**Installation Guide**

# IQ 35M Meter Series


EATON

*Powering Business Worldwide*

# Contents

## Product Overview

The IQ 35M Meter Series provides a solution for measuring energy data with a single device. Inputs include Control Power, CT, and 3-Phase Voltage. The device supports multiple output options, including solid state relay contacts, Modbus (with or without data logging), BACnet MS/TP, and pulse. The LCD screen on the faceplate allows instant output viewing.

The meter is housed in a plastic enclosure suitable for installation on T35 DIN rail according to EN50022. It can be mounted with any orientation over the entire ambient temperature range, either on a DIN rail or screw mounted in a panel.

The IQ 35MA1x models are not sensitive to CT orientation, reducing installation errors.

The IQ 35MA2x models are capable of bidirectional metering. Power is monitored in both directions (upstream and downstream from the meter). Observe correct CT orientation when installing these models.

## Product Identification

| Model | Description | Output | | | |
|---|---|---|---|---|---|
| | | Pulse | Alarm | Modbus | BACnet |
| IQ 35MA11 | Pulse output only | ● | ● | | |
| IQ 35MA12 | Modbus output | ● | ● | ● | |
| IQ 35MA13 | Modbus output, data logging | ● | ● | ● | |
| IQ 35MA15 | BACnet MS/TP, data logging, Pulse contact inputs | | | | ● |
| IQ 35MA22 | Modbus output, bidirectional | ● | ● | ● | |
| IQ 35MA23 | Modbus output, bidirectional, data logging | ● | ● | ● | |

## Safety Information

RoHS Compliant · CE · c UL us · SunSpec alliance

# ⚠ DANGER ⚠

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Follow safe electrical work practices. See NFPA 70E in the USA, or applicable local codes.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Read, understand and follow the instructions before installing this product.
- Turn off all power supplying equipment before working on or inside the equipment.
- Any covers that may be displaced during the installation must be reinstalled before powering the unit.
- Use a properly rated voltage sensing device to confirm power is off.
  DO NOT DEPEND ON THIS PRODUCT FOR VOLTAGE INDICATION

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

# NOTICE

- This product is not intended for life or safety applications.
- Do not install this product in hazardous or classified locations.
- The installer is responsible for conformance to all applicable codes.
- Mount this product inside a suitable fire and electrical enclosure.

# CAUTION

**RISK OF EQUIPMENT DAMAGE**

- This product is designed only for use with 1V or 0.33V current transducers (CTs).
- DO NOT USE CURRENT OUTPUT (e.g. 5A) CTs ON THIS PRODUCT.
- Failure to follow these instructions can result in overheating and permanent equipment damage.

**FCC PART 15 INFORMATION**

**NOTE: This equipment has been tested by the manufacturer and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause harmful interference in which case the user will be required to correct the interference at his own expense. Modifications to this product without the express authorization of the manufacturer nullify this statement.**

For use in a Pollution Degree 2 or better environment only. A Pollution Degree 2 environment must control conductive pollution and the possibility of condensation or high humidity. Consider the enclosure, the correct use of ventilation, thermal properties of the equipment, and the relationship with the environment. Installation category: CAT II or CAT III

Provide a disconnect device to disconnect the meter from the supply source. Place this device in close proximity to the equipment and within easy reach of the operator, and mark it as the disconnecting device. The disconnecting device shall meet the relevant requirements of IEC 60947-1 and IEC 60947-3 and shall be suitable for the application. In the US and Canada, disconnecting fuse holders can be used. Provide overcurrent protection and disconecting device for supply conductors with approved current limiting devices suitable for protecting the wiring. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the device may be impaired.

⚠ This symbol indicates an electrical shock hazard exists.

⚠ Documentation must be consulted where this symbol is used on the product.

# Specifications

| | |
|---|---|
| Measurement Accuracy: | |
| Real Power and Energy | IEC 62053-22 Class 0.5S, ANSI C12.20 0.5% |
| Reactive Power and Energy | IEC 62053-23 Class 2, 2% |
| Current | 0.4% (+0.015% per °C deviation from 25°C) from 5% to 100% of range; 0.8% (+0.015% per °C deviation from 25°C) from 1% to 5% of range |
| Voltage | 0.4% (+0.015% per °C deviation from 25°C) from 90 $V_{L-N}$ to 600 $VAC_{L-L}$ |
| Sample Rate | 2520 samples per second, continuous on all inputs |
| Data Update Rate | 1 sec |
| Type of Measurement | True RMS, one to three phase AC system |
| Input Voltage Characteristics: | |
| Measured AC Voltage | Minimum 90 $V_{L-N}$ (156 $V_{L-L}$) for stated accuracy<br>UL Maximums: 600 $V_{L-L}$ (347 $V_{L-N}$)<br>CE Maximums: 300 $V_{L-N}$ (520 $V_{L-L}$) |
| Metering Over-Range | +20% |
| Impedance | 2.5 MΩ (L-N)/5 MΩ (L-L) |
| Frequency Range | 45 to 65 Hz |
| Input Current Characteristics: | |
| CT Scaling | Primary: Adjustable from 5 A to 32,000 A |
| Measurement Input Range | 0 to 0.333 VAC or 0 to 1.0 VAC (+20% over-range) |
| Impedance | 10.6 kΩ (1/3 V mode) or 32.1 kΩ (1 V mode) |
| Control Power: | |
| AC | 5 VA max.; 90 V min.<br>UL Maximums: 600 $V_{L-L}$ (347 $V_{L-N}$)<br>CE Maximums: 300 $V_{L-N}$ (520 $V_{L-L}$) |
| DC * | 3 W max.; UL and CE: 125 to 300 V |
| Ride Through Time | 100 msec at 120 VAC |
| Input (IQ 35MA15 only): | |
| Pulse | Solid-state or mechnical contacts (current less than 1 mA) |
| Minimum Pulse Width | 20 msec |
| Output: | |
| Alarm Contacts (IQ 35MA11, IQ 35MA12, IQ 35MA13, IQ 35MA2x) | N.C., static output, (30 VAC/DC, 100 mA max. @ 25°C, derate 0.56 mA per °C above 25°C) |
| Real Energy Pulse Contacts (IQ 35MA11, IQ 35MA12, IQ 35MA13, IQ 35MA2x) AND Reactive Energy Pulse Contacts (IQ 35MA11 only) | N.O., static output (30 VAC/DC, 100 mA max. @ 25°C, derate 0.56 mA per °C above 25°C) |
| RS-485 Port (IQ 35MAx2 and IQ 35MAx3) | 2-wire + Shield, 1200 to 38400 baud, Modbus RTU |
| RS-485 Port (IQ 35MA15) | 2-wire, 9600 to 115.2 kbaud, BACnet MS/TP |
| Mechanical Characteristics: | |
| Weight | 0.62 lb (0.28 kg) |
| IP Degree of Protection (IEC 60529) | IP40 front display; IP20 Meter |
| Display Characteristics | Back-lit blue LCD |
| Terminal Block Screw Torque | 0.37 ft-lb (0.5 N·m) nominal/0.44 ft-lb (0.6 N·m) max. |
| Terminal Block Wire Size | 14 to 24 AWG) |
| Rail | T35 (35mm) DIN Rail per EN50022 |
| Environmental Conditions: | |
| Operating Temperature | -30° to 70°C |
| Storage Temperature | -40° to 85°C |
| Humidity Range | <95% RH (non-condensing) |
| Altitude of Operation | 3 km max. |
| Metering Category: | |
| North America | CAT III; for distribution systems up to 347 $V_{L-N}$/600 $VAC_{L-L}$ |
| CE | CAT III; for distribution systems up to 300 $V_{L-N}$/480 $VAC_{L-L}$ |
| Dielectric Withstand | Per UL 508, EN61010 |
| Conducted and Radiated Emissions | FCC part 15 Class B, EN55011/EN61000 Class B (residential and light industrial) |
| Conducted and Radiated Immunity | EN61000 Class A (heavy industrial) |
| Safety: | |
| North America (cULus) | UL508 (open type device)/CSA 22.2 No. 14-05 |
| Europe (CE) | EN61010-1:2001 |

** External DC current limiting is required. See Fuse Recommendations.*

# Data Outputs

## IQ 35MA11

kVARh and Wh Pulses

***User Interface accessible data:***

- Power (kW)
- Energy (kWh)
- Configurable for CT and PT ratios, system type, and passwords
- Diagnostic alerts
- Current: 3-phase average
- Volts: 3-phase average
- Current: by phase
- Volts: by phase Line-Line and Line-Neutral
- Power: Real, Reactive, and Apparent 3-phase total and per phase
- Power Factor: 3-phase average and per phase
- Frequency
- Power Demand: Most Recent and Peak
- Demand Configuration: Fixed, Rolling Block

## IQ 35MA12, IQ 35MA13, IQ 35MA15

***Modbus Data Set (DS):***

- Power (kW)
- Energy (kWh)
- Configurable for CT and PT ratios, system type, and passwords
- Diagnostic alerts
- Current: 3-phase average
- Volts: 3-phase average
- Current: by phase
- Volts: by phase Line-Line and Line-Neutral
- Power: Real, Reactive, and Apparent 3-phase total and per phase
- Power Factor: 3-phase average and per phase
- Frequency
- Power Demand: Most Recent and Peak
- Demand Configuration: Fixed, Rolling Block, and External Sync (Modbus only)

***Data Logging (IQ 35MA13 only; includes all DS outputs, plus):***

- Real Time clock: user configurable
- 10 user configurable log buffers: each buffer holds 5760 16-bit entries (user configures which 10 data points are stored in these buffers)
- User configurable logging interval (when configured for a 15-minute interval, each buffer holds 60 days of data)
- Continuous and Single Shot logging modes: user selectable
- Auto write pause: read logs without disabling the meter's data logging mode

