EATON | Cutler-Hammer

IQ MULTIPOINT ENERGY SUBMETER II

INSTALLATION, OPERATION AND CONFIGURATION INSTRUCTIONS FOR THE CUTLER-HAMMER IQ MULTIPOINT ENERGY SUBMETER II MULTI-POINT METER

INSTRUCTION LEAFLET
IL02601001E Rev. B

Table of Contents

SECTION 1: INTRODUCTION

1.1 PRELIMINARY COMMENTS AND SAFETY PRECAUTIONS

This Technical Document covers most aspects of installation, operation, unit-level maintenance and configuration of the IQ Multipoint Energy Submeter. It is a guide for authorized and qualified personnel only.

This document assumes the Eaton | Cutler-Hammer PowerPort Software utility is being used to configure the IQ Multipoint Energy Submeter II unit. If you do not have a copy of this software please see the "Getting Your Own Copy of PowerPort" section of this document. Please refer to the specific WARNINGS and CAUTIONS throughout each section before installing, operating or performing maintenance to the unit. If you require further information regarding a particular installation, application or maintenance activity, contact your Cutler-Hammer representative.

1.1.2 Safety Precautions

All safety codes, safety standards, and/or regulations must be strictly observed in the installation, operation and maintenance of this device.

WARNING

THE WARNINGS AND CAUTIONS INCLUDED AS PART OF THE PROCEDURAL STEPS IN THIS DOCUMENT ARE FOR PERSONNEL SAFETY AND PROTECTION OF EQUIPMENT FROM DAMAGE. AN EXAMPLE OF A TYPICAL WARNING LABEL IS SHOWN ABOVE. THIS WILL HELP TO ENSURE THAT PERSONNEL ARE ALERT TO WARNINGS WHICH MAY APPEAR THROUGHOUT THE DOCUMENT. IN ADDITION,

CAUTION

CAUTIONS ARE ALL UPPER CASE AND BOLDFACED AS SHOWN BELOW.

COMPLETELY READ AND UNDERSTAND THE MATERIAL PRESENTED IN THIS DOCUMENT BEFORE ATTEMPTING INSTALLATION, OPERATION OR APPLICATION OF THE EQUIPMENT. ONLY QUALIFIED PERSONS SHOULD BE PERMITTED TO PERFORM ANY WORK ASSOCIATED WITH THE EQUIPMENT. ANY WIRING INSTRUCTIONS PRESENTED IN THIS DOCUMENT MUST BE FOLLOWED PRECISELY. FAILURE TO DO SO COULD CAUSE PERMANENT EQUIPMENT DAMAGE, BODILY INJURY OR DEATH.

1.2 PRODUCT OVERVIEW

The IQ Multipoint Energy Submeter II is a very versatile electronic sub-metering device with sixteen current inputs that can be configured to be up to five 3-phase meters, up to eight single-phase 3 wire meters, up to 16 individual single-phase meters or any combination of phase-to-phase meters. It can be mounted in a switchboard, panelboard or load center. The IQ Multipoint Energy Submeter II measures and records calculated values, allowing users to track energy usage patterns of various metered points throughout the electrical distribution system. The IQ Multipoint Energy Submeter II is capable of measuring the energy values of individual loads or processes. In turn the information can be reported to a local system or transmitted to a third party billing company via remote access.

The IQ Multipoint Energy Submeter II is a compact multipoint meter. A selection of Current Sensors in popular current capacities (5 A, 50 A, 70 A, 125 A, 200 A, 400 A) can be attached to the IQ Multipoint Energy Submeter II unit. It can communicate information over the Cutler-Hammer INCOM™ network, and can be configured using Cutler-Hammer's PowerPort software utility. INCOM™ and PowerPort are discussed in more detail later in this document.

With its revenue grade accuracy the IQ Multipoint Energy Submeter II is well suited for multi-tenant, multi-dwelling or other commercial applications where accurate allocation of electrical usage is desired.

The IQ Multipoint Energy Submeter II monitors system and phase values in the following typical system wiring configurations, as shown in Table 1.2.1.

1.3 ORDERING INFORMATION

Table 1.2.1 IQ Multipoint Energy Submeter II Wiring and Circuit Breaker Recommendations

3 Phase 4 Wire	Single Phase 3 Wire	Single Phase 2 Wire
208Y/120 Vac 480Y/277 Vac 600Y/347 Vac	120/240 Vac	120 Vac 277 Vac 347 Vac
THREE POLE CIRCUIT BREAKER RECOMMENDED	TWO POLE CIRCUIT BREAKER RECOMMENDED	ONE POLE CIRCUIT BREAKER RECOMMENDED

When ordering IQ Multipoint Energy Submeter II components, please refer to the Catalog Numbers listed in the table below.

1.4 PRODUCT SPECIFICATIONS

Table 1.3.1 IQ Multipoint Energy Submeter II Ordering Information

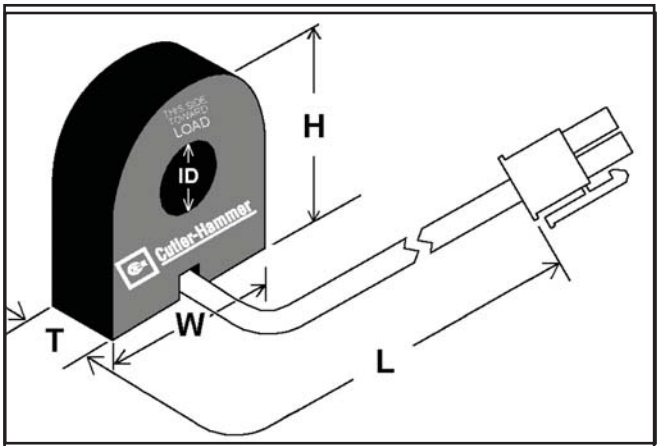
Description	Catalog Number
IQ Multipoint Energy Submeter II 120 V L-N / 208 V L-L with INCOM Communications	IQMESIIN1
IQ Multipoint Energy Submeter II 277 V L-N / 480 V L-L with INCOM Communications	IQMESIIN2
IQ Multipoint Energy Submeter II 346 V L-N / 600 V L-L with INCOM Communications	IQMESIIN3
5 A Current Sensor (3 per box)	CS005
50 A Current Sensor (6 per box)	CS050
70 A Current Sensor (6 per box)	CS070
125 A Current Sensor (3 per box)	CS125
200 A Current Sensor (3 per box)	CS200
400 A Current Sensor (3 per box)	CS400
4' Sensor Extension Cable (6 per box)	CSET04
8' Sensor Extension Cable (3 per box)	CSET08
16' Sensor Extension Cable (3 per box)	CSET16

Table 1.4.1 Specifications

Environmental Conditions
Indoor Use Only
* Operating Temperature
-4° to 158°F
-20° to 70°C
* Storage Temperature
-40° to 257°F
-40° to 125°C
* Humidity
80% for temperatures up to 87.8°F (31°C) - decreasing linearly to 50% at 122°F (50°C)
* Maximum Operating Altitude
3000 meters

Figure 1.4.1 IQ Multipoint Energy Submeter II

Dimensions
IQ Multipoint Energy Submeter II
* Height
6 inches
* Width
11 inches
* Depth (without mounting feet)
1 1/2 inches
* Shipping Weight
4.5 lbs.



Sensor	H	W	T	ID	L
CS005	2.28	0.60	N/A	N/A	2.60
CS050	1.55	1.18	0.50	0.32	36.00
CS070	2.10	1.73	0.58	0.55	36.00
CS125	2.10	1.73	0.58	0.55	45.00
CS200	3.06	2.69	0.75	1.25	45.00
CS400	4.33	3.67	1.08	1.75	56.00

Figure 1.4.2 Current Sensor Dimensions

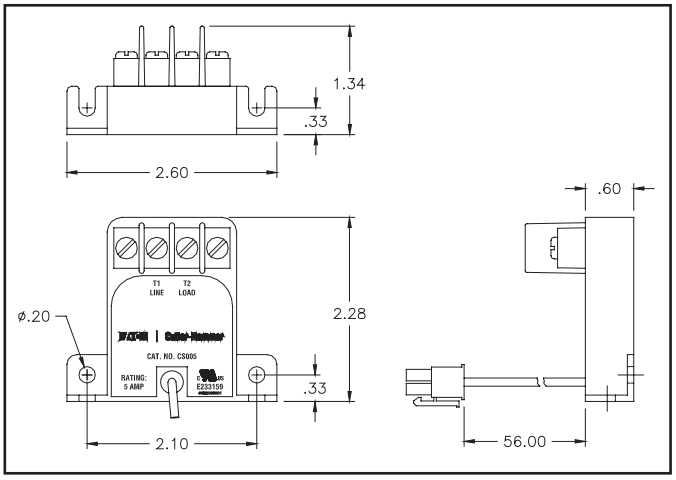


Figure 1.4.3 5A Current Sensor Dimensions

1.5 REGULATORY/STANDARDS COMPLIANCE

Certifications
Standard
* ANSI C12.1 - 2001 Revenue Accuracy
* CSA
* UL 916 File Number E166079
Conducted Emissions
* FCC Part 15, Subpart B, Class B
Radiated Emissions
* FCC Part 15, Subpart B, Class B

Current Input
* Current Inputs
10 mA maximum
* Power Measurement Accuracy
Certified to ANSI C12.1
* Current Overload Capability
125% of full scale rating

Voltage Input Terminal
* Wire Size
14 AWG minimum
10 AWG maximum
* Torque Rating
5 in.-lb. maximum

Control Voltage
* Frequency Range (all models)
55 to 65 Hz +/-10%
* IQMESIIN1
Operating Voltage L-N
120 V nominal +/-15%
Operating Voltage L-L
208 V nominal +/-15%
* IQMESIIN2
Operating Voltage L-N
277 V nominal +/-15%
Operating Voltage L-L
480 V nominal +/-15%
* IQMESIIN3
Operating Voltage L-N
346 V nominal +/-15%
Operating Voltage L-L
600 V nominal +/-15%
* Power Consumption (all models)
6 watts

Figure 1.5.1 Typical Current Sensor

Sensor Max Wire OD
* CS005
N/A
* CS050
0.315 inches
* CS070
0.545 inches
* CS125
0.545 inches
* CS200
1.130 inches
* CS400
1.75 inches

Accuracy For both the Current Sensor and IQ Multipoint Energy Submeter II Combined
Current Range * CS005 0 -- 5 A * CS050 0 -- 50 A * CS070 0 -- 70 A * CS125 0 -- 125 A * CS200 0 -- 200 A * CS400 0 -- 400 A +/-1% of reading from 1.5% of Full Scale

Communication
* Protocol INCOM MODBUS (future) * Speed 9600 Baud FSK * Software Compatibility PowerPort PowerNet FetchIT

The IQ Multipoint Energy Submeter II meets Underwriters Laboratories Inc. (UL® 916), Canadian Standards Association (CSA®), Emissions Standards Part 15, Subpart B and Federal Communications Commission (FCC) requirements.

SECTION 2: HARDWARE OVERVIEW

2.1 GENERAL

Because the configuration of the IQ Multipoint Energy Submeter II is an internal representation of the external hardware setup, it is impossible to discuss the configuration of a unit without a thorough understanding of the hardware components being used. The following contains a brief description of the IQ Multipoint Energy Submeter hardware, its functions and nomenclature.

The IQ Multipoint Energy Submeter II consists of two component types, the IQ Multipoint Energy Submeter II Module itself and six different styles of Current Sensor (5 A, 50 A, 70 A, 125 A , 200 A and 400 A). Extension cables (four, eight and sixteen-foot lengths) are also available to extend the length of the Current Sensor. The use of extension cables have no affect on the function of the IQ Multipoint Energy Submeter II; as long as the total lead length of any current sensor is 20 feet or less. However, due to UL restriction for using extension cables, the connectors must not reside inside conduit.

NOTE: Do not attempt to disassemble the IQ Multipoint Energy Submeter II or the Current Sensors. The units contain no user-serviceable components.

Figure 2.1.1: IQ Multipoint Energy Submeter II & Current Sensor

2.2 IQ MULTIPOINT ENERGY SUBMETER II MODULE

The IQ Multipoint Energy Submeter II is equipped with connectors for up to sixteen Current Sensors, terminals for three voltage phases (plus neutral) and a connector for INCOM™. Each voltage input is monitored with respect to electrical neutral. Therefore, all three-phase voltages must be wye configured. The unit will not work without a neutral connection.

The IQ Multipoint Energy Submeter II is factory calibrated for use with any of the available Current Sensors. Expensive field calibration is NOT required; the factory calibration is good for the life of the product.

2.2.1 Voltage Inputs

The voltage terminal block is located at the bottom left side of the chassis. It has four terminals for wiring to phase voltages and the neutral (see figure 2.2.1 and 2.2.2).

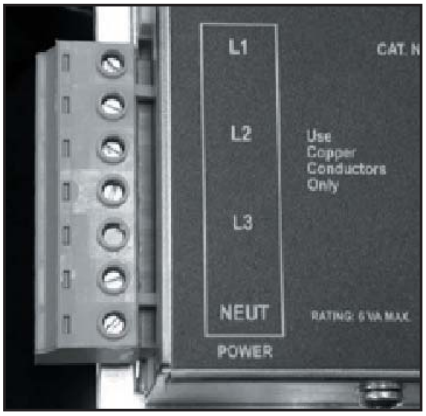


Figure 2.2.1 Voltage Inputs

Because the unit uses the L1 connection to power itself, the neutral terminal MUST be connected to electrical neutral and voltage MUST be applied between L1 and Neutral. Any voltage that is used to power a load to be metered must be connected at this terminal block. It does not matter which input is connected to L1, L2 or L3, so long as L1 and N (neutral) are connected properly.

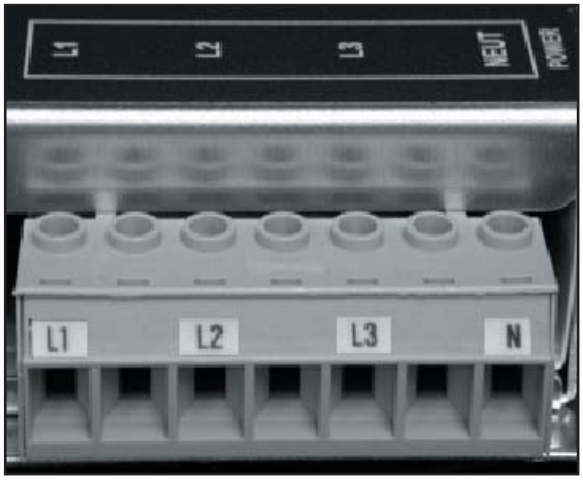


Figure 2.2.2 Voltage Inputs Side View

Also note that any unused voltage inputs MUST be connected to Neutral. Floating or unconnected inputs generate non-zero readings due to the way the IQ Multipoint Energy Submeter II subtracts neutral from the phase voltage.

The IQ Multipoint Energy Submeter II is available in 3 different voltage styles, a 120 Vac L-N version, a 277 Vac L-N version and a 346 Vac L-N version. All voltages must be compatible to the version you are using.

Table 2.2.1 IQ Multipoint Energy Submeter Voltage Input Connections

Phase Input	Connect to Voltage Input Terminal
A	L1 *
B	L2
C	L3
Neutral	NEUT *

*this connection is required for the unit to function

Use only copper conductors with the voltage inputs.

Remember, consistency is key to the successful setup and configuration. The phase designations that are assigned by virtue of the connections to the voltage input terminal block must be maintained throughout the entire configuration process. All electrical wiring and connections to the IQ Multipoint Energy Submeter II must be made in accordance with applicable national and local requirements and codes.

2.2.2 Current Inputs

The sixteen Current Sensor connectors are located on

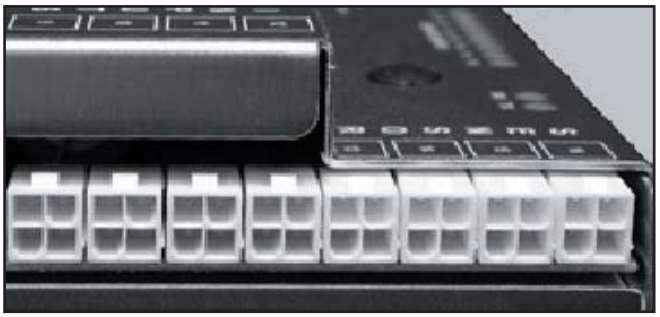


Figure 2.2.3 Current Sensor Connectors

the top left and right sides of the chassis. Each identical Current Sensor input connector has four pins and is keyed so that the connector cannot be incorrectly oriented (see figure below). Use only Cutler-Hammer Current Sensors, which are pre-terminated with the mating connectors. As previously stated, if additional lead lengths are required, pre-terminated Sensor Extension Cables are available.

2.2.3 LEDs

The IQ Multipoint Energy Submeter II has 19 LEDs located on the front top of the unit.

The Power LED, located on the left hand side of the unit, blinks when the unit is OK. It notifies the user that the unit has power applied, the processor is running and the firmware is operating.

The 16 center LEDs associate with each current sensor input. These LEDs are numbered 1 through 16 just as the current sensor inputs and are synchronized to the meter point to which the current sensor is configured. Each LED will transition on and off for each 1/128 per watthour of energy accumulated to the associated current sensor. See section 6.2 for additional information.

The last two are the RX (receive) and TX (transmit) LEDs. The RX LED will blink when the unit is receiving information and the TX LED will blink when the unit is transmitting information.

NOTE: If the LEDs begin to blink in sequence the unit may have gone into “reset mode”, contact the Power Management Application Support team at 1-800-809-2772 option 1 / option 1 for additional information.

2.2.4 Data Logging

The IQ Multipoint Energy Submeter can capture selected measured data at selected periodic intervals of time (5, 10, 15, 20, 30 and 60 minutes). This function is useful to capture trends over longer periods of time. The IQ Multipoint Energy Submeter II has a 128K of nonvolatile memory to story the energy log entries. Depending on how many power cycles occur, up to 4096 samples of measured data can be recorded during a 45-day period. The logged data can be viewed using the PowerNet software package equipped with the NPMONITOR component.

2.2.5 Real Time Clock and Capacitor Backup

The IQ Multipoint Energy Submeter II contains a real time clock enabling the unit to maintain accurate data logging. A capacitor powers this real time clock if power failure occurs. The capacitor will maintain the clock integrity for up to 3 weeks in the event of a power outage. No maintenance is required.

2.3 IQ MULTIPOINT ENERGY SUBMETER II CURRENT SENSORS

The Current Sensors (see below) provide the current monitoring capability of the IQ Multipoint Energy Submeter II so that it can provide energy data. Internally, the current that is sensed is combined with the associated voltage information and the resultant energy is stored (in watthours). The data from multiple sensors can also be combined internally within the IQ Multipoint Energy Submeter II to produce split-phase (2 pole) or three-phase (3 pole) meters. Any combination of single, split-phase or three phase meters may be selected, as long as the total number of sensors does not exceed sixteen (16).

In order to avoid damage to themselves or the IQ Multipoint Energy Submeter II, the Current Sensors are

Figure 2.3.1 125 A Current Sensor

protected against inadvertent disconnection by an internal voltage-limiting device.

The rating of any Current Sensor is automatically detected when the sensor is connected to the IQ Multipoint Energy Submeter II. Any tampering with a sensor while the unit is operating will be detected, logged and reported to the monitoring system.

2.4 EXTERNAL CIRCUIT BREAKERS OR FUSES

The IQ Multipoint Energy Submeter II must be provided with over-current protection. Cutler-Hammer recommends that user-supplied circuit breakers or fuses be installed near the IQ Multipoint Energy Submeter II to protect it and related components from damage. If the unit is located within or near a panelboard, then supplying voltage to the IQ Multipoint Energy Submeter II through a one-pole, two-pole or three-pole 15 A UL listed circuit breaker is recommended.

If fuses are used they should be sized to protect the wire feeding the IQ Multipoint Energy Submeter II.

2.5 SOFTWARE

2.5.1. PowerPort Software Utility

The PowerPort Software utility has been provided by Cutler-Hammer to facilitate the setup of a wide variety of INCOM™ compatible metering products.

PowerPort is a free software utility that allows configuration of the IQ Multipoint Energy Submeter II by supplying the following capabilities:

- Meter Point configuration (up to 16 current sensors).
- Correct phase voltage for each Current Sensor.
- Verification of proper operation of the unit.
- Incoming voltage readings.
- W and Wh values for each meter point reading.
- Logging and Automatic Metering setup.

To access additional information on PowerPort and to download a free copy of the PowerPort software, visit the Cutler-Hammer web site at http://www.ch.cutler-hammer.com.

2.5.2 PowerNet

PowerNet is Cutler-Hammer's system of integrated metering, protection and control devices. In additional to the functionality listed above for PowerPort, PowerNet Software is the suite of software applications that allows you to monitor device data, physically control devices, collect information, compile information and generate reports.

PowerNet enables efficient monitoring, alarming and trending of an electrical distribution system. In addition to the IQ Multipoint Energy Submeter II, the Cutler-Hammer PowerNet system communicates with state-of-the-art meters, relays, trip units, motor protectors, starters and more to process vital power information.

PowerNet delivers the information needed to analyze power quality, manage power costs, track and schedule maintenance, troubleshoot system faults and receive early warnings about potential problems.

For additional information on PowerNet visit the Cutler-Hammer web site at http://www.ch.cutler-hammer.com.

2.5.3 FetchIT

Cutler-Hammer's FetchIT is a user-friendly automated application that dials remote locations, gathers energy data and saves the data in ASCII text for direct import into a spreadsheet format (such as Microsoft Excel) or to a Microsoft SQL Server Desktop Engine (MSDE) database.

FetchIT saves the meter energy data with a time stamp in an ASCII text file. To gather on-board logged energy data, the software polls the device's logging buffers for the data from the last dial-in time to the current time and saves the data point with time stamps to an ASCII text file and/or an MSDE database.

The ASCII text files are in comma-separated value (CSV) format. Each remote location has its own text file containing the energy usage data for all the devices under one common header. The on-board logged energy data must be stored in a separate file from the energy usage data for each location.

For additional information on FetchIT contact Power Quality Technical Support Center at 1-800-809-2772, option 4.

This page is intentionally left blank.

SECTION 3: INSTALLATION

3.1 INTRODUCTION

The IQ Multipoint Energy Submeter II is designed so it can be installed, operated and maintained by adequately trained personnel. These instructions do not cover all details, variations or combinations of the equipment, its storage, delivery, installation, checkout, safe operation or maintenance. Care must be exercised to comply with local, state and national regulations, as well as with industry standard safety practices for this class of equipment.

CAUTION

A DISCONNECT SWITCH OR CIRCUIT BREAKER SHOULD BE IN CLOSE PROXIMITY TO THE IQ MULTIPOINT ENERGY SUBMETER II MOUNTING LOCATION AND CLEARLY MARKED AS THE DISCONNECTING DEVICE FOR THE EQUIPMENT. THE DEVICE MUST BE ABLE TO SIMULTANEOUSLY DISCONNECT ALL VOLTAGES THAT ARE APPLIED TO THE IQ MULTIPOINT ENERGY SUBMETER II UNIT, TURN OFF AND LOCK OUT POWER SUPPLIED TO THE PANELBOARD OR OTHER ELECTRICAL ENCLOSURE IN WHICH THE IQ MULTIPOINT ENERGY SUBMETER II(S) ARE BEING INSTALLED. FAILURE TO DO SO COULD CAUSE PERMANENT EQUIPMENT DAMAGE, BODILY INJURY OR DEATH.

3.2 PANEL PREPARATION

The IQ Multipoint Energy Submeter II must be mounted in a grounded UL listed electrical enclosure that is suitable for its environment. The IQ Multipoint Energy Submeter II may be mounted individually or multiple units may reside together within a dedicated electrical enclosure. The enclosure may also contain other electrical and/or electronic devices.

3.2.1 Stacking the IQ Multipoint Energy Submeter II

The IQ Multipoint Energy Submeter II has stacking ability that allows two units to be placed one on top of the other (see figure 3.2.1). This enables the user to save space and if need be double the amount of current inputs being used in an application. For example two stacked IQ Multipoint Energy Submeter IIs can be configured, using PowerPort or PowerNet, to provide up to 32 individual single-phase meters, up to 16 single-phase 3 wire meters, up to 10 3-phase meters

Figure 3.2.1 Two IQ Multipoint Energy Submeter II Stacked

or any combination of phase-to-phase meters in only 8 inches of vertical panel space.

Although you can physically stack more than 2 units together Cutler-Hammer recommends stacking only 2 units. Each unit is sold separately and comes equipped with the necessary parts for stacking. Follow the steps below to stack 2 IQ Multipoint Energy Submeter II units:

- Remove the back plate from 1 (one) of the units by removing the 4 nuts located on the back of the unit.
- Once the back plate is removed take the 4 standoffs (2 standoffs are supplied with each unit) and thread them on the studs on the rear of the unit.

