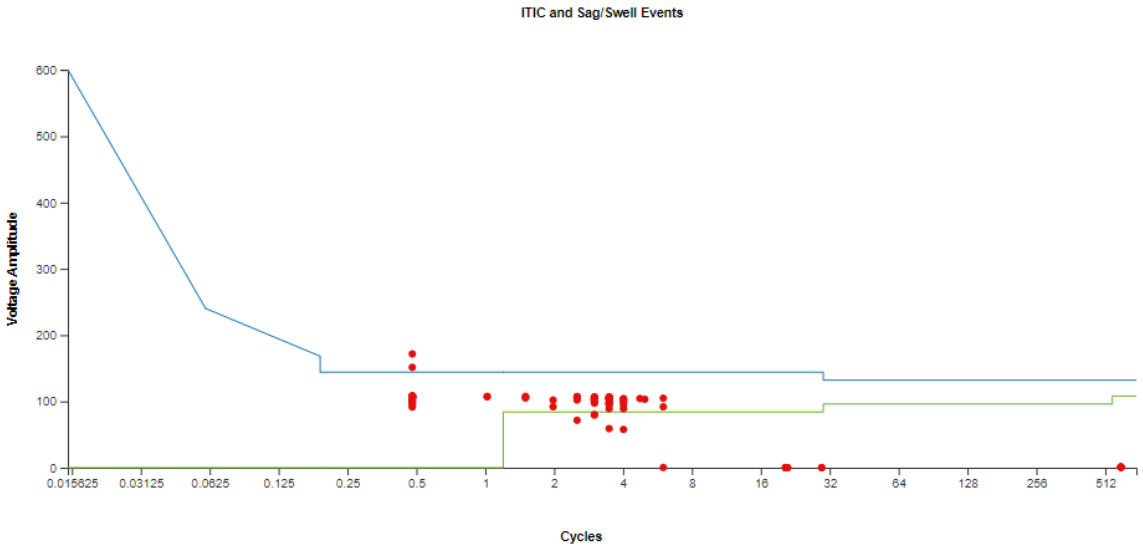
SN: 10095397, Meter Name: Meter 1 Test, Meter #: 1

Meter #	Channel #	kWH	kW	kVA	kVAR	PF	Current	THDI
1	Total	2621.53	0.00	0.00	0.00	0.00	0.00	0.00
	1	2613.78	0.00	0.00	0.00	0.00	0.00	0.00
	2	3.98	0.00	0.00	0.00	0.00	0.00	0.00
	3	3.76	0.00	0.00	0.00	0.00	0.00	0.00

SN: 10095397, Meter Name: True Meter 2, Meter #: 2

Meter #	Channel #	kWH	kW	kVA	kVAR	PF	Current	THDI
2	Total	2620.10	0.00	0.00	0.00	0.00	0.00	0.00
	1	2612.35	0.00	0.00	0.00	0.00	0.00	0.00
	2	3.99	0.00	0.00	0.00	0.00	0.00	0.00
	3	3.76	0.00	0.00	0.00	0.00	0.00	0.00

Figure 29. **Busway Data** *shows the serial numbers of any attached strips and interface cards. The tables summarize data for True Meters (Channels, kWh, Power Factor, etc).*



Download Voltage Events | Remove

Timestamp	Event Type	Category	Line	Voltage	Duration(S)
10/12/2023 16:50:37	Dropout	Temporary	Line 2	0.78	60.000
10/12/2023 16:50:37	Dropout	Temporary	Line 3	0.83	60.000
10/12/2023 16:50:53	Voltage Sag	Instantaneous	Line 1	107.80	0.008
01/01/2020 00:01:01	Dropout	Temporary	Line 2	0.72	60.000

Figure 30. **Voltage Events** *shows various events (Dropout, Voltage Sag, etc). This page allows for the removal of the events and the option to download the events to a CSV. The CSV is saved on the computer via the web page and not to the USB stick.*

Configuration (Tab 4)

The **Configuration** tab provides access to changing various settings. These settings include: General Settings, CT Size, Breaker Size, Voltage Phase, True Meter, Virtual Meter, Virtual Meter Breaker, Busway, and System.

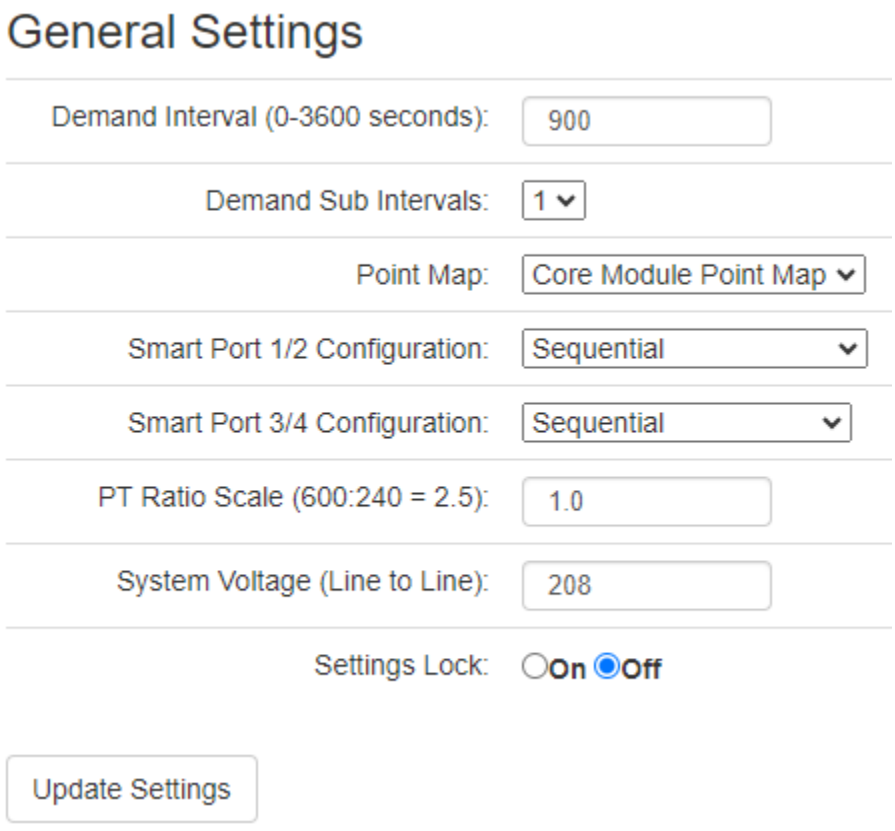


Figure 31. **General Settings** *allows the user to change various general settings. Please note that changing the "Smart Port 1/2 Configuration" and "Smart Port 3/4 Configuration" settings will change the True Meter circuit order and phases. Refer to the Placement and Orientation of Solid Core CT Strips section for more information.*

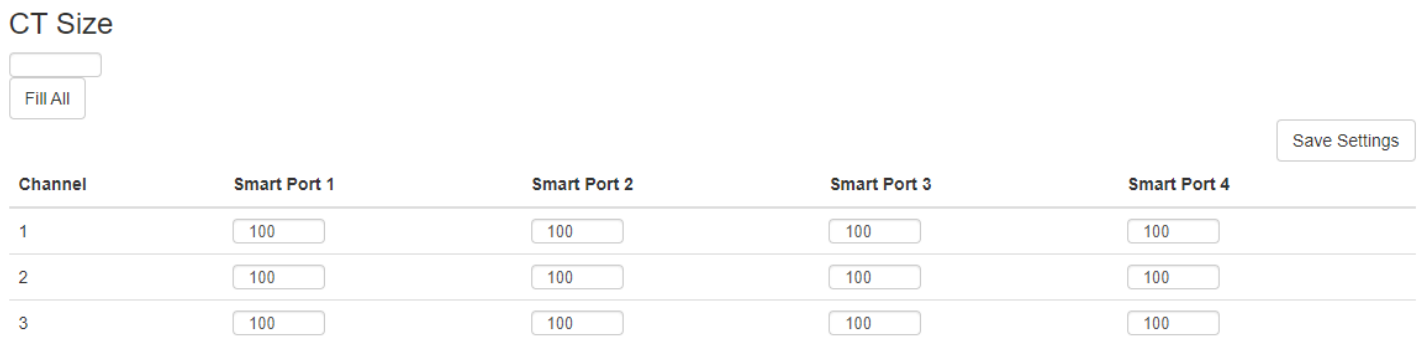


Figure 32. **CT Size** *allows the user to change the CT size for each channel.*

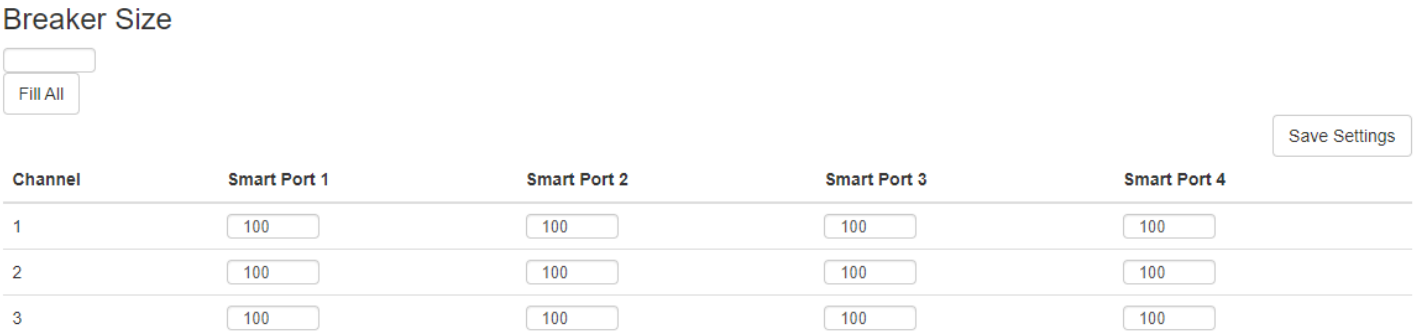


Figure 33. **Breaker Size** *allows the user to change the breaker size for each channel. If the amp draw is above the value, it will trigger an alarm (non-audible).*

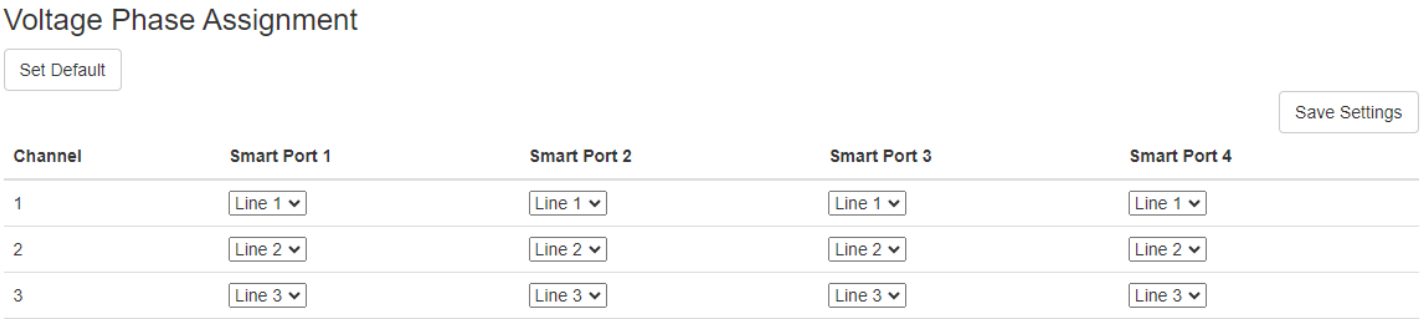


Figure 34. **Voltage Phase** *allows the user to see and change the assigned phase for each channel. The drop down options are Line 1, Line 2 or Line 3. Please note: changing the Smart Port 1/2 Configuration and the Smart Port 3/4 Configuration on the General Settings page, will automatically assign the Lines or Voltage phases in this section. This is important for Solid Core strips, and each setting (Sequential, Top Feed, Bottom Feed, etc) is explained here Placement and Orientation of Solid Core CT Strips.*