***Data Logging (IQ 35MA15 only; includes all DS outputs, plus):***

- Real Time clock: uses BACnet Time Syncronization services
- 3 BACnet Log_Events: each buffer holds 5760 32-bit entries (User configures which 3 data points are stored in these buffers)
- User configurable logging interval (when configured for a 15-minute interval, each buffer holds 60 days of data)
- Continuous and Single Shot logging modes: user selectable
- Auto write pause: read logs without disabling the meter's data logging mode

### IQ 35MA22, IQ 35MA23

***Modbus Data Set (DS):***

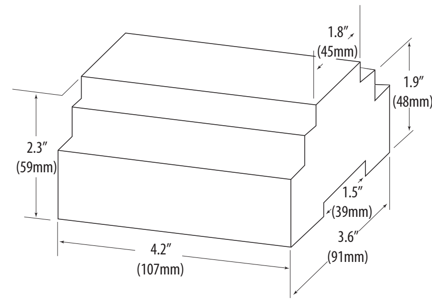
- Signed Power: Real, Reactive, and Apparent 3-phase total and per phase
- Real and Apparent Energy Accumulators: Import, Export, and Net; 3-phase total and per phase
- Reactive Energy Accumulators by Quadrant: 3-phase totals and per phase
- Configurable for CT & PT ratios, system type, and passwords
- Diagnostic alerts
- Current: 3-phase average and per phase
- Volts: 3-phase average and per phase Line-Line and Line-Neutral
- Power Factor: 3-phase average and per phase
- Frequency
- Power Demand: Most Recent and Peak (Import and Export)
- Demand Configuration: Fixed, Rolling Block, and External Sync (Modbus only)

***Data Logging (IQ 35MA23 only; includes all DS outputs, plus)):***

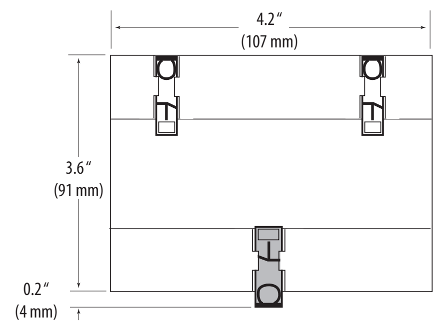
- Real Time Clock: user configurable
- 10 user configurable log buffers: each buffer holds 5760 16-bit entries (user configures which 10 data points are stored in these buffers)
- User configurable logging interval (when configured for a 15-minute interval, each buffer holds 60 days of data)
- Continuous and Single Shot logging modes: user selectable
- Auto write pause: read logs without disabling the meter's data logging mode

## Dimensional Drawings

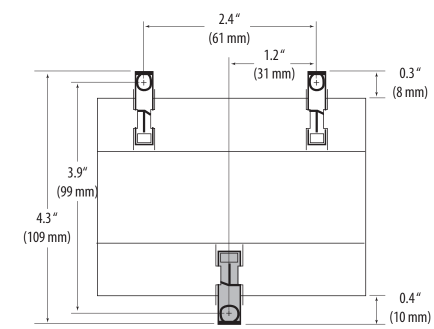
### Housing




### Bottom View (DIN Mount Option)

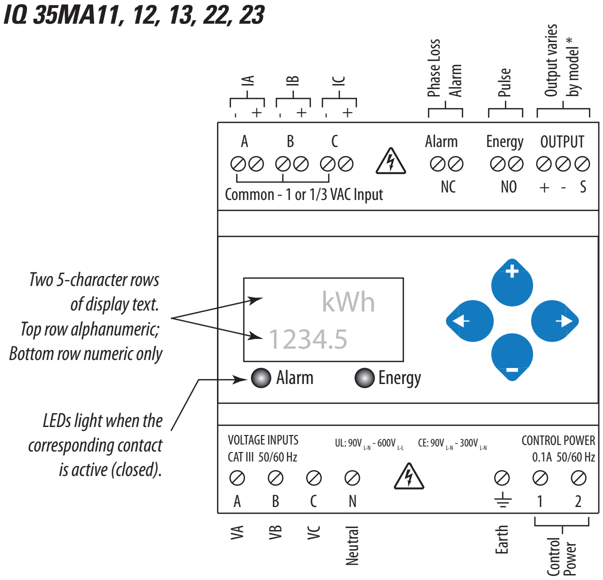



### Bottom View (Screw Mount Option)

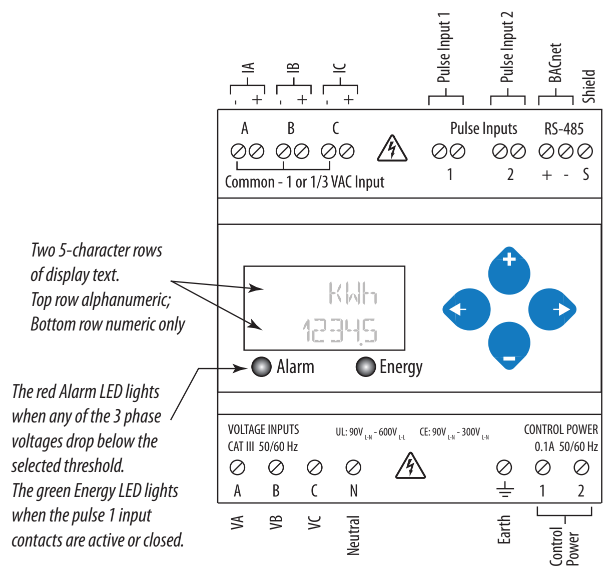


## Product Diagram

### *IQ 35MA11, 12, 13, 22, 23*

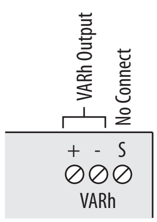



### *IQ 35MA15*

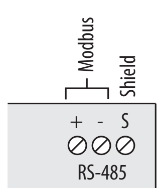



## * Two Output Options Available:

### *Pulse (IQ 35MA11 only)*




### *RS-485*



## Installation

⚠ **Disconnect power prior to installation**

⚠ **Any covers that may be displaced during the installation must be reinstalled before powering the unit.**

**Mount the meter in an appropriate electrical enclosure near equipment to be monitored.**

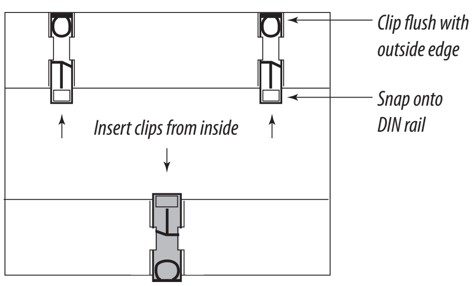
**Do not install on the load side of a Variable Frequency Drive (VFD).**

**For IQ 35MA2x models, observe correct CT orientation.**

The meter can be mounted in two ways: on standard 35 mm DIN rail or screw mounted to the interior surface of the enclosure.

A. DIN Rail Mounting

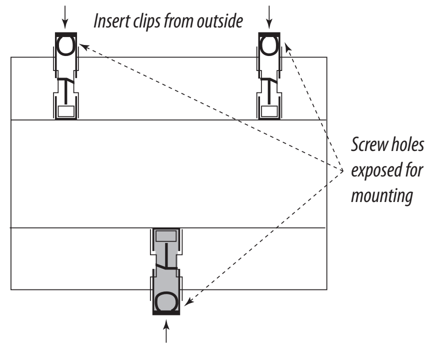
1. Attach mounting clips to the underside of the housing by sliding them into the slots from the inside. The stopping pegs must face the housing, and the outside edge of the clip must be flush with the outside edge of the housing.
2. Snap the clips onto the DIN rail. See diagram of the underside of the housing.




3. To prevent horizontal shifting across the DIN rail, use two Eaton IQ35M-DRSC end stop clips or equivalent.

B. Screw Mounting

1. Attach the mounting clips to the underside of the housing by sliding them into the slots from the outside. The stopping pegs must face the housing, and the screw hole must be exposed on the outside of the housing.
2. Use three #8 screws (not supplied) to mount the meter to the inside of the enclosure. See diagram of the underside of the housing



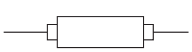
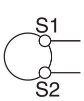
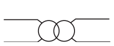
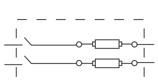
## Supported System Types

The IQ 35M power meters have a number of different possible system wiring configurations (see Wiring Diagrams, next page). To configure the meter, set the System Type via the User Interface or Modbus register 130 (if so equipped). The System Type tells the meter which of its current and voltage inputs are valid, which are to be ignored, and whether neutral is connected. Setting the correct System Type prevents unwanted energy accumulation on unused inputs, selects the formula to calculate the Theoretical Maximum System Power, and determines which phase loss algorithm is to be used. The phase loss algorithm is configured as a percent of the Line-to-Line System Voltage (except when in System Type 10) and also calculates the expected Line to Neutral voltages for system types that have Neutral (12 & 40).