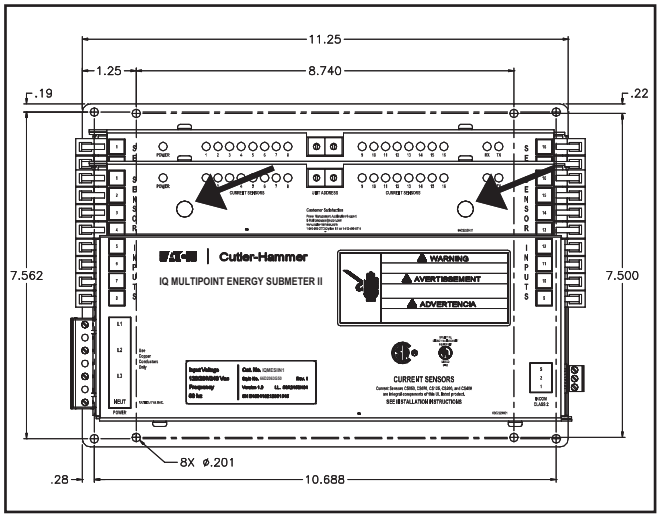


Figure 3.2.2 Drawing of Two IQ Multipoint Energy Submeter II Stacked

- On the second unit (the one WITH the back plate) remove the 2 black plastic hole plugs located on the right and left top front of the unit. See the arrows below on Figure 3.2.2.
- Place the first unit (with the standoffs) on top of the second unit sliding the 2 top studs into the holes that you uncovered in the previous step.
- Holding both units together, turn the 2 units over and place the 4 screws (2 screws are provided with each unit) into the holes on the back plate, see Figure 3.2.3.

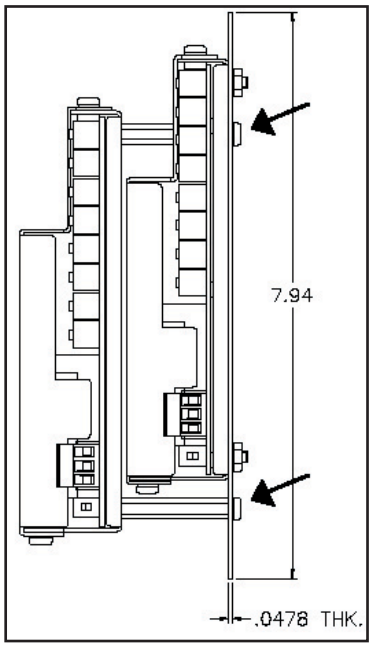


Figure 3.2.3 Side View Drawing of IQ Multipoint Energy Submeter II Stacked

NOTE: Prior to stacking the IQ Multipoint Energy Submeter II the jumper within the unit must be moved if the units have been programmed and sealing against changes is desired. See Section 4.4 Sealing Provisions for additional information.

3.2.2 Mounting an IQ Multipoint Energy Submeter II in a UL listed enclosure

Before installing the IQ Multipoint Energy Submeter II refer to the dimensions shown in Figure 3.2.5. Identify an available area within the selected UL listed enclosure that has enough area to allow for the IQ Multipoint Energy Submeter II to be mounted, plus at least three inches clearance on each side of the unit where connections must be made. Make sure you have allotted additional space around the connectors to allow the connectors to be attached and removed without external interference.

NOTE: A location that keeps the communication connection within 24 inches from the side of the enclosure is ideal because a 24-inch piece of tubing is included with each IQ Multipoint Energy Submeter II. The tubing is required as an additional barrier around the INCOM™ communication cables. In all installation instances, the IQ Multipoint Energy Submeter II chassis must be connected to earth ground. This can be in done in two ways, by mounting the unit to a panelboard with the 4 mounting screws studs located on the back of the unit, or by mounting the unit to a panelboard with the back plate attached. For additional safety, attach the ground wire to the screw located on the bottom left of the Multipoint Energy Submeter II, see Figure 3.2.4.

Figure 3.2.4 Ground Screw

WARNING

Using the four nuts with captive lock screws provided (or other installer-supplied hardware), attach the studs of the IQ Multipoint Energy Submeter II unit to the inside of the enclosure. The size and shape of the panels may vary but the installation methodology will remain the same. The required mounting hole pattern is shown in Figure 3.2.5.

ALL WIRING MUST CONFORM TO NATIONAL AND LOCAL CODES. SUFFICIENT ROOM MUST BE PROVIDED FOR ROUTING OF ALL POWER CABLES. ALL SIGNAL CABLES MUST BE ROUTED SEPARATELY FROM POWER.

3.2.3 IQ Multipoint Energy Submeter II Installation in a Cutler-Hammer Panelboard or Switchboard

The IQ Multipoint Energy Submeter II has been designed for easy mounting in a full range of Cutler-Hammer panelboards and switchboards. The mounting bracket supplied with the unit has been designed to quickly mount the IQ Multipoint Energy Submeter II on the breaker mounting rails of these assemblies. Both the single and stacked pair of IQ Energy II units require a minimum of 8 inches of vertical rail space. The two-high, stacked pair, will fit between the mounting rails and the cover trim. All of the connectors of the unit face into the side gutters of the panelboard or switchboard thus making wiring of the IQ Multipoint Energy Submeter II convenient. Figure 3.2.6 shows an example of a stacked pair of units in a panelboard.

When mounted in a panelboard or switchboard the IQ Multipoint Energy Submeter II provides an integrated

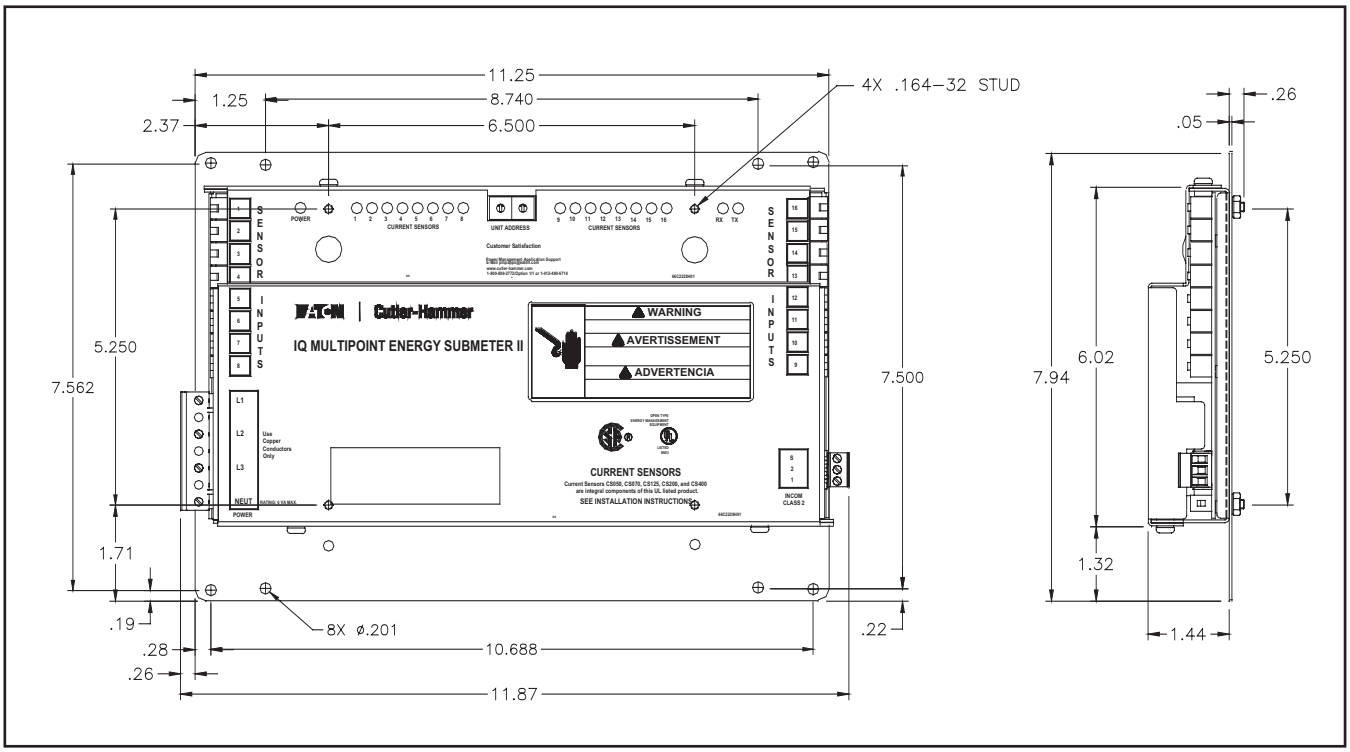


Figure 3.2.5 Single IQ Multipoint Energy Submeter II (with Mounting Plate) Mounting Hole Template with Dimensions

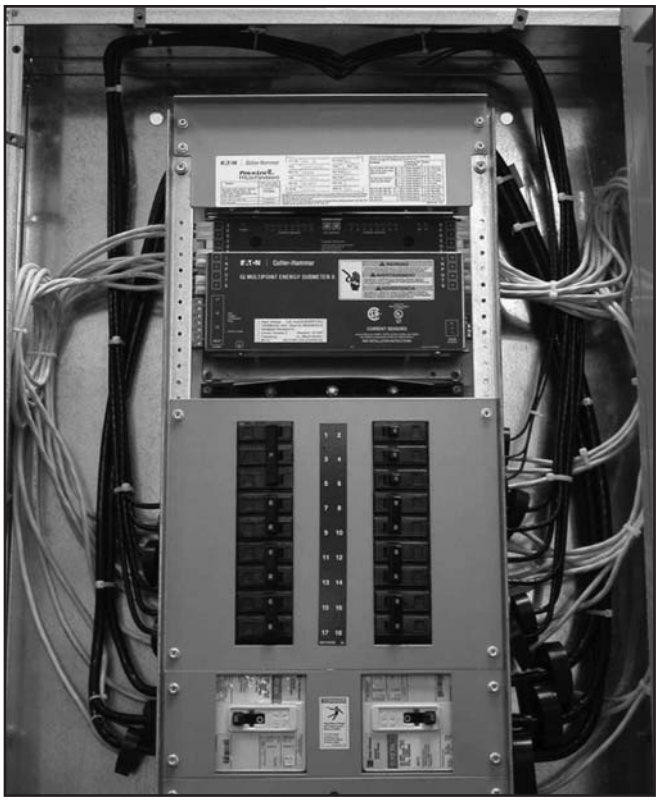


Figure 3.2.6 Stacked Pair of IQ Multipoint Energy Submeter II in a Cutler-Hammer Type PRL3a Panelboard

power distribution and metering package that requires less space than other separately mounted metering packages and eliminates field installation and wiring. These integrated distribution and meter packages are UL listed and can be supplied in a wide variety of voltage and current ratings. Please consult your local Cutler-Hammer sales office or authorized distributor for additional information.

3.2.4 Mounting and Installing the IQ Multipoint Energy Submeter II in a Separate Enclosure

You can mount the IQ Multipoint Energy Submeter II enclosure adjacent to the existing panelboard. The enclosure may be mounted above, below or on either side of the panelboard and may even house multiple IQ Multipoint Energy Submeter II units. The recommended maximum distance between the panelboard and the IQ Multipoint Energy Submeter II enclosure is 12 feet.

Install minimum conduit of 1¼ inches (diameter) between the panelboard and the IQ Multipoint Energy Submeter II enclosure. The Current Sensor leads and the power leads to the IQ Multipoint Energy Submeter II can be “bundled” together. The Current Sensor leads are made of cable rated at 600 V. They are classified as Class 1 wiring and can occupy the same raceway as the power wiring. If multiple conduits are used, the

size should be determined by National Electrical Code (NEC®) requirements, but each conduit may not be smaller than 1¼ inches (diameter).

3.2.5 Terminating Resistor Switch

A terminating resister switch is located on the bottom right hand side of the IQ Multipoint Energy Submeter II. When using the IQ Multipoint Energy Submeter II as a single unit, the terminating switch MUST be in the ON (UP) position for proper communication. However, when stacking the IQ Multipoint Energy Submeter II or using multiple units in a chain, all of the units' terminating switches must be in the OFF (DOWN) position except for the last unit in the chain, this IQ Multipoint Energy Submeter II's terminating switch MUST be in the ON (UP) position. See the INCOM wiring rules (TD17515) for additional information.

NOTE: If sensor extension cables are used to facilitate the interconnection between the IQ Multipoint Energy Submeter II and the panelboard the mating connections must reside within either of the enclosures and MUST NOT reside within the conduit.

⚠ WARNING ⚡

ALL WIRING MUST CONFORM TO NATIONAL AND LOCAL CODES. SUFFICIENT ROOM MUST BE PROVIDED FOR ROUTING OF ALL POWER CABLES. ALL SIGNAL CABLES MUST BE ROUTED SEPARATELY FROM POWER.

3.3 IQ MULTIPOINT ENERGY SUBMETER II ELECTRICAL CONNECTIONS

Electrical connections should be made to the IQ Multipoint Energy Submeter II according to table 3.3.1.

Table 3.3.1 IQ Multipoint Energy Submeter II Electrical Connections

Electrical Service Available	IQ Multipoint Energy Submeter Terminal Connections	Recommended Circuit Breaker and Wire Gauge
Single Phase, 2 Wire	L1 plus N (white)	15 A Single Pole w/ 14 gauge wire
Single Phase, 3 Wire (Split-Phase)	L1 and L2, plus N (white)	15 A Double Pole w/ 14 gauge wire
Three Phase, 4 Wire	L1, L2 and L3, plus N (white)	15 A Triple Pole w/ 14 gauge wire

The IQ Multipoint Energy Submeter II power source must be provided with over-current protection (fuse or circuit breaker) and be wired with #14 gauge (minimum) copper wire. A local power disconnect is also recommended in order to combine all of these features. Cutler-Hammer recommends attaching to L1, L2 and L3 through a UL listed 15 A circuit breaker located within the panelboard. It is also recommended that this circuit breaker (one pole per each electrical phase to be connected) be dedicated to the IQ Multipoint Energy Submeter II to avoid any unnecessary disruption of power to the unit.

Wire (with #14 gauge (minimum) copper wire) from the neutral connection of the panelboard through the conduit to the neutral (NEUT) termination on the IQ Multipoint Energy Submeter II voltage plug. Apply rated voltage to L1, L2 and L3 connections (if applicable). It is important to properly identify the phase connections to the IQ Multipoint Energy Submeter II and to use that information to configure the unit. Interchanging phases will result in either incorrect power readings or no power readings.

NOTE: The IQ Multipoint Energy Submeter II has a removable plug for making all voltage connections. Torque screw terminals to 5 in-lbs.

NOTE: All versions of the IQ Multipoint Energy Submeter II use inputs L1 and neutral (NEUT) to power the unit. Connection must always be made to L1 and NEUT. Connections to L2 and L3 should be made as required, depending on the voltage configuration to be metered.

NOTE: To avoid any non-zero (incorrect) readings on unconnected inputs, unused voltage inputs MUST be connected to Neutral.

3.4 IQ MULTIPOINT ENERGY SUBMETER II COMMUNICATION CONNECTIONS (IF MOUNTED IN A PANELBOARD)

Route the INCOM™ communication cable through a separate conduit or knockout. NEC article 725-52 states the INCOM™ cable MUST exit through a separate conduit or knockout. The communication wiring is Class 2 wiring and cannot occupy the same raceway as Class 1 wiring.

NEC article 725-52 also states the INCOM™ communication wiring MUST be additionally insulated. For this reason a two-foot length UL recognized PVC tube is provided with the IQ Multipoint Energy Submeter II. Cut the tube to the desired length and install it over the entire length of the INCOM™ cable that resides within the panelboard.

The IQ Multipoint Energy Submeter II has two communication LEDs (RX and TX) located at the top right of the unit that blink when receiving or transmitting information.

A variety of software tools are available from Cutler-Hammer in order to satisfy your INCOM™ communication needs. Discuss your application with a Cutler-Hammer representative to determine which software and/or hardware products are appropriate for your specific application.

3.4.1 INCOM™ Network Communications

Note: To satisfy INCOM™ Wiring Specifications, use only Cutler-Hammer IMPCABLE shielded twisted pair cable or Cutler-Hammer recommended equivalent (such as Belden 9463 or 3072F) according to system requirements. Consult TD17515: IMPACC Wiring Specifications Base Rules for detailed information on proper installation and termination of network cable.

Connect the IQ Multipoint Energy Submeter II to the INCOM™ network by connecting the twisted pair communication cable to the INCOM™ port located as indicated on the housing label of the IQ Multipoint Energy Submeter II Module. Connect the shield to the terminal marked “S” and the two single wires to the terminals marked “1” and “2”. The polarity of the twisted pair is not important.

Tie the communication cable shield to ground only once at the INCOM™ master device. If there is more than one remote INCOM™ compatible device cabled to the master device in the system, tie the communication cable shields together but do not connect to ground.

A terminating resister switch is located on the bottom right hand side of the IQ Multipoint Energy Submeter II. When using the IQ Multipoint Energy Submeter II as a single unit, the terminating switch MUST be in the ON (UP) position for proper communication. However, when stacking the IQ Multipoint Energy Submeter II or using multiple units in a chain, all of the units’ terminating switches must be in the OFF (DOWN) position except for the last unit in the chain, this IQ Multipoint Energy Submeter II’s terminating switch MUST be in the ON (UP) position. See the INCOM wiring rules (TD17515) for additional information.

3.4.2 MODBUS Communications (Future)

MODBUS RS485 communications for the IQ Multipoint Energy Submeter II is not available at this time. MODBUS will be available for this unit in future enhancements; contact your Cutler-Hammer representative for additional information about availability.

3.5 CURRENT SENSOR INSTALLATION

The Current Sensors are designed to monitor either incoming current or branch load circuit current. There are six sizes of Current Sensors that can be used with the IQ Multipoint Energy Submeter II. See the IQ Multipoint Energy Submeter Current Sensors Table in the Product Specifications section of this document for current range and accuracy information for each size.

Table 3.5.1 Typical Sensor Usage

Values Monitored		
Monitoring Scenario	**Sensors Required**	**Typical* Sensor Class**
High Current (over 400 A)	1 Sensor per Phase	5 A plus external current transformer
Incoming Power	1 Sensor per Phase	125 A , 200 A , 400 A
Subpanel Feeds	1 Sensor per Phase	70 A , 125 A , 200 A
Line-to-Line Load	1 Sensor	50 A , 70 A
Line-to-Neutral Load	1 Sensor	50 A , 70 A
Phase-to-Neutral Voltage	No Sensor Required	Up to three Phase-to-Neutral Voltages

To determine the number and size of the sensors needed for each monitoring application in your system use table 3.5.1.

Cutler-Hammer has designed the 5 A Current Sensor (CS005) for applications over 400 A. By attaching the 5 A current sensor as the secondary transformer to a (XXX:5 A) primary transformer you are able to monitor primary currents from 5 to 5000 A.

For example route the load wire through an appropriate (XXX:5 A) primary current transformer. Attach the 5 A current sensor to the primary current transformer secondary. The 5 A current sensor will plug directly into the mating connectors on the IQ Multipoint Energy Submeter II. The primary current rating must be set in the IQ Multipoint Energy Submeter II, see section 5.2.3.1 for additional information.

3.5.1 Current Sensor Considerations

The selection of the appropriate Current Sensor type is important to ensure maximum accuracy in the energy value. Sensors should be sized so that the current rating of the sensor is not exceeded in normal operation. The orientation of the Current Sensors is also important. Current is only sensed in one direction, so the sensors must always be oriented with the label side of the sensor pointing in the direction of the current flow. An incorrect orientation of the sensor will cause a zero energy reading. The LEDs will NOT blink if this occurs.

When installing the load wiring, route the wire through the center hole of the Current Sensor and terminate the wire into the circuit breaker terminal. The words "This Side Toward Load" are indicated on the sensor. In the case of a branch circuit in a panelboard, "toward load" is away from the branch circuit breaker. For the service entrance, "toward load" is away from the utility meter and toward the main circuit breaker.

Plug the Current Sensor connectors into the mating connectors on the IQ Multipoint Energy Submeter II. The sixteen Current Sensor connectors are located in two rows on each side of the chassis, and are numbered 1 through 16 as shown on the IQ Multipoint Energy Submeter II nameplate. Plug into the appropriate connectors.

Once powered, the IQ Multipoint Energy Submeter II's current sensor LEDs (located at the top of the unit) will blink when current is read. The LED pulse rate depends on the amount of wattage the unit is reading.

To ensure revenue accuracy is not compromised, the total sensor lead length from the IQ Multipoint Energy Submeter II to sensor housing (sensor lead and extension cable(s) combined) must not exceed 20 feet.

⚠ WARNING ⚠

DO NOT BEND LEADS OF THE CURRENT SENSORS CLOSER THAN ONE TO TWO INCHES FROM THE SENSOR HOUSING, ALLOW A MINIMUM OF 1-2 INCHES OF LINEAR TRAVEL FROM THE HOUSING. BENDING THE LEADS LESS THAN ONE INCH FROM THE SENSOR HOUSING CAN DESTROY THE DEVICE BY BREAKING INTERNAL CONNECTIONS BETWEEN THE LEAD AND THE SENSOR.

3.6 RECOMMENDED ELECTRICAL WIRING

Cutler-Hammer recommends following one of the IQ Multipoint Energy Submeter II wiring diagrams that include suggested Current Sensor placements. These diagrams are provided in Section 6: Configuring Into Meter Points, figures 6.1, 6.2 and 6.3. It is the user's responsibility to determine which wiring diagram best applies and to install all Current Sensors, circuit breakers, fuses and other components.

NOTE: If your application does not conform to one of the diagrams provided contact your Cutler-Hammer representative prior to applying power to discuss other solutions.

SECTION 4: COMMUNICATION

4.1 INCOM™

The IQ Multipoint Energy Submeter II Multi-Point Meter is an INCOM™ compatible device.

INCOM™ (INdustrial COMmunications protocol) is a noise-immune communications system that permits communication to and from a master computer and the IQ Multipoint Energy Submeter II or other devices using a high frequency carrier signal transmitted over a properly terminated, shielded twisted pair cable. Consult TD17513: IMPACC Wiring Specification Base Rules for detailed information on proper installation and termination of network cable. As such, the IQ Multipoint Energy Submeter II must be remotely configured for use and its metering information needs to be remotely displayed.

The following functions can be viewed and/or performed remotely when the IQ Multipoint Energy Submeter II is connected to an external INCOM™ compatible network:

- Display of measured electrical phase voltages
- Display of measured power (kW) and energy (kWh) for each metering point
- View and edit setpoints
- Wiring configuration
- Sensor configuration and combination
- Determine if tampering has occurred
- Determine if any sensors have been disconnected
- Insure confidence in system integrity

In order to access the IQ Multipoint Energy Submeter II data, or to configure the unit, an INCOM™ translator must be used in conjunction with INCOM™ protocol compatible software tools and an INCOM™ protocol translator.

Four models of INCOM™ protocol translators are available:

1) PMCOM5 INCOM™ Communication Adapter (recommended for laptop computers and for residential and other lighter-duty applications). INCOM™ protocol allows communication transmission distances of up to 1000 feet.
2) Cutler-Hammer MINT II (recommended for industrial applications).
3) Cutler-Hammer EMINT (for conversion to Ethernet networks.
4) CONI card (PC with ISA slot required)

4.1.1 PMCOM5 INCOM™ Communication Adapter

The PMCOM5 INCOM™ Communication Adapter provides interface between the host computer's serial (RS-232) port and one or more IQ Multipoint Energy Submeter II on an INCOM™ network. It interfaces to a computer through a standard nine pin D-connector type serial cable, provides INCOM™ protocol from the RJ45 connector on its front face and plugs directly into a standard wall outlet or power strip.

4.1.2 Master INCOM™ Network Translator II (MINTII)

The MINTII product can perform the same protocol translation that other products provide, but has additional features that are more suitable for industrial environments. The main advantages are its industrial packaging and its expanded communications protocol. The MINTII allows additional handshaking between the host computer and the devices on the INCOM™ network. This ensures error-free communication regardless of the electrical noise level surrounding the devices.

4.1.3 Ethernet Master INCOM™ Network Transfer (EMINT)

The Ethernet MINT (Master INCOM Network Translator) enables Ethernet TCP/IP communications. This makes it possible for energy monitoring, power quality analysis and other information to be delivered to a PC over an existing Ethernet infrastructure. The EMINT enables users to capitalize on the low cost of Ethernet communications equipment for use as the backbone for a power monitoring system.

4.1.4 Computer Operated Network Interface (CONI)

The CONI card is an INCOM™ translator that installs into any desktop PC computer with an open ISA slot and connects to the INCOM™ network using an RJ11 (telephone type) plug.

4.2 SETTING UP FOR INCOM™ COMMUNICATION

As previously stated, the IQ Multipoint Energy Submeter II is a very versatile device that can provide single phase, 2 or 3 wire (120 V/240 V) and 3 phase, 4 wire (120 V/208Y, 277 V/480Y or 346 V/600Y) electrical metering information of a monitored load. As a result, configuring the unit to meet the specific metering need(s) and properly accessing the resulting metering data are crucial to the effective use of this product. Section 6: Configuring Into Meter Points provides details on setting up PowerPort with INCOM™ Communication.

4.3 INCOM™ ADDRESSING BASICS

Each INCOM™ compatible device must have its own unique address on the INCOM™ network so that it may receive individualized commands from the host computer system. The unique address can be selected using the two rotary switches that are located on the top center of the unit, see figure 4.2.1 below.