Figure 35. **True Meter** *maps each channel to a Physical Meter. A true meter is a collection of channels to monitor as one circuit, ie 3-phase system is three channels.*

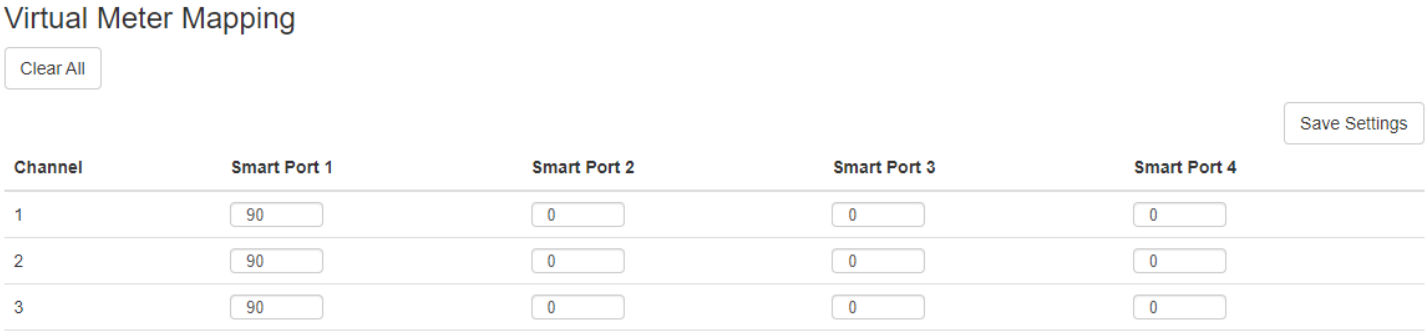


Figure 36. **Virtual Meter** *allows the user to create Virtual Meters, which is a meter made up of true meters. An example would be aggregating a whole apartment where each true meter is a tenant. A data center could use a virtual meter to aggregate a row of server racks where each true meter is a single rack.*

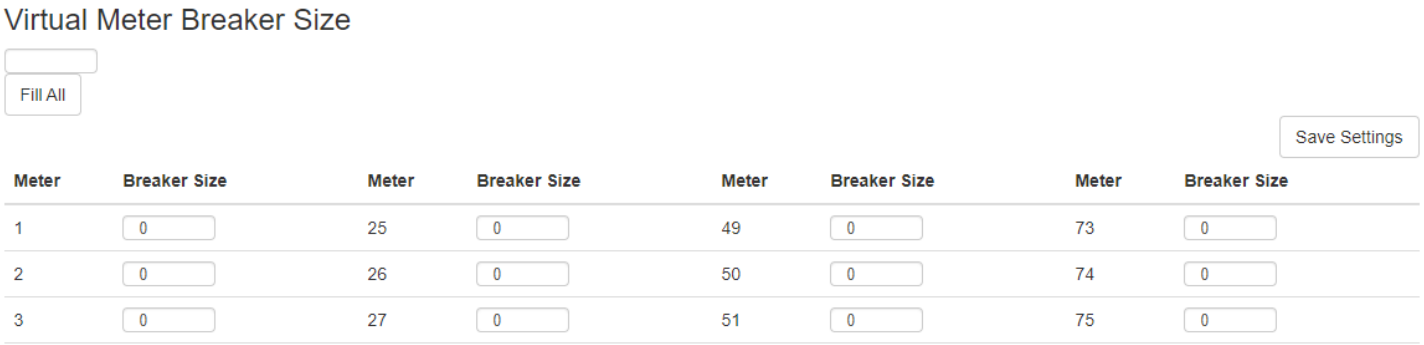


Figure 37. **Virtual Meter Breaker** *allows the user to set a breaker size on any Virtual Meter.*

Smart Port 1	Smart Port 2	Smart Port 3	Smart Port 4
SN: 10095397 Tapbox: Meters 1,2,3,4,5,6,7,8			

TapBox Settings

Serial Number: 10095397

Tap Box Name:

Channel	True Meter#:	True Meter Name:	Voltage Phase:	Breaker Size:	CT Size:
1:	1	Meter 1 Test	Line 1	100	100
2:	1	Meter 1 Test	Line 2	100	100
3:	1	Meter 1 Test	Line 3	100	100
4:	2	True Meter 2	Line 1	100	100
5:	2	True Meter 2	Line 2	100	100
6:	2	True Meter 2	Line 3	100	100

Save Settings

Figure 38. **Busway** *is a quick and easy way to change multiple settings for specific channels at once. It gives a snapshot of what accessories (interface cards, strips, etc) have been attached to the Smart Ports. It also shows if channels (i.e. CTs) are being used on the accessories via the channel #. This is an easy method for quickly changing multiple settings in one location.*

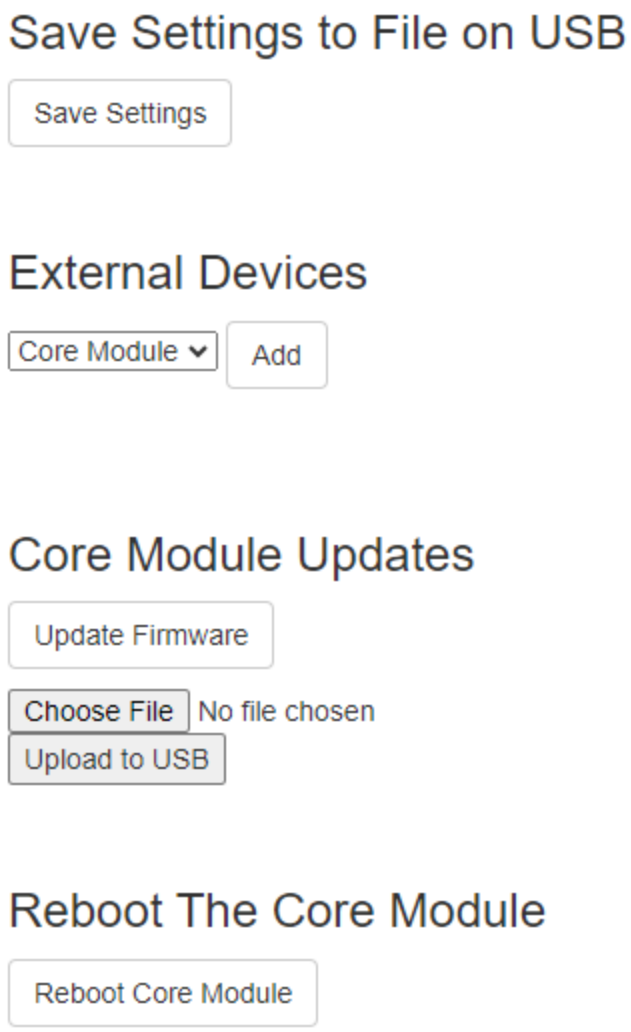


Figure 39. **System** *allows for rebooting the core module, updating the firmware, and saving the settings to the USB drive.*

Configuring via a CSV File

IMPORTANT	**Save Settings to File on USB:** The BCM comes stock **without** the CSV file on the USB drive. The "Save Settings" button above will get the CSV file onto the USB drive. If no settings have been changed on the Web Page, it will download a CSV file (with default settings) to the USB drive. If anything has been changed, those settings will carry over onto the CSV that is saved to the drive.

The core module is packaged with a USB drive. The config.csv file can be generated or procured, using the following options:

1. Create it from the Web Page
    a. See the last step in the Configuring via The Onboard Web Console section.
2. Copy from another Core Module
    a. Take a config file from another Core Module that has been installed already. Save it as a copy, and be sure to change the IP address before loading it into the new Core Module.
3. Download it from Senva's website
    a. Download the template file and load it onto the Core Module.
4. Contact Senva Tech Support
    a. Senva will email the template file and load it onto the Core Module.

To change settings, the config file must be opened with a text editor or spreadsheet application. The text on the left side of the comma (in all capital letters) is the the *field text*. Never change the field text. The text on the right of the comma, is the *configuration value*. The configuration values may be changed manually and then saved. Do not change the filename from "config.csv" when saving.

NOTE	It is recommended to edit the CSV in a text editor. It is possible to edit the CSV in Microsoft Excel, but do so with caution. If doing so, be sure to not make any changes other than editing the text itself. Any **bolding**, *italics*, or any excel features (highlighting cells, borders, etc) may make the CSV file incompatible with the Core Module. Corrupted files from Excel formatting will typically affect what data is loaded onto the Core Module. This issues is most readily seen on the Web Page.

```
ADMIN_NAME,admin
ADMIN_PASSWORD,admin
DEVICE_NAME,CM02SV
INSTALL_LOCATION1,Panel #1
INSTALL_LOCATION2,NA
,
DHCP,0
IPV4ADDRESS,192.168.5.77
IPV4MASK,255.255.255.0
IPV4GATEWAY,0.0.0.0
IPV4DNS1,8.8.8.8
IPV4NTP,pool.ntp.org
BACNETPROTOCOL,1
BACNETPORT,47808
BACNETID,10083874
BACNETVIRTNETWORK,1111
,
,
SERIALSLAVEADDRESS,1
SERIALBAUDRATE,38400
SERIALPARITY,0
SERIALSTOPBITS,1
SERIALDIPSWITCHENABLE,0
,
OVERVOLTSTHRESHOLD,300
OVERVOLTSTIMEDELAY,3
UNDERVOLTSTHRESHOLD,90
UNDERVOLTSTIMEDELAY,3
VOLTSHYSTERESIS,0
HICURRENTTHRESHOLD,700
HICURRENTTIMEDELAY,10
LOWCURRENTTHRESHOLD,0
LOWCURRENTTIMEDELAY,10
HICURRENTNONLATCHTHRESHOLD,0
LOWCURRENTNONLATCHTHRESHOLD,0
CURRENTHYSTERESIS,0
```

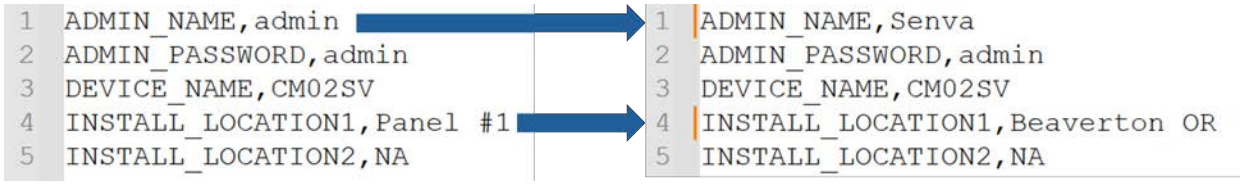
Figure 40. Here is an example of the CSV text in Notepad. "ADMIN_NAME" is an example of Field Text (never change this). "admin" is an example of a Configuration Value (this can be changed).

NOTE

Never change the capitalized *Setting/Field* text on the left.

Never change the commas or comma location ","

Do change the values on the right side of the comma.



The following settings can be changed from the CSV:

1. Log in credentials, device name, and location
2. Network and communication (Parity and Stop bits can't currently be changed).
3. Alarms
4. Waveform Capture
5. Demand Intervals, PT Ratio, System Voltage (L-L), Point Map Type, and Smart Port Configuration.
6. CT Amp Rating
7. Breaker Rating
8. Voltage Phase
9. Digital I/O Data
    a. Only change this setting if the *IOC24A1 - 24-Channel Digital Input Card* is connected to a smart port.
10. Virtual Meter Mapping and Breaker Size

For more detail on what each setting does and what it can be changed to. Refer to the Configuring via The Onboard Web Console section above.