Values that are not valid in a particular System Type will display as "----" on the User Interface or as QNAN (Quiet Not A Number) in the Modbus registers.

| | **CTs** | | **Voltage Connections** | | | **System Type** | | **Phase Loss Measurements** | | | **Wiring** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Number of wires** | **Qty** | **ID** | **Qty** | **ID** | **Type** | **Modbus Register 130** | **User Interface: SETUP>S SYS** | **VLL** | **VLN** | **Balance** | **Diagram Number** |
| Single-Phase Wiring | | | | | | | | | | | |
| 2 | 1 | A | 2 | A, N | L-N | 10 | 1L + 1n | | AN | | 1 |
| 2 | 1 | A | 2 | A, B | L-L | 11 | 2L | AB | | | 2 |
| 3 | 2 | A, B | 3 | A, B, N | L-L with N | 12 | 2L + 1n | AB | AN, BN | AN-BN | 3 |
| Three-Phase Wiring | | | | | | | | | | | |
| 3 | 3 | A, B, C | 3 | A, B, C | Delta | 31 | 3L | AB, BC, CA | | AB-BC-CA | 4 |
| 4 | 3 | A, B, C | 4 | A, B, C, N | Grounded Wye | 40 | 3L + 1n | AB, BC, CA | AN, BN, CN | AN-BN-CN & AB-BC-CA | 5, 6 |

## Wiring

| **Symbol** | **Description** |
|---|---|
|  | Voltage Disconnect Switch |
|  | Fuse (installer is responsible for ensuring compliance with local requirements. No fuses are included with the device.) |
|  | Earth ground |
|  | Current Transducer |
|  | Potential Transformer |
|  | Protection containing a voltage disconnect switch with a fuse or disconnect circuit breaker. The protection device must be rated for the available short-circuit current at the connection point. |

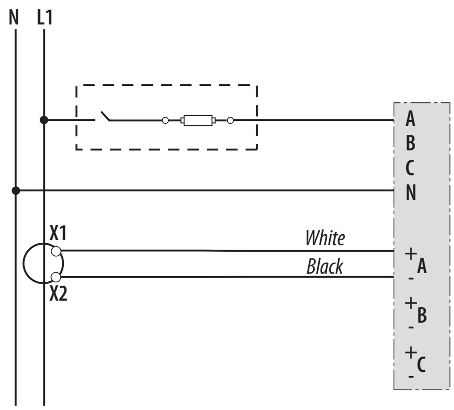
IQ 35MA1x models are not polarity sensitive. No need to observe polarity when wiring.

IQ 35MA2x models are polarity sensitive. Observe correct polarity when wiring.

## Wiring Diagrams

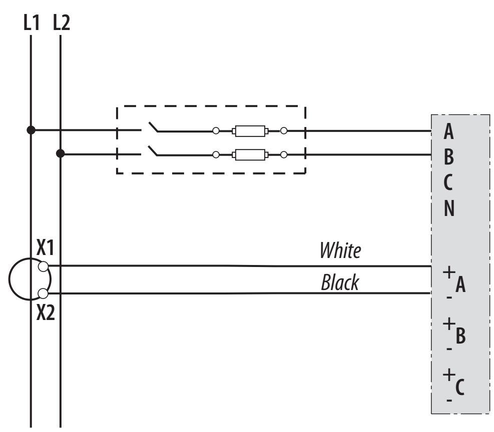
### Diagram 1: 1-Phase Line-to-Neutral 2-Wire System 1 CT

Use System Type 10 (1L + 1n)



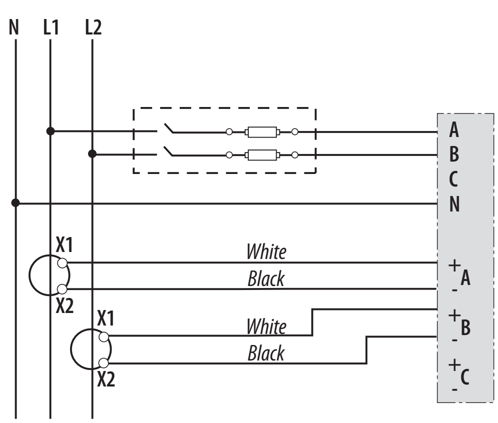

### Diagram 2: 1-Phase Line-to-Line 2-Wire System 1 CT

Use System Type 11 (2L)



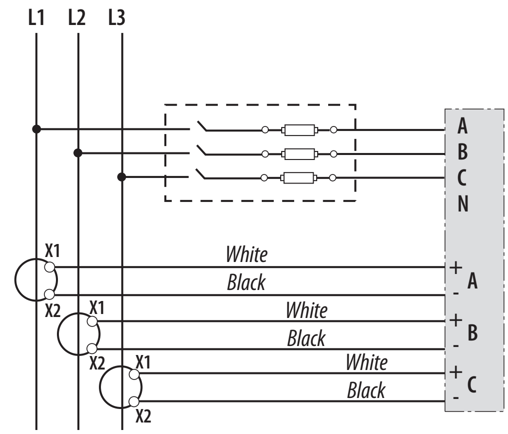

### Diagram 3: 1-Phase Direct Voltage Connection 2 CT

Use System Type 12 (2L + 1n)



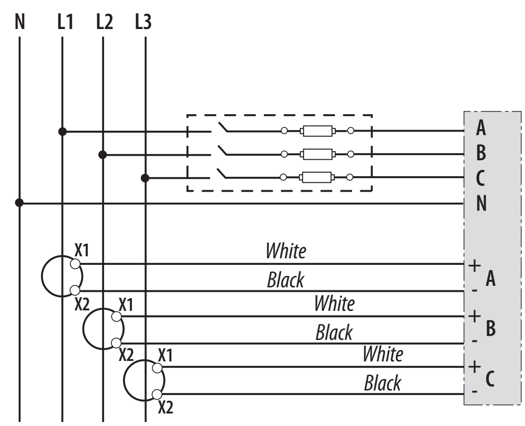

### Diagram 4: 3-Phase 3-Wire 3 CT no PT

Use System Type 31 (3L)



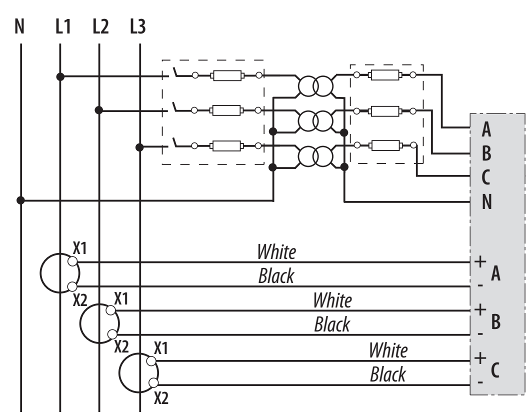

### Diagram 5: 3-Phase 4-Wire Wye Direct Voltage Connection 3 CT

Use System Type 40 (3L + 1n)



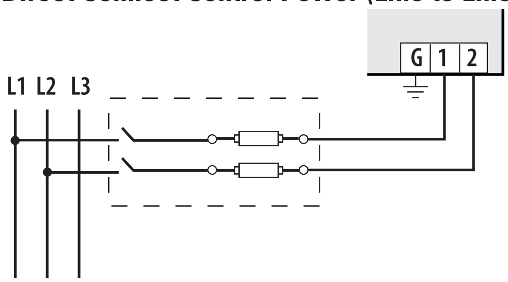

### Diagram 6: 3-Phase 4-Wire Wye Connection 3CT 3 PT

Use System Type 40 (3L + 1n)



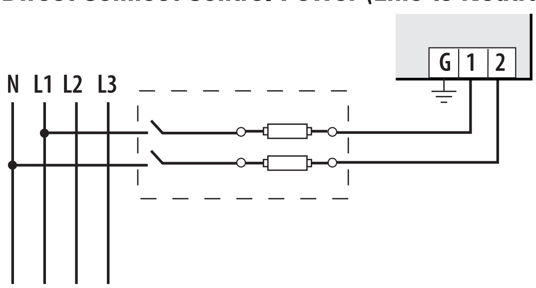
# Control Power

## Direct Connect Control Power (Line to Line)



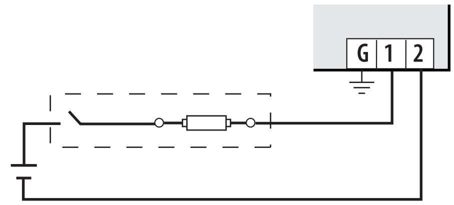

Line to Line from 90VAC to 600VAC (UL) (520 VAC CE). In UL installations, the lines may be floating (i.e. a delta). If any lines are tied to an earth (i.e. a corner grounded delta), see the Line to Neutral installation limits. In CE installations, the lines must be neutral (earth) referenced at less than $300VAC_{L-N}$.

## Direct Connect Control Power (Line to Neutral)



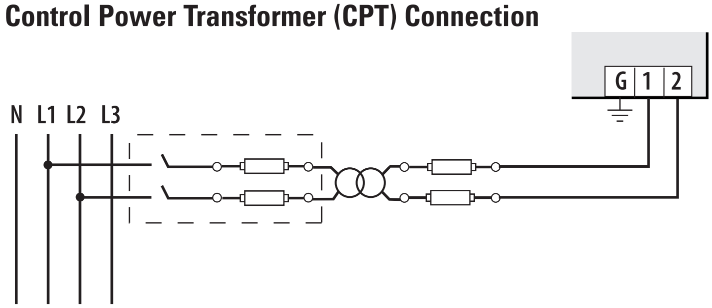

Line to Neutral from 90VAC to 347VAC (UL) or 300VAC (CE)

## Direct Connect Control Power (DC)




DC Control Powerfrom 125VDC to 300VDC (UL and CE max.).

## Control Power Transformer (CPT) Connection




The Control Power Transformer may be wired L-N or L-L. Output to meet meter input requirements

### Fuse Recommendations:

Keep the fuses close to the power source (obey local and national code requirements).

For selecting fuses and circuit breakers, use the following criteria:

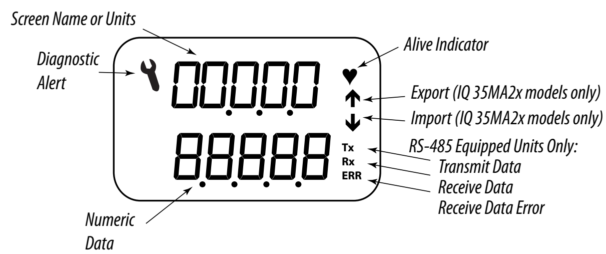
- Select current interrupt capacity based on the installation category and fault current capability.
- Select over-current protection with a time delay.
- The voltage rating should be sufficient for the input voltage applied.
- Provide overcurrent protection and disconnecting means to protect the Wiring. For DC installations, the installer must provide external circuit protection (suggested: 0.5A, time delay fuses).
- The earth connection is required for electromagnetic compatibility (EMC) and is not a protective earth ground.