The address is a hexadecimal number, which means that each rotary switch has sixteen valid settings, 0-9 and A-F. This provides 255 possible addresses, 01 to FF hexadecimal, address 00 is NOT valid. Using a

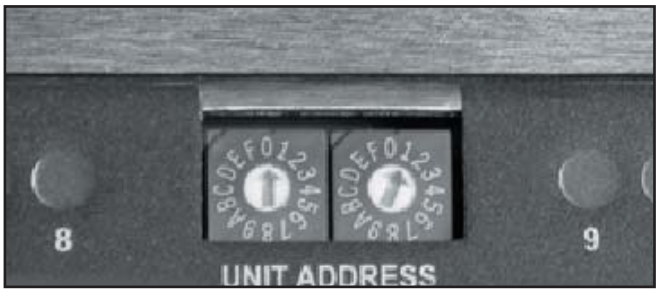


Figure 4.2.1 IQ Multipoint Energy Submeter II Rotary Switches

flathead screwdriver turn one of the dials to the desired position and repeat this step for the second dial. This address will be needed when configuring the device setpoints within PowerPort. The rotary switches shown in the photo above are set to address 01.

When more than one IQ Multipoint Energy Submeter II is connected in a network each unit must have a unique address.

4.4 SEALING PROVISIONS

The IQ Multipoint Energy Submeter II also comes equipped with sealing provisions or lock out functionality.

Located under the front cover of the unit beneath the rotary switches is Jumper J4, see Figure 4.2.2.

Jumper J4 prohibits configuration changes of the IQ Multipoint Energy Submeter II. When Jumper J4 is connected across the two pins (as shown in Figure 4.2.2) the configuration of the unit can be altered via Group 1 setpoints, see Section 5.2.3 Changing Setpoints for details. When this jumper is removed or installed on only one of the two pins, as shown in Figure 4.2.3, the IQ Multipoint Energy Submeter II will not accept configuration changes to the sensor / meter assignments, the sensor phase voltage, sensor orientation assignments or the external CT ratings.

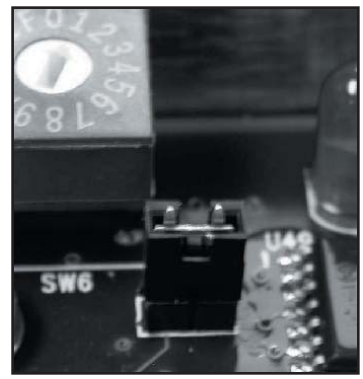


Figure 4.2.2 IQ Multipoint Energy Submeter II Jumper On

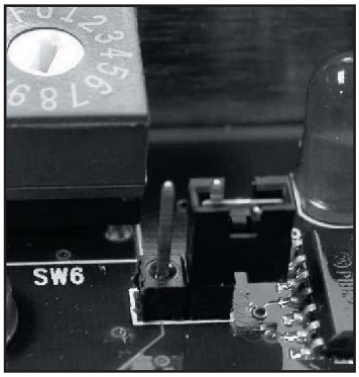


Figure 4.2.3 IQ Multipoint Energy Submeter II Jumper (Off)

The unit is shipped from the factory with Jumper J4 installed, allowing configuration changes. If the customer wishes to disable configuration changes to the settings in Group 1 this jumper should be moved, as shown in Figure 4.2.3, and the case of the unit sealed closed with a standard utility meter seal as shown in Figure 4.2.4.

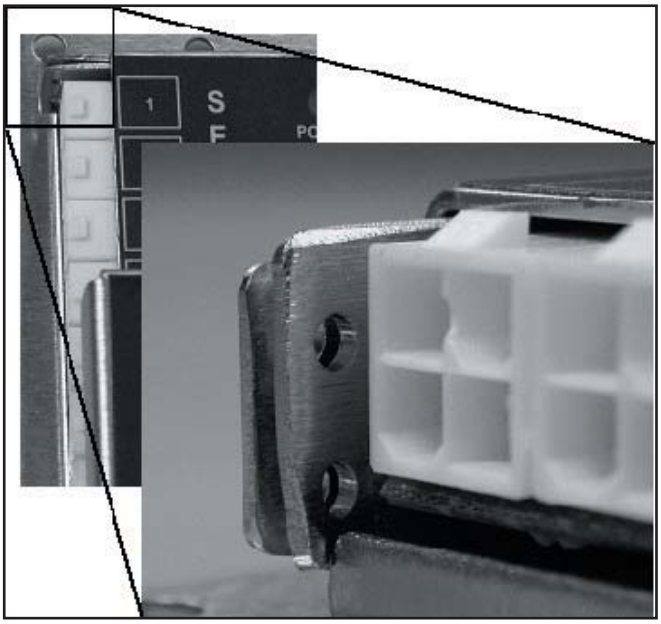


Figure 4.2.4 IQ Multipoint Energy Submeter II Meter Seal Location

SECTION 5: CONFIGURING INTO METER POINTS

5.1 CONFIGURATION BASICS

The IQ Multipoint Energy Submeter II monitors line voltages connected through its voltage input terminal block. Based upon the configuration that is provided, it internally combines these voltages with the currents sensed by the selected Current Sensor inputs. The IQ Multipoint Energy Submeter II determines their phase relationships and measures power. Each power measurement is stored and the energy for that point is accumulated and stored as an individual Meter Point.

You can think of a Meter Point as just a single meter that measures power for one electrical circuit. The IQ Multipoint Energy Submeter II houses up to sixteen meters (meter points) simultaneously. Depending on the metering application, a meter point can include information from up to three voltage inputs and up to three Current Sensors.

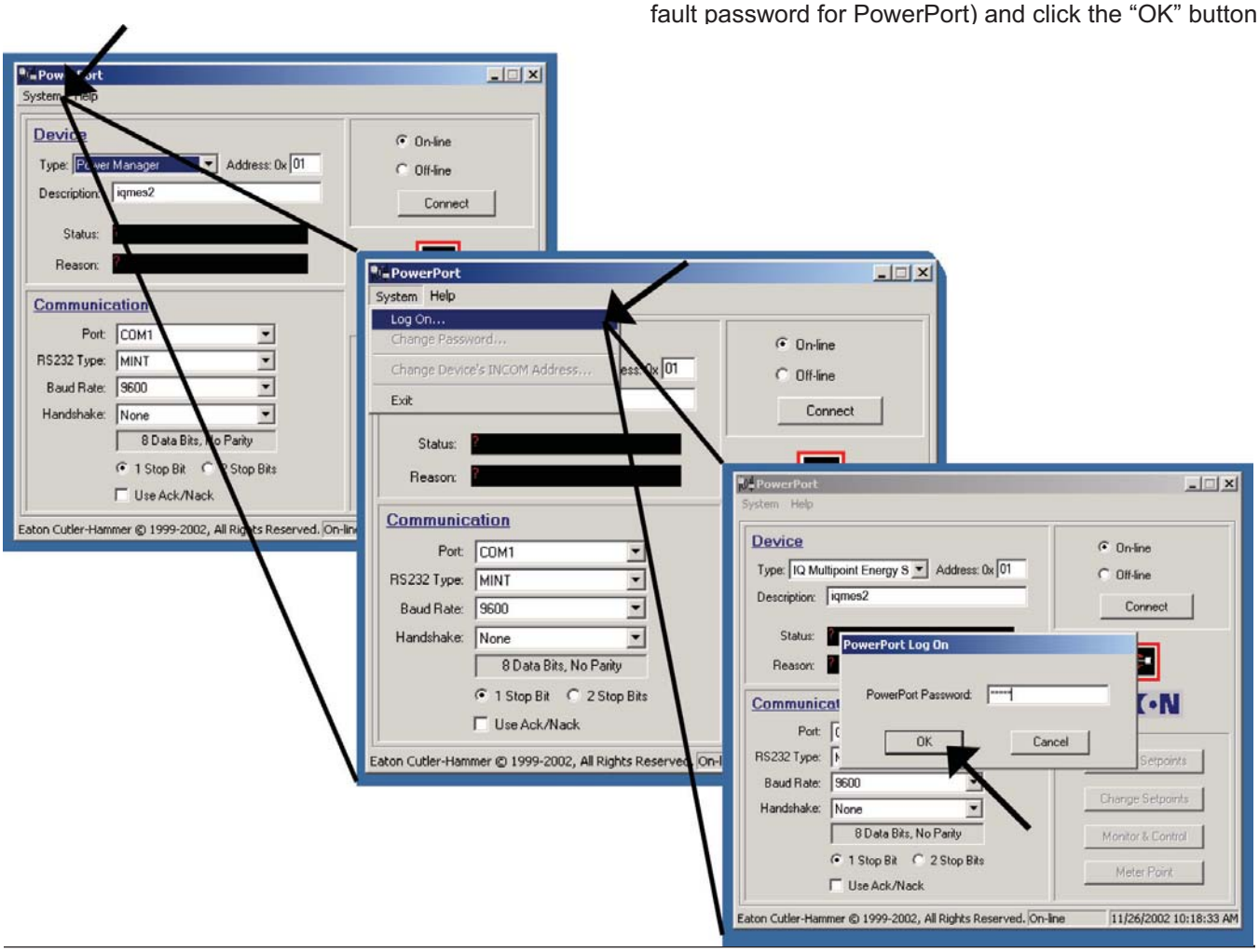
5.2 USING POWERPORT TO CONFIGURE THE IQ MULTIPOINT ENERGY SUBMETER II

Configuring the IQ Multipoint Energy Submeter II should only be attempted by a qualified individual who has completely read through this manual and thoroughly understands the INCOM™ protocol and the features of the IQ Multipoint Energy Submeter II. For this reason, the options for configuring the device are password protected and can only be accessed by a user that has password access to PowerPort.

5.2.1 Setting Up PowerPort

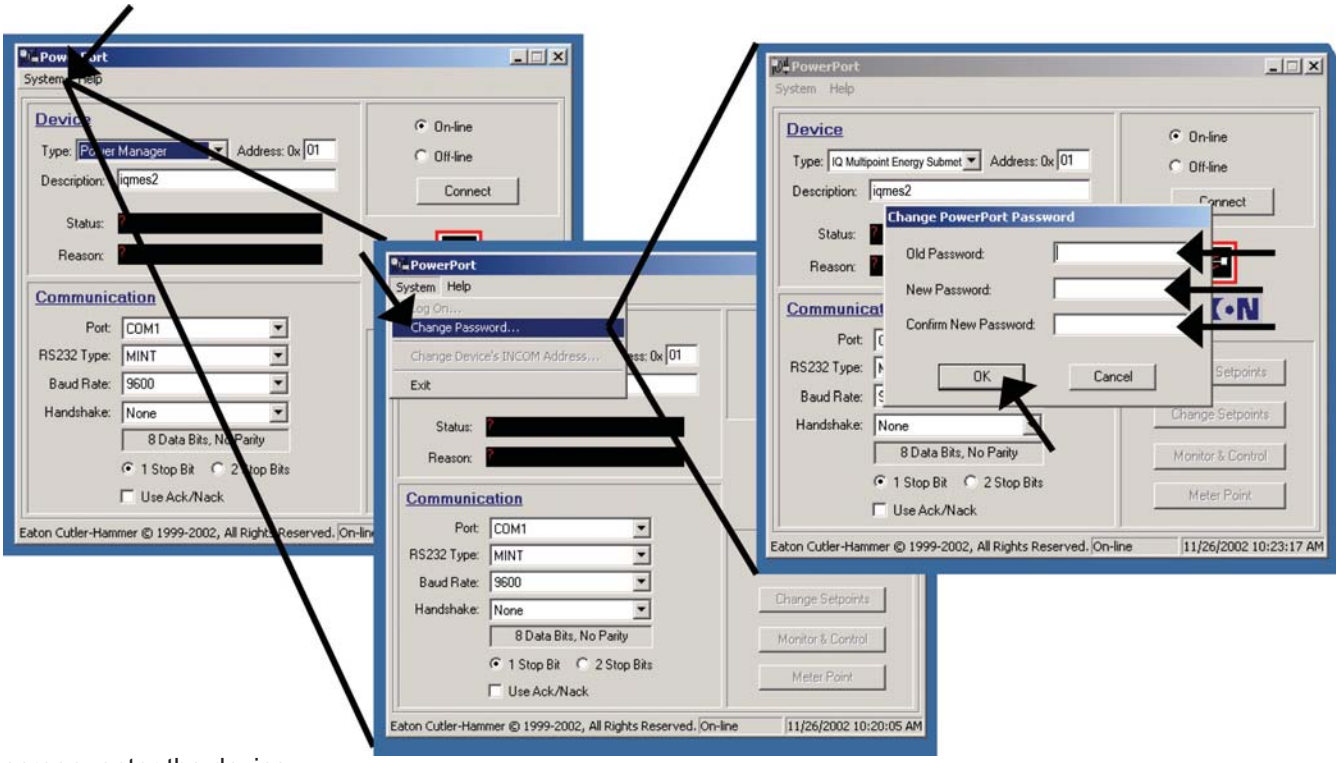
As discussed earlier, PowerPort is a utility software package designed to communicate with one device at a time through a direct connection.

Once PowerPort is downloaded (see section 2.5.1 for additional information on downloading PowerPort) log on to the PowerPort software by clicking “System” from the screen menu and select “Log On” from the pull-down menu. The user will be prompted to enter a password. Type in the word ADMIN (which is the default password for PowerPort) and click the “OK” button



Once you enter the default password you must establish a distinct password for yourself. Click on “System” from the screen menu and select “Change Password” from the pull-down menu.

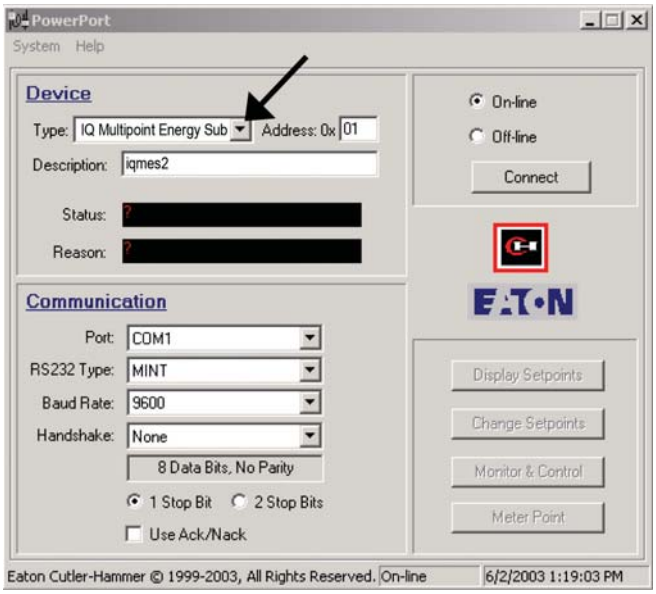
Enter the old password (ADMIN) and press the Tab key. Enter a new password and press the Tab key. Re-enter your password in the “Confirm New Password” box and click the “OK” button (see below).

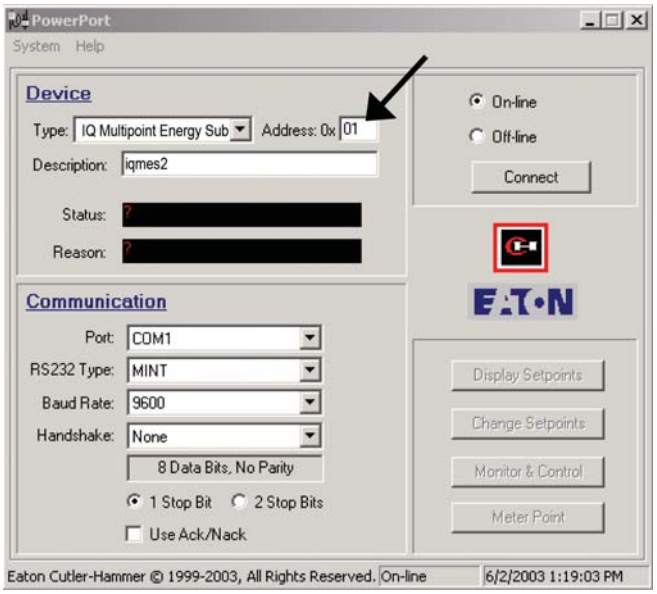


screen, enter the device “Type”, “Address” and “Description”.

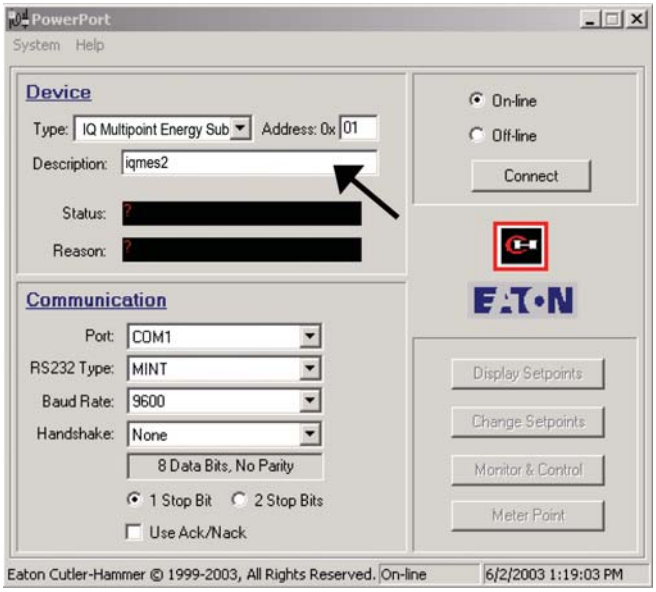
Click on the drop down arrow next to “Type” and select “IQ Multipoint Energy Submeter II” (see below).

Enter the hexadecimal address previously set with the two rotary switches on the unit in the “Address” box (see below).

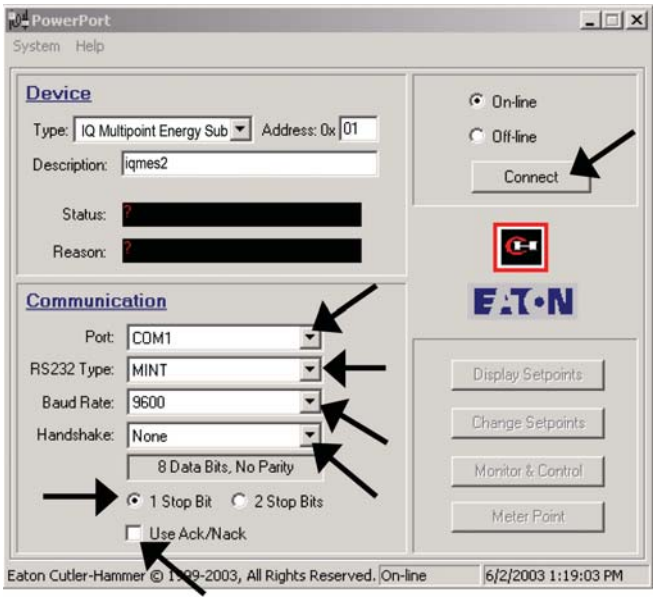




Type a description for the device in the “Description” box (see below).



In the “Communication” section of the PowerPort main screen, enter the “Port”, “RS232 Type”, “Baud Rate” and the “Handshake” information by clicking on the drop down arrow next to the respective item and selecting your choice (see below).



The “Port” determines the PC COM Port which PowerPort will communicate with the device.

“RS-232” determines the network interface being used to connect the device to PowerPort.

The “Baud Rate” determines the baud rate at which your network interface conducts communication. The IQ Multipoint Energy Submeter II product uses a 9600 Baud Rate.

The “Handshake” determines the handshake signal (if any) used by your PowerPort computer and the network interface to control the flow of their communication.

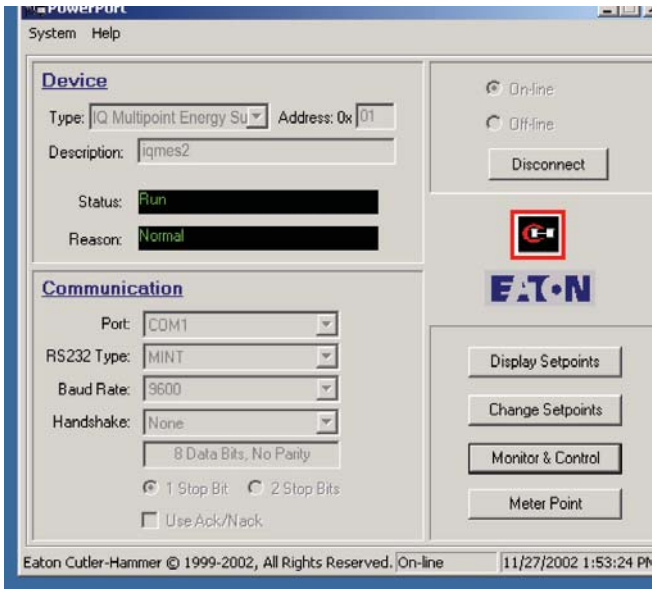
Click the “1 Stop Bit” radio button to designate the stop bits used by the network interface.

When using a MINT to communicate between the IQ Multipoint Energy Submeter II and PowerPort, check the “Ack/Nack” box if you want the MINT to signal it has received data sent to it from PowerPort. The DIP switch settings on the MINT must correspond to the selection made through PowerPort. If you are not using a MINT to communicate between the IQ Multipoint Energy Submeter II and PowerPort, or if you choose to bypass this feature, do NOT check this box.

Click the “Connect” button.

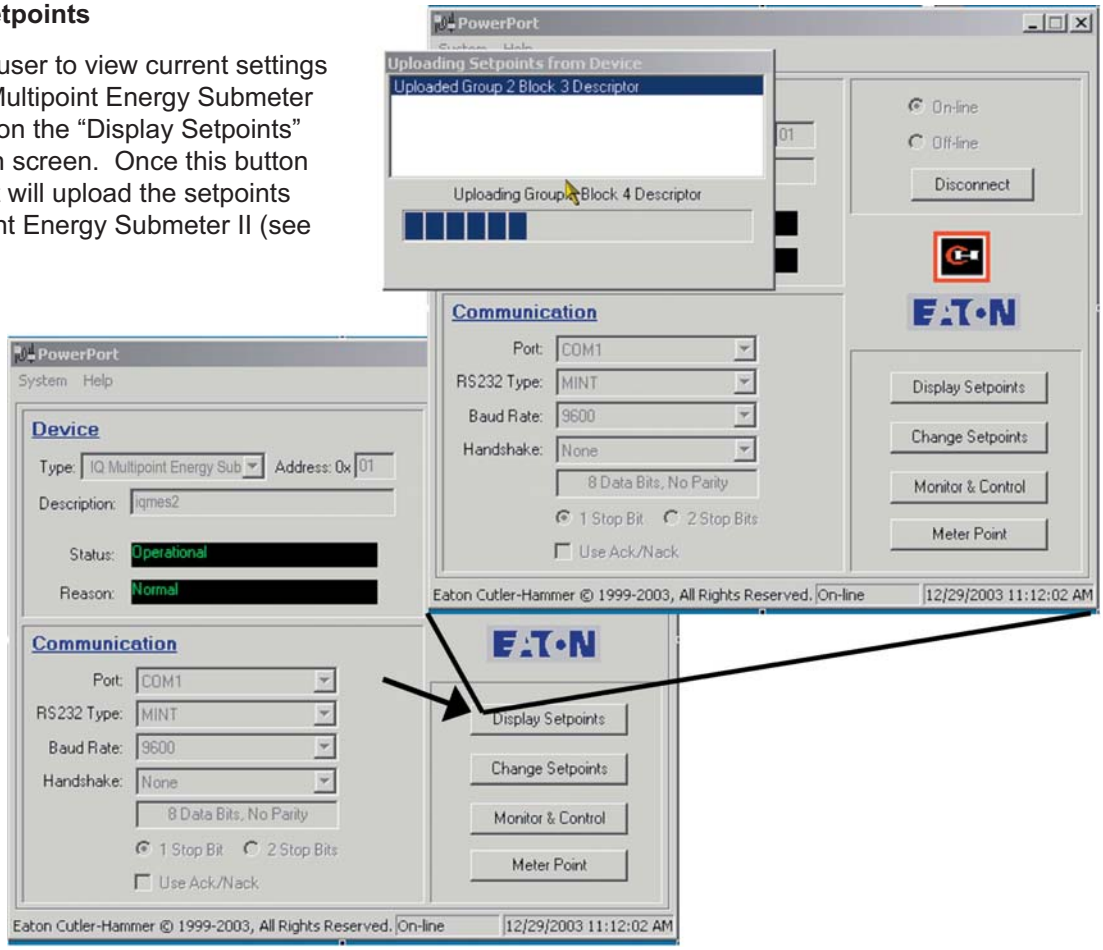
PowerPort is now connected only to the IQ Multipoint Energy Submeter II at the INCOM™ address designated. Even if there are other devices on the INCOM™ network, they will be ignored.

NOTE: The status field indicates “Run”, the reason field says “Normal” and the “Device” and “Communication” selections are gray. The selections on the right side of the screen are now active (see below).



5.2.2 Displaying Setpoints

PowerPort allows a user to view current settings assigned to the IQ Multipoint Energy Submeter II by simply clicking on the “Display Setpoints” button from the main screen. Once this button is clicked PowerPort will upload the setpoints from the IQ Multipoint Energy Submeter II (see below and right).