Table 3. CSV parameters and their Web Page location

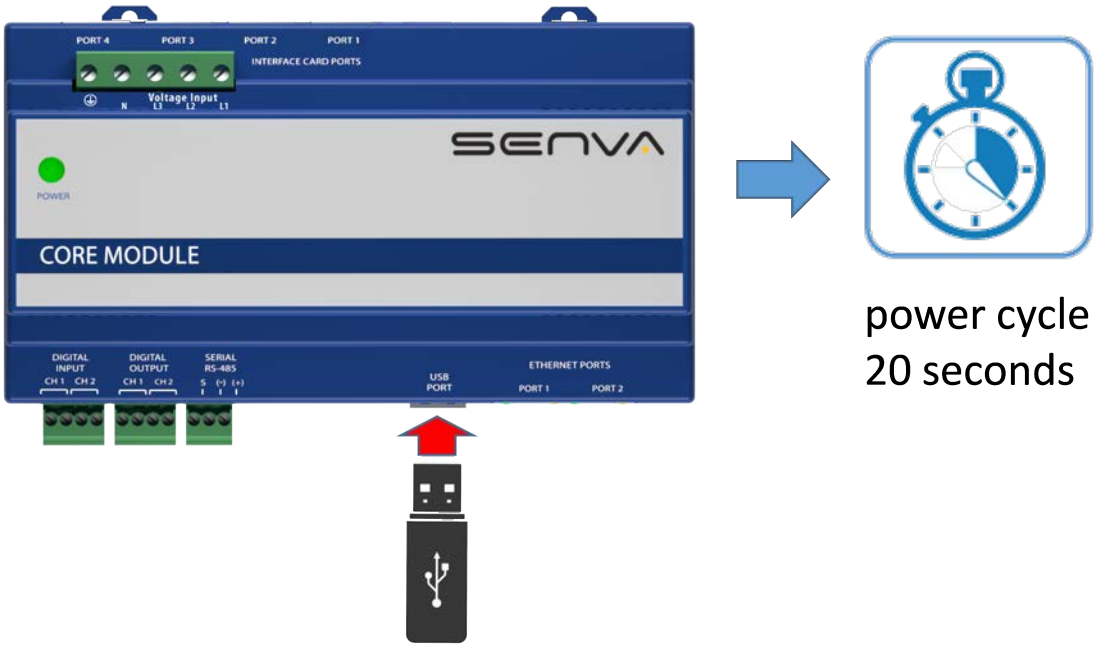
Setting	**CSV Setting Text "Field Text'"**	**Default Value "Configuration Value"**	**Webpage Location**
Login in Name	ADMIN_NAME	admin	Main Tab
Login Password	ADMIN_PASSWORD	admin	Main Tab
Name of Device	DEVICE_NAME	CM02SV	Main Tab
Install Location 1	INSTALL_LOCATION1	Panel #1	Main Tab
Install Location 2	INSTALL_LOCATION2	NA	Main Tab
DHCP (0) vs Static (1)	DHCP	0	Network Tab ¬ Ethernet Settings
IPv4 Address	IPV4ADDRESS	192.168.5.77	Network Tab ¬ Ethernet Settings
IPv4 NetMask	IPV4MASK	255.255.255.0	Network Tab ¬ Ethernet Settings
IPv4 Gateway	IPV4GATEWAY	0.0.0.0	Network Tab ¬ Ethernet Settings
IPv4 Primary DNS1	IPV4DNS1	8.8.8.8	Network Tab ¬ Ethernet Settings
IPv4 NTP Server	IPV4NTP	pool.ntp.org	Network Tab ¬ Ethernet Settings

Setting	CSV Setting Text "Field Text'"	Default Value "Configuration Value"	Webpage Location
Bacnet On (1) vs Off (0)	BACNETPROTOCOL	1	Network Tab ¬ Ethernet Settings
BACnet UDP Port	BACNETPORT	47808	Network Tab ¬ Ethernet Settings
BACnet Device ID	BACNETID	10083874	Network Tab ¬ Ethernet Settings
BACnet Virtual Network	BACNETVIRTNETWORK	1111	Network Tab ¬ Ethernet Settings
Serial Address (1-255)	SERIALSLAVEADDRESS	1	Network Tab ¬ Serial Settings
Serial Baud Rate	SERIALBAUDRATE	38400	Network Tab ¬ Serial Settings
Serial Parity	SERIALPARITY	0 (Can’t be changed)	Network Tab ¬ Serial Settings
Serial Stop Bits	SERIALSTOPBITS	1 (Can’t be changed)	Network Tab ¬ Serial Settings
Dip Switches On (1) vs Off (0)	SERIALDIPSWITCHENABLE	0	Network Tab ¬ Serial Settings
Voltage Alarm: High Threshold L-L [V]	OVERVOLTSTHRESHOLD	300	Data Tab ¬ Detail Data ¬ Voltage Alarm ¬ 'Update Settings'
Voltage Alarm: High Time Delay [s]	OVERVOLTSTIMEDELAY	3	Data Tab ¬ Detail Data ¬ Voltage Alarm ¬ 'Update Settings'
Voltage Alarm: Low Threshold L-L [V]	UNDERVOLTSTHRESHOLD	90	Data Tab ¬ Detail Data ¬ Voltage Alarm ¬ 'Update Settings'
Voltage Alarm: Low Time Delay [s]	UNDERVOLTSTIMEDELAY	3	Data Tab ¬ Detail Data ¬ Voltage Alarm ¬ 'Update Settings'
Voltage Alarm: Non-Latching Hysterises [%]	VOLTSHYSTERESIS	0	Data Tab ¬ Detail Data ¬ Voltage Alarm ¬ 'Update Settings'
Current Alarm: High Threshold Latching [%]	HICURRENTTHRESHOLD	700	Data Tab ¬ Detail Data ¬ Current Alarm ¬ 'Update Settings'

Setting	CSV Setting Text "Field Text'"	Default Value "Configuration Value"	Webpage Location
Current Alarm: High Time Delay [s]	HICURRENTTIMEDELAY	10	Data Tab ¬ Detail Data ¬ Current Alarm ¬ 'Update Settings'
Current Alarm: Low Threshold Latching [%]	LOWCURRENTTHRESHOLD	0	Data Tab ¬ Detail Data ¬ Current Alarm ¬ 'Update Settings'
Current Alarm: Low Time Delay [s]	LOWCURRENTTIMEDELAY	10	Data Tab ¬ Detail Data ¬ Current Alarm ¬ 'Update Settings'
Current Alarm: High Threshold Non-Latching [%]	ICURRENTNONLATCHTHRESHOLD	0	Data Tab ¬ Detail Data ¬ Current Alarm ¬ 'Update Settings'
Current Alarm: Low Threshold Non-Latching [%]	LOWCURRENTNONLATCHTHRESHOLD	0	Data Tab ¬ Detail Data ¬ Current Alarm ¬ 'Update Settings'
Current Alarm: Non-Latching Hysterises [%]	CURRENTHYSTERESIS	0	Data Tab ¬ Detail Data ¬ Current Alarm ¬ 'Update Settings'
Waveform Capture: Voltage Threshold L-L [V]	WAVEFORMCAPVOLTSTHRESHOLD	0	Data Tab ¬ Waveform Capture
Waveform Capture: Current Threshold [%]	WAVEFORMCAPAMPSTHRESHOLD	0	Data Tab ¬ Waveform Capture
Demand Interval (0-3600 seconds)	DEMANDSUBINTLENGTH	900	Configuration Tab ¬ General Settings
Demand Sub Intervals (0-6)	DEMANDSUBINTERVALS	1	Configuration Tab ¬ General Settings
PT Ratio Scale	PTRATIO	1000	Configuration Tab ¬ General Settings
System Voltage (Line to Line)	SYSTEMVOLTAGE	208	Configuration Tab ¬ General Settings
Point Map (Core Module vs Schneider)	MODBUSPOINTMAP	22000	Configuration Tab ¬ General Settings
Smart Port 1/2 Configuration (Sequential, Top Feed, etc)	CTCONFIGURATION1	4	Configuration Tab ¬ General Settings

Setting	CSV Setting Text "Field Text'"	Default Value "Configuration Value"	Webpage Location
Smart Port 3/4 Configuration (Sequential, Top Feed, etc)	CTCONFIGURATION2	4	Configuration Tab ¬ General Settings
Installed CT sizes for each circuit	CTSIZE1 to CTSIZE96	100	Configuration Tab ¬ CT Size
Breaker Size for each circuit	BREAKER1 to BREAKER96	100	Configuration Tab ¬ Breaker Size
The Line/Phase for each CT/Channel/Circuit	VOLTAGE1 to VOLTAGE96	(0=Line 1, 1=Line 2, 2=Line 3)	Configuration Tab ¬ Voltage Phase
True Meter Mapping	LOGIC_CIRCUIT1 to LOGIC_CIRCUIT96		N/A
Virtual Meter Mapping	VIRTUAL_METER1 to VIRTUAL_METER96	0	Configuration Tab ¬ Virtual Meter
Meter Naming	NAME_METER1 to NAME_METER96	Varies	Busway ¬ True Meter Name Field
Virtual Meter Breaker Size	VM_BRKR_SIZE1 to VM_BRKR_SIZE96	0	Configuration Tab ¬ Virtual Meter Breaker

Once the Settings are changed to the desired values, save the CSV file. Transfer the file onto a USB flash drive or save directly to the flash drive. With the Core Module powered off, insert drive into the USB port of the Core Module. Power up the Core Module and wait 20 seconds. The configuration data will automatically be extracted from the .csv file.



Writing to Modbus or BACnet registers

The Core Module can be connected to the network via a serial connection (Modbus RTU), or an ethernet connection (Modbus TCP or BACnet IP). The Core Module can then be configured via the BACnet or Modbus.

Navigate to the Core Module List of Parameters for information on what parameters can be changed with this method.

Communications

The Core Module supports several common communication standards over RS-485 and Ethernet.

Supported Protocols

- Serial via RS-485
  - Modbus RTU
- Ethernet
  - Modbus TCP/IP
  - BACnet IP

Configuration of these protocols is done via the web server or configuration file loaded through the USB port.

RS-485 Wiring

RS-485 twisted pair is landed on lower side of the Core Module with a terminal dedicated to landing a shield wire. While shielding is recommended, the shielding should only be tied to ground in one place. Core Module does not internally ground the shield terminal, so should only be used to daisy chain the shield. Wire the + and - cabling directly to their respective terminals. For daisy chaining it is allowed to place two conductors in each terminal.

Please note that the Core Module does not include an internal termination resistor. An external termination is needed on the Core Module if it is an end-of-line device. A resistor of 120 Ohm is recommended.

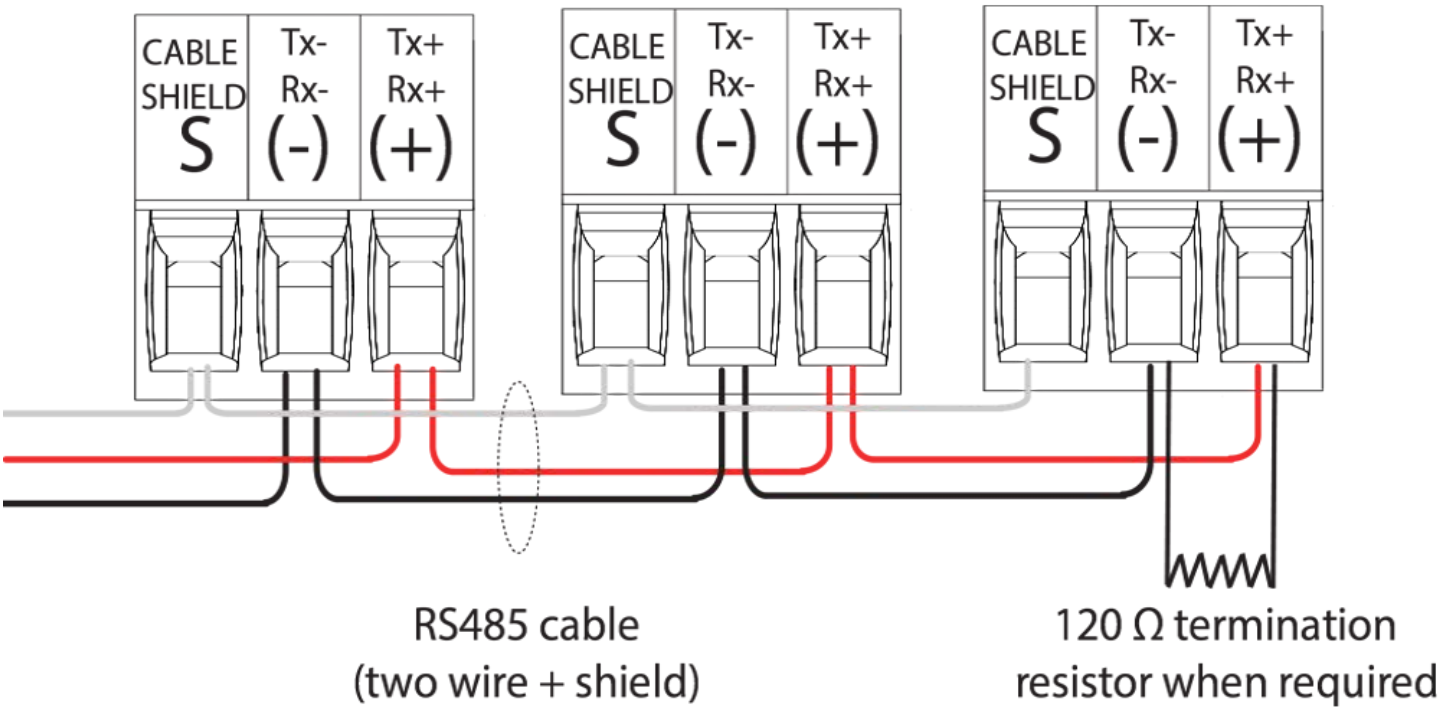


Figure 41. Serial communications wiring

Ethernet Wiring

The Core Module is equipped with dual managed Ethernet ports. Either port can be used to communicate with the device. The free or open port can be used to link additional Core Modules or other third party Ethernet devices to the network. To configure the IP settings see the configuration.