### Wiring Notes

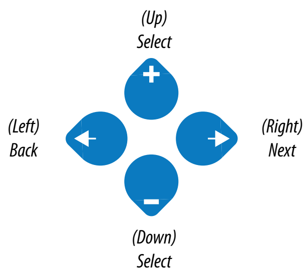
- Use 14-24 gauge wire for all connections.
- When tightening terminals, ensure that the correct torque is applied: 0.37 to 0.44 ft·lb (0.5 to 0.6 N·m).

## Display Screen

LCD Screen:




Buttons:




## Quick Setup Instructions

### IQ 35MA11, IQ 35MA12, IQ 35MA13, IQ 35MA2x

These instructions assume the meter is set to factory defaults. If it has been previously configured, all optional values should be checked.

1. Press the (+) or (−) button repeatedly until SETUP screen appears.
2. (→) to the PASWD screen.
3. (→) through the digits. Use the (+) or (−) buttons to select the password (the default is 00000). Exit the screen to the right.
4. Use the (+) or (−) buttons to select the parameter to configure.
5. If the unit has an RS-485 interface, the first Setup screen is S COM (set communications).

   a. (→) to the ADDR screen and through the address digits. Use the (+) or (−) buttons to select the Modbus address.

   b. (→) to the BAUD screen. Use the (+) or (−) buttons to select the baud rate.

   c. (→) to the PAR screen. Use the (+) or (−) buttons to select the parity.

   d. (→) back to the S COM screen.

**6.** (−) to the S CT (Set Current Transducer) screen. If this unit does not have an RS-485 port, this will be the first screen.

   a. (→) to the CT V screen. Use the (+) or (−) buttons to select the voltage mode Current Transducer output voltage.

   b. (→) to the CT SZ screen and through the digits. Use the (+) or (−) buttons to select the CT size in amps.

   c. (→) back to the S CT screen.

**7.** (−) to the S SYS (Set System) screen.

   a. (→) to the SYSTM screen. Use the (+) or (−) buttons to select the System Type (see wiring diagrams).

   b. (→) back to the S SYS screen.

8. (Optional) (−) to the S PT (Set Potential Transformer) screen. If PTs are not used, then skip this step.

   a. (→) to the RATIO screen and through the digits. Use the (+) or (−) buttons to select the Potential Transformer step down ratio.

   b. (→) back to the S PT screen.

**9.** (−) to the S V (Set System Voltage) screen.

   a. (→) to the VLL (or VLN if system is 1L-1n) screen and through the digits. Use the (+) or (−) buttons to select the Line to Line System Voltage.

   b. (→) back to the S V screen.

10. Use the (←) to exit the setup screen and then SETUP.
11. Check that the wrench is not displayed on the LCD.

   a. If the wrench is displayed, use the (+) or (−) buttons to find the ALERT screen.

   b. (→) through the screens to see which alert is on.

For full setup instructions, see the configuration instructions on the following pages.

## IQ 35MA15

Use this section to enter:

- BACnet communication parameters

- CT (Current Transducer) output voltage and input current ranges

- The service type to be monitored

These instructions assume the meter is set to factory defaults. If it has been previously configured, all optional values should be checked.

### *A. To Navigate to the Setup screens:*

1. Press ⊕ or ⊖ repeatedly until SETUP screen appears.
2. Press ➡ to get to the PASWD screen.
3. Press ➡ to move through the digits. Use the ⊕ or ⊖ buttons to enter your password (the default is 00000).
4. Press ➡ to move to the first Setup screen (S BAC)
5. Use ⊕ or ⊖ to select the parameter screen you want to set.
6. After you set the parameters you want, use ⊕ or ⊖ to select the next Setup screen or ⬅ to exit the Setup screens (return to SETUP).

### *B. To Enter BACnet communication parameters*

1. Navigate to the S BAC (set BACnet) Setup screen (see section A above).
2. Press ➡ to go to the MAC screen and through the address digits. Use ⊕ or ⊖ to select the BACnet MAC address (default is 001).
3. Press ➡ to accept the value and go to the K BAUD screen. Use ⊕ or ⊖ to select the baud rate (default is 76.8K).
4. Press ➡ to go to the ID1 screen and through the upper four digits of the Device Instance. Use ⊕ or ⊖ to select the ID digits. The setup screen splits the Device ID into two parts, the most significant four digits (ID1) and the least significant three digits (ID2). The IQ35MA15 supports BACnet Device ID values from 1 to 4,193,999. Units are shipped with a factory default setting that is pseudo-randomly generated in the range from 1,000,000 to 3,097,151.
5. Press ➡ to accept the value and go to the ID2 screen and through the lower three digits of the Device Instance. Use ⊕ or ⊖ to select the ID digits.
6. Press ➡ to accept the value and go back to the S BAC screen.

### *C. To Enter the CT (Current Transducer) output voltage and input current ranges:*

1. Navigate to the S CT (Set Current Transducer) Setup screen (see section A above).
2. Press ➡ to go to the CT V screen. Use ⊕ or ⊖ to select the voltage mode Current Transducer output voltage (default is 1.00).
3. Press ➡ to go to the CT SZ screen and through the digits. Use ⊕ or ⊖ to select the CT size in amps (default is 100). accept the value and
4. Press ➡ to accept the value and go back to the S CT screen.

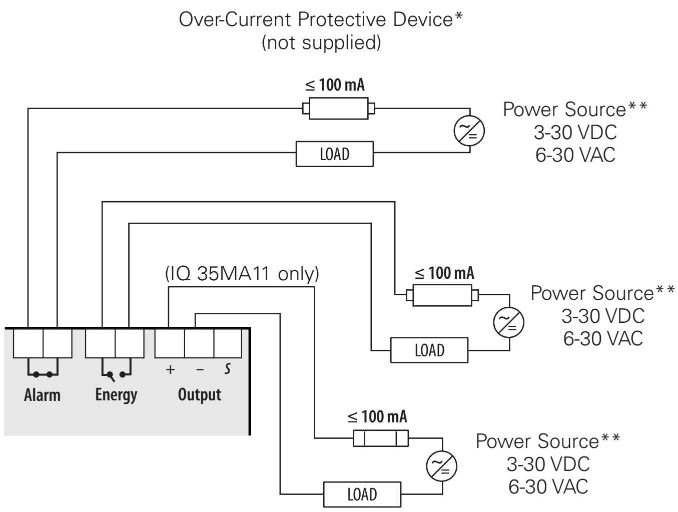
### *D. To Enter the service type to be monitored:*

1. Navigate to the S SYS (Set System) Setup screen (see section A above).
2. Press ➡ to go to the SYSTM screen. Use ⊕ or ⊖ to select the configuration (see wiring diagrams - default is 3LN-1N).

Press ➡ to go back to the S SYS screen. For full setup instructions, see the configuration instructions on the following pages.

## Solid State Pulse Output (IQ 35MA11, IQ 35MA12, IQ 35MA13, IQ 35MA2x)

The meter has one normally open (N.O.) KY Form A output and one normally closed (N.C.) output. One is dedicated to energy (Wh), and the other to Alarm. On the IQ 35MA2x bi-directional models, the energy output pulse represents import energy. The IQ 35MA11 also provides an additional N.O. reactive energy (VARh) contact. See the Setup section for configuration information.




The solid state pulse outputs are rated for 30 VAC/DC max.

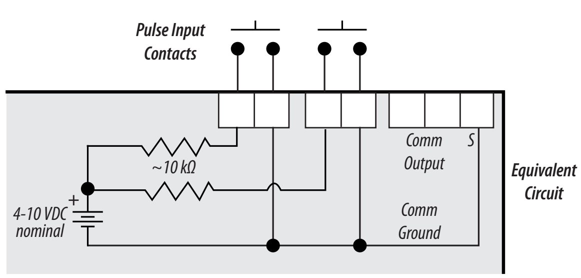
Maximum load current is 100mA at 25°C. Derate 0.56mA per °C above 25°C.

* The over-current protective device must be rated for the short circuit current at the connection point.

** All pulse outputs and communication circuits are only intended to be connected to non-hazardous voltage circuits (SELV or Class 2). Do not connect to hazardous voltages.

## Pulse Contact Inputs (IQ 35MA15 only)

The IQ 35MA15 has two inputs with pulse accumulators for solid state or mechanical contacts in other sensors, such as water or gas flow meters. These inputs are isolated from the measured circuits and referenced to the communication signal ground. Use with contacts that do not require current to remove oxidation.