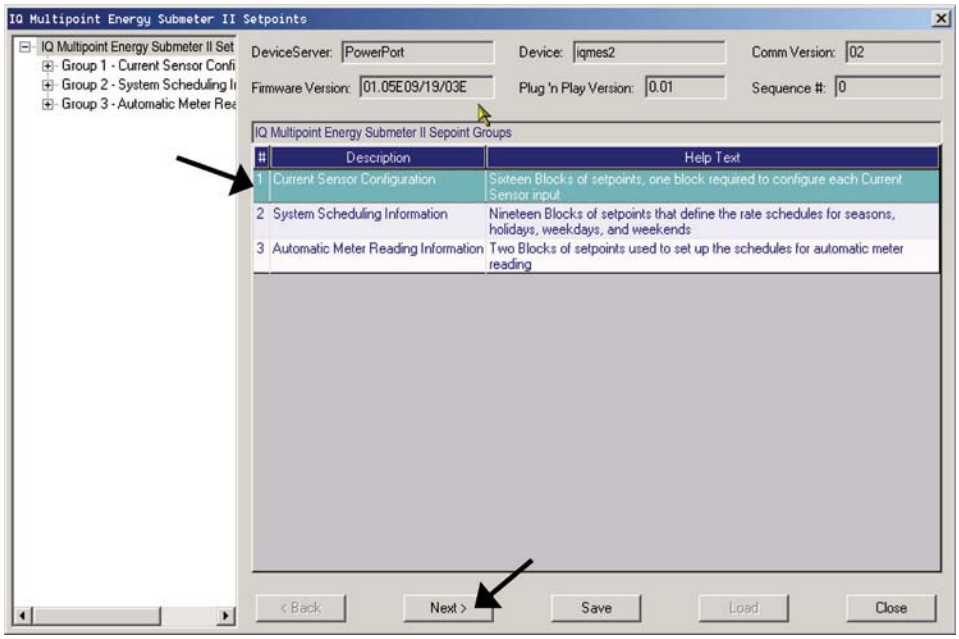


A new screen will be displayed showing the type of setpoints you can view, “Current Sensor Configuration”, “System Scheduling Information” or “Automatic Meter Reading Information”.

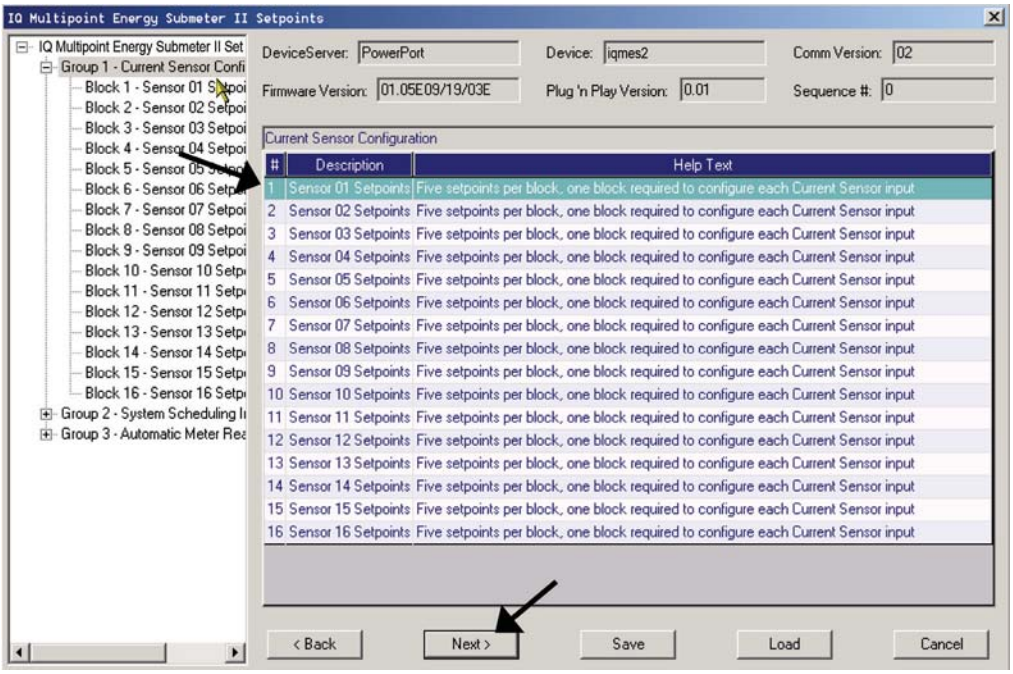
5.2.2.1 Display Current Sensor Setpoints - Group 1

Group 1 contains the sensor configuration setpoints. There are 16 blocks within Group 1 setpoints, one block for each corresponding sensor. Each sensor has five setpoints.

Highlight “Current Sensor Configuration” and click the “Next” button (see right).



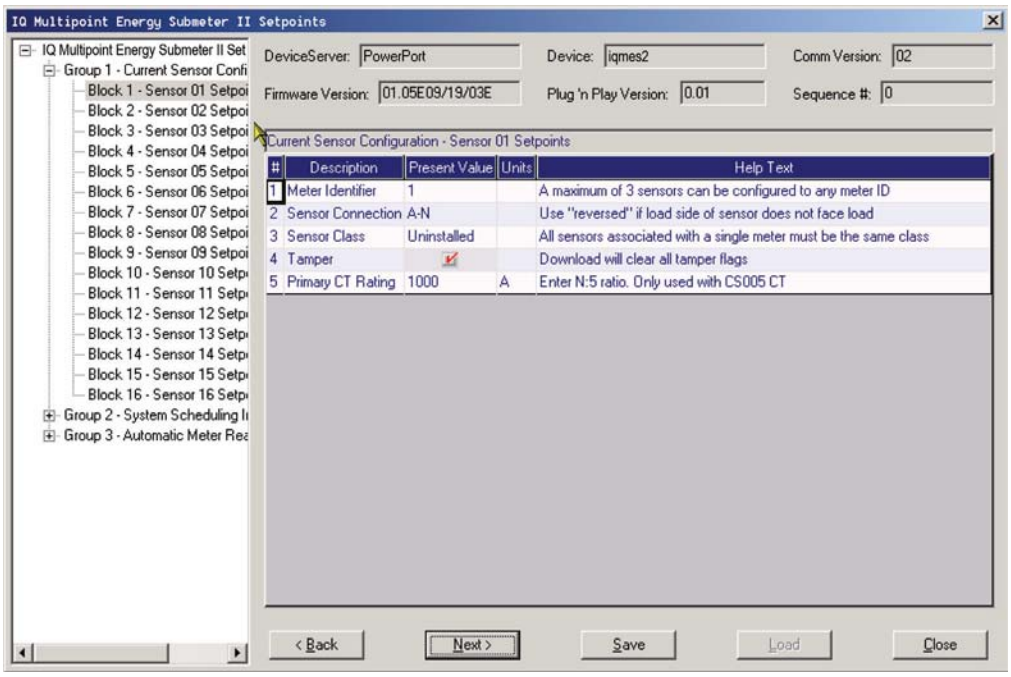
After the sensor information is uploaded a new screen will appear listing all the sensors. Highlight the sensor row you want to view and click “Next”. The screen shown to the right is an example of highlighting “Sensor 01 Setpoints”.



Once the “Next” button is clicked a new screen will appear showing the current values assigned to this sensor (see right).

See 5.2.3 Changing Setpoints for details on the meanings of each “Present Value” setting and how to change their current value.

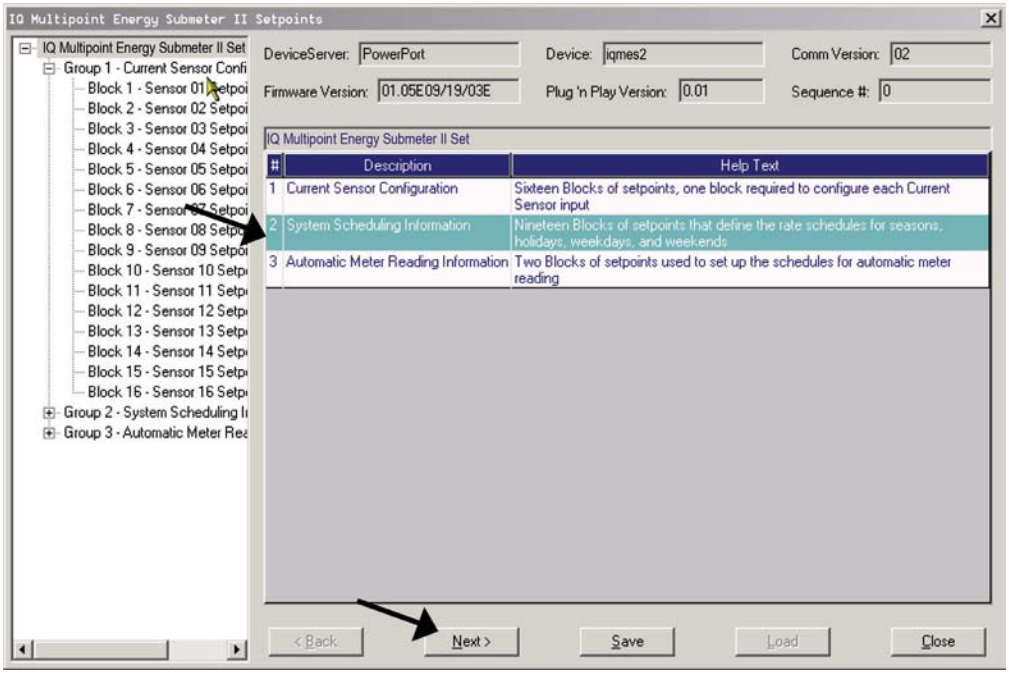
Click “Next” or follow the above steps to view each sensor’s settings.



5.2.2.2 Displaying System Scheduling - Group 2

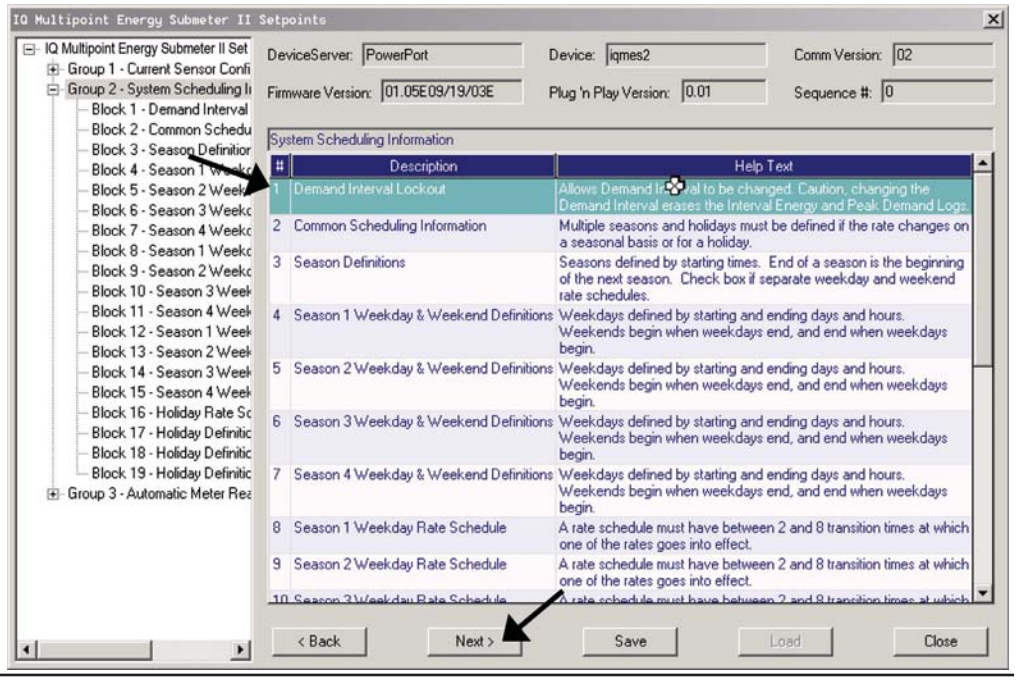
The IQ Multipoint Energy Submeter II allows the user to define how many and the timing of seasons, weekdays, weekends and holidays. The "System Scheduling Information" section of PowerPort defines these schedules. There are 19 blocks within Group 2 setpoints. These setpoints are used to set up the system information for demand, time of use energy and peak demand logging functions.

Highlight "System Scheduling Information" and click the "Next" button (see right).



After the schedule information is uploaded a new screen will appear listing all the setpoint options.

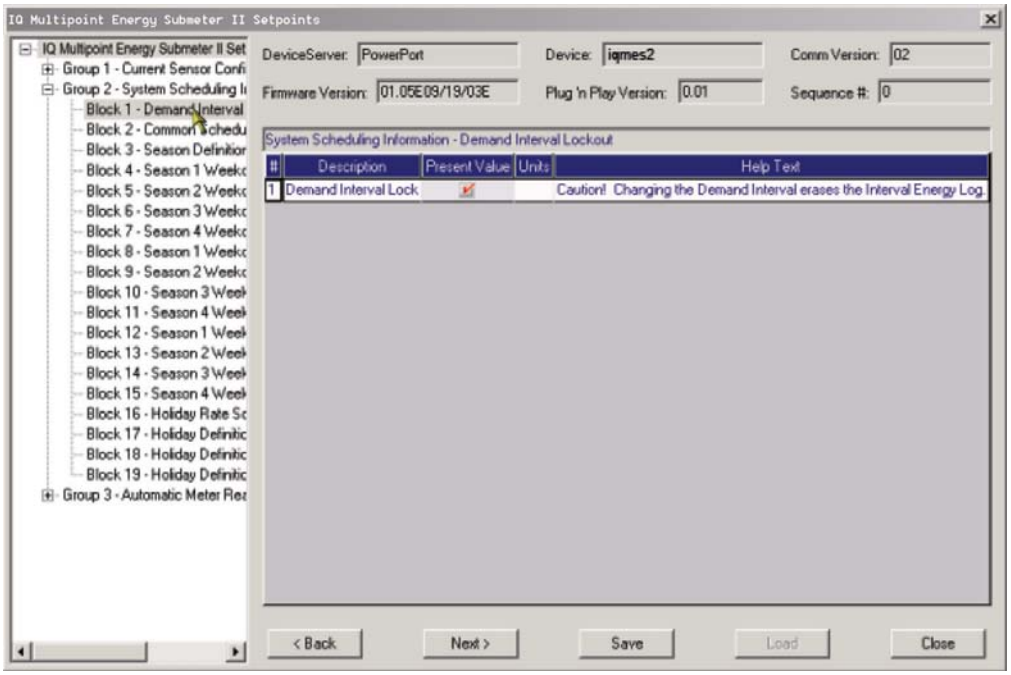
Highlight the row of information you want to view and click the "Next" button. The screen shown to the right is an example of highlighting the "Demand Interval Lock Out" row.



Once the “Next” button is clicked a new screen will appear showing the current values assigned to the row selected. The example to the right is of the demand interval lock out information.

See 5.2.3 Changing Setpoints for details on the meanings of each “Present Value” setting and how to change their current value.

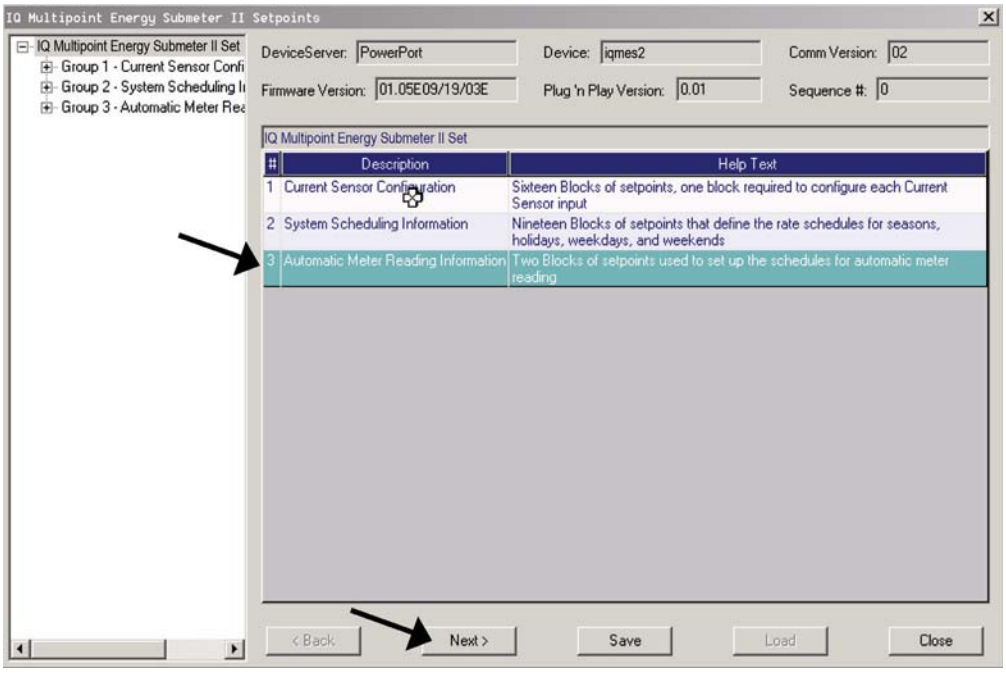
Click “Next” or follow the above steps to view each scheduling information screen.



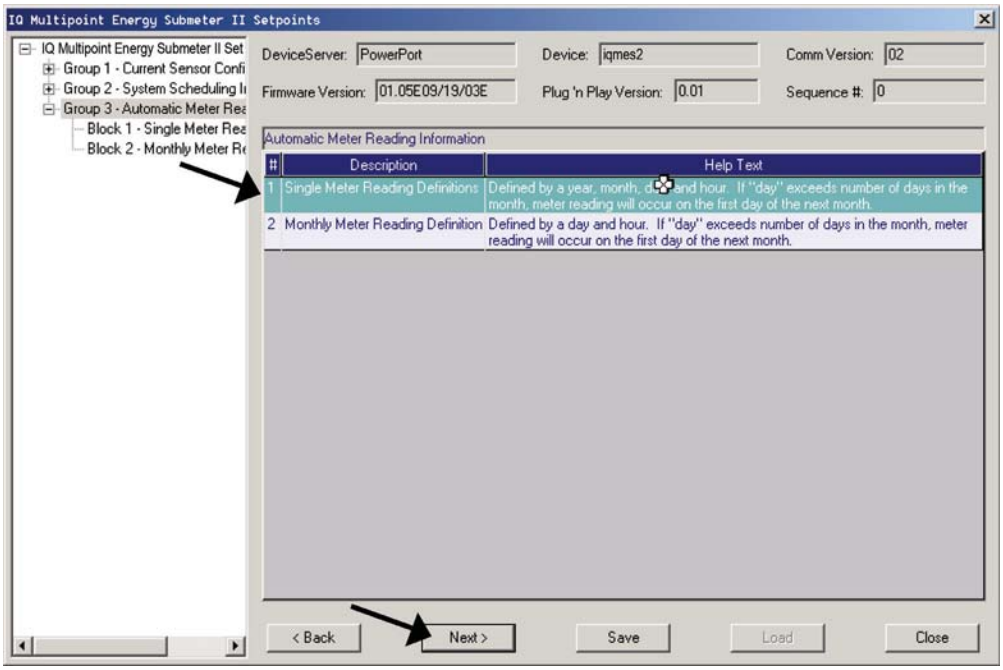
5.2.2.3 Displaying Automatic Meter Reading Information - Group 3

The IQ Multipoint Energy Submeter II also allows the user to set up dates and times for specific reading events. When these reading events occur a snapshot is taken of the time of use energy registers and of the peak demand values with time tags. A log is generated with these entries and the peak demand values are then reset. Group 3 contains 2 blocks of information.

To view the current dates and times defined for the IQ Multipoint Energy Submeter II highlight “Automatic Meter Reading Information” and click the “Next” button (see right).



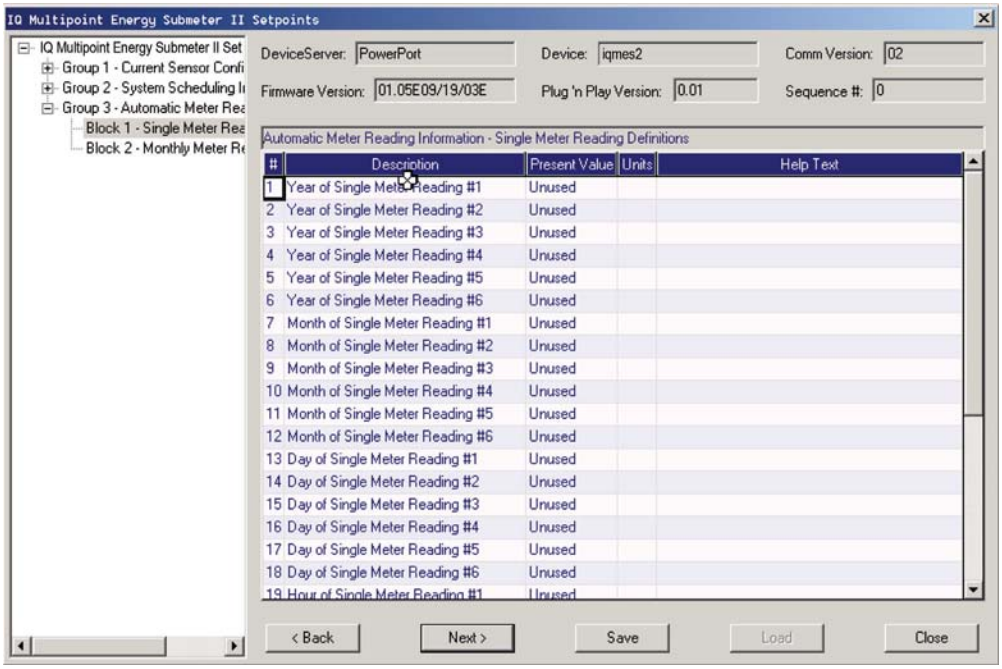
After the information is uploaded a new screen will appear listing single and monthly meter reading setpoints. Highlight the meter reading setpoints you want to view and click “Next” (see right).



Once the “Next” button is clicked a new screen will appear showing the current values assigned to the setpoint (see right).

See 5.2.3 Changing Setpoints for details on the meanings of each “Present Value” setting and how to change their current value.

Click “Next” or follow the above steps to view each setpoint setting.

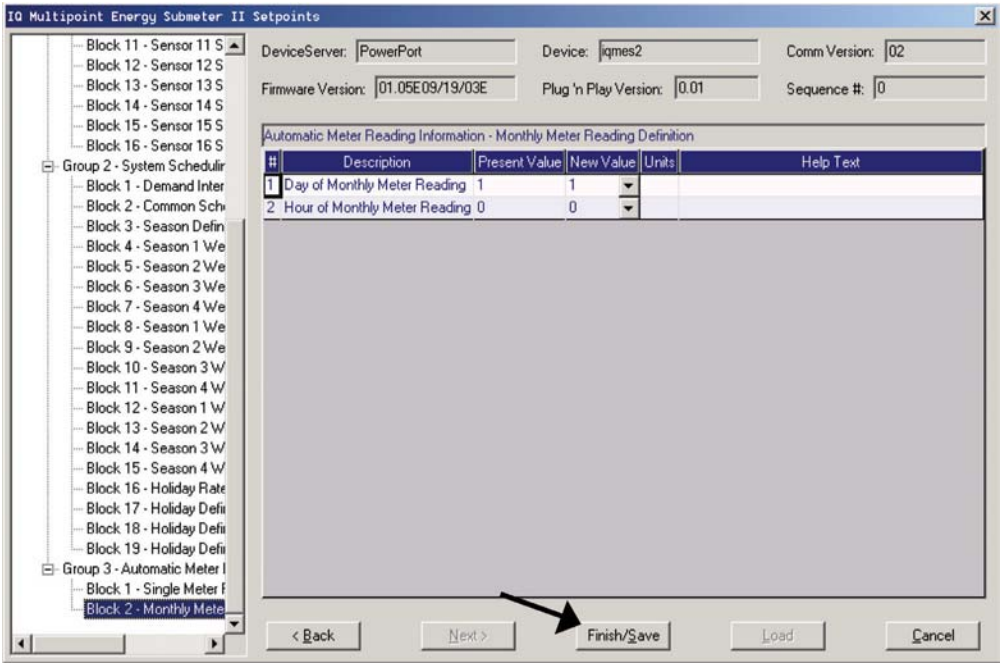


5.2.2.4 Saving Displayed Setpoints

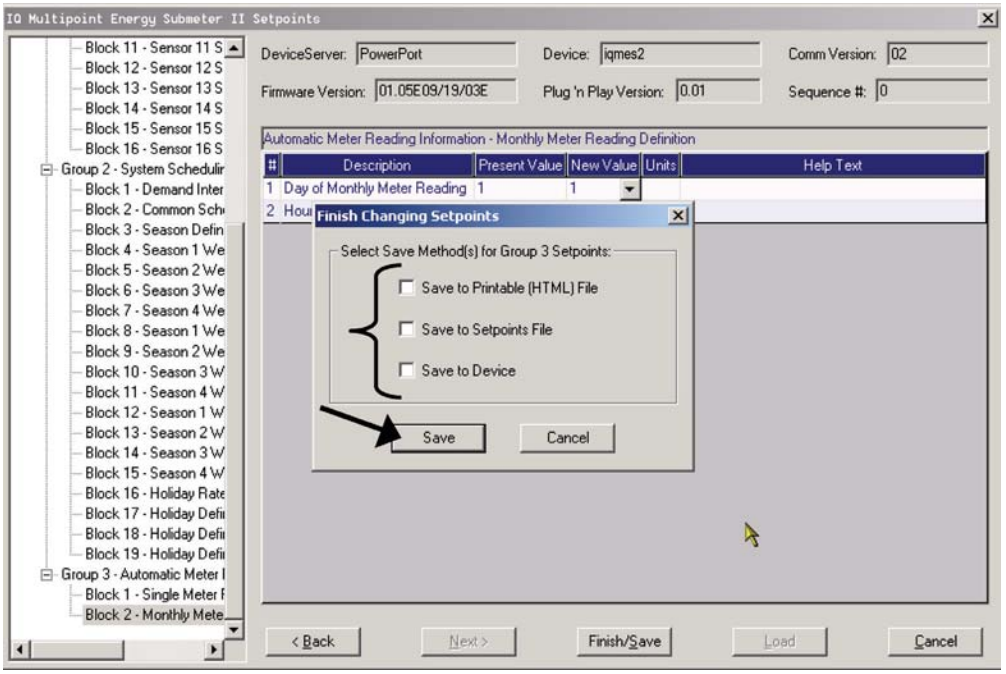
Along with viewing the current values of each sensor, the schedule information and the automatic meter reading information, PowerPort gives the user the option of saving the information to a file, an HTML file or the device.