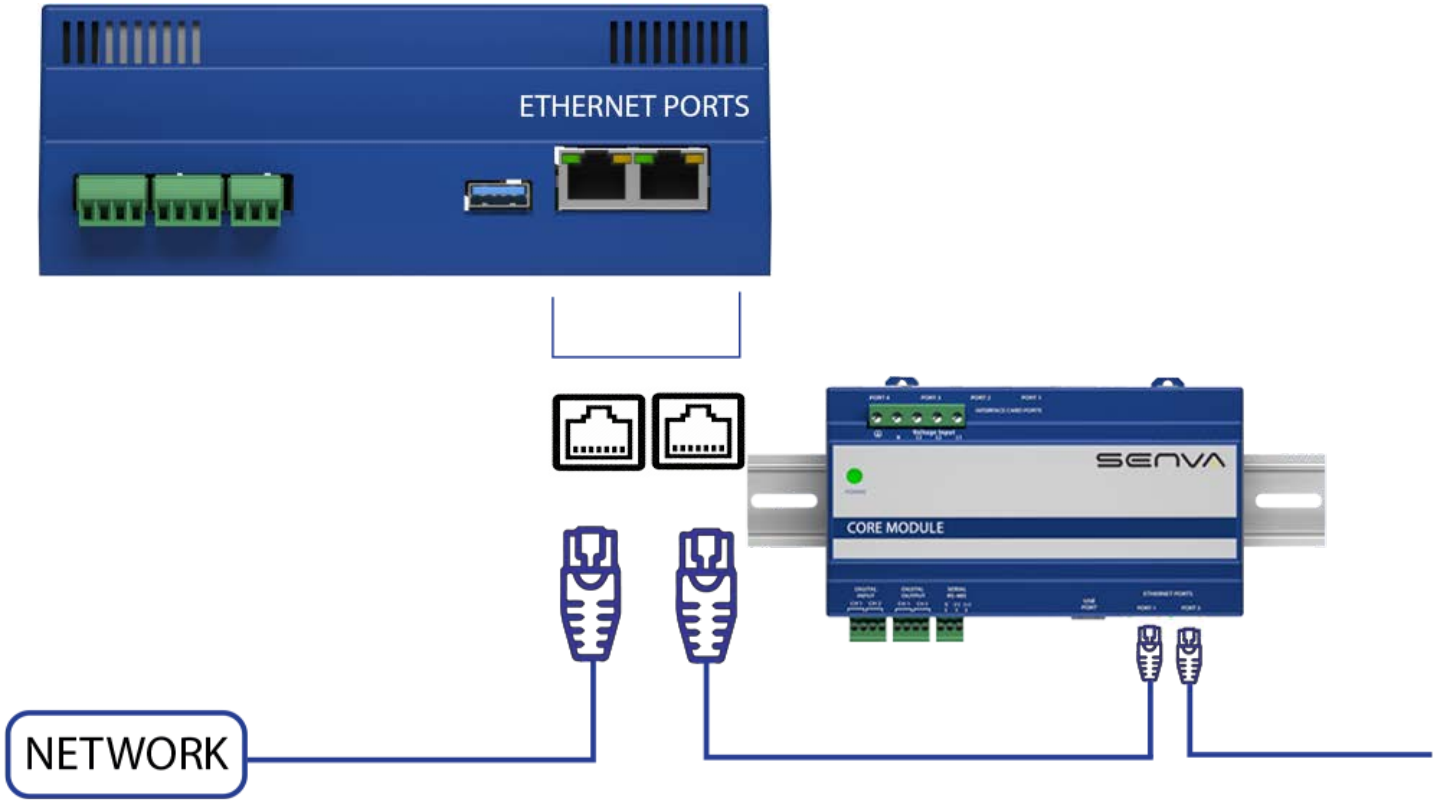


Figure 42. Ethernet port wiring

Modbus

The Core Module shares the list of data points with both Modbus protocols. Various data types are used, but some parameters will both an integer as well as a float address available. Data types for each parameter can be seen in the data point table.

Datatypes Used

- INT16 - Single signed integer address of 16 bits in length.
- UINT16 - Single unsigned integer address of 16 bits in length.
- UINT32 - Two 16 bit addresses read as a single unsigned integer addresses. First address is higher of the two.
- BITS - A single address of 16 bits, each bit is an individual value.
- Float - Two 16 bit addresses read as a single floating point value. First address is higher of the two.

Configuring via the Web Server

NOTE See Web Server section for more detail.

All Modbus settings can be configured through the Web Server. Both serial and ethernet setting screens are under the Network menu. Serial settings is used for Modbus RTU over RS-485, whereas Ethernet is used for the IP settings. However, Modbus IP uses the address setting under the serial screen.

Figure 43. Serial Settings

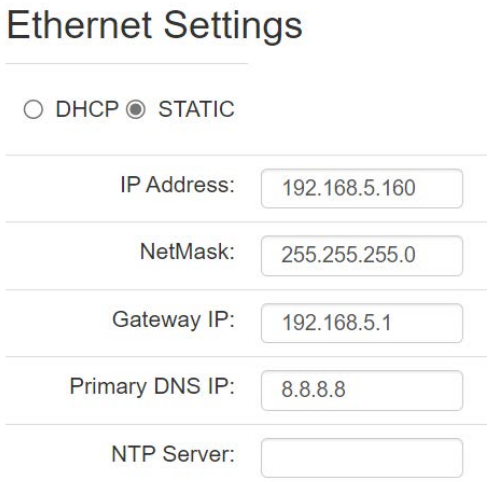


Figure 44. Ethernet Settings

Both Serial and Ethernet screens require the "Update Settings" button at the bottom of the screen to be pressed to save any changes.

Use DHCP settings to have the Core Module assigned it's connection setting from the local router. Static setting allows the network administrator to manually assign the IP connection settings.

NTP (National Time Protocol) Server address can either be an IP address or a URL. This setting is separated from the DHCP or static IP setting.

Set Core Module's Modbus address on the serial screen. Ensure address is unique, otherwise it will likely cause network errors for all devices.

NOTE Newer Core Modules do not use DIP switches. Leave the setting turned off.

All devices on a RS-485 network must have their baud rate, parity, and stop bit set to the same value, otherwise

network error will occur.

Configuring via the USB Port

NOTE See USB configuration section for more detail.

All Modbus settings can be configured through the USB configuration method. Modbus RTU settings only use the serial lines of the CSV but Modbus IP uses IP lines as well as the serial address line.

SERIALSLAVEADDRESS	1
SERIALBAUDRATE	38400
SERIALPARITY	0
SERIALSTOPBITS	1
SERIALDIPSWITCHENABLE	0

Figure 45. Serial Settings

DHCP	0
IPV4ADDRESS	192.168.5.160
IPV4MASK	255.255.255.0
IPV4GATEWAY	192.168.5.1
IPV4DNS1	8.8.8.8
IPV4NTP	

Figure 46. Ethernet Settings

BACnet

The Core Module has many BACnet devices. A core device with all settings plus a series of virtual devices with a smaller list of objects. Address of the virtual devices continues with the core module's address, there are no gaps. There are up to 96 of these virtual devices.

Supported Services

- Read Property
- Read Property Multiple
- Write Property
- Device Communication Control
- Reinitialize Device
- Time Synchronization
- Who Has
- Who Is

Supported Objects

- Analog Input
- Analog Value
- Binary Input
- Binary Output
- Device
- Bitstring Value

Configuring via the Web Server

NOTE See Web Server section for more detail.

All BACnet settings can be configured through the Web Server. Ethernet setting screen are under the Network menu. This screen has all the settings needed for setting up BACnet.

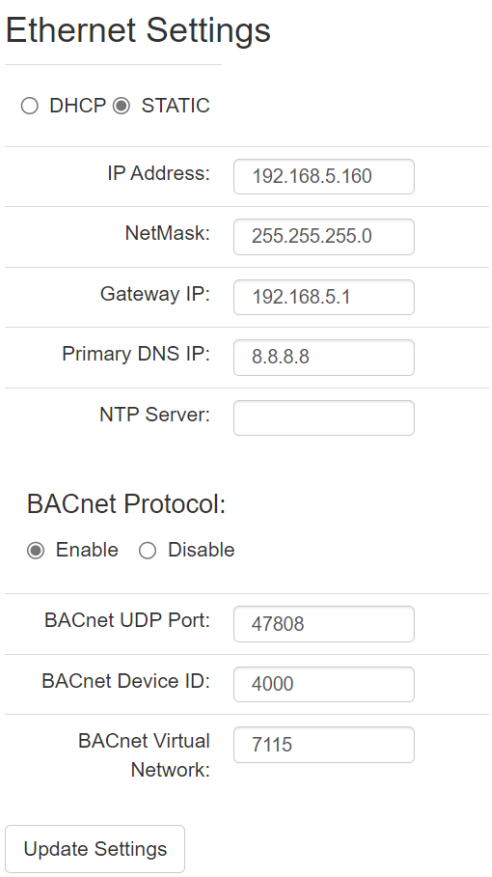


Figure 47. BACnet Web Settings

Ethernet screen require the "Update Settings" button at the bottom of the screen to be pressed to save any changes.

Use DHCP settings to have the Core Module assigned it's connection setting from the local router. Static setting allows the network administrator to manually assign the IP connection settings.

NTP (National Time Protocol) Server address can either be an IP address or a URL. This setting is separated from the DHCP or static IP setting.

Enable BACnet Protocol setting is needed for BACnet functionality.

NOTE	BACnet Device ID needs to be unique on the network. Ensure there are enough available continuous addresses for the Core Module and its virtual devices. Otherwise network errors may occur.

Configuring via the USB Port

NOTE	See USB configuration section for more detail.

All BACnet settings can be configured through the USB configuration method. Need to setup in the CSV both the IP settings as well as the BACnet settings.

DHCP	0
IPV4ADDRESS	192.168.5.160
IPV4MASK	255.255.255.0
IPV4GATEWAY	192.168.5.1
IPV4DNS1	8.8.8.8
IPV4NTP	
BACNETPROTOCOL	1
BACNETPORT	47808
BACNETID	10083874
BACNETVIRTNETWORK	1111

Figure 48. BACnet CSV Settings

See previous section as the settings are the same.

DHCP and BACNETPROTOCOL are enabled when set to '1'.

Core Module List of Parameters

Majority of the parameter are on the core module. Here is where the device is setup, circuits are setup and read from, and general alarms. This is a single list of both Modbus and BACnet parameters.