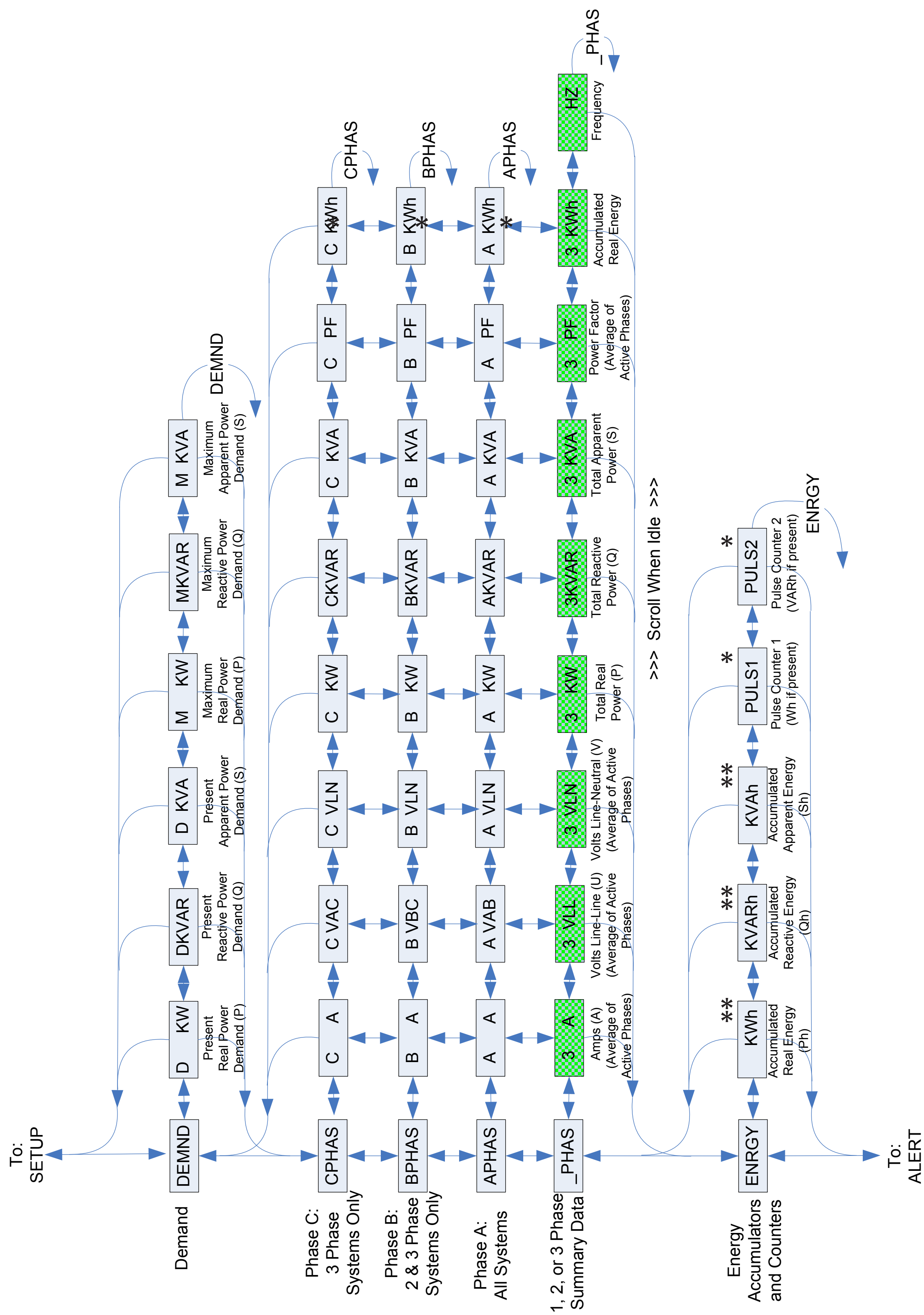

## UI Menu Abbreviations Defined

The user can set the display mode to IEC or IEEE notation in the SETUP menu.

**Main Menu**

| IEC | IEEE | Description |
|---|---|---|
| D | D | Demand |
| MAX | M | Maximum Demand |
| P | W | Present Real Power |
| Q | VAR | Present Reactive Power |
| S | VA | Present Apparent Power |
| A | A | Amps |
| UAB, UBC, UAC | VAB, VBC, VAC | Voltage Line to Line |
| V | VLN | Voltage Line to Neutral |
| PF | PF | Power Factor |
| U | VLL | Voltage Line to Line |
| HZ | HZ | Frequency |
| KSh | KVAh | Accumulated Apparent Energy |
| KQh | KVARh | Accumulated Reactive Energy |
| KPh | KWh | Accumulated Real Energy |
| PLOSS | PLOSS | Phase Loss |
| LOWPF | LOWPF | Low Power Factor Error |
| F ERR | F ERR | Frequency Error |
| I OVR | I OVR | Over Current |
| V OVR | V OVR | Over Voltage |
| PULSE | PULSE | kWh Pulse Output Overrun (configuration error) |
| _PHASE | _PHASE | Summary Data for 1, 2, or 3 active phases |
| ALERT | ALERT | Diagnostic Alert Status |
| INFO | INFO | Unit Information |
| MODEL | MODEL | Model Number |
| OS | OS | Operating System |
| RS | RS | Reset System |
| SN | SN | Serial Number |
| RESET | RESET | Reset Data |
| PASWD | PASWD | Enter Reset or Setup Password |
| ENERG | ENERG | Reset Energy Accumulators |
| DEMND | DEMND | Reset Demand Maximums |
| *IQ 35MA2x only:* | | |
| ⇧ | | Import |
| ⇩ | | Export |
| PULS_ | PULS_ | Pulse Counter (if equipped) |
| Q_ | Q_ | Quadrant 1-4 per IEEE 1459 |
| n | n | Net |

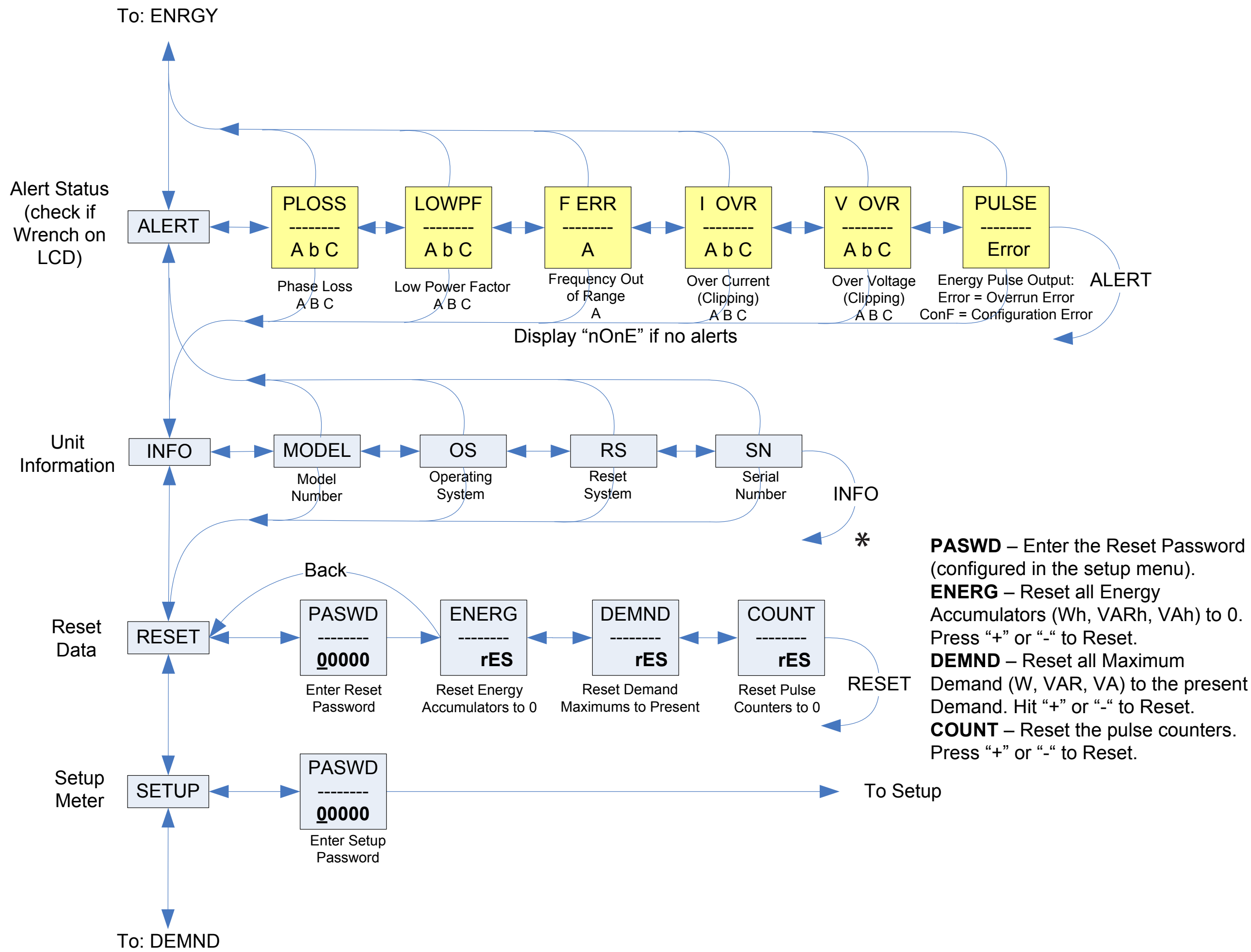
## User Interface for Data Configuration: IQ 35MA11, 12, and 13




* This screen is not available in units with firmware versions 1.018 or earlier.