If you are viewing the setpoint information in the “Display Setpoints” section of PowerPort click on the “Save” button located at the bottom of the screen.

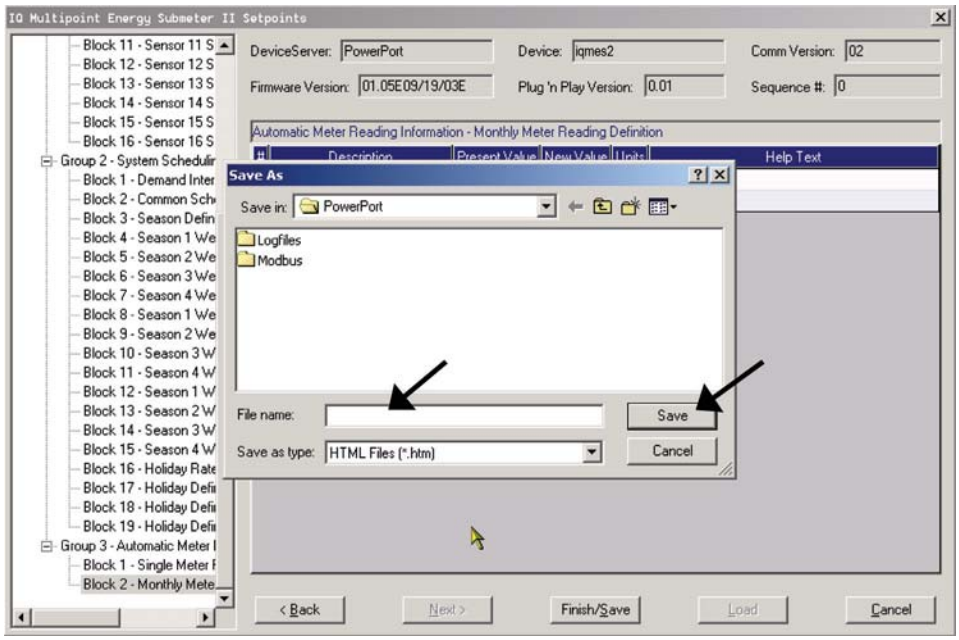
If you are changing the setpoint information in the “Change Setpoints” section of PowerPort click the “Finish/Save” button located at the bottom of the screen (the screen to the right is an example of the “Monthly Meter Reading Information” screen under the “Change Setpoints” option).



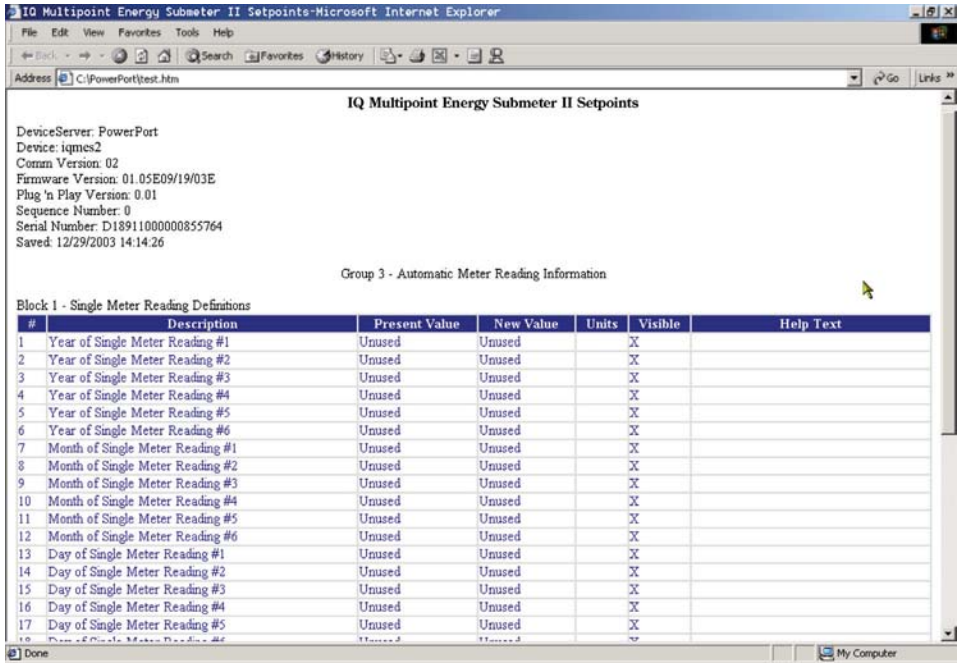
Select the save method you would like to use by checking the appropriate box next to your selection and clicking the “Save” button (see right).



A pop up screen will appear, select the location the file should be saved to, type in the file name in the “File name” box and click the “Save” button. The example shown to the right is saving the file as an HTML.



The HTML file created will look similar to the one shown to the right.



IQ Multipoint Energy Submeter II Setpoints-Microsoft Internet Explorer

IQ Multipoint Energy Submeter II Setpoints

DeviceServer: PowerPort
Device: iqmes2
Comm Version: 02
Firmware Version: 01.05E09/19/03E
Plug 'n Play Version: 0.01
Sequence Number: 0
Serial Number: D18911000000855764
Saved: 12/29/2003 14:14:26

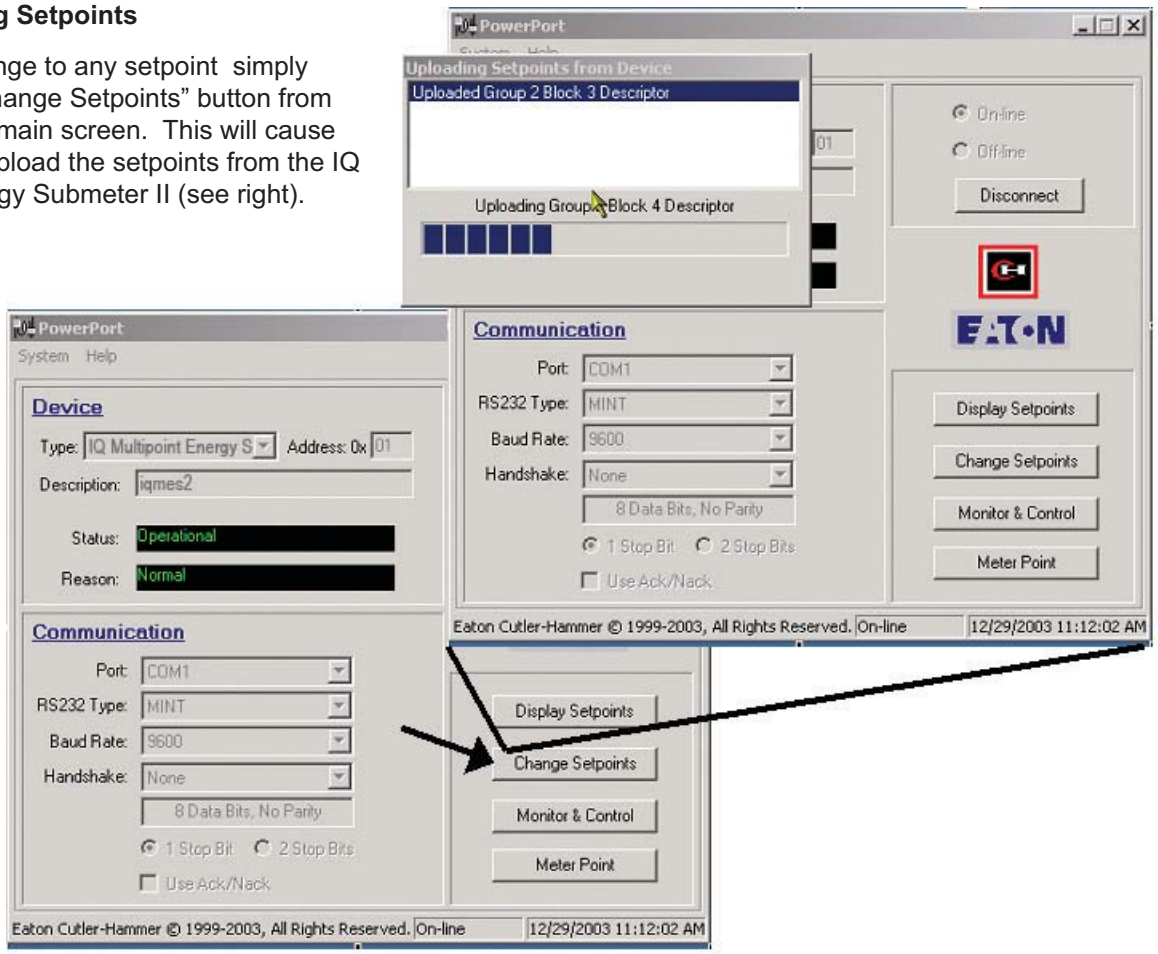
Group 3 - Automatic Meter Reading Information

Block 1 - Single Meter Reading Definitions

#	Description	Present Value	New Value	Units	Visible	Help Text
1	Year of Single Meter Reading #1	Unused	Unused		X	
2	Year of Single Meter Reading #2	Unused	Unused		X	
3	Year of Single Meter Reading #3	Unused	Unused		X	
4	Year of Single Meter Reading #4	Unused	Unused		X	
5	Year of Single Meter Reading #5	Unused	Unused		X	
6	Year of Single Meter Reading #6	Unused	Unused		X	
7	Month of Single Meter Reading #1	Unused	Unused		X	
8	Month of Single Meter Reading #2	Unused	Unused		X	
9	Month of Single Meter Reading #3	Unused	Unused		X	
10	Month of Single Meter Reading #4	Unused	Unused		X	
11	Month of Single Meter Reading #5	Unused	Unused		X	
12	Month of Single Meter Reading #6	Unused	Unused		X	
13	Day of Single Meter Reading #1	Unused	Unused		X	
14	Day of Single Meter Reading #2	Unused	Unused		X	
15	Day of Single Meter Reading #3	Unused	Unused		X	
16	Day of Single Meter Reading #4	Unused	Unused		X	
17	Day of Single Meter Reading #5	Unused	Unused		X	

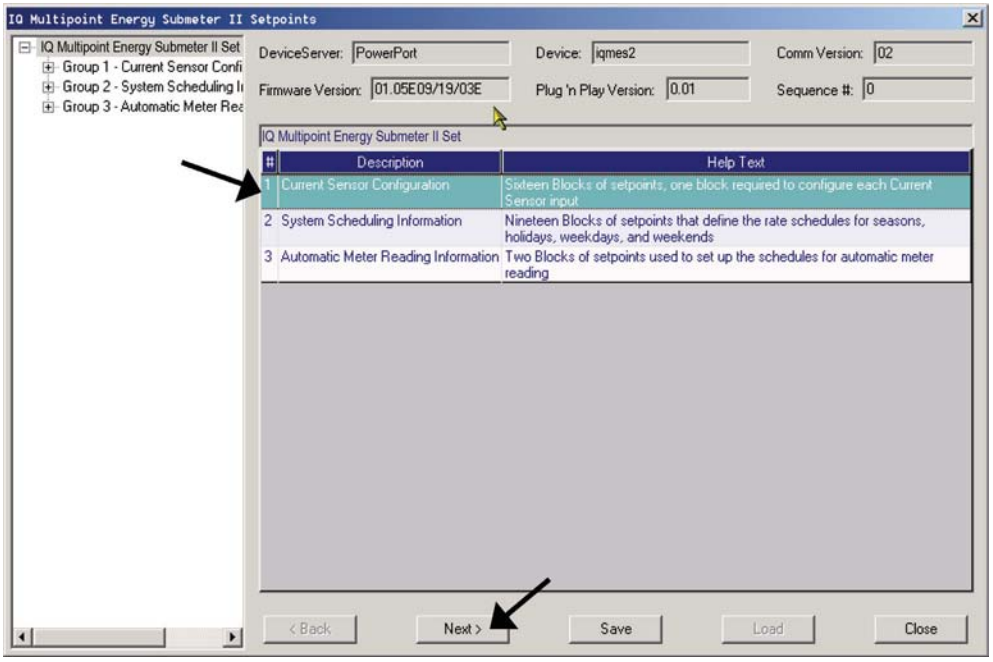
5.2.3 Changing Setpoints

To make a change to any setpoint simply click on the “Change Setpoints” button from the PowerPort main screen. This will cause PowerPort to upload the setpoints from the IQ Multipoint Energy Submeter II (see right).

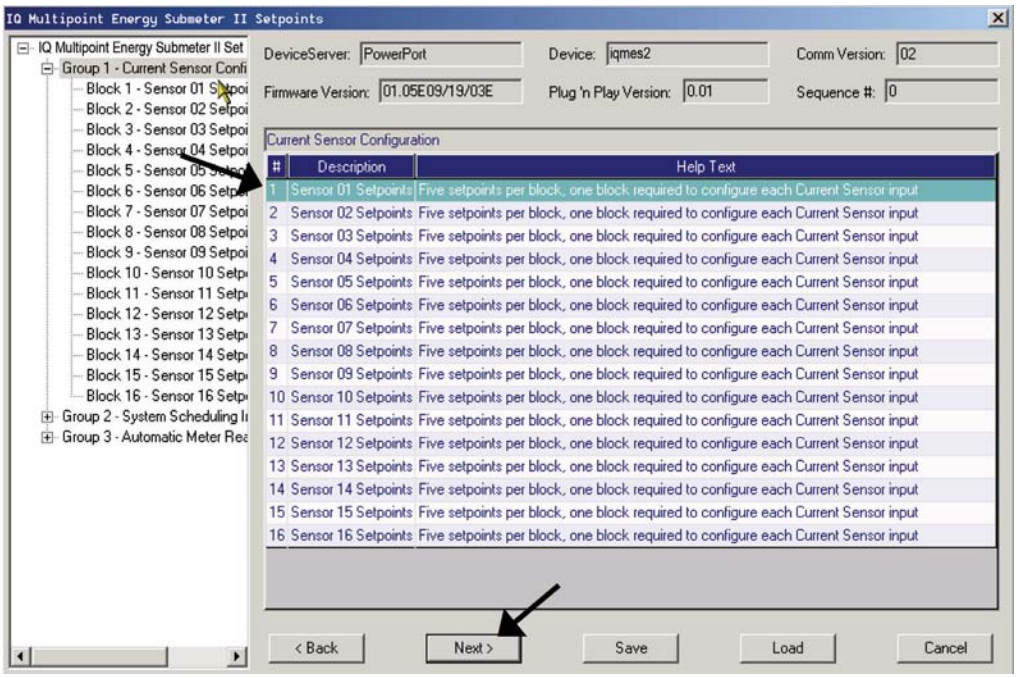


5.2.3.1 Changing Current Sensor Configuration - Group 1

Once the setpoints are uploaded a new screen will be displayed. Highlight “Current Sensor Configuration” and click “Next” (see right).



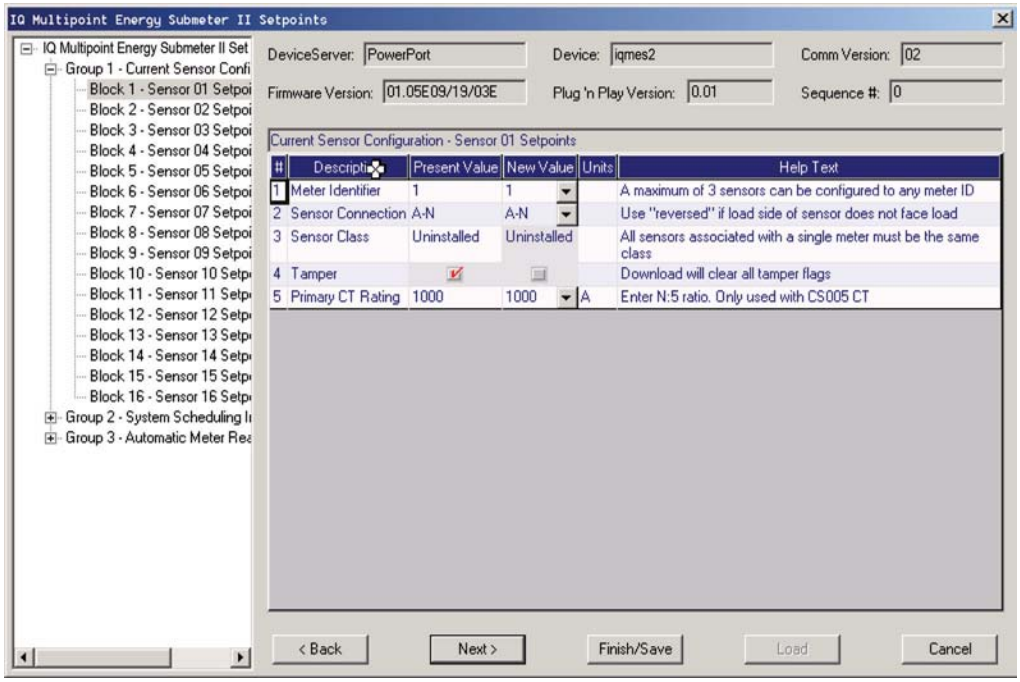
A new screen will appear listing all the sensors. Highlight the sensor row you want to make changes to and click “Next”. The screen shown to the right is an example of highlighting “Sensor 01 Setpoints”.



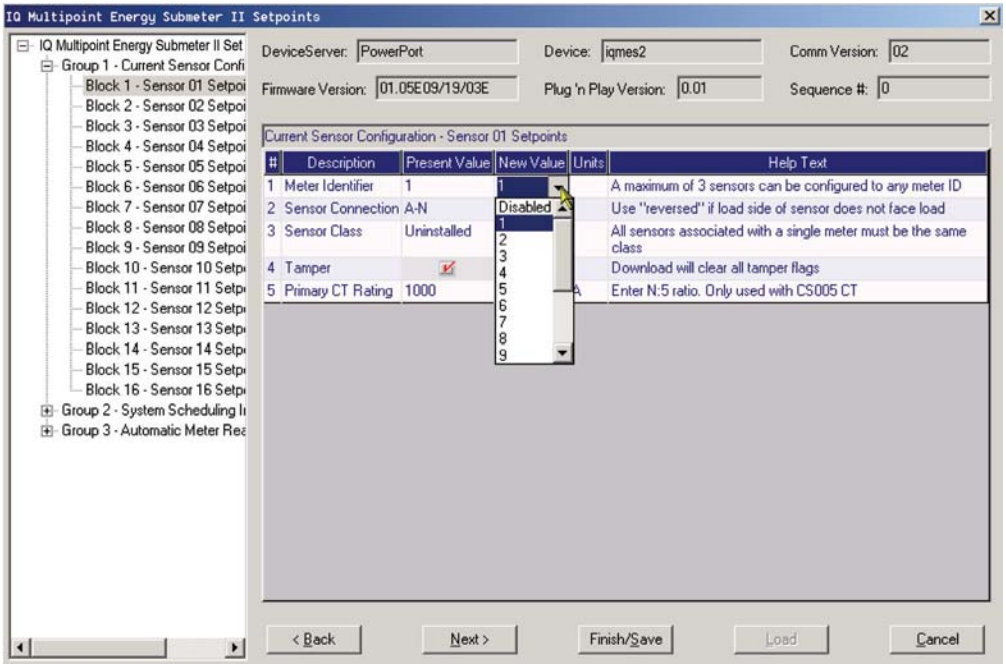
A screen will appear showing the current settings assigned to this sensor (see right).

At this point you can change the “Meter Identifier”, the “Sensor Connection” and the “Primary CT Ratio”.

NOTE: The example provided is of Sensor 1, however, regardless of which Sensor Setpoint you selected earlier, the screen will have the same options to select from.



With your cursor in the "New Value" column click on the item you want to change. A drop down box will appear with the options to choose from. Highlight and click on the value you want to change the item to. To the right is an example of clicking on the "Meter Identifier" setting.



The "Meter Identifier" identifies which meter the load should be applied to depending on the wiring configuration you established for your IQ Multipoint Energy Submeter II. There are seventeen choices to choose from, 1 through 16 and disable. Once a meter identifier has been assigned to three sensors it will not be available for further use. This function prevents the user from accidently assigning more than three current sensors to one meter.

The "Sensor Connection" identifies the voltage inputs, L1 = A, L2 = B, L3 = C and NEUT = N. For additional information see section 5.2.4 Specific Configurations.

The "Sensor Class" is not a user changeable field. PowerPort recognizes the current sensor plugged into each sensor on the IQ Multipoint Energy Submeter II. Each sensor associated with a single meter must be the same class. For additional information see section 5.2.4 Specific Configurations.

The "Tamper" field is read-only. This flag is set anytime a current sensor is unplugged. This flag will be cleared after a download is completed.

The "Primary CT Ratio" drop down allows the user to tell PowerPort what the CT ratio is for that specific current sensor if an external current transformer is in use. In other words, if a 5 A current sensor is being used as a secondary transformer, the primary transformer's ratio must be identified to the IQ Multipoint Energy Submeter II; this field allows the user to identify this to the unit. For example, if an application requires 800 A to be measured, a 5 A current sensor is attached as a secondary transformer to a 800/5 A CT. The primary transformers rating must be indicated within the "Primary CT Ratio" field. The user can select any range between 5 to 5000 and disabled. In this example "800" would be selected.

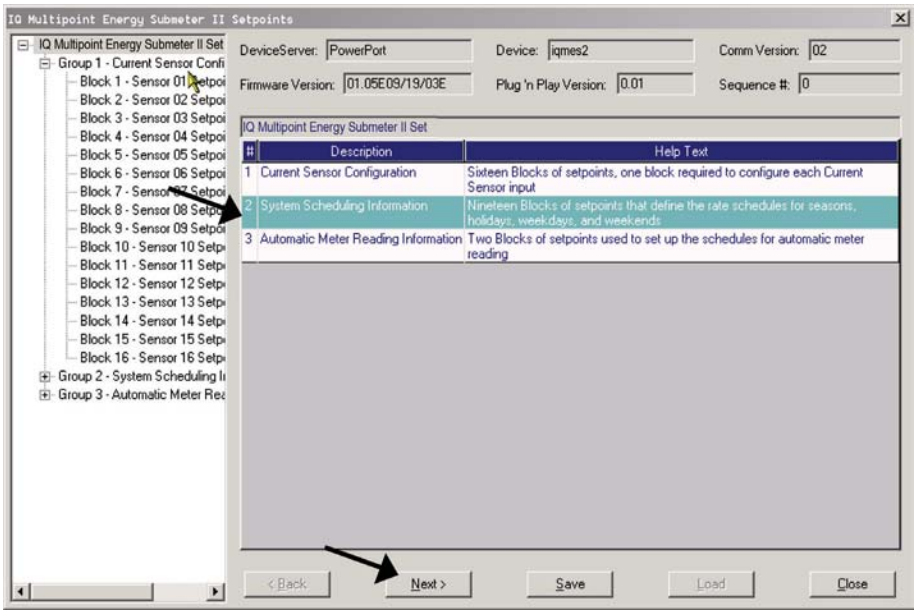
It is a good idea to use the configuration form at the end of this manual (page 6-4) to record your settings.

Once you have made the necessary changes to sensor 1, click the "Next" button at the bottom of the screen to move to sensor 2. Follow these steps to change each of the sensors to your desired configuration.

After you have entered all your changes either click the "Next" button and proceed to enter changes to the System Scheduling - Group 2 or Automatic Meter Reading Information - Group 3 areas or click the "Finish/Save" button at the bottom of the screen to save your setting to a file or the device (see 5.2.2.4 Saving Displayed Setpoints).