Name	Modbus	BACnet	Range/Values	Units	Scale
Serial Number	1-2 UINT32				
Bootloader Version	3 UINT16				
Firmware Version	4 UINT16				
Device ID	5 UINT16		**15172=** Schneider Pointmap **22000=** Incusense Pointmap		
Power Up Counter	6 UINT16				
Uptime	7-8 UINT32			Seconds	

Name	Modbus	BACnet	Range/Values	Units	Scale
Device Health	9 BITS		**Bit0:** Invalid Configuration Panel 1 (Port 1&2) **Bit1:** Invalid Configuration Panel 2 (Port 3&4)		
Smart Product ID #1	10 UINT16		**0=** Nothing Connected **1=** MCM CT Card **2=** 21 CT Strip 3 Aux(V1) **3=** 18 CT Strip 3 Aux(V1) **4=** Floating CT Strip		
Smart Product ID #2	11 UINT16		**5=** 23 CT Strip 1 Aux **6=** 24 CT Strip **7=** Schneider Adapter **8=** 21 CT Strip 3 Aux(V2) **9=** 18 CT Strip 3 Aux(V2)		
Smart Product ID #3	12 UINT16		**10=** Digital Input **11=** 18 CT Strip 3 Aux(VP) **12=** 21 CT Strip 3 Aux(VP) **13=** 23 CT Strip 1 Aux(VP) **14=** 24 CT Strip(VP)		
Smart Product ID #4	13 UINT16		**15=** Busway 6CT(VP) **16=** Busway 3CT(VP) **17=** Busway 6CT(VP) (VP) Indicates Product Supports Voltage Presence		

Name	Modbus	BACnet	Range/Values	Units	Scale
Smart Port #1 Serial Number	14-15 UINT32				
Smart Port #2 Serial Number	16-17 UINT32				
Smart Port #3 Serial Number	18-19 UINT32				
Smart Port #4 Serial Number	20-21 UINT32				
Smart Port #1 Firmware Version	22 UINT16				
Smart Port #2 Firmware Version	23 UINT16				
Smart Port #3 Firmware Version	24 UINT16				
Smart Port #4 Firmware Version	25 UINT16				
MAC Address (Bit 33-48)	26	1			
MAC Address (Bit 17-32)	27				
MAC Address (Bit 1-16)	28				
Brand Name (16 Registers)	29-44				
Model Name (16 Register)	45-60				
Device Name (16 Registers)	61-76				
Circuit Configuration Locked	77 BITS		**Bit0:** Settings have been locked		
Demand # of Sub-Intervals	100 UINT16	AV 1	1 - 6		
Demand Sub-Interval Length	101 UINT16	AV 2	0, 10 - 32767 0= Sync to Comms	Seconds	

Name	Modbus	BACnet	Range/Values	Units	Scale
Demand Time Stamp (Year)	102 UINT16		Years since 1900 (118 = 2018)	Year	
Demand Time Stamp (Month)	103 UINT16		0 - 11 0= January	Month	
Demand Time Stamp (Day)	104 UINT16		1 - 31	Day	
Demand Time Stamp (Weekday)	105 UINT16		0 - 6 0= Sunday	Weekday	
Demand Time Stamp (Hour)	106 UINT16		0 - 23 13= 1PM	Hour	
Demand Time Stamp (Minute)	107 UINT16		0 - 59	Minute	
Demand Time Stamp (Second)	108 UINT16		0 - 59	Seconds	
Real Time Clock (Year)	109 UINT16			Year	
Real Time Clock (Month)	110 UINT16		0 - 11	Month	
Real Time Clock (Day)	111 UINT16		1 - 31	Day	
Real Time Clock (Weekday)	112 UINT16		0 - 6	Weekday	
Real Time Clock (Hour)	113 UINT16		0 - 23	Hour	
Real Time Clock (Min)	114 UINT16		0 - 59	Minute	
Real Time Clock (Second)	115 UINT16		0 - 59	Seconds	
Digital Output #1	116	BO 1			
Digital Output #2	117	BO 2			
Digital Input #1 State	118	BI 1			
Digital Input #2 State	119	BI 2			

Name	Modbus	BACnet	Range/Values	Units	Scale
Modbus Slave Address	124 UINT16		1 - 254		
Modbus TCP Port	125 UINT16				
IP Address	126-127	1			
Gateway	128-129				
Mask	130-131				
NTP	132-133				
DNS	134-135				
DHCP	136 BITS				
Baudrate	140-141 UINT32		**0=** 9600 **1=** 19200 **2=** 38400 **3=** 57600 **4=** 76800	Baud	
Dip Switch Enabled	144 BITS		Disabled in Firmware Version 1.121 (Always 0)		
Dips Switch Value	145 UINT16		Disabled in Firmware Version 1.121 (Always 1)		
Panel 1 (Smart Port 1&2) Configuration	147	AV 3	**0=** Top Feed **1=** Bottom Feed **2=** Single Row Sequential **3=** Single Row Odd/Even **4=** Sequential **5=** Single Panel Sequential **6=** Single Panel Odd/Even		
Panel 2 (Smart Port 3&4) Configuration	148	AV 4			

Name	Modbus	BACnet	Range/Values	Units	Scale
CT Compensation Enabled	149 BITS	AV 5	**Bit0:** No Longer Used, Compensation Determined by CT Type Registers **Bit1:** Active Only With Schneider Adapter Board (0-VAC Compensation,1-Vitec Compensation) **Bit2:** No Longer Used, DC CT Set using CT Type Registers		
System Voltage	150 UINT16	AV 697	0 - 65535		-3
PT Ratio	151 UINT16	AV 698	0 - 65535		
Protocols Enabled	152 BITS		**Bit0:** BACnet IP **Bit1:** SNMP **Bit2:** Modbus RTU **Bit3:** Modbus TCP **Bit4:** Webserver		
Pi (Integer)	153 UINT16				-4
Pi (Floating Point)					
Noise Filter Setting	156 UINT16	AV 699	**0=** Disable		
Global CT Size	190 UINT16	AV 6	0 - 32000 (Always Reads 0) Writing this register will set all branches to same CT size		

Name	Modbus	BACnet	Range/Values	Units	Scale
Global Breaker Size	191 UINT16	AV 7	0 - 32000 (Always Reads 0) Writing this register will set all branches to same breaker size		
Global Reset/Command	192 UINT16	AV 8	**10203=** Resets All Resettable kWh **12345=** Reboot Device **20097=** Reset Max Demand **24658=** Clear True Meter Assignment **24659=** Reset True Meter to Default **26012=** New Demand SubInterval **26013=** Reset Demand **27212=** Reset Voltage Event Counter **29877=** Reset Max kW and Current **31010=** Clear All Latching Alarms **32123=** Start Waveform Capture (All Circuits)		
Global CT Type/Compensation	193 UINT16	AV 9	Writing this register will set all branches to same CT Type, See Registers 680 - 775 for CT Types		
CT Size	200-295 UINT16	AV 10 - 105	0 - 32000	Amps	

Name	Modbus	BACnet	Range/Values	Units	Scale
Breaker Size	296-391 UINT16	AV 106 - 201	0 - 32000	Amps	
Voltage Phase	392-487 UINT16	AV 202 - 297	0, 1, 2 Voltage Phase: 0 = L1, 1 = L2, 2 = L3		
True Meter Assignment	488-583 UINT16	AV 298 - 393	0 - 96 True Meter Assignment (Starting at register 15000), 0 = Not Assigned Max of 3 Circuits assigned to each True Meter (True Meter Assignment will take precedence over Virtual Meter Assignment if there are conflicts)		
Reset/Command	584-679	AV 394 - 489	**10203=** Resets Resettable kWh **29877=** Reset Max kW and Current **32123=** Waveform Capture		

Name	Modbus	BACnet	Range/Values	Units	Scale
CT Type	680-775	AV 490 - 585	**0=** Default (CT Type Not Listed) **1=** XH-SCT-T10A/75A **2=** XH-SCT-T16/100A **3=** BCT-1250-250A **4=** ECS1050_L79D **5=** ECS1075_L79E **6=** ECS12100_L79A **7=** ECS24100_L79C **8=** ECS24200_L79N **9=** ECS24250_L79B **10=** ECS36400_L79H **11=** ECS36600_L79F **12=** HSTS016L-S11/100A/1.65+/-0.625 **13=** EHS1632_T01 *14=*T859 EHS1650_T01 (Writing the CT Type will update the CT Size to the correct size)		

Name	Modbus	BACnet	Range/Values	Units	Scale
Virtual Meter Assignment	872-967 UINT16	AV 586 - 681	Creates a Virtual Meter by summing readings from assigned Circuits using a True Meter (True Meter Assignment will take precedence over Virtual Meter Assignment if there are conflicts)		
CT Turn On Threshold	968-982	AV 682 - 696	Turn on Threshold (% Full Scale) when the CT Type is used (1000 = 1.000%)		-3
Overvoltage Alarm Time Delay	1000 UINT16	AV 700	0 - 32767	Seconds	
Undervoltage Alarm Time Delay	1001 UINT16	AV 701	0 - 32767	Seconds	
Overvoltage Latching Alarm Threshold	1002 UINT16	AV 702	0 - 32767	Volts	
Undervotage Latching Alarm Threshold	1003 UINT16	AV 703	0 - 32767	Volts	
Voltage Alarm Hysteresis	1004 UINT16	AV 704	0 - 1000	Percent	-1
High Latching Alarm Time Delay	1008 UINT16	AV 705	0 - 32767	Seconds	
Low Latching Alarm Time Delay	1009 UINT16	AV 706	0 - 32767	Seconds	
High Latching Alarm Threshold	1014 UINT16	AV 707	0 - 1000	Percent	-1
Low Latching Alarm Threshold	1015 UINT16	AV 708	0 - 1000	Percent	-1

Name	Modbus	BACnet	Range/Values	Units	Scale
Non-Latching High Alarm Threshold	1018 UINT16	AV 709	0 - 1000	Percent	-1
Non-Latching Low Alarm Threshold	1019 UINT16	AV 710	0 - 1000	Percent	-1
Non-Latching Hysteresis	1021 UINT16	AV 711	0 - 1000	Percent	-1
Voltage Capture High RMS Threshold	1100 UINT16		0 - 32767	Volts	
Current Capture High RMS Threshold	1102 UINT16		0 - 1000	Percent	-1
Global Latching Alarm Bit Mask	1998 BITS	BSV 1	Set Bit to Enable Alarm, Clear Bit to Disable Alarm: See Voltage Alarm Status (Reg 1208 - 1210) for Bits		
Global Non-Latching Alarm Bit Mask	1999 BITS	BSV 2	Set Bit to Enable Alarm, Clear Bit to Disable Alarm: See Branch Alarm Status (Reg 1211 - 1306) for Bits		
Global Latching Alarm Status	1200 BITS	BSV 3	**Bit1:** High Latching Alarm **Bit2:** Low Latching Alarm **Bit8:** Overvoltage Latching Alarm **Bit9:** Undervoltage Latching Alarm **Bit11:** Waveform Capture Triggered **Bit12:** Zero Current Detected **Bit13:** Presence of Voltage		

Name	Modbus	BACnet	Range/Values	Units	Scale
Global Non-Latching Alarm Status	1201 BITS	BSV 4	**Bit0:** High Latching Alarm **Bit1:** Low Latching Alarm **Bit8:** Overvoltage Non-Latching Alarm **Bit9:** Undervoltage Non-Latching Alarm		
Global Most Recent Latching Alarm Circuit	1202 UINT16	AV 712			
Global Most Recent Non-Latching Alarm Circuit	1203 UINT16	AV 713			
Total Number of Latching Circuit In Alarm	1204 UINT16	AV 714			
Total Number of Non-Latching Circuit In Alarm	1205 UINT16	AV 715			
Voltage Alarm Bit Mask	1206 BITS	BSV 5	Set Bit to Enable Alarm, Clear Bit to Disable Alarm: See Voltage Alarm Status (Reg 1208 - 1210) for Bits		
Circuit Alarm Bit Mask	1207 BITS	BSV 6	Set Bit to Enable Alarm, Clear Bit to Disable Alarm: See Branch Alarm Status (Reg 1211 - 1306) for Bits		