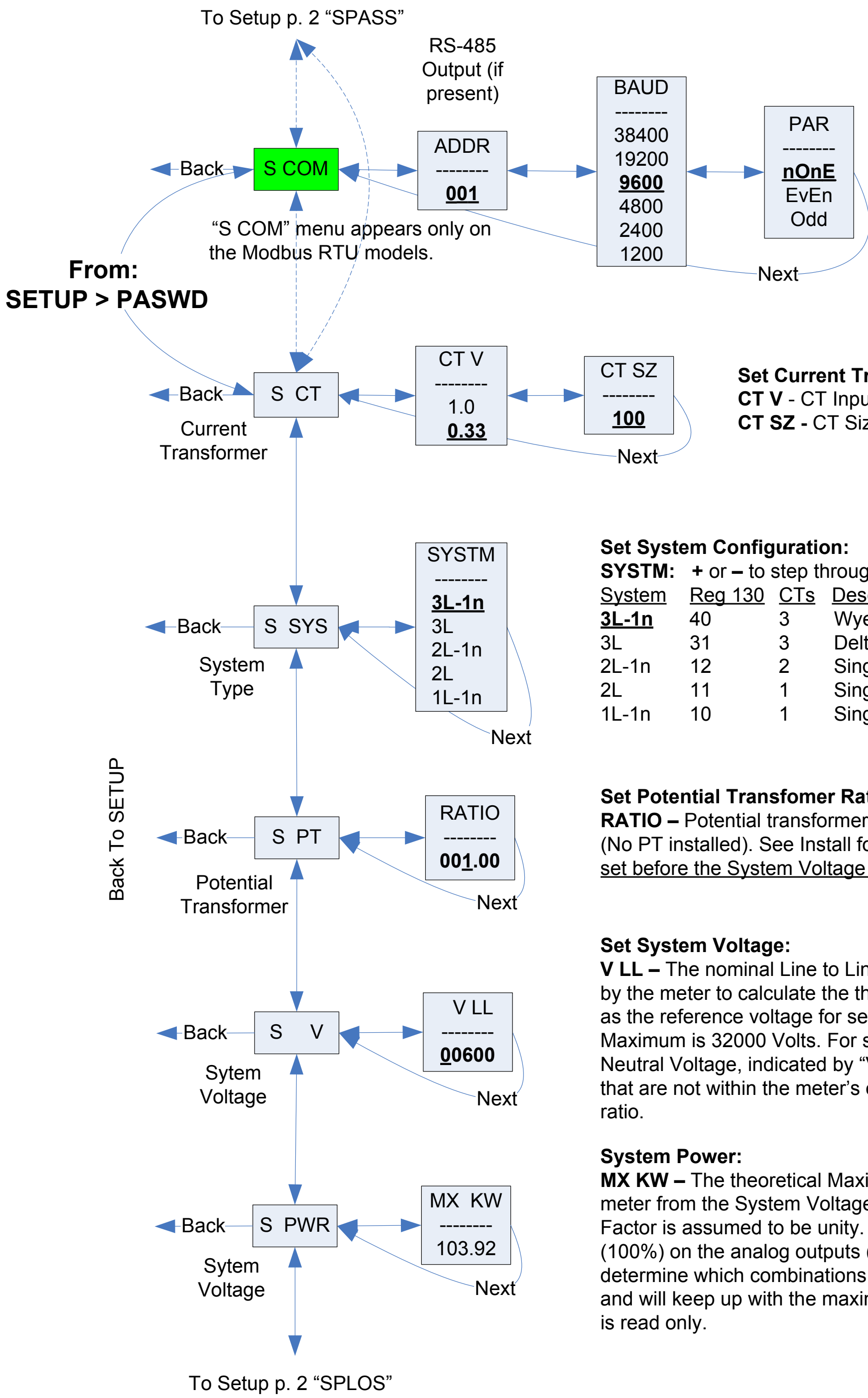
** This screen is part of the Phase Summary Data in units with firmware versions 1.018 or earlier.

## Alert/Reset Information: IQ 35MA11, 12, and 13




*** This screen is not available in units with firmware versions 1.018 or earlier.**

# User Interface for Setup: IQ 35MA11, 12, and 13




**Set Communications Parameters:**
**ADDR - Modbus Address:** 1 – 247.
**+** increments the selected (blinking) digit.
**-** selects the digit to the left.
**BAUD - Baud Rate:** 1200 – 38400 Baud
**PAR - Parity:** Odd, Even, None
**+** or **–** to step through the options.

**Set Current Transducer:**
**CT V** - CT Input Voltage: + or **–** to Select 1.0 or .33V.
**CT SZ -** CT Size: in Amps. Maximum is 32000 Amps.

**Set System Configuration:**
**SYSTM:** **+** or **–** to step through the following System Type options:

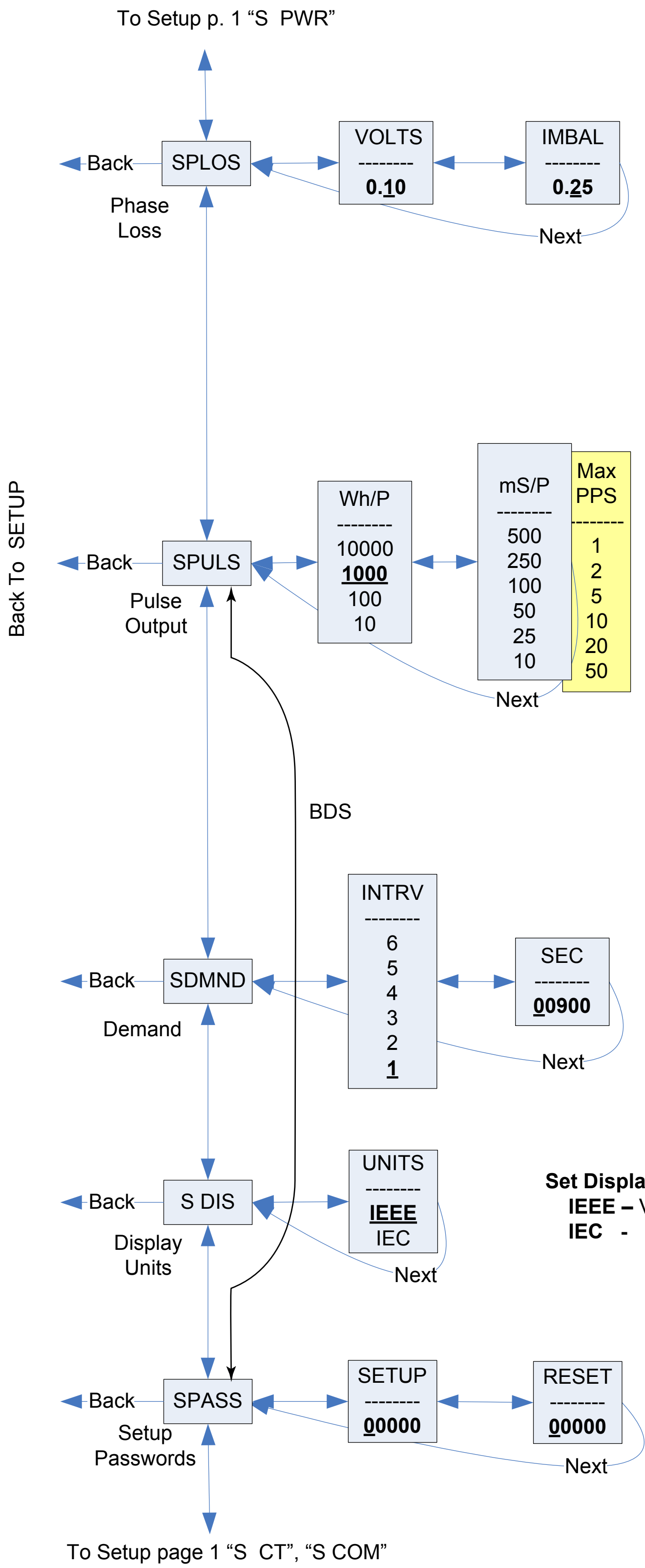
| System | Reg 130 | CTs | Description |
|---|---|---|---|
| **3L-1n** | 40 | 3 | Wye Three Phase: A, B, & C with Neutral (Default). |
| 3L | 31 | 3 | Delta Three Phase: A, B & C; no Neutral |
| 2L-1n | 12 | 2 | Single Split Phase: A & B with Neutral |
| 2L | 11 | 1 | Single Phase: A & B; no Neutral |
| 1L-1n | 10 | 1 | Single Phase: A to Neutral |

**Set Potential Transfomer Ratio:**
**RATIO –** Potential transformer step down is RATIO:1. Default is 1:1 (No PT installed). See Install for wiring diagrams. This value must be set before the System Voltage (if used).

**Set System Voltage:**
**V LL –** The nominal Line to Line Voltage for the system. This is used by the meter to calculate the theoretical maximum system power, and as the reference voltage for setting the Phase Loss threshold. Maximum is 32000 Volts. For system type 1+N (10), this is a Line to Neutral Voltage, indicated by "V LN". Note: the meter will reject settings that are not within the meter's operating range when divided by the PT ratio.

**System Power:**
**MX KW –** The theoretical Maximum System Power is calculated by the meter from the System Voltage, CT size, and System Type. Power Factor is assumed to be unity. The value of System Power is Full Scale (100%) on the analog outputs (20mA or 5V DC). It is also used to determine which combinations of pulse weight and duration are valid and will keep up with the maximum power the meter will see. This value is read only.

Note: **Bold** is the Default.




**Set Phase Loss:**
**VOLTS - Phase Loss Voltage:** The fraction of the system voltage below which Phase Loss Alarm is on. For system types with neutral, the Line to Neutral voltage is also calculated and tested. If the System Voltage is 600 and the fraction is set to 0.10, then the Phase Loss threshold will be 60 volts.
**IMBAL - Phase Loss Imbalance**: The fractional difference in Line to Line voltages above which Phase Loss Alarm is on. For system types with neutral, the Line to Neutral voltages are also tested. For system types 1+N (10) and 2 (11) , imbalance is not tested.