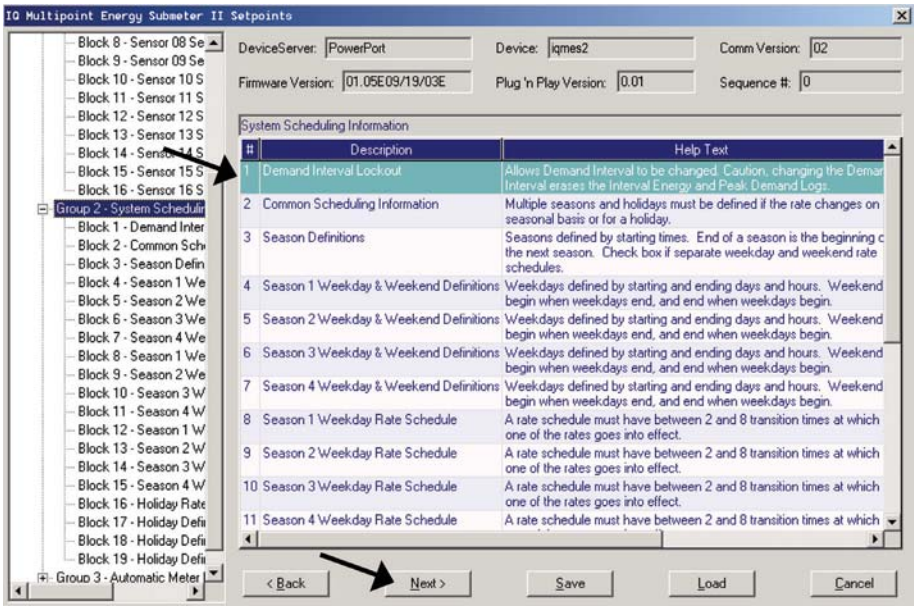
5.2.3.2 Changing System Scheduling Information - Group 2

Once you have selected to change setpoints and the setpoints are uploaded a new screen will be displayed. Highlight “System Scheduling Information” and click “Next” (see right).

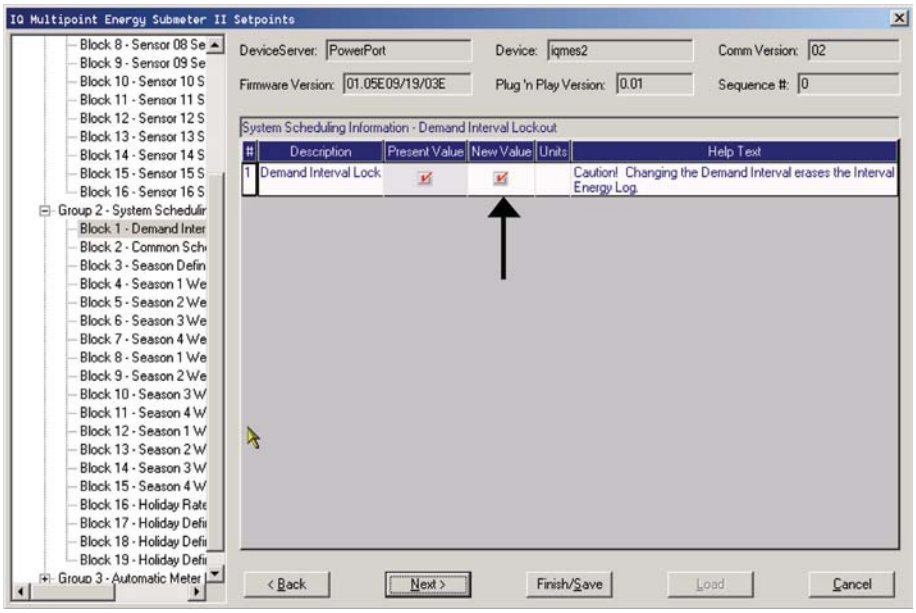


Unlike the “Current Sensor Configuration” area, the scheduling section has several different blocks of information to provide the user. The IQ Multipoint Energy Submeter II has 19 blocks of scheduling information. As mentioned earlier the scheduling information area is used to set up the system information for the demand, time of use energy and peak demand logging functions.

A new screen will appear listing 19 blocks of scheduling information. Select the row of information you would like to change setpoints for by highlighting it and click the “Next” button (see right).

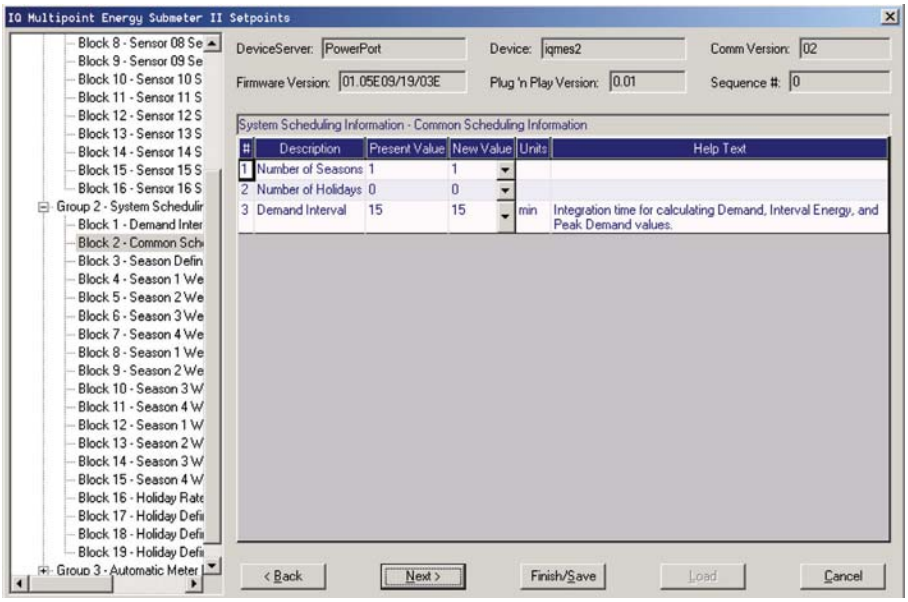


The “System Scheduling Information” screen will appear for the specific row you selected on the previous page, listing it’s present value(s) and an area for a new value(s). This “New Value” column is the area where you make any changes to the existing or present value (see right).



Once you have entered or changed the value(s) click the “Next” button to move to the next block (in this example, pressing next would take the user to the “Common Scheduling Information” screen).

Block 1 - The “Demand Interval Lockout” screen (see right) when checked prevents the user from changing setpoint 3 of block 2 “Reading Time Interval. Changing the “Reading Time Interval” results in a clearing and restarting of the demand and peak demand logs. If a user wants to change the “Reading Time Interval” setpoint they must first UNCHECK the “Demand Interval Lockout” on this screen.

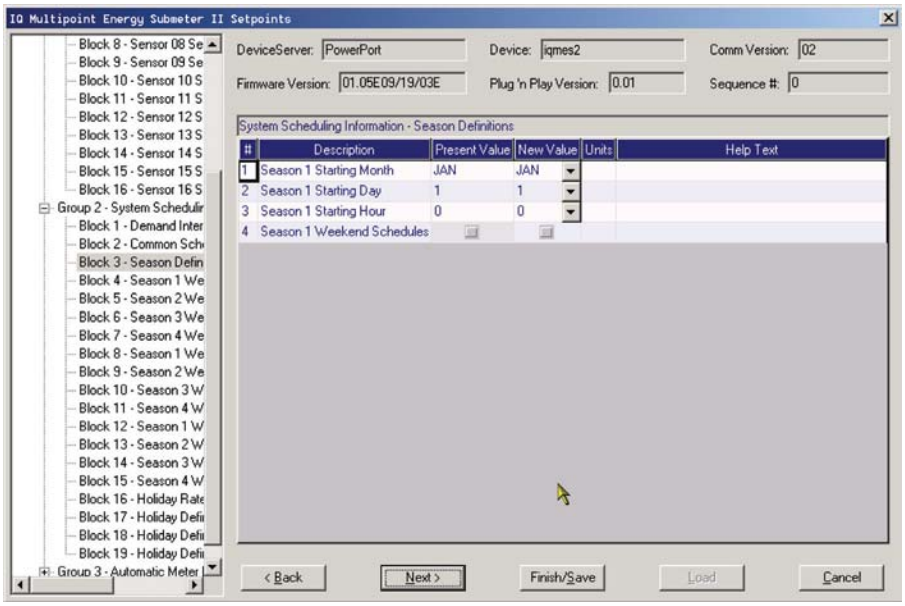


Block 2 - The “Common Scheduling Information” screen (see right) has 3 changeable items, “Number of Seasons”, “Number of Holidays” and “Demand Interval”.

“Number of Seasons” allows the user to select how many seasons (1-4) throughout the year there will be. If the same rate schedule is used throughout the year there is no need for different seasons.

“Number of Holidays” allows the user to select how many holidays (0-18) there will be in a year. Again, if the same rate schedule is used throughout the year regardless of holidays, then there is no need for holidays to be entered.

The “Demand Interval” can only be changed if the “Demand Interval Lockout” in Block 1 is NOT checked. Changing the “Demand Interval” will result in clearing and restarting the demand and peak demand logs. The user can select the integration time for calculating demand, interval energy and peak demand in 5 minute, 10 minute, 15 minute, 20 minute, 30 minute or 60 minute intervals.



Block 3 - The “Season Definitions” screen (see right) has 4 setpoints for each of the four seasons (depending on how many seasons you entered in Group 2 of Block 2 “Common Scheduling Information”; the example to the right is of one season). These setpoints define the starting times and ending times for each season (a season ends when another begins).

The “Starting Month” allows the user to pick the starting month for that particular season (Jan - Dec).

The “Starting Day” allows the user to pick the starting day for that particular season (1-31). Day numbers greater than the last day of the month (a day of 31 for the month of Feb) will be accepted; when this season is checked, a day greater than the last day of the month is equivalent to a day of 1 in the following month.

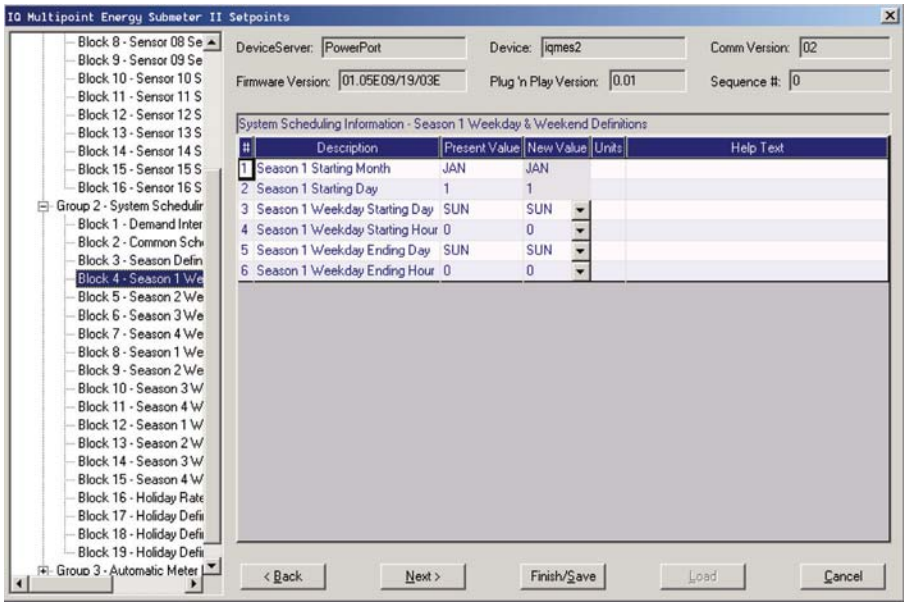
The “Starting Hour” allows the user to pick the starting hour for that particular season (0-23).

The check box for the “Weekend Schedules” allows the user to distinguish between weekdays and weekends. If this item is NOT checked there will NOT be a difference in rates between weekdays and weekends.

Blocks 4 through 7 - The “Weekday & Weekend Definitions” (the example screen to the right is block 4) screens allow the user to define the starting times and ending times (a weekday ends when a weekend begins) for weekdays and weekends of each season selected.

The visibility of items on this screen is dependent on the corresponding “Weekday/Weekend Rate Schedule” check box (Block 3 of Group 2) and the “Number of Seasons” entered (Block 2 of Group 2).

The “Weekday (or Weekend) Starting Day” allows the user to select the starting day of the week for that specific season, month and day listed (Sun - Sat).

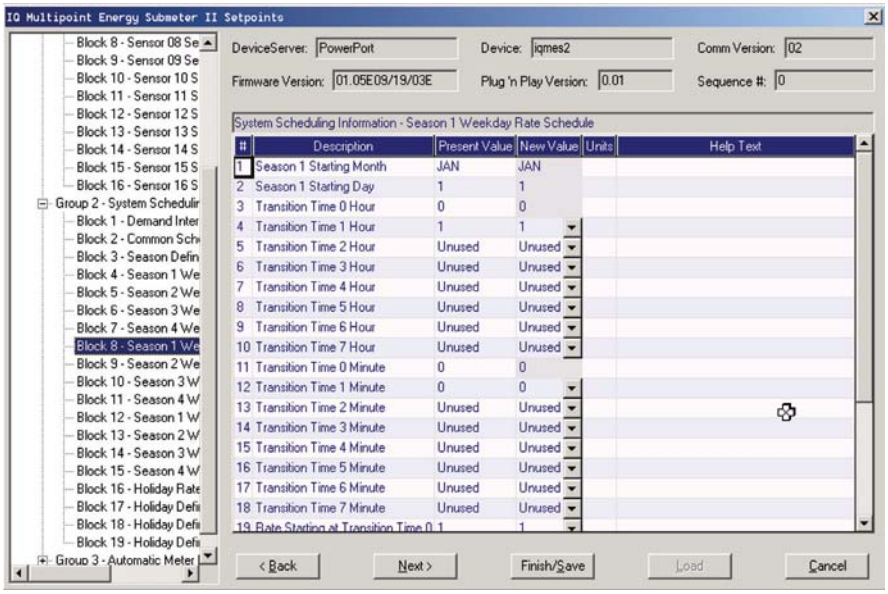


The “Weekday (or Weekend) Starting Hour” allows the user to select the starting hour for that specific season, month and day listed (0-23).

The “Weekday (or Weekend) Ending Day” allows the user to select the ending day of the week for that specific season, month and day listed (Sun - Sat).

The “Weekday (or Weekend) Ending Hour” allows the user to select the ending hour for that specific season, month and day listed (0-23).

Blocks 8 through 11 - The "Weekday Rate Schedule" screen (see right) allows the user to define the rate schedules for energy usage for each season's weekday, if the season exists. Each block (8, 9, 10 and 11) has 24 setpoints each, 8 transition hours, 8 transition minutes and 8 rates. These transition hours and transition minutes define the starting time at which the corresponding rate goes into effect.



The visibility of items on these screens is dependent on the "Number of Seasons" entered (Block 2 of Group 2) and if it's corresponding season exists and there are separate rate schedules defined for weekdays and weekends. For example Block 4 setpoints are visible if setpoint 4 of Block 3 is True, the separate "Weekday/Weekend Rate Schedule" check box for season 1 is checked.

The user can select 1 through 23 for "Transition Hour 1", and select Unused or 1 through 23 for "Transition Hours" 2 through 7.

The user can select 0, 15, 30 or 45 for "Transition Time 1", and select Unused or 0, 15, 30 or 45 for "Transition Times" 2 through 7.

The "Rate Starting at Transition Time" allows the user to define the rate assigned to each interval. The user can select 1-4 for Transition Time 0 and 1 (rows 19 and 20) and select Unused, 1 through 4 for Transition Time 2 through 7 (rows 21-26).

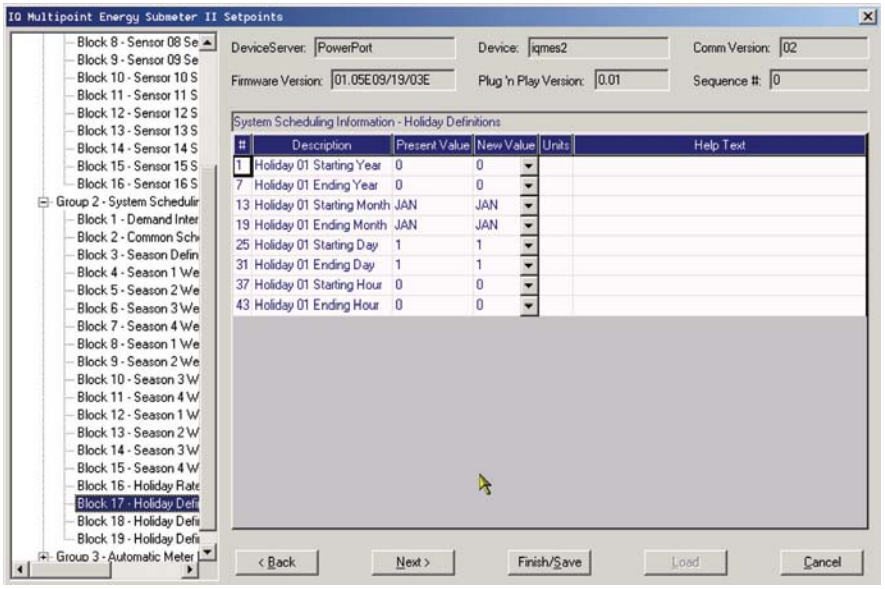
Block 16 - The "Holiday Rate Schedule" screen allows the user to define the rate schedule for energy usage for any holiday, if a holiday exists.

Once again, similar to the "Weekday /Weekend Rate Schedules", there are 24 setpoints; 8 transition hours, 8 transition minutes and 8 rates. These transition hours and transition minutes define the starting time at which the corresponding rate goes into effect.

The screen and the item options available are exactly the same as Blocks 8 through 15; however, Block 16 is regarding HOLIDAYS opposed to weekdays or weekends. See the above descriptions for details on each item listed on the screen.

Blocks 12 through 15 - The "Weekend Rate Schedule" screen allows the user to define the rate schedules for energy usage for each season's weekend, if the season exists and its associated "Weekday/Weekend Rate Schedule" check box is checked.

The screens and the item options are exactly the same as Blocks 8 through 11, however, Blocks 12 through 15 are regarding weekENDS opposed to weekDAYS. See the above descriptions for details on each item listed on the screen.



The visibility of items on this screen is dependent on the “Number of Holidays” entered (Block 2 of Group 2).

Blocks 17 through 19 - The “Holiday Definitions” screens (see bottom of previous page) allow the user to define a holiday by specifying its start dates, end dates and time (year, month, day and hour). Block 17 handles holidays 1 through 6, Block 18 handles holidays 7 through 12 and Block 19 handles holidays 13 through 18. Each block contains 8 setpoints for each holiday.

The visibility of an item on this screen is dependent on the “Number of Holidays” entered in Block 2 of Group 2. For example if less than 7 holidays are entered Block 17 will be the only active screen. However, if 8 holidays are entered Blocks 17 and 18 will be active, and so on.

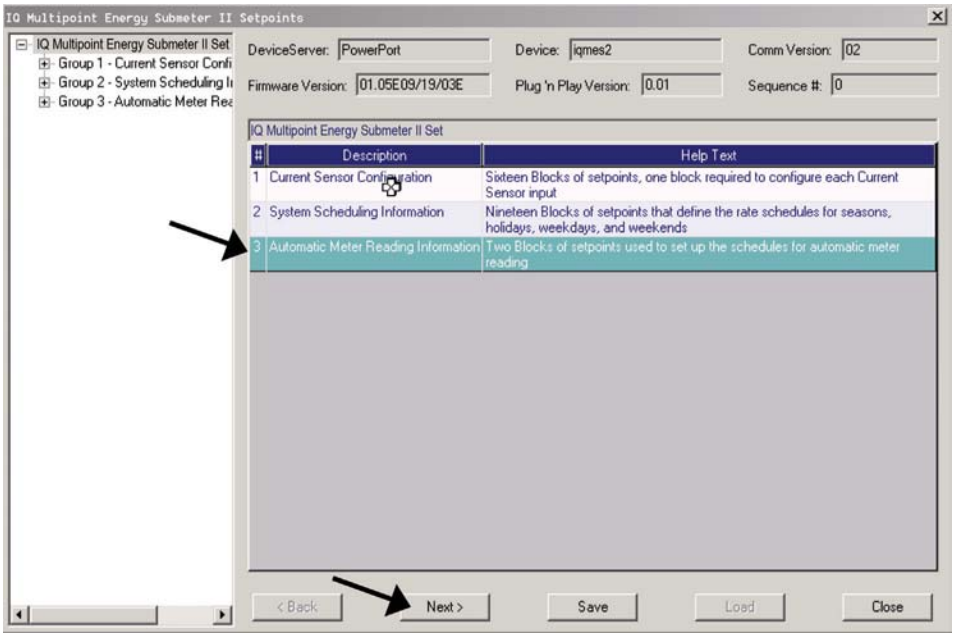
The user can select 1 through 99 or “Holiday applies to every year” for the “Starting Year” (row 1) and “Ending Year” (row 2). If the user wants the holiday to apply to every year they MUST select “Holiday applies to every year” for both rows 1 and 2.

The user also needs to select the “Starting Month” and “Ending Month” (Jan - Dec), the “Starting Day” and “Ending Day” (1-31) and “Starting Hour” and “Ending Hour” (0-23).

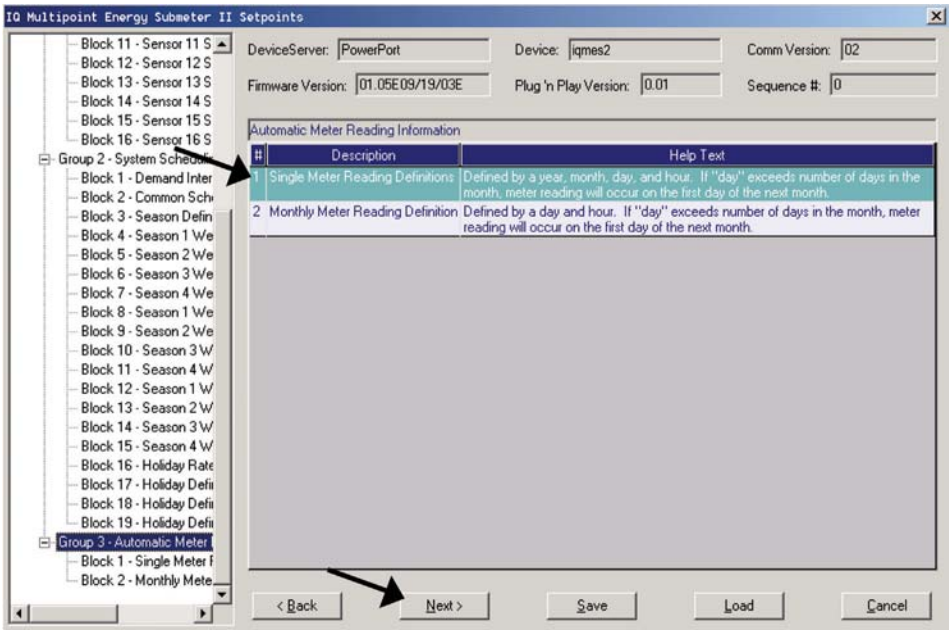
5.2.3.3 Changing Automatic Meter Reading Information - Group 3

Group 3 setpoints are used to set up the dates and times for Automatic Meter Reading events. When these reading events occur a snapshot is taken of the time of use energy registers and of the peak demand values with time tags. A log is generated in the unit with these entries and the peak demand values are then reset.

Once you have selected to change setpoints and the setpoints are uploaded a new screen will be displayed. Highlight “Automatic Meter Reading Information” and click “Next” (see right).



A new screen will appear listing 2 blocks of automatic meter reading information, “Single Meter Reading” and “Monthly Meter Reading”. The IQ Multipoint Energy Submeter II will save the last 13 meter readings.

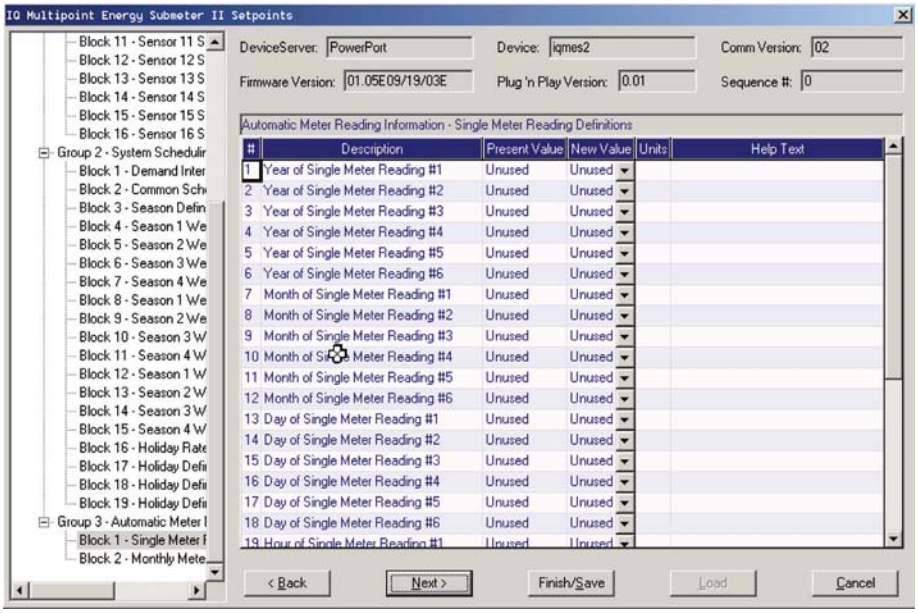


“Single Meter Reading” events specifies a year, month, day and hour for automatic meter readings. When the present time reaches this date and time the automatic reading event occurs. The “Single Meter Reading Event” is then checked off and the reading cannot occur at that time again, even if the real-time clock was adjusted backwards. The IQ Multipoint Energy Submeter II can schedule up to 6 “Single Meter Reading” times.

The “Monthly Meter Reading” event specifies a day and hour for the automatic meter reading. When the present time reaches this day and time the automatic reading event occurs. The IQ Multipoint Energy Submeter II will not generate another reading if the day and hour occurs again in the same month. When that day and hour is reached again, under a forward movement of time, the reading will occur again.