Name	Modbus	BACnet	Range/Values	Units	Scale
Voltage Alarm Status	1208-1210 BITS	BSV 7 - 9	**Bit0:** Overvoltage Latching Alarm **Bit1:** Undervoltage Latching Alarm **Bit8:** Overvoltage Non-Latching Alarm **Bit9:** Undervoltage Non-Latching Alarm **Bit11:** Waveform Capture Triggered		
Voltage Alarm Status L1	1208 BITS	BSV 7			
Voltage Alarm Status L2	1209 BITS	BSV 8			
Voltage Alarm Status L3	1210 BITS	BSV 9			
Circuit Alarm Status	1211-1306 BITS	BSV 10 - 105	**Bit1:** High Latching Alarm **Bit2:** Low Latching Alarm **Bit8:** High Non-Latching Alarm **Bit9:** Low Non-Latching Alarm **Bit11:** Waveform Capture Triggered **Bit12:** Zero Current Detected **Bit13:** Presence of Voltage State (1 - Voltage is Present, 0 - Voltage Not Present) **Bit 14:** Voltage Presence Change of State (Bit is set when Voltage Presence (Bit13) changes state from 1 to 0)		
Zero Current State	1403-1498 UINT16	AI 1841 - 1936			

Name	Modbus	BACnet	Range/Values	Units	Scale
Digital Input Summary	1500-1507 BITS		**Bit0:** Channel 1 **Bit1:** Channel 2 **…** **Bit23:** Channel 24		
Digital Inputs State By Channel	1508-1603 BITS	BI 3 - 98	Digital Inputs are active only when Digital Input card is connected to Smart Port		
Total Number of Events	1700 UINT16		0 - 65535		
Most Recent Event Type	1701 UINT16		**0=** No Event **1=** Line Voltage Swell **2=** Line Voltage Sag **3=** Dropout **4=** Low Frequency Decaying Ringwave **5=** High-Frequency Impulse and Ringwave		
Most Recent Event Line	1702 UINT16		0 - 2 0 = L1, 1 = L2, 2 = L3		
Most Recent Event Time Stamp (Year)	1703 UINT16		Years since 1900 (118 = 2018)		
Most Recent Event Time Stamp (Month)	1704 UINT16		0 - 11 Month (0 = January)		
Most Recent Event Time Stamp (Day)	1705 UINT16		1 - 31		
Most Recent Event Time Stamp (Weekday)	1706 UINT16		0 - 6 Weekday (1 = Monday)		

Name	Modbus	BACnet	Range/Values	Units	Scale
Most Recent Event Time Stamp (Hour)	1707 UINT16		0 - 23 Hour (13 = 1PM)		
Most Recent Event Time Stamp (Min)	1708 UINT16		0 - 59		
Most Recent Event Time Stamp (Second)	1709 UINT16		0 - 59		
Most Recent Event Voltage	1710 +Float: 1712-1713				-2
Most Recent Event Duration	1711 +Float: 1714-1715				-3
Smart Port 1&2 (Panel 1) Circuit Configuration	1800	AV 3	**0=** Top Feed **1=** Bottom Feed **2=** Single Row Sequential **3=** Single Row Odd/Even **4=** Sequential **5=** Single Panel Sequential **6=** Single Panel Odd/Even		
Smart Port 3&4 (Panel 2) Circuit Configuration	1801	AV 4			
Panel 1 Location (64 Registers)	1802-1865				
Panel 2 Location (64 Registers)	1866-1929				
Smart Port 1 Status	1930		**0=** Nothing Detected **1=** Status OK **2=** Offline **3=** Invalid Device Detected		
Smart Port 2 Status	1931				
Smart Port 3 Status	1932				
Smart Port 4 Status	1933				

Name	Modbus	BACnet	Range/Values	Units	Scale
# of Devices Connected to Smart Port 1	1934				
# of Devices Connected to Smart Port 2	1935				
# of Devices Connected to Smart Port 3	1936				
# of Devices Connected to Smart Port 4	1937				
# of Active Channels on Smart Port 1	1938				
# of Active Channels on Smart Port 2	1939				
# of Active Channels on Smart Port 3	1940				
# of Active Channels on Smart Port 4	1941				
Smart Port #1 Device #1 Device ID	1942				
Smart Port #1 Device #2 Device ID	1943				
Smart Port #1 Device #3 Device ID	1944				
Smart Port #1 Device #4 Device ID	1945				
Smart Port #1 Device #5 Device ID	1946				

Name	Modbus	BACnet	Range/Values	Units	Scale
Smart Port #1 Device #6 Device ID	1947				
Smart Port #1 Device #7 Device ID	1948				
Smart Port #1 Device #8 Device ID	1949				
Smart Port #1 Device #1 Serial Number	1950-1951				
Smart Port #1 Device #2 Serial Number	1952-1953				
Smart Port #1 Device #3 Serial Number	1954-1955				
Smart Port #1 Device #4 Serial Number	1956-1957				
Smart Port #1 Device #5 Serial Number	1958-1959				
Smart Port #1 Device #6 Serial Number	1960-1961				
Smart Port #1 Device #7 Serial Number	1962-1963				
Smart Port #1 Device #8 Serial Number	1964-1965				
Smart Port #1 Device #1 Firmware Version	1966				
Smart Port #1 Device #2 Firmware Version	1967				

Name	Modbus	BACnet	Range/Values	Units	Scale
Smart Port #1 Device #3 Firmware Version	1968				
Smart Port #1 Device #4 Firmware Version	1969				
Smart Port #1 Device #5 Firmware Version	1970				
Smart Port #1 Device #6 Firmware Version	1971				
Smart Port #1 Device #7 Firmware Version	1972				
Smart Port #1 Device #8 Firmware Version	1973				
Smart Port #1 Device #1 Status	1974				
Smart Port #1 Device #2 Status	1975				
Smart Port #1 Device #3 Status	1976				
Smart Port #1 Device #4 Status	1977				
Smart Port #1 Device #5 Status	1978				
Smart Port #1 Device #6 Status	1979				
Smart Port #1 Device #7 Status	1980				
Smart Port #1 Device #8 Status	1981				

Name	Modbus	BACnet	Range/Values	Units	Scale
Smart Port #1 Device #1 Number Of Channels	1982				
Smart Port #1 Device #2 Number Of Channels	1983				
Smart Port #1 Device #3 Number Of Channels	1984				
Smart Port #1 Device #4 Number Of Channels	1985				
Smart Port #1 Device #5 Number Of Channels	1986				
Smart Port #1 Device #6 Number Of Channels	1987				
Smart Port #1 Device #7 Number Of Channels	1988				
Smart Port #1 Device #8 Number Of Channels	1989				
Smart Port #1 Device #1 Name (15 Registers)	1990-2004				
Smart Port #1 Device #2 Name (15 Registers)	2005-2019				

Name	Modbus	BACnet	Range/Values	Units	Scale
Smart Port #1 Device #3 Name (15 Registers)	2020-2034				
Smart Port #1 Device #4 Name (15 Registers)	2035-2049				
Smart Port #1 Device #5 Name (15 Registers)	2050-2064				
Smart Port #1 Device #6 Name (15 Registers)	2065-2079				
Smart Port #1 Device #7 Name (15 Registers)	2080-2094				
Smart Port #1 Device #8 Name (15 Registers)	2095-2109				
Smart Port #2 Device #1 Device ID	2110				
Smart Port #2 Device #2 Device ID	2111				
Smart Port #2 Device #3 Device ID	2112				
Smart Port #2 Device #4 Device ID	2113				
Smart Port #2 Device #5 Device ID	2114				
Smart Port #2 Device #6 Device ID	2115				
Smart Port #2 Device #7 Device ID	2116				

Name	Modbus	BACnet	Range/Values	Units	Scale
Smart Port #2 Device #8 Device ID	2117				
Smart Port #2 Device #1 Serial Number	2118-2119				
Smart Port #2 Device #2 Serial Number	2120-2121				
Smart Port #2 Device #3 Serial Number	2122-2123				
Smart Port #2 Device #4 Serial Number	2124-2125				
Smart Port #2 Device #5 Serial Number	2126-2127				
Smart Port #2 Device #6 Serial Number	2128-2129				
Smart Port #2 Device #7 Serial Number	2130-2131				
Smart Port #2 Device #8 Serial Number	2132-2133				
Smart Port #2 Device #1 Firmware Version	2134				
Smart Port #2 Device #2 Firmware Version	2135				
Smart Port #2 Device #3 Firmware Version	2136				
Smart Port #2 Device #4 Firmware Version	2137				

Name	Modbus	BACnet	Range/Values	Units	Scale
Smart Port #2 Device #5 Firmware Version	2138				
Smart Port #2 Device #6 Firmware Version	2139				
Smart Port #2 Device #7 Firmware Version	2140				
Smart Port #2 Device #8 Firmware Version	2141				
Smart Port #2 Device #1 Status	2142				
Smart Port #2 Device #2 Status	2143				
Smart Port #2 Device #3 Status	2144				
Smart Port #2 Device #4 Status	2145				
Smart Port #2 Device #5 Status	2146				
Smart Port #2 Device #6 Status	2147				
Smart Port #2 Device #7 Status	2148				
Smart Port #2 Device #8 Status	2149				
Smart Port #2 Device #1 Number Of Channels	2150				
Smart Port #2 Device #2 Number Of Channels	2151				

Name	Modbus	BACnet	Range/Values	Units	Scale
Smart Port #2 Device #3 Number Of Channels	2152				
Smart Port #2 Device #4 Number Of Channels	2153				
Smart Port #2 Device #5 Number Of Channels	2154				
Smart Port #2 Device #6 Number Of Channels	2155				
Smart Port #2 Device #7 Number Of Channels	2156				
Smart Port #2 Device #8 Number Of Channels	2157				
Smart Port #2 Device #1 Name (15 Registers)	2158-2172				
Smart Port #2 Device #2 Name (15 Registers)	2173-2187				
Smart Port #2 Device #3 Name (15 Registers)	2188-2202				
Smart Port #2 Device #4 Name (15 Registers)	2203-2217				
Smart Port #2 Device #5 Name (15 Registers)	2218-2232				

Name	Modbus	BACnet	Range/Values	Units	Scale
Smart Port #2 Device #6 Name (15 Registers)	2233-2247				
Smart Port #2 Device #7 Name (15 Registers)	2248-2262				
Smart Port #2 Device #8 Name (15 Registers)	2263-2277				
Smart Port #3 Device #1 Device ID	2278				
Smart Port #3 Device #2 Device ID	2279				
Smart Port #3 Device #3 Device ID	2280				
Smart Port #3 Device #4 Device ID	2281				
Smart Port #3 Device #5 Device ID	2282				
Smart Port #3 Device #6 Device ID	2283				
Smart Port #3 Device #7 Device ID	2284				
Smart Port #3 Device #8 Device ID	2285				
Smart Port #3 Device #1 Serial Number	2286-2287				
Smart Port #3 Device #2 Serial Number	2288-2289				

Name	Modbus	BACnet	Range/Values	Units	Scale
Smart Port #3 Device #3 Serial Number	2290-2291				
Smart Port #3 Device #4 Serial Number	2292-2293				
Smart Port #3 Device #5 Serial Number	2294-2295				
Smart Port #3 Device #6 Serial Number	2296-2297				
Smart Port #3 Device #7 Serial Number	2298-2299				
Smart Port #3 Device #8 Serial Number	2300-2301				
Smart Port #3 Device #1 Firmware Version	2302				
Smart Port #3 Device #2 Firmware Version	2303				
Smart Port #3 Device #3 Firmware Version	2304				
Smart Port #3 Device #4 Firmware Version	2305				
Smart Port #3 Device #5 Firmware Version	2306				
Smart Port #3 Device #6 Firmware Version	2307				
Smart Port #3 Device #7 Firmware Version	2308				