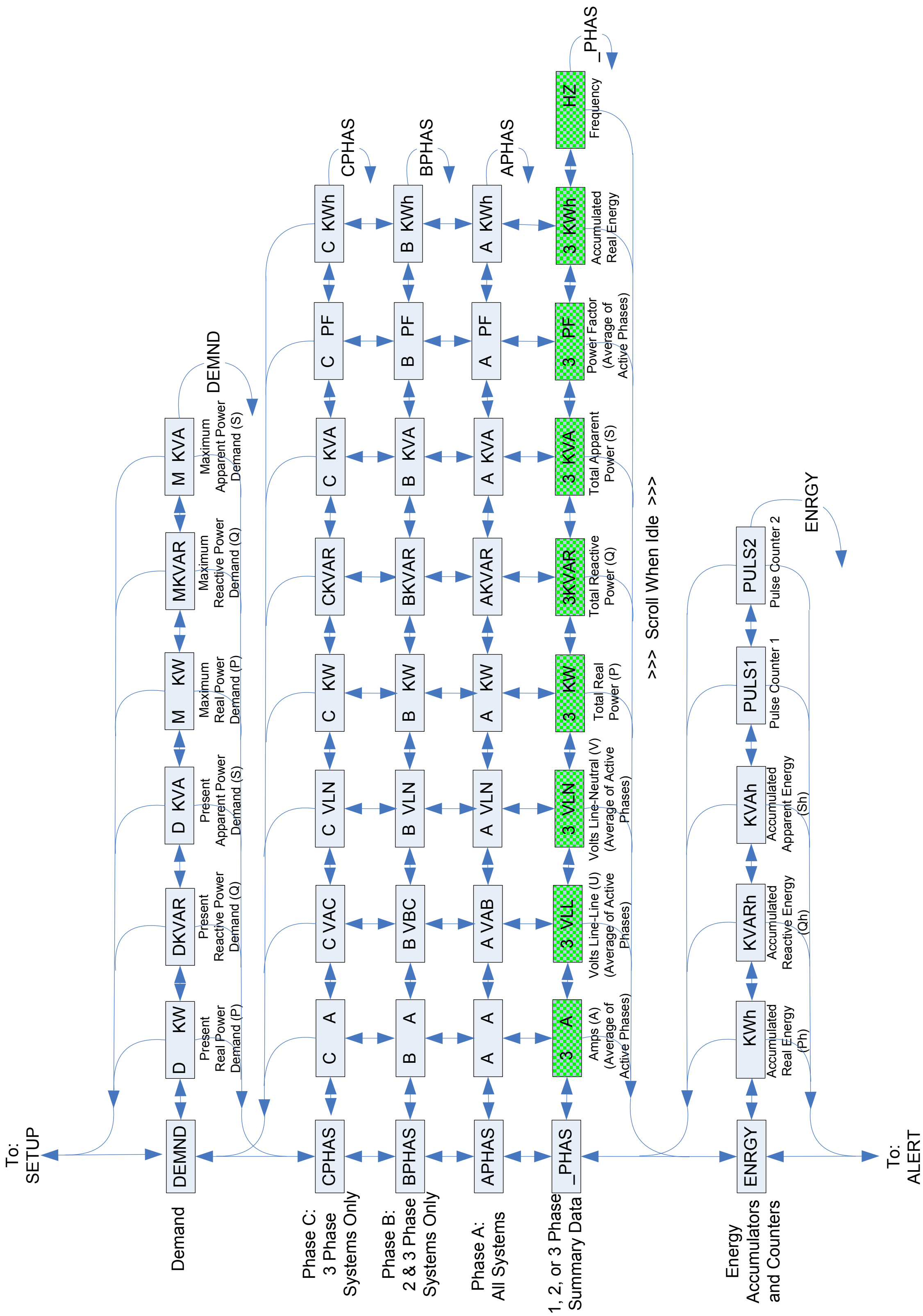
**Set Pulse:**
The System Type , CT size, PT Ratio, and System Voltage must all be configured before setting the Pulse Energy. If any of these parameters are changed, the meter will hunt for a new Pulse Duration, but will not change the Pulse Energy. If it cannot find a solution, the meter will display the wrench, show "ConF" in the ALARM -> PULSE screen, and enable Energy pulse output configuration error bit in the Modbus Diagnostic Alert Bitmap (if equipped).
**Wh/P - Set Pulse Energy:** In Watt Hours (& VAR Hours, if present) per Pulse. When moving down to a smaller energy, the meter will not allow the selection if it cannot find a pulse duration that will allow the pulse output to keep up with Theoretical Maximum System Power (see S_PWR screen). When moving up to a larger energy, the meter will jump to the first value where it can find a valid solution.
**mS/P – Minimum Pulse Duration Time:** This read only value is set by the meter to the slowest duration (in mS per closure) that will keep up with the Theoretical Maximum System Power. The open time is greater than or equal to the closure time. The maximum Pulses Per Second (PPS) is shown in yellow.

**Set Demand Interval:**
**INTRV -** The number of Sub-Intervals (1 to 6) in a Demand Interval**.** Default is 1 (block demand).
**SEC -** Sub-Interval length in seconds. Default is 900 (15 minutes). Set to 0 for external sync-to-comms (Modbus units only).

**Set Display Units: +/-** to switch between:
**IEEE –** VLL VLN W VAR VA Units.
**IEC -** U V P Q S Units.

**Set Passwords:**
**SETUP -** The Password to enter the SETUP menu.
**RESET -** The Password to enter the RESET menu.

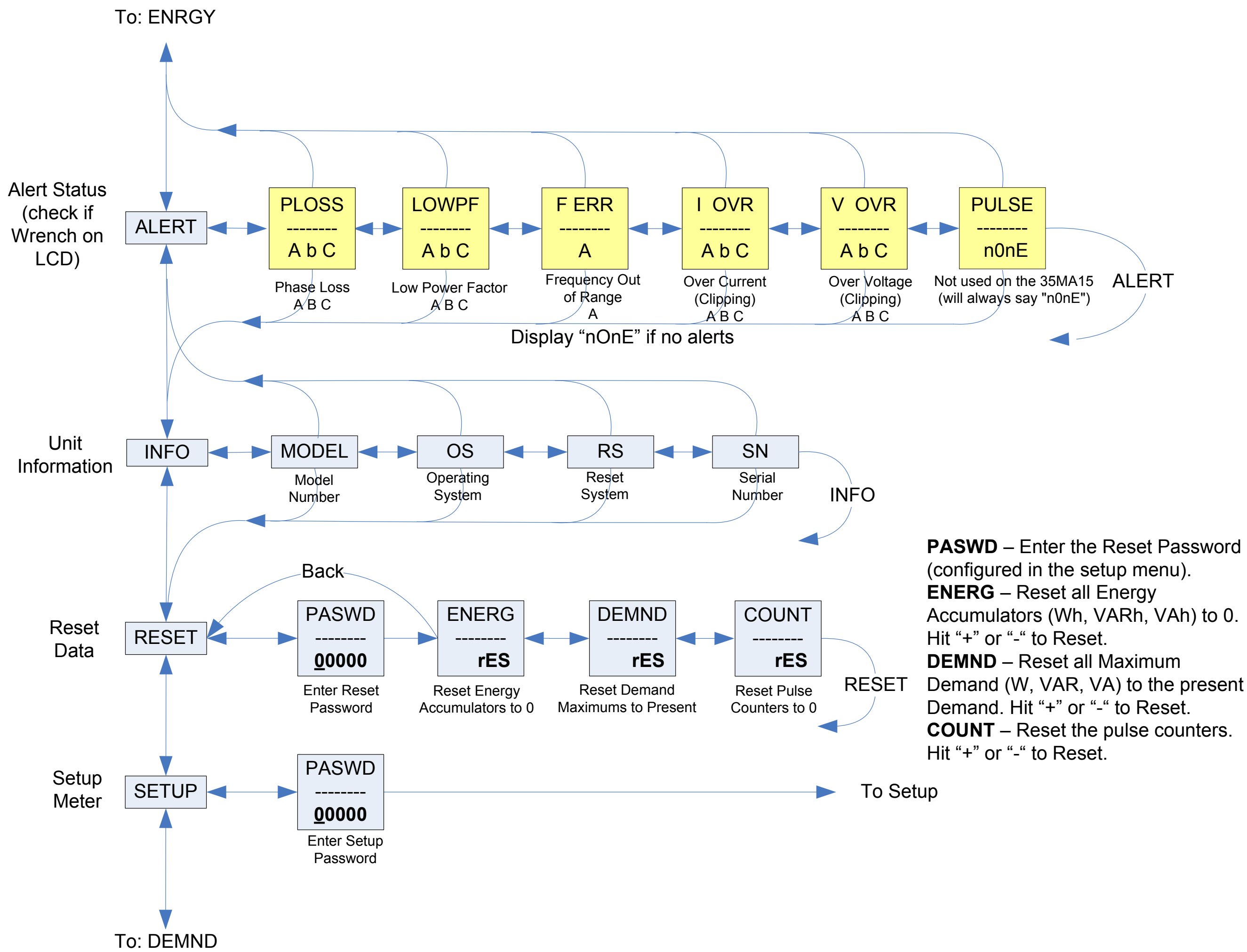
## User Interface for Data Configuration:  IQ 35MA15





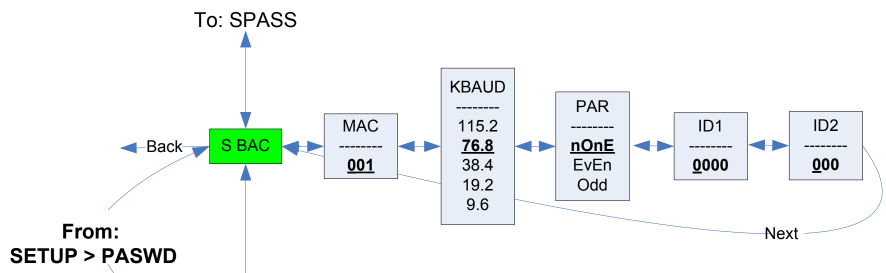

ZL0072-0F

## Alert/Reset Information: IQ 35MA15

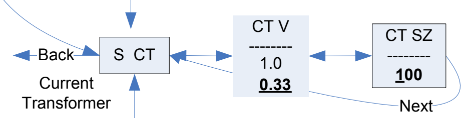



**PASWD** – Enter the Reset Password (configured in the setup menu).
**ENERG** – Reset all Energy Accumulators (Wh, VARh, VAh) to 0. Hit "+" or "-" to Reset.
**DEMND** – Reset all Maximum Demand (W, VAR, VA) to the present Demand. Hit "+" or "-" to Reset.
**COUNT** – Reset the pulse counters. Hit "+" or "-" to Reset.