Select the row of information you would like to change setpoints for by highlighting it and click the “Next” button (see above).

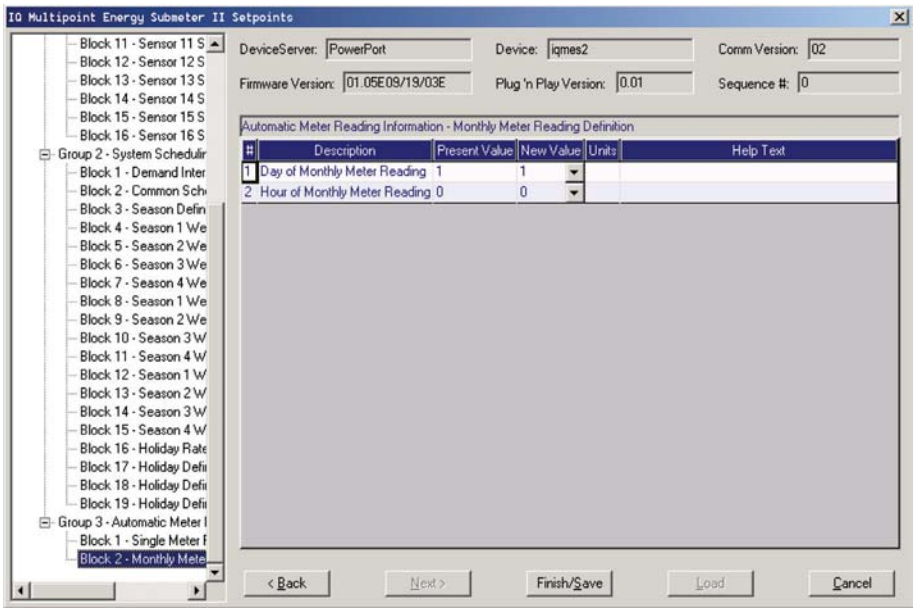
Block 1 - The “Single Meter Reading Definitions” screen (see right) lists 30 setpoints. There are 6 sets of 5 setpoints. Each set defines a single reading event and contains a check box (scroll down to the bottom of the screen) to show if the event time has been used or is still pending.



Setpoints 1, 7, 13, 19 and 25 define single event #1, setpoints 2, 8, 14, 20 and 26 define single event #2, setpoints 3, 9, 15, 21 and 27 define single event #3, and so on.

Mark the value as “Unused” if less than 6 readings are required. If the reading is to be taken select 1-99 for the “Year”, Jan - Dec for the “Month”, 1-31 for the “Day” and 0-23 for the “Hour” of the corresponding meter reading.

Block 2 - The “Monthly Meter Reading Definition” screen (see right) lists 2 setpoints. These set-points define the “Monthly Meter Reading” event time.



If the “Monthly Meter Reading” is not required mark the value as “Monthly Meter Reading Not Used” for both row 1 and row 2. If the reading is required select 1-31 for the “Day” and 0-23 for the “Hour”.

NOTES

5.2.4 Specific Configurations

The following sections provide detailed configuration guides for specific situations. Matrices are provided to show the value of each sensor as it should be entered into PowerPort. A blank matrix is also provided at the end of this manual to assist you in documenting the values entered into PowerPort.

5.2.4.1 Single Pole Metering Configuration

One possible application for the IQ Multipoint Energy Submeter II is to configure each current sensor as an individual 120 Vac meter. It is not necessary to combine sensors together into meter points but rather each sensor can be assigned to its own meter point.

This single meter application is more typical in single-phase, two-wire electrical applications where the purpose of the system might be to determine the energy utilization of multiple individual electrical loads in order to identify where the opportunities exist to reduce energy usage.

If an entire IQ Multipoint Energy Submeter II was to be configured into sixteen separate single meters, the values entered into PowerPort for configuration will be the same as the matrix provided in Table 5.2.

It is worth noting that each meter point is unique for the entire IQ Multipoint Energy Submeter II.

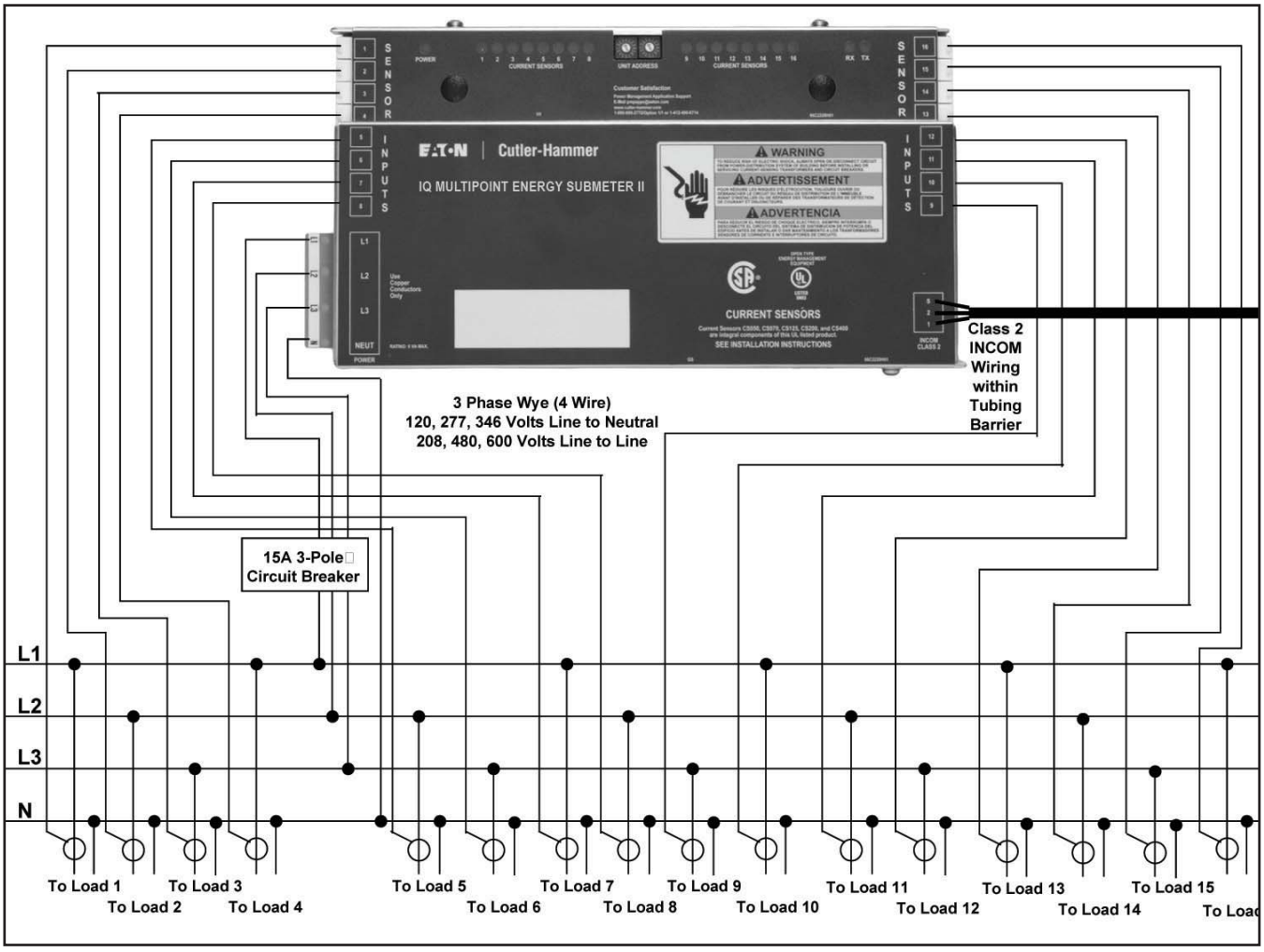
There is no need for the Current Sensor orientations to alternate between L1-NEUT, L2-NEUT and L3-NEUT. It is just a way to maintain consistency with the standard configuration of the IQ Multipoint Energy Submeter II. The system can easily be configured with only one 120 V input at L1, with all sensors configured as A-N (L1-NEUT). The configuration shown in this example is used to monitor individual loads from a 208 V three-phase wye voltage source with each phase at 120 V to neutral.

This type of configuration will correspond to the wiring diagram in Figure 5.1.

Table 5.2 Sixteen Individual Single Pole Matrix

Current Sensor	Meter Identifier	Sensor Connection
1	1	A-N (L1 & NEUT)
2	2	B-N (L2 & NEUT)
3	3	C-N (L3 & NEUT)
4	4	A-N (L1 & NEUT)
5	5	B-N (L2 & NEUT)
6	6	C-N (L3 & NEUT)
7	7	A-N (L1 & NEUT)
8	8	B-N (L2 & NEUT)
9	9	C-N (L3 & NEUT)
10	10	A-N (L1 & NEUT)
11	11	B-N (L2 & NEUT)
12	12	C-N (L3 & NEUT)
13	13	A-N (L1 & NEUT)
14	14	B-N (L2 & NEUT)
15	15	C-N (L3 & NEUT)
16	16	A-N (L1 & NEUT)

Figure 5.1 Example Wiring for Sixteen Individual Single Phase Meter Points



5.2.4.2 Two Pole Metering Configuration

Assume you are using the IQ Multipoint Energy Submeter II for a multi-tenant application such as an apartment. The device is expecting a 120 V/240 V; three wire electrical service that will be supplied to the IQ Multipoint Energy Submeter II at voltage input L1 and L2. The sensors are configured so sensors 1 & 2, 3 & 4, 5 & 6, 7 & 8, 9 & 10, 11 & 12, 13 & 14 and 15 & 16 are combined together to meter one apartment per sensor set. Sensors 1, 3, 5, 7, 9, 11, 13 and 15 are internally associated to electrical phase L1 and the remaining sensors are associated with phase L2, see table 5.3.

The “Sensor Connection” on the matrix lists both the setting within PowerPort (A-N, B-N, etc.) and the wiring on the IQ Multipoint Energy Submeter II (L1 & NEUT, L2 & NEUT, etc.).

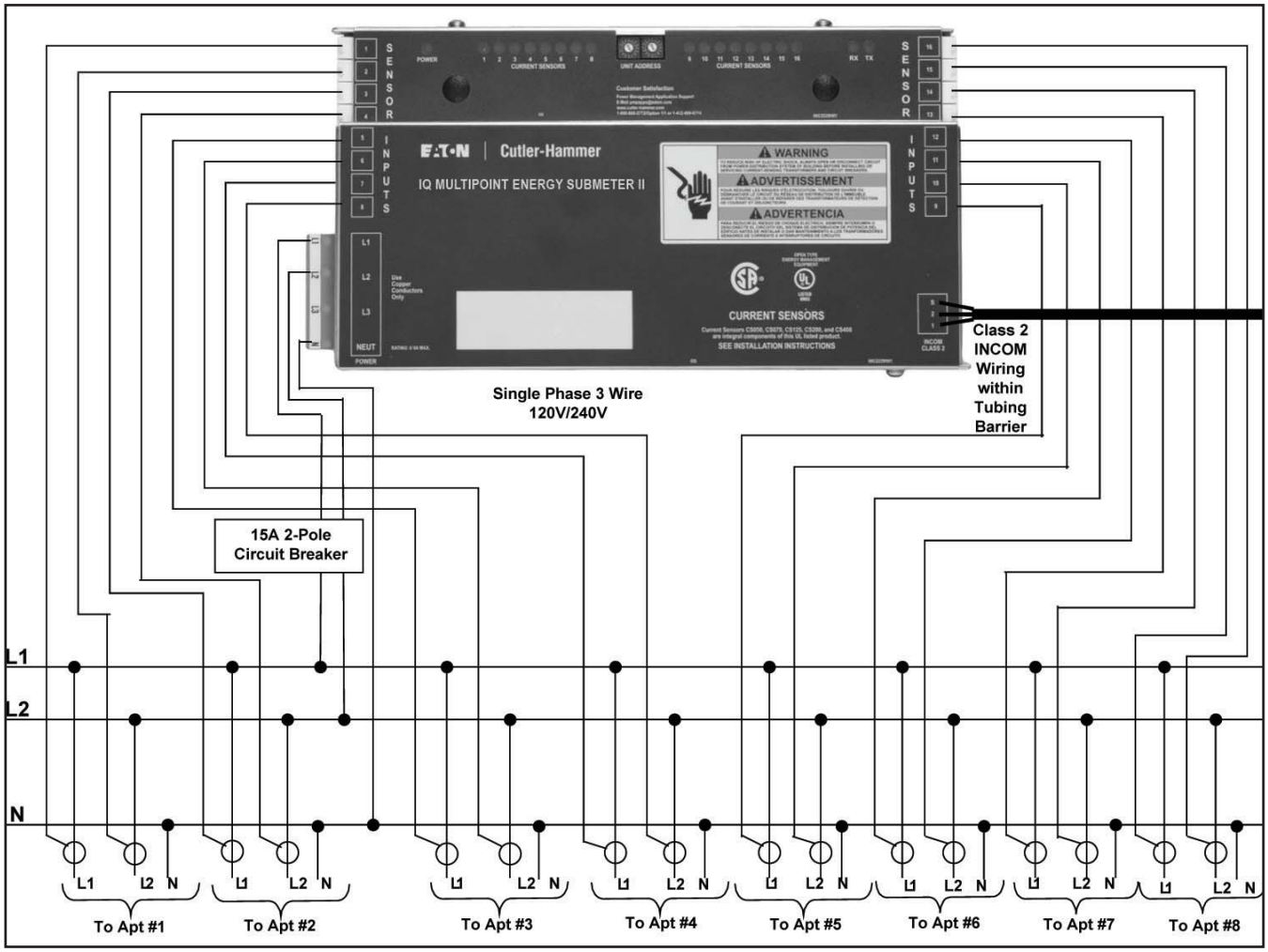
This means the voltage at input L1 and the voltage of the conductor that goes through sensors 1, 3, 5, 7, 9, 11, 13 and 15 must be electrically the same. Likewise, the voltage at input L2 must be electrically the same as the voltage through sensors 2, 4, 6, 8, 10, 12, 14 and 16.

This type of configuration will correspond with the wiring diagram shown on the next page.

Table 5.3 Two Pole Matrix

Current Sensor	Meter Identifier	Sensor Connection
1	1	A-N (L1 & NEUT)
2	1	B-N (L2 & NEUT)
3	2	A-N (L1 & NEUT)
4	2	B-N (L2 & NEUT)
5	3	A-N (L1 & NEUT)
6	3	B-N (L2 & NEUT)
7	4	A-N (L1 & NEUT)
8	4	B-N (L2 & NEUT)
9	5	A-N (L1 & NEUT)
10	5	B-N (L2 & NEUT)
11	6	A-N (L1 & NEUT)
12	6	B-N (L2 & NEUT)
13	7	A-N (L1 & NEUT)
14	7	B-N (L2 & NEUT)
15	8	A-N (L1 & NEUT)
16	8	B-N (L2 & NEUT)

Figure 5.2 Example Wiring for Eight Two Pole Meter Points



5.2.4.3 Three Pole Metering Configuration

The IQ Multipoint Energy Submeter II can also be configured to provide five 3-phase meter points. In this case, the power and energy information from three sensors must be combined to form one (1) meter point. The configuration settings will be the same as the matrix provided in Table 5.4.

Sensors 1, 2 & 3, sensors 4, 5 & 6, sensors 7, 8 & 9, sensors 10, 11 & 12 and sensors 13, 14 & 15 are assigned to input voltages L1, L2 and L3 respectively. Each sensor set is combined together into one meter point. Therefore, they form five individual 3-phase meters.

This type of configuration will correspond to the wiring diagram in Figure 5.3.

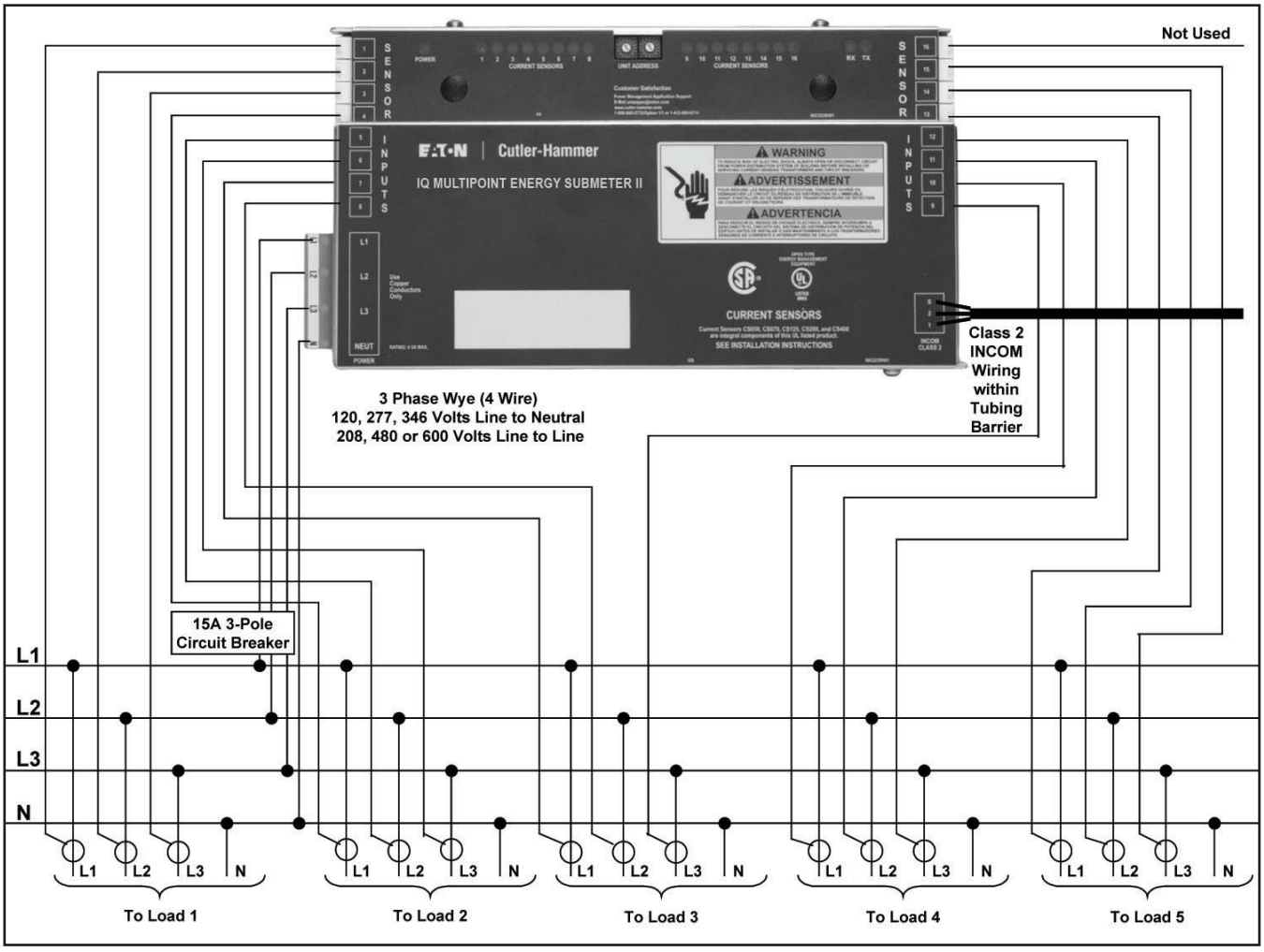
Notice that it is possible for Current Sensor #16 not to be used and not connected. In applications where more than one IQ Multipoint Energy Submeter II unit is installed, it is possible to use the #16 sensor input on two different IQ Multipoint Energy Submeter II units and program the host computer to combine the separate power readings into one.

For consistency and for ease of system maintenance and debugging, Cutler-Hammer suggests that the standard configurations be used unless the system requirements demand otherwise. The remaining configurations in Section 5.2.4 provide some alternate configurations and wiring diagrams that will help in choosing the appropriate configuration for more complicated systems that do not conform to the standard configurations.

Table 5.4 Three Pole Metering Matrix

Current Sensor	Meter Identifier	Sensor Connection
1	1	A-N (L1 & NEUT)
2	1	B-N (L2 & NEUT)
3	1	C-N (L3 & NEUT)
4	2	A-N (L1 & NEUT)
5	2	B-N (L2 & NEUT)
6	2	C-N (L3 & NEUT)
7	3	A-N (L1 & NEUT)
8	3	B-N (L2 & NEUT)
9	3	C-N (L3 & NEUT)
10	4	A-N (L1 & NEUT)
11	4	B-N (L2 & NEUT)
12	4	C-N (L3 & NEUT)
13	5	A-N (L1 & NEUT)
14	5	B-N (L2 & NEUT)
15	5	C-N (L3 & NEUT)
16	DISABLE	

Figure 5.3 Example Wiring for Three Pole Meter Points



5.2.4.4 A More Complex Three-Phase Scenario

Not every application contains only multiples of a single type meter so the IQ Multipoint Energy Submeter II has the ability to be configured as different meter types simultaneously, making it the right choice for many applications.

First, consider an electrical system that has a 120 V / 208 V 3-phase wye voltage input with one three-phase motor, a sub-panel feed to another three-phase panel and a few single phase loads. It is perfectly acceptable to configure the unit in the following manner.

Refer to Table 5.5 for the PowerPort settings while reviewing this scenario. Meter identifier 1 is a single-phase meter associated to voltage L1. Meter identifier 2 is a three-phase meter comprised of sensors 2, 3 and 4, where sensor #2 is referenced to voltage L3, sensor #3 is referenced to L1 and sensor #4 is referenced to L2. Meter identifier 3 is another three-phase meter comprised of sensors 5, 7 and 9, where sensor #5 is referenced to voltage L3, sensor #7 is referenced to L2 and sensor #9 is referenced to L1. Meter identifier 4 is a single-phase meter associated to voltage L3 and meter identifier 5 is another single-phase meter associated to voltage L2. Meter identifier 6, comprised of sensors 10, 11 and 12 is a three-phase meter. Sensor #10 is referenced to L1, sensor #11 to L3 and sensor #12 is referenced to L2. Meter identifier 7, comprised of sensors 13 through 15 is another three-phase meter. Sensor #13 is referenced to L1, sensor #14 is referenced to L3 and sensor #15 is referenced to L2. Notice that sensor #16 is disabled.

This type of configuration may become confusing and make the system a bit more difficult to maintain; but as you can see, the meter point values and voltage phase relationships can be changed to almost any combination to fit your application.

Table 5.5 Three-Phase Matrix

Current Sensor	Meter Identifier	Sensor Connection
1	1	A-N (L1 & NEUT)
2	2	C-N (L3 & NEUT)
3	2	A-N (L1 & NEUT)
4	2	B-N (L2 & NEUT)
5	3	C-N (L3 & NEUT)
6	4	C-N (L3 & NEUT)
7	3	B-N (L2 & NEUT)
8	5	B-N (L2 & NEUT)
9	3	A-N (L1 & NEUT)
10	6	A-N (L1 & NEUT)
11	6	C-N (L3 & NEUT)
12	6	B-N (L2 & NEUT)
13	7	A-N (L1 & NEUT)
14	7	C-N (L3 & NEUT)
15	7	B-N (L2 & NEUT)
16	DISABLE	

5.2.4.5 A Complex Three-Wire Single-Phase Scenario

Consider a three-wire single-phase electrical system that contains a feed to a sub-panel, a two 240 V loads (such as an air conditioning unit, an electric hot water heater, etc.), one combination 120 V / 240 V load (such as an electric stove or electric dryer) and a couple of single phase loads.

Because not every electrical load is connected phase-to-neutral, the number of Current Sensors required to meter the system may be reduced. For this scenario, an electrical understanding of each load will help determine the wiring and configuration that is necessary to accomplish accurate metering.

Keep in mind the combination phase-to-phase / phase-to-neutral load is handled in the same way as a sub-panel or an apartment feed; two sensors accomplish the task. Also, it only takes one sensor per phase-to-phase load to accurately meter the power. This is possible for two reasons, one, the current draw through L1 will be exactly the same as that from L2 for that load, and two, the IQ Multipoint Energy Submeter II allows for the sensor to be configured as phase-to-phase.

Notice in PowerPort there are six phase-to-phase selections, A-B (L1-L2), A-C (L1-L3), B-A (L2-L1), B-C (L2-L3), C-A (L3-L1) and C-B (L3-L2). In some instances this ability makes it possible to reduce the number of sensors that are required to accomplish the metering task.

A sample configuration matrix for this wiring scenario is provided in Table 5.6.

As with all power metering, phase relationships between voltage and current are crucial in acquiring an accurate energy reading. For example, the two phase-to-phase sensors can be different phases, so they need configured differently. For phase-to-phase applications, the sensor orientation is just as critical as in phase-to-neutral applications.