Name	Modbus	BACnet	Range/Values	Units	Scale
Smart Port #3 Device #8 Firmware Version	2309				
Smart Port #3 Device #1 Status	2310				
Smart Port #3 Device #2 Status	2311				
Smart Port #3 Device #3 Status	2312				
Smart Port #3 Device #4 Status	2313				
Smart Port #3 Device #5 Status	2314				
Smart Port #3 Device #6 Status	2315				
Smart Port #3 Device #7 Status	2316				
Smart Port #3 Device #8 Status	2317				
Smart Port #3 Device #1 Number Of Channels	2318				
Smart Port #3 Device #2 Number Of Channels	2319				
Smart Port #3 Device #3 Number Of Channels	2320				
Smart Port #3 Device #4 Number Of Channels	2321				

Name	Modbus	BACnet	Range/Values	Units	Scale
Smart Port #3 Device #5 Number Of Channels	2322				
Smart Port #3 Device #6 Number Of Channels	2323				
Smart Port #3 Device #7 Number Of Channels	2324				
Smart Port #3 Device #8 Number Of Channels	2325				
Smart Port #3 Device #1 Name (15 Registers)	2326-2340				
Smart Port #3 Device #2 Name (15 Registers)	2341-2355				
Smart Port #3 Device #3 Name (15 Registers)	2356-2370				
Smart Port #3 Device #4 Name (15 Registers)	2371-2385				
Smart Port #3 Device #5 Name (15 Registers)	2386-2400				
Smart Port #3 Device #6 Name (15 Registers)	2401-2415				
Smart Port #3 Device #7 Name (15 Registers)	2416-2430				

Name	Modbus	BACnet	Range/Values	Units	Scale
Smart Port #3 Device #8 Name (15 Registers)	2431-2445				
Smart Port #4 Device #1 Device ID	2446				
Smart Port #4 Device #2 Device ID	2447				
Smart Port #4 Device #3 Device ID	2448				
Smart Port #4 Device #4 Device ID	2449				
Smart Port #4 Device #5 Device ID	2450				
Smart Port #4 Device #6 Device ID	2451				
Smart Port #4 Device #7 Device ID	2452				
Smart Port #4 Device #8 Device ID	2453				
Smart Port #4 Device #1 Serial Number	2454-2455				
Smart Port #4 Device #2 Serial Number	2456-2457				
Smart Port #4 Device #3 Serial Number	2458-2459				
Smart Port #4 Device #4 Serial Number	2460-2461				

Name	Modbus	BACnet	Range/Values	Units	Scale
Smart Port #4 Device #5 Serial Number	2462-2463				
Smart Port #4 Device #6 Serial Number	2464-2465				
Smart Port #4 Device #7 Serial Number	2466-2467				
Smart Port #4 Device #8 Serial Number	2468-2469				
Smart Port #4 Device #1 Firmware Version	2470				
Smart Port #4 Device #2 Firmware Version	2471				
Smart Port #4 Device #3 Firmware Version	2472				
Smart Port #4 Device #4 Firmware Version	2473				
Smart Port #4 Device #5 Firmware Version	2474				
Smart Port #4 Device #6 Firmware Version	2475				
Smart Port #4 Device #7 Firmware Version	2476				
Smart Port #4 Device #8 Firmware Version	2477				
Smart Port #4 Device #1 Status	2478				

Name	Modbus	BACnet	Range/Values	Units	Scale
Smart Port #4 Device #2 Status	2479				
Smart Port #4 Device #3 Status	2480				
Smart Port #4 Device #4 Status	2481				
Smart Port #4 Device #5 Status	2482				
Smart Port #4 Device #6 Status	2483				
Smart Port #4 Device #7 Status	2484				
Smart Port #4 Device #8 Status	2485				
Smart Port #4 Device #1 Number Of Channels	2486				
Smart Port #4 Device #2 Number Of Channels	2487				
Smart Port #4 Device #3 Number Of Channels	2488				
Smart Port #4 Device #4 Number Of Channels	2489				
Smart Port #4 Device #5 Number Of Channels	2490				
Smart Port #4 Device #6 Number Of Channels	2491				

Name	Modbus	BACnet	Range/Values	Units	Scale
Smart Port #4 Device #7 Number Of Channels	2492				
Smart Port #4 Device #8 Number Of Channels	2493				
Smart Port #4 Device #1 Name (15 Registers)	2494-2508				
Smart Port #4 Device #2 Name (15 Registers)	2509-2523				
Smart Port #4 Device #3 Name (15 Registers)	2524-2538				
Smart Port #4 Device #4 Name (15 Registers)	2539-2553				
Smart Port #4 Device #5 Name (15 Registers)	2554-2568				
Smart Port #4 Device #6 Name (15 Registers)	2569-2583				
Smart Port #4 Device #7 Name (15 Registers)	2584-2598				
Smart Port #4 Device #8 Name (15 Registers)	2599-2613				

Name	Modbus	BACnet	Range/Values	Units	Scale
External Device Summary Status	3000 UINT16		**0=** Device OK **1=** Unable to Connect **2=** Response Timeout **3=** Invalid Response		
External Device #1 Status	3001 UINT16				
External Device #2 Status	3002 UINT16				
External Device #3 Status	3003 UINT16				
External Device #4 Status	3004 UINT16				
External Device #5 Status	3005 UINT16				
IP Address	3006-3007				
Device Type	3008 UINT16		**0=** No Device **1=** Anord Mardix CM02AM		
Slave Address	3009 UINT16				
Assigned Custom Meter	3010 UINT16				
Read From Meter Number	3011 UINT16				
IP Address	3012-3013				
Device Type	3014 UINT16				
Slave Address	3015 UINT16				
Assigned Custom Meter	3016 UINT16				
Read From Meter Number	3017 UINT16				
IP Address	3018-3019				
Device Type	3020 UINT16				

Name	Modbus	BACnet	Range/Values	Units	Scale
Slave Address	3021 UINT16				
Assigned Custom Meter	3022 UINT16				
Read From Meter Number	3023 UINT16				
IP Address	3024-3025				
Device Type	3026 UINT16				
Slave Address	3027 UINT16				
Assigned Custom Meter	3028 UINT16				
Read From Meter Number	3029 UINT16				
IP Address	3030-3031				
Device Type	3032 UINT16				
Slave Address	3033 UINT16				
Assigned Custom Meter	3034 UINT16				
Read From Meter Number	3035 UINT16				
Voltage Scale	4800 INT16				
Frequency	4801 UINT16 Float: 4900-4901	AI 1	Derived from L1	Hz	-2
Voltage LN Average	4802 UINT16 Float: 4902-4903	AI 2		Volts	4800
Voltage LL Average	4803 UINT16 Float: 4904-4905	AI 3		Volts	4800

Name	Modbus	BACnet	Range/Values	Units	Scale
Voltage LN	4804-4806 UINT16 Float: 4906-4911	AI 4 - 6		Volts	4800
Voltage L1	4804 UINT16 Float: 4906-4907	AI 4		Volts	4800
Voltage L2	4805 UINT16 Float: 4908-4909	AI 5		Volts	4800
Voltage L3	4806 UINT16 Float: 4910-4911	AI 6		Volts	4800
Voltage LL	4807-4809 UINT16 Float: 4912-4917	AI 7 - 9		Volts	4800
Voltage L1 - L2	4807 UINT16 Float: 4912-4913	AI 7		Volts	4800
Voltage L2 - L3	4808 UINT16 Float: 4914-4915	AI 8		Volts	4800
Voltage L3 - L1	4809 UINT16 Float: 4916-4917	AI 9		Volts	4800
Percent THD	4810-4813 UINT16 Float: 4918-4925	AI 10 - 13		Percent	-1
Percent THD Average (L1, L2 & L3)	4810 UINT16 Float: 4918-4919	AI 10		Percent	-1
Percent THD - L1	4811 UINT16 Float: 4920-4921	AI 11		Percent	-1
Percent THD - L2	4812 UINT16 Float: 4922-4923	AI 12		Percent	-1
Percent THD - L3	4813 UINT16 Float: 4924-4925	AI 13		Percent	-1

Name	Modbus	BACnet	Range/Values	Units	Scale
Voltage Angle	4814-4816 INT16 Float: 4926-4931	AI 14 - 16		Degrees	-1
L1 Angle	4814 INT16 Float: 4926-4927	AI 14		Degrees	-1
L2 Angle	4815 INT16 Float: 4928-4929	AI 15		Degrees	-1
L3 Angle	4816 INT16 Float: 4930-4931	AI 16		Degrees	-1
Energy Scale	5000-5095 INT16				
Power Scale	5096-5191 INT16				
Current Scale	5192-5287 INT16				
kWh	5288-5479 UINT32 Float: 10000-10191	AI 17 - 112		kWh	Energy
kVARh	5480-5671 UINT32 Float: 10192-10383	AI 113 - 208		kVARh	Energy
kVAh	5672-5863 UINT32 Float: 10384-10575	AI 209 - 304		kVAh	Energy
kW	5864-5959 UINT16 Float: 10576-10767	AI 305 - 400		kW	Power
kVAR	5960-6055 UINT16 Float: 10768-10959	AI 401 - 496		kVAR	Power

Name	Modbus	BACnet	Range/Values	Units	Scale
kVA	6056-6151 UINT16 Float: 10960-11151	AI 497 - 592		kVA	Power
Current	6152-6247 UINT16 Float: 11152-11343	AI 593 - 688		Amps	Current
Power Factor	6248-6343 INT16 Float: 11344-11535	AI 689 - 784	-1.0 - 1.0 Positive for Leading (Capacitive), Negative for Lagging (Inductive)		-3
Current Angle	6344-6439 INT16 Float: 11536-11727	AI 785 - 880	-90° - 90° Referenced to Assigned Voltage Phase	Degrees	-1
Percent THD	6440-6535 UINT16 Float: 11728-11919	AI 681 - 976		Percent	-1
Max Current	6536-6631 UINT16 Float: 11920-12111	AI 977 - 1072		Amps	
Max kW	6632-6727 UINT16 Float: 12112-12303	AI 1073 - 1068		kW	
Current Demand	6728-6823 UINT16 Float: 12304-12495	AI 1169 - 1264		Amps	
kW Demand	6824-6919 UINT16 Float: 12496-12687	AI 1265 - 1360		kW	

Name	Modbus	BACnet	Range/Values	Units	Scale
Max Current Demand	6920-7015 UINT16 Float: 12688-12879	AI 1361 - 1456		Amps	
Max kW Demand	7016-7111 UINT16 Float: 12880-13071	AI 1457 - 1552		kW	
KWH Snapshot	7112-7303 UINT32 Float: 13072-13263	AI 1553 - 1648		kWh	
Crest Factor	7304-7399 UINT16 Float: 13264-13455	AI 1649 - 1744			-3
Breaker Utilization	7400-7495 UINT16 Float: 13456-13647	AI 1745 - 1840	Circuit Utilization = (Current / Breaker Size) * 100	Percent	-2
Resettable kWh	7496-7687 UINT32 Float: 13648-13839			kWh	-3

Virtual Device List of Parameters

The remaining parameters are virtual devices. Each virtual device will have the entire virtual points map as seen in this section. Each virtual device corresponds to a meter on the core module. The addresses of the virtual devices are continuous and start immediately after the address of the core module. Addresses are active only if the meter number is active.