Table 5.6 Three-Wire Single-Phase Matrix

Current Sensor	Meter Identifier	Sensor Connection
1	1	A-N (L1 & NEUT)
2	1	B-N (L2 & NEUT)
3	2	A-B (L1 & L2)
4	3	B-A (L2 & L1)
5	4	A-N (L1 & NEUT)
6	4	B-N (L2 & NEUT)
7	5	A-N (L1 & NEUT)
8	6	B-N (L2 & NEUT)
9	DISABLE	
10	DISABLE	
11	DISABLE	
12	DISABLE	
13	DISABLE	
14	DISABLE	
15	DISABLE	
16	DISABLE	

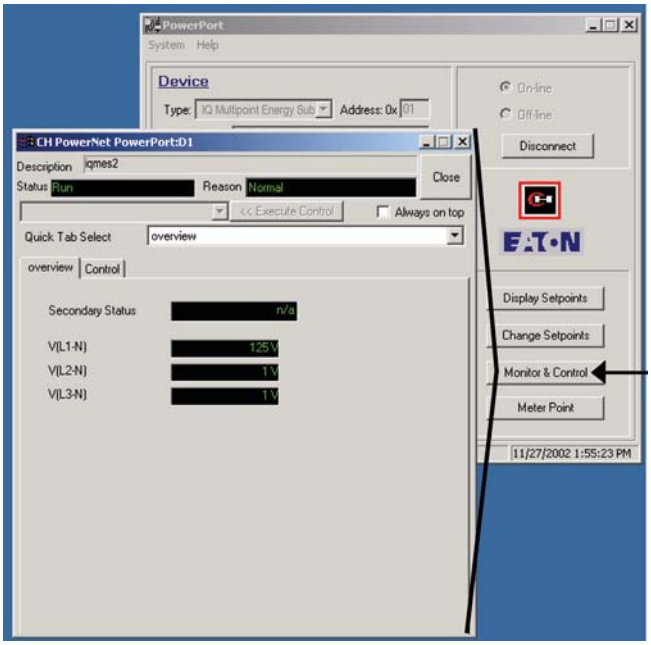
5.2.4.6 Other Configuration Selections

You may have noticed in using the setpoints in PowerPort that there are more selections to choose from for the phase relationships for each sensor. Only the selections discussed in this document are valid if the sensors have been correctly oriented. The other selections ONLY become useful if the installation conventions have been violated. The proper way to solve this problem is to have the sensor orientation corrected. However, in some cases correcting the sensor orientation discrepancy may not be an option. In this case it would be necessary to select another configuration (NEUT-L1 [N-A *(Reversed CT)], NEUT-L2 [N-B (Reversed CT)] and NEUT-L3 [N-C (Reversed CT)]). These selections should only be used in very rare occasions when no other means of resolution are available.*

5.2.5 Monitor and Control

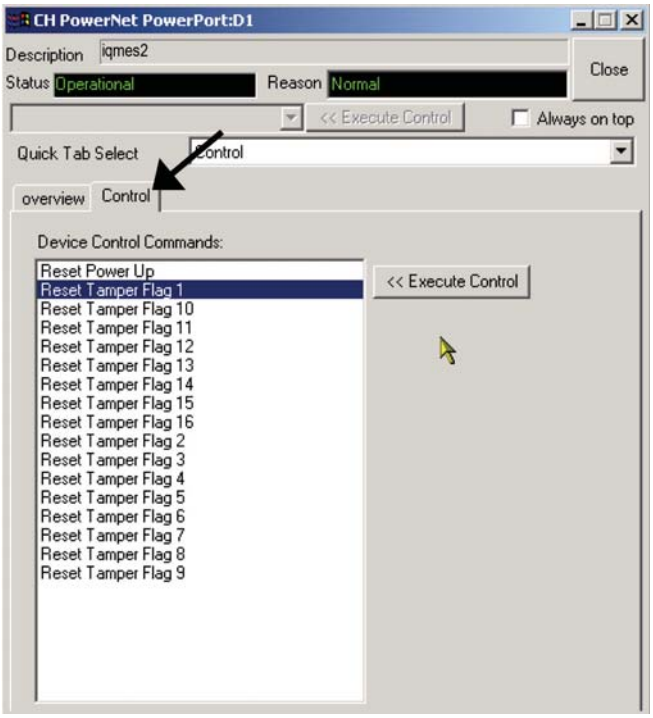
While logged onto PowerPort you are also able to view real-time data about the IQ Multipoint Energy Submeter II.

From the main screen in PowerPort click on the “Monitor & Control” button. A new screen will appear showing an overview of L1, L2 and L3 values, along with the description of the device you are viewing, the status of the device and the reason for the status.



This screen also provides the user a list of all controls that can be executed for the IQ Multipoint Energy Submeter II and enables you to execute them.

Click the “Control” tab in the monitor and control window. A list of “Reset Tamper Flags” will appear (see below).

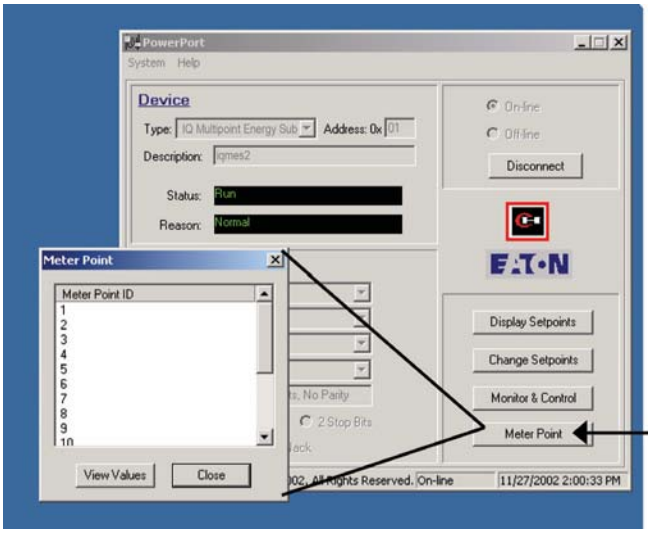


Highlight the reset you want to execute and click the “Execute Control” button.

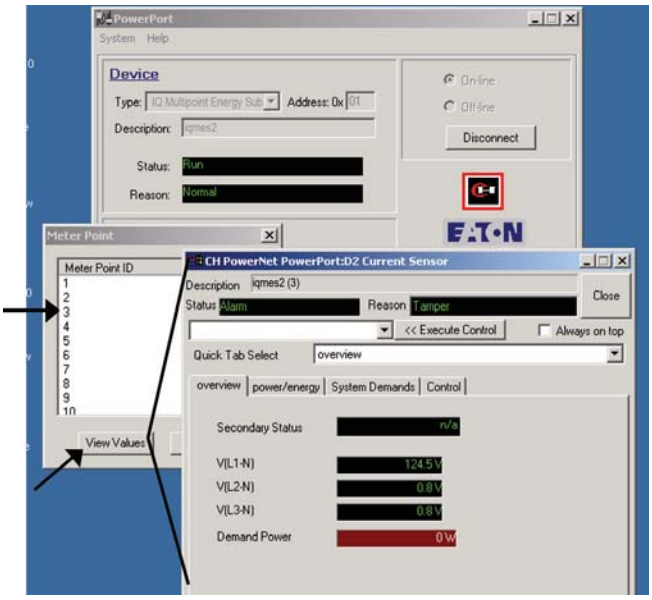
A confirmation message displays, asking you whether you want to execute the selected control. Click “Yes” to confirm.

5.2.6 Meter Point

PowerPort also enables you to view IQ Multipoint Energy Submeter II's meter point values individually. Click on the "Meter Point" button from the main PowerPort screen to view the list of Meter Point ID's, see below.

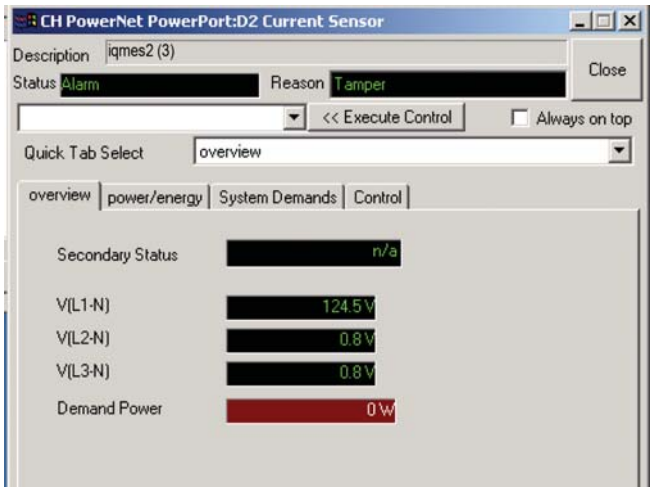


Press the down or up arrow on your keyboard to highlight the meter point you want to view information for and click the "View Values" button, see below.

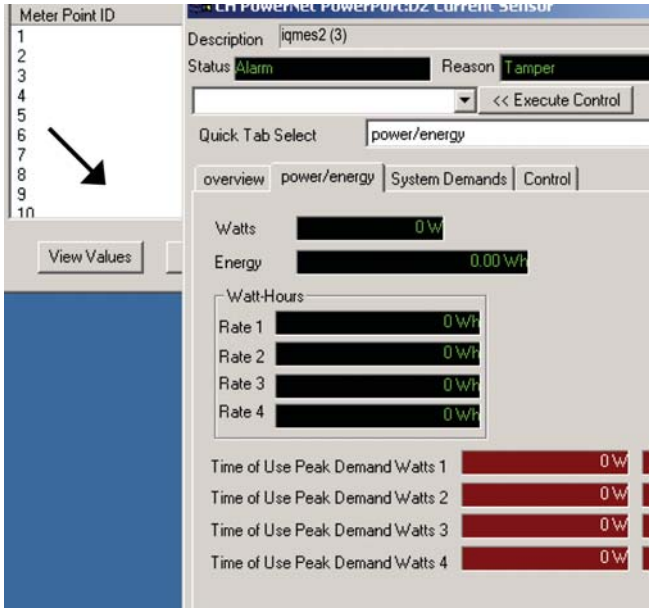


A new screen will appear showing the description of the device with the meter point you are viewing in parentheses (the above example is viewing meter point 3), the status of the device and the reason for the status. There are also four tabs near the top of the screen, "overview", "power/energy", "System Demands" and "Control", the overview tab will be the default selection.

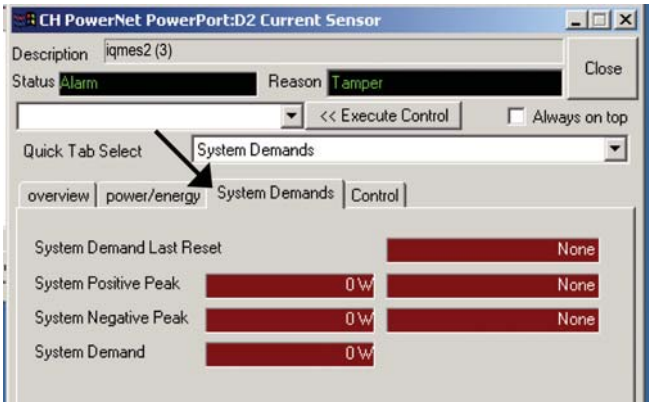
The "overview" screen (shown below) shows values for the "Secondary Status", L1, L2, L3 values and the "Demand Power" for the meter point selected on the previous screen.



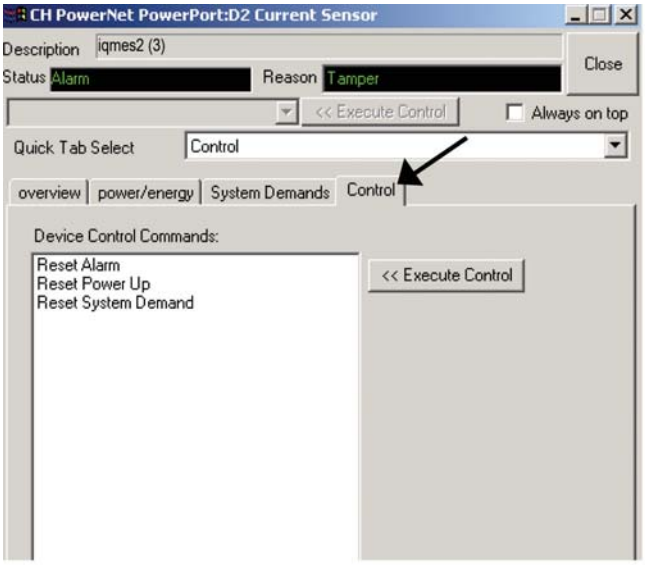
Click on the "power/energy" tab (see below) to view the screen showing the "Watts", "Energy", the Watt-Hour Rates (1 through 4) and the Time of Use Peak Demand Watts (1 through 4) for the meter point selected on the previous screen.



Click on the “System Demands” tab (see below) to view the screen showing when the system demand was last reset, the system positive and negative peaks and the system demand for the meter point selected on the previous screen.



Click on the “Control” tab (see below) to view the “Device Control Command” options.



Highlight the command you want to execute, “Reset Alarm”, “Reset Power Up” or “Reset System Demand”, and click the “Execute Control” button.

A pop up box will appear asking you to confirm your action, click “Yes” to execute your action or click “No” to cancel the request, see the example screen below.

Click the “Close” button to return back to PowerPort’s main screen.

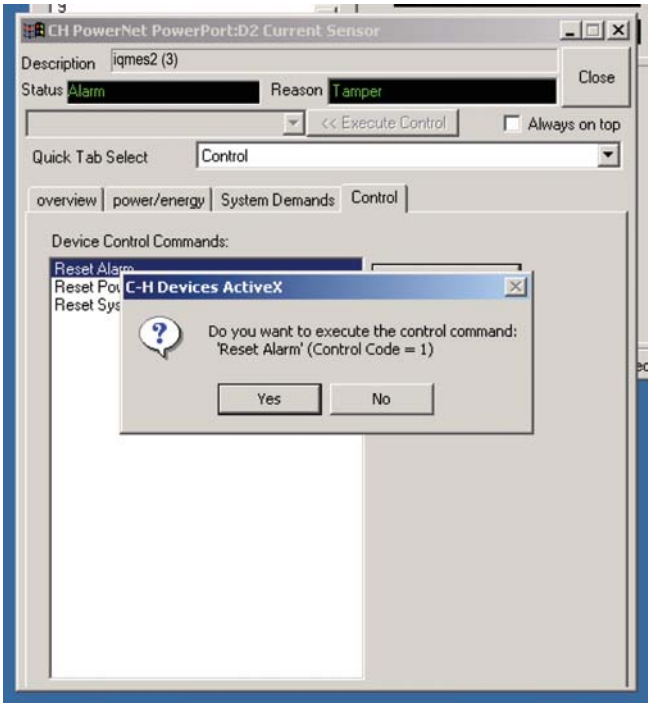


Table 6.1 Blank Matrix

Program Date: _____ **Work Order #:** _____

Serial #: _____ **Unit ID:** _____

Customer Name: _____

Location: _____

DEVICE

Type: IQ Multipoint Energy Submeter (16) **Address: 0x**_____

Description: _____

Port: _____ **RS232 Type:** _____

Baud Rate: 9600 **Handshake:** _____

ALWAYS
Select

NEVER
Select

Current Sensor	Meter Identifier / Subnet Address	Sensor Connection	Sensor Location
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

NOTES

SECTION 6: TROUBLESHOOTING AND MAINTENANCE

6.1 LEVEL OF REPAIR

These troubleshooting procedures are supplied as an aid to help determine if the IQ Multipoint Energy Submeter II unit has malfunctioned. They identify common occurrences that may cause a disruption in your monitoring system. The IQ Multipoint Energy Submeter II does NOT have any user-serviceable components; if you have any questions or problems with the IQ Multipoint Energy Submeter II contact Power Quality Technical Support Center at 1-800-809-2772, option 4.

6.2 MAINTENANCE AND CARE

The IQ Multipoint Energy Submeter II is designed to be a self-contained and a maintenance-free unit. The printed circuit boards are calibrated and conformally coated at the factory. They are intended to be serviced by factory trained personnel only.

The calibration can be verified in the field by using the LEDs on the IQ Multipoint Energy Submeter II unit . Each channel energy LED will turn ON or turn OFF whenever that channel registers 1/128 per-unit watthour. At full-load (100% current) and nominal voltage, the LED will change state every 0.234375 seconds. For a 50A CT each LED transition represents 0.390625 Wh.

To convert per unit Wh, multiply by the channel's CT rating, and the nominal voltage rating/120. For a 120 V unit the 120/120 factor can be ignored; for a 346 V unit the 346/120 must be accounted for in the energy calculation.

The IQ Multipoint Energy Submeter II never requires cleaning. However, if cleaning is desired, NEVER clean the IQ Multipoint Energy Submeter II with system or power on. Clean the IQ Multipoint Energy Submeter II using only a clean, dry cloth. Do not use water or solvents of any kind.

Operate the IQ Multipoint Energy Submeter II Module in an environment within the temperature range of -20°C to 70°C and free of excess humidity. Spare units should be stored in the original packing material and container.

6.4 REMOVAL AND REPLACEMENT

WARNING

ALL MAINTENANCE PROCEDURES MUST BE PERFORMED ONLY BY QUALIFIED PERSONNEL WHO ARE FAMILIAR WITH THE IQ MULTIPOINT ENERGY SUBMETER II AND ITS USES. FAILURE TO OBSERVE THIS WARNING COULD RESULT IN EQUIPMENT DAMAGE, SERIOUS INJURY AND/OR DEATH.

WARNING

TROUBLESHOOTING PROCEDURES MAY INVOLVE WORKING ON EQUIPMENT IN AREAS WITH EXPOSED ENERGIZED (LIVE) ELECTRICAL WIRING AND/OR PARTS WHERE THE HAZARD OF FATAL ELECTRIC SHOCK IS PRESENT. PERSONNEL MUST EXERCISE EXTREME CARE TO AVOID INJURY OR DEATH. ALWAYS DISCONNECT, LOCK OUT AND TAG THE CURRENT AND VOLTAGE SOURCES BEFORE TOUCHING THE CONNECTIONS OR COMPONENTS OF THE IQ MULTIPOINT ENERGY SUBMETER II.

6.3.1 General Safety Precautions

Turn off, lock out and tag all sources of system power to the IQ Multipoint Energy Submeter II and to all the circuits that are monitored by the Current Sensors.

6.3.2 Replacing the IQ Multipoint Energy Submeter II

Perform the following steps to replace the IQ Multipoint Energy Submeter II:

- Disconnect the supply voltage to the IQ Multipoint Energy Submeter II by placing the supply circuit breaker or disconnect in the OFF position.

WARNING

OTHER UNITS OR OTHER ELECTRICAL DEVICES WITHIN THE PANEL MAY BE LIVE. MAKE SURE ALL VOLTAGE IS DISCONNECTED PRIOR TO REMOVING ANY CABLES, CURRENT SENSORS, ETC.

- Disconnect the INCOM cable from the IQ Multipoint Energy Submeter II and mark it for later connection.
- Disconnect each of the Current Sensor connections from the IQ Multipoint Energy Submeter II and mark them for later connection.
- Disconnect the Voltage Input Connector from the IQ Multipoint Energy Submeter II and mark it for later connection.

- Remove three of the four screws from the mounting feet of the IQ Multipoint Energy Submeter II. Grasp the IQ Multipoint Energy Submeter II to prevent it from falling and remove the last screw.
- Carefully remove the IQ Multipoint Energy Submeter II. Do Not scrape or puncture any wiring insulation while removing the unit.

To reinstall or to replace the IQ Multipoint Energy Submeter II, reverse the above steps. Torque each of the voltage connections on the Voltage Input Connector to 5 in-lbs.

6.3.3 Replacing the IQ Multipoint Energy Submeter II Current Sensors

Perform the following steps to replace the IQ Multipoint Energy Submeter II Current Sensors:

- Disconnect the supply voltage to the IQ Multipoint Energy Submeter II by placing the supply circuit breaker or disconnect in the OFF position.

WARNING

OTHER UNITS OR OTHER ELECTRICAL DEVICES WITHIN THE PANEL MAY BE LIVE. MAKE SURE ALL VOLTAGE IS DISCONNECTED PRIOR TO REMOVING ANY CABLES, CURRENT SENSORS, ETC.

- Verify that the power has been removed from the conductor where the Current Sensor resides.
- Disconnect the Current Sensor lead from the IQ Multipoint Energy Submeter II and note the input to which it was connected for later connection.
- Disconnect the wire conductor from the circuit breaker or other convenient location in order to remove the Current Sensor from the conductor. Note the orientation of the Current Sensor for the installation later.
- Install the new Current Sensor in the same orientation as the one that was removed.
- Reconnect the wire conductor to complete load circuit.
- Connect the new Current Sensor lead to the same IQ Multipoint Energy Submeter II input.
- Reconnect the power to the IQ Multipoint Energy Submeter II and the monitored circuits.

6.4 GENERAL TROUBLESHOOTING PROCEDURES

These procedures cover the IQ Multipoint Energy Submeter II only and can only indicate or eliminate the IQ Multipoint Energy Submeter II as a cause of the malfunction. Keep in mind other system components may be causing or contributing to system malfunctions.

To use the following troubleshooting guide, first identify the symptom of the malfunction in the first column, note the corresponding possible cause listed in the second column and attempt one or more of the corresponding possible solutions in the third column. If the malfunction continues after following this guide contact the plant maintenance department or contact Power Quality Technical Support at 1-800-809-2772, opton 4.

6.5 TECHNICAL ASSISTANCE

For additional information, technical assistance or referral to a local authorize distributor, contact Power Management Applications Support at 1-800-809-2772, option 1 / option 1 (outside the United States please call 1-414-449-7100 option 1 / option 1). You can also e-mail us at pmpapps@eaton.com or visit us on the web, **www.cutler-hammer.eaton.com**, and follow the power management product link.

You can also access our searchable database C-H eXpert that provides self-help solutions with troubleshooting information. Simply connect to the C-H eXpert Web site at **http://chexpert.ch.cutler-hammer.com/chexpert** and type in a keyword or product for your particular technical problem in the search box.

IQ Multipoint Energy Submeter II Troubleshooting Guide		
Symptom	**Possible Cause**	**Possible Solution**
One or more voltage phases read incorrectly	• Failure to connect to voltage inputs or incorrect torque of screw terminals	• Verify proper connection to voltage input terminals. Re-torque screw terminals to 5 in-lbs. • Check the seating of the Voltage Input plug.
Zero power readings	• Failure to connect to voltage inputs or incorrect torque of screw terminals • Bad Current Sensor	• Check Current Sensor connections. Also check orientation and phase relationship. Check IQ Multipoint Energy Submeter II configuration and verify that the actual Current Sensor orientations and phase relationships are reflected in the configuration. Correct as necessary. • Replace faulty Current Sensor
Incorrect Power readings	• Incorrect phasing of voltage with respect to Current Sensor	• Check phasing and verify connections with wiring diagrams. Verify that the IQ Multipoint Energy Submeter configuration matches.
Unit fails to communicate over INCOM™ network	• Wrong or conflicting address set for IQ Multipoint Energy Submeter II • Incorrect usage of INCOM™ translator • Communication wiring error	• Check the address of the IQ Multipoint Energy Submeter II unit via PowerPort or PowerNet and verify that the software is addressing the proper unit. • Check the settings in the INCOM™ communication software and verify that 9600 baud is used and when using the PMCOM5 INCOM™ Communication Adapter, be certain that the "MINT Ack/Nack" and "CTS - RTS" options are ***DESELECTED*** • Verify that wiring conforms to Wiring Base Rules (see TD 17513).
No LED operation	• Lack of input voltage or failure to connect 120 V to the L1 input terminal • Failure to connect electrical neutral • Faulty IQ Multipoint Energy Submeter II	• Verify that power is indeed present and connected properly to the terminal block • Verify that power is indeed present and connected properly to the terminal block • Contact the Power Management Application Support team (1-800-809-2772 option 1 / option 1).

6.6 WARRANTY AND LIABILITY INFORMATION

This instruction booklet is published solely for information purposes and should not be considered all-inclusive. If further information is required, you should consult Eaton | Cutler-Hammer. Sale of the product shown in this literature is subject to terms and conditions outlined in appropriate Eaton | Cutler-Hammer selling policies or other contractual agreements between the parties. This literature is not intended to and does not enlarge or add to any such contract. The sole source governing the rights and remedies of any purchaser of this equipment is the contract between the purchaser and Eaton | Cutler-Hammer.

NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY, OR WARRANTIES ARISING FROM COURSE OF DEALING OR USAGE OF TRADE, ARE MADE REGARDING THE INFORMATION, RECOMMENDATIONS AND DESCRIPTIONS CONTAINED HEREIN.

In no event will Eaton | Cutler-Hammer be responsible to the purchaser or user in contract, in tort (including negligence), strict liability or otherwise for any special, indirect, incidental or consequential damage or loss whatsoever, including but not limited to damage or loss of equipment use, plant or power system, cost of capital, loss of power, additional expenses in the use of existing power facilities or claims against the purchaser or user by its customers resulting from the use of the information, recommendations and description contained herein.

Program Date: _____ **Work Order #:** _____

Serial #: _____ **Unit ID:** _____

Customer Name: _____

Location: _____

DEVICE

Type: IQ Multipoint Energy Submeter (16) **Address: 0x**_____

Description: _____

Port: _____ **RS232 Type:** _____

Baud Rate: 9600 _____ **Handshake:** _____

ALWAYS
Select

NEVER
Select

Current Sensor	Meter Identifier / Subnet Address	Sensor Connection	Sensor Location
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Eaton Corporation
Eaton Electrical
Power Quality Division
1000 Cherrington Parkway
Moon Township, PA 15108-4312
USA
www.eatonelectrical.com

IL02601001E Rev. B / Style #66A2153H03

EATON | Cutler-Hammer

Publication No. IL02601001E Rev. B
January 2004