Name	Modbus	BACnet	Range/Values	Units
# of Circuits Assigned	15000	AV 1		
Assigned Circuits	15001-15003	AV 2 - 4		
Assigned Circuit to Circuit 1	15001	AV 2		
Assigned Circuit to Circuit 2	15002	AV 3		

Name	Modbus	BACnet	Range/Values	Units
Assigned Circuit to Circuit 3	15003	AV 4		
CT Size	15004-15006	AV 5 - 7		Amps
CT Size - Assigned Circuit 1	15004	AV 5		Amps
CT Size - Assigned Circuit 2	15005	AV 6		Amps
CT Size - Assigned Circuit 3	15006	AV 7		Amps
Breaker Size	15007-15009	AV 8 - 10	0 - 32000 True Meter - Read Only, Virtual Meter - Writable (used for alarming)	Amps
Breaker Size - Assigned Circuit 1	15007	AV 8	0 - 32000 True Meter - Read Only, Virtual Meter - Writable (used for alarming)	Amps
Breaker Size - Assigned Circuit 2	15008	AV 9	0 - 32000 True Meter - Read Only, Virtual Meter - Writable (used for alarming)	Amps
Breaker Size - Assigned Circuit 3	15009	AV 10	0 - 32000 True Meter - Read Only, Virtual Meter - Writable (used for alarming)	Amps
Voltage Phase	15010-15012	AV 11 - 13		
Voltage Phase - Assigned Circuit 1	15010	AV 11		
Voltage Phase - Assigned Circuit 2	15011	AV 12		
Voltage Phase - Assigned Circuit 3	15012	AV 13		

Name	Modbus	BACnet	Range/Values	Units
Command/Reset	15013		**20097=** Reset Max Demand **29877=** Reset Max kW and Current **31010=** Clear All Latching Alarms Always Reads 0 (True Meter - Read Only, Virtual Meter - Writable)	
Alarm Status Meter Summary - All Phases	15014	BSV 1	**Bit1:** High Latching Alarm **Bit2:** Low Latching Alarm **Bit8:** High Non-Latching Alarm **Bit9:** Low Non-Latching Alarm **Bit11:** Waveform Capture (True Meter Only) **Bit12:** Zero Current Detected (True Meter Only) **Bit13:** Voltage Presence State (True Meter Only) **Bit14:** Voltage Presence Change (True Meter Only)	
Alarm Status - Circuit 1	15015	BSV 2		
Alarm Status - Circuit 2	15016	BSV 3		
Alarm Status - Circuit 3	15017	BSV 4		
Meter Mode	15018		**0=** Not Used **1=** True Meter **2=** Virtual Meter	
Digital Inputs	15019			
Meter Name - 40 Characters (20 Register)	15020-15039			
Frequency	15040 +Float: 15060-15061	AI 1		Hz
Voltage LN	15041-15044 +Float: 15062-15069	AI 2 - 5		Volts

Name	Modbus	BACnet	Range/Values	Units
Voltage LN - Average of Assigned Circuit	15041 +Float: 15062-15063	AI 2		Volts
Voltage LN - Assigned Circuit 1	15042 +Float: 15064-15065	AI 3	Always 0 (Line 1) when configured as Virtual Meter	Volts
Voltage LN - Assigned Circuit 2	15043 +Float: 15066-15067	AI 4	Always 1 (Line 2) when configured as Virtual Meter	Volts
Voltage LN - Assigned Circuit 3	15044 +Float: 15068-15069	AI 5	Always 2 (Line 2) when configured as Virtual Meter	Volts
Voltage LN THD	15045-15048 +Float: 15070-15077	AI 6 - 9		Volts
Voltage LN THD - Average of Assigned Circuit	15045 +Float: 15070-15071	AI 6		Volts
Voltage LN THD - Assigned Circuit 1	15046 +Float: 15072-15073	AI 7	Always 0 (Line 1) when configured as Virtual Meter	Volts
Voltage LN THD - Assigned Circuit 2	15047 +Float: 15074-15075	AI 8	Always 1 (Line 2) when configured as Virtual Meter	Volts
Voltage LN THD - Assigned Circuit 3	15048 +Float: 15076-15077	AI 9	Always 2 (Line 2) when configured as Virtual Meter	Volts
Voltage LL - Average of Assigned Circuit	+Float: 15078-15079			Volts
Voltage LL - Assigned Circuit 1	+Float: 15080-15081		Always 0 (Line 1) when configured as Virtual Meter	Volts
Voltage LL - Assigned Circuit 2	+Float: 15082-15083		Always 1 (Line 2) when configured as Virtual Meter	Volts
Voltage LL - Assigned Circuit 3	+Float: 15084-15085		Always 2 (Line 2) when configured as Virtual Meter	Volts
Serial Number Assigned to Circuit 1	15094-15095		Virtual Meter - Not used (always 0)	

Name	Modbus	BACnet	Range/Values	Units
Serial Number Assigned to Circuit 2	15096-15097		Virtual Meter - Not used (always 0)	
Serial Number Assigned to Circuit 3	15098-15099		Virtual Meter - Not used (always 0)	
Energy Scale	15100			
Power Scale	15101			
Current Scale	15102			
Voltage Scale	15103			
Alarm Status	15104		Same as register 15014	
kWh	15105-15106 +Float: 15300-15301	AI 10		kWh
kVARh	15107-15108 +Float: 15302-15303	AI 11		kVARh
kVAh	15109-15110 +Float: 15304-15305	AI 12		kVAh
kW	15111 +Float: 15306-15307	AI 13		kW
kVAR	15112 +Float: 15308-15309	AI 14		kVAR
kVA	15113 +Float: 15310-15311	AI 15		kVA
Current	15114 +Float: 15312-15313	AI 16		Amps
Power Factor Average	15115 +Float: 15314-15315	AI 17	0 - 1.0 Average Power Factor is not signed	
Neutral Current	15116 +Float: 15316-15317	AI 18	Virtual Meter - Not used (always 0)	Amps
Current THD Average	15117 +Float: 15318-15319	AI 19	Virtual Meter - Not used (always 0)	Percent
Max Current	15118 +Float: 15320-15321	AI 20		Amps
Max kW	15119 +Float: 15322-15323	AI 21		kW

Name	Modbus	BACnet	Range/Values	Units
Current Demand	15120 +Float: 15324-15325	AI 22	Virtual Meter - Not used (always 0)	Amps
kW Demand	15121 +Float: 15326-15327	AI 23	Virtual Meter - Not used (always 0)	kW
Max Current Demand	15122 +Float: 15328-15329	AI 24	Virtual Meter - Not used (always 0)	Amps
Max kW Demand	15123 +Float: 15330-15331	AI 25	Virtual Meter - Not used (always 0)	kW
KWH Snapshot	15124-15125 +Float: 15332-15333	AI 26	Virtual Meter - Not used (always 0)	kWh
Crest Factor	15126 +Float: 15334-15335	AI 27	Virtual Meter - Not used (always 0)	
Resettable kWh	15127-15128 +Float: 15336-15337			kWh
Energy Scale	15150			
Power Scale	15151			
Current Scale	15152			
Voltage Scale	15153			
Alarm Status	15154		Same as register 15015	
kWh	15155-15156 +Float: 15350-15351	AI 28		kWh
kVARh	15157-15158 +Float: 15352-15353	AI 29		kVARh
kVAh	15159-15160 +Float: 15354-15355	AI 30		kVAh
kW	15161 +Float: 15356-15357	AI 31		kW
kVAR	15162 +Float: 15358-15359	AI 32		kVAR
kVA	15163 +Float: 15360-15361	AI 33		kVA
Current	15164 +Float: 15362-15363	AI 34		Amps

Name	Modbus	BACnet	Range/Values	Units
Power Factor	15165 +Float: 15364-15365	AI 35	-1.0 - 1.0 Positive for Leading (Capacitive), Negative for Lagging (Inductive)	
Current Angle	15166 +Float: 15366-15367	AI 36	-90° - 90°	Degrees
Percent THD	15167 +Float: 15368-15369	AI 37	Virtual Meter - Not used (always 0)	Percent
Max Current	15168 +Float: 15370-15371	AI 38		Amps
Max kW	15169 +Float: 15372-15373	AI 39		kW
Current Demand	15170 +Float: 15374-15375	AI 40	Virtual Meter - Not used (always 0)	Amps
kW Demand	15171 +Float: 15376-15377	AI 41	Virtual Meter - Not used (always 0)	kW
Max Current Demand	15172 +Float: 15378-15379	AI 42	Virtual Meter - Not used (always 0)	Amps
Max kW Demand	15173 +Float: 15380-15381	AI 43	Virtual Meter - Not used (always 0)	kW
KWH Snapshot	15174-15175 +Float: 15382-15383	AI 44	Virtual Meter - Not used (always 0)	kWh
Crest Factor	15176 +Float: 15384-15385	AI 45	Virtual Meter - Not used (always 0)	
Breaker Utilization	15177 +Float: 15386-15387	AI 46	(Current / Breaker Size) * 100	Percent
Resettable kWh	15178-15179 +Float: 15388-15389			kWh
Energy Scale	15200			
Power Scale	15201			
Current Scale	15202			
Voltage Scale	15203			
Alarm Status	15204		Same as register 15016	

Name	Modbus	BACnet	Range/Values	Units
kWh	15205-15206 +Float: 15400-15401	AI 47		kWh
kVARh	15207-15208 +Float: 15402-15403	AI 48		kVARh
kVAh	15209-15210 +Float: 15404-15405	AI 49		kVAh
kW	15211 +Float: 15406-15407	AI 50		kW
kVAR	15212 +Float: 15408-15409	AI 51		kVAR
kVA	15213 +Float: 15410-15411	AI 52		kVA
Current	15214 +Float: 15412-15413	AI 53		Amps
Power Factor	15215 +Float: 15414-15415	AI 54	-1.0 - 1.0 Positive for Leading (Capacitive), Negative for Lagging (Inductive)	
Current Angle	15216 +Float: 15416-15417	AI 55	-90° - 90°	Degrees
Percent THD	15217 +Float: 15418-15419	AI 56	Virtual Meter - Not used (always 0)	Percent
Max Current	15218 +Float: 15420-15421	AI 57		Amps
Max kW	15219 +Float: 15422-15423	AI 58		kW
Current Demand	15220 +Float: 15424-15425	AI 59	Virtual Meter - Not used (always 0)	Amps
kW Demand	15221 +Float: 15426-15427	AI 60	Virtual Meter - Not used (always 0)	kW
Max Current Demand	15222 +Float: 15428-15429	AI 61	Virtual Meter - Not used (always 0)	Amps
Max kW Demand	15223 +Float: 15430-15431	AI 62	Virtual Meter - Not used (always 0)	kW

Name	Modbus	BACnet	Range/Values	Units
KWH Snapshot	15224-15225 +Float: 15432-15433	AI 63	Virtual Meter - Not used (always 0)	kWh
Crest Factor	15226 +Float: 15434-15435	AI 64	Virtual Meter - Not used (always 0)	
Breaker Utilization	15227 +Float: 15436-15437	AI 65	(Current / Breaker Size) * 100	Percent
Resettable kWh	15228-15229 +Float: 15438-15439			kWh
Energy Scale	15250			
Power Scale	15251			
Current Scale	15252			
Voltage Scale	15253			
Alarm Status	15254		Same as register 15017	
kWh	15255-15256 +Float: 15450-15451	AI 66		kWh
kVARh	15257-15258 +Float: 15452-15453	AI 67		kVARh
kVAh	15259-15260 +Float: 15454-15455	AI 68		kVAh
kW	15261 +Float: 15456-15457	AI 69		kW
kVAR	15262 +Float: 15458-15459	AI 70		kVAR
kVA	15263 +Float: 15460-15461	AI 71		kVA
Current	15264 +Float: 15462-15463	AI 72		Amps
Power Factor	15265 +Float: 15464-15465	AI 73	-1.0 - 1.0 Positive for Leading (Capacitive), Negative for Lagging (Inductive)	
Current Angle	15266 +Float: 15466-15467	AI 74	-90° - 90°	Degrees

Name	Modbus	BACnet	Range/Values	Units
Percent THD	15267 +Float: 15468-15469	AI 75	Virtual Meter - Not used (always 0)	Percent
Max Current	15268 +Float: 15470-15471	AI 76		Amps
Max kW	15269 +Float: 15472-15473	AI 77		kW
Current Demand	15270 +Float: 15474-15475	AI 78	Virtual Meter - Not used (always 0)	Amps
kW Demand	15271 +Float: 15476-15477	AI 79	Virtual Meter - Not used (always 0)	kW
Max Current Demand	15272 +Float: 15478-15479	AI 80	Virtual Meter - Not used (always 0)	Amps
Max kW Demand	15273 +Float: 15480-15481	AI 81	Virtual Meter - Not used (always 0)	kW
KWH Snapshot	15274-15275 +Float: 15482-15483	AI 82	Virtual Meter - Not used (always 0)	kWh
Crest Factor	15276 +Float: 15484-15485	AI 83	Virtual Meter - Not used (always 0)	
Breaker Utilization	15277 +Float: 15486-15487	AI 84	(Current / Breaker Size) * 100	Percent
Resettable kWh	15278-15279 +Float: 15488-15489			