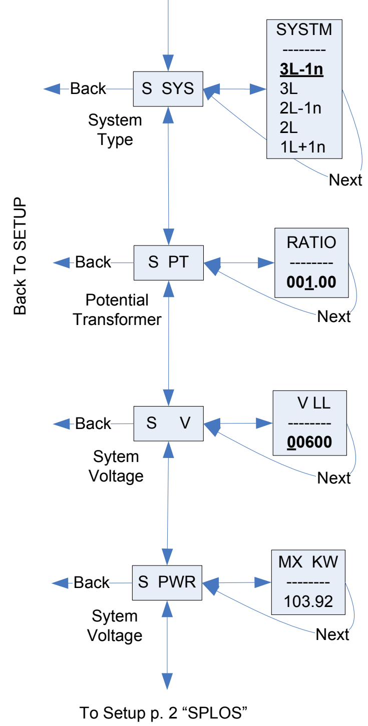
## User Interface for Setup:  IQ 35MA15




**Set Communications Parameters:**
**ADDR – BACnet MS/TP MAC Address: 0** – 127.
**+** increments the selected (blinking) digit.
**–** selects the digit to the left.
**BAUD - Baud Rate:** 9600 – 115200 Baud
**PAR - Parity:** Odd, Even, None
**+** or **–** to step through the options.
**BACnet ID:** These two screens set the 7 digit BACnet device ID. Screen ID1 is the most significant 4 digits and ID2 the least significant three digits. This is in the range of 0 - 4,194,302.




**Set Current Transducer:**
**CT V** - CT Input Voltage: + or **–** to Select 1.0 or .33V.
**CT SZ -** CT Size: in Amps. Maximum is 32000 Amps.




**Set System Configuration:**
**SYSTM:** **+** or **–** to step through the following System Type options:

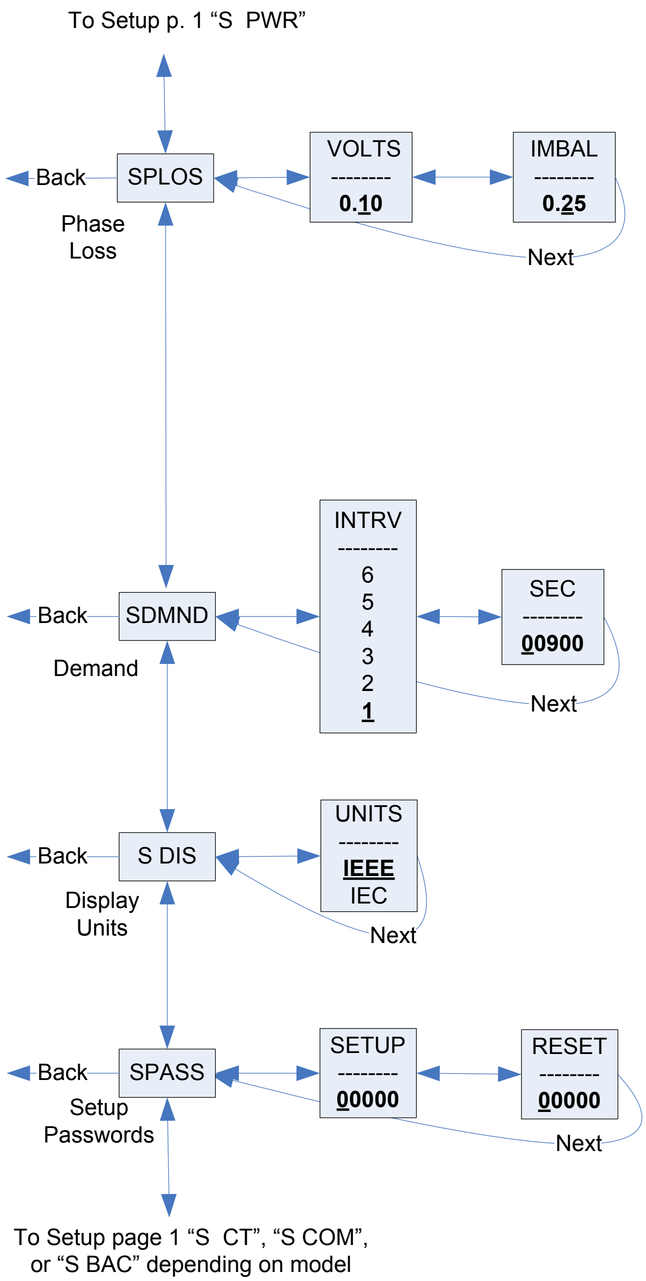
| System | Reg 130 | CTs | Description |
|---|---|---|---|
| **3L-1n** | 40 | 3 | Wye Three Phase: A, B, & C with Neutral (Default). |
| 3L | 31 | 3 | Delta Three Phase: A, B & C; no Neutral |
| 2L-1n | 12 | 2 | Single Split Phase: A & B with Neutral |
| 2L | 11 | 1 | Single Phase: A & B; no Neutral |
| 1L-1n | 10 | 1 | Single Phase: A to Neutral |

**Set Potential Transfomer Ratio:**
**RATIO –** Potential transformer step down is RATIO:1. Default is 1:1 (No PT installed). See Install for wiring diagrams. <u>This value must be set before the System Voltage</u> (if used).

**Set System Voltage:**
**V LL –** The nominal Line to Line Voltage for the system. This is used by the meter to calculate the theoretical maximum system power, and as the reference voltage for setting the Phase Loss threshold. Maximum is 32000 Volts. For system type 1+N (10), this is a Line to Neutral Voltage, indicated by "V LN". Note: the meter will reject settings that are not within the meter's operating range when divided by the PT ratio.

**System Power:**
**MX KW –** The theoretical Maximum System Power is calculated by the meter from the System Voltage, CT size, and System Type. Power Factor is assumed to be unity. The value of System Power is used to determine which combinations of pulse weight and duration are valid and will keep up with the maximum power the meter will see. This value is read only.

Note: **Bold** is the Default.



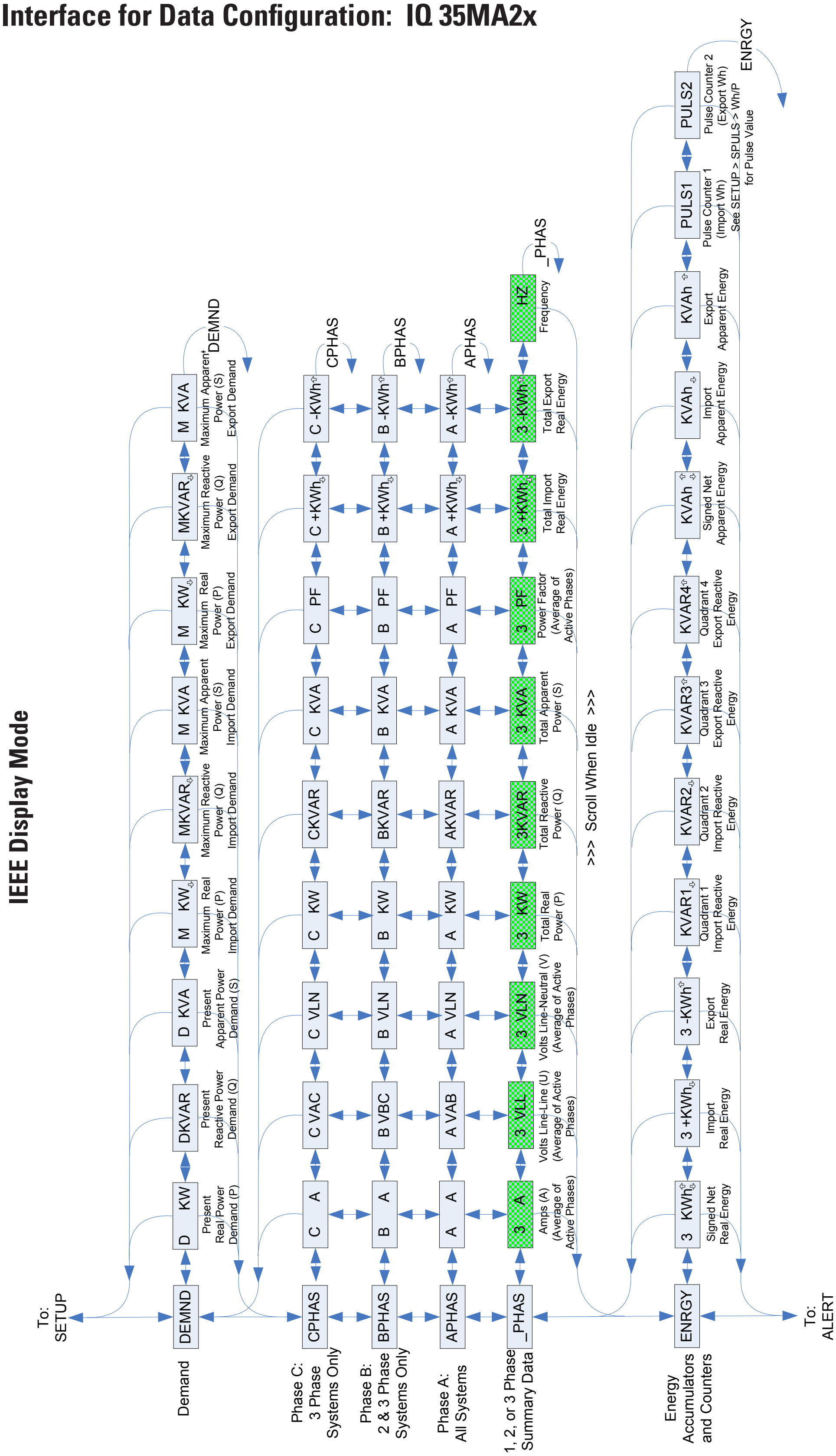

**Set Phase Loss:**
**VOLTS - Phase Loss Voltage:** The fraction of the system voltage below which Phase Loss Alarm is on. For system types with neutral, the Line to Neutral voltage is also calculated and tested. If the System Voltage is 600 and the fraction is set to 0.10, then the Phase Loss threshold will be 60 volts.
**IMBAL - Phase Loss Imbalance**: The fractional difference in Line to Line voltages above which Phase Loss Alarm is on. For system types with neutral, the Line to Neutral voltages are also tested. For system types 1+N (10) and 2 (11) , imbalance is not tested.

**Set Demand Interval:**
**INTRV -** The number of Sub-Intervals (1 to 6) in a Demand Interval**.** Default is 1 (block demand).
**SEC -** Sub-Interval length in seconds. Default is 900 (15 minutes). Set to 0 for external sync-to-comms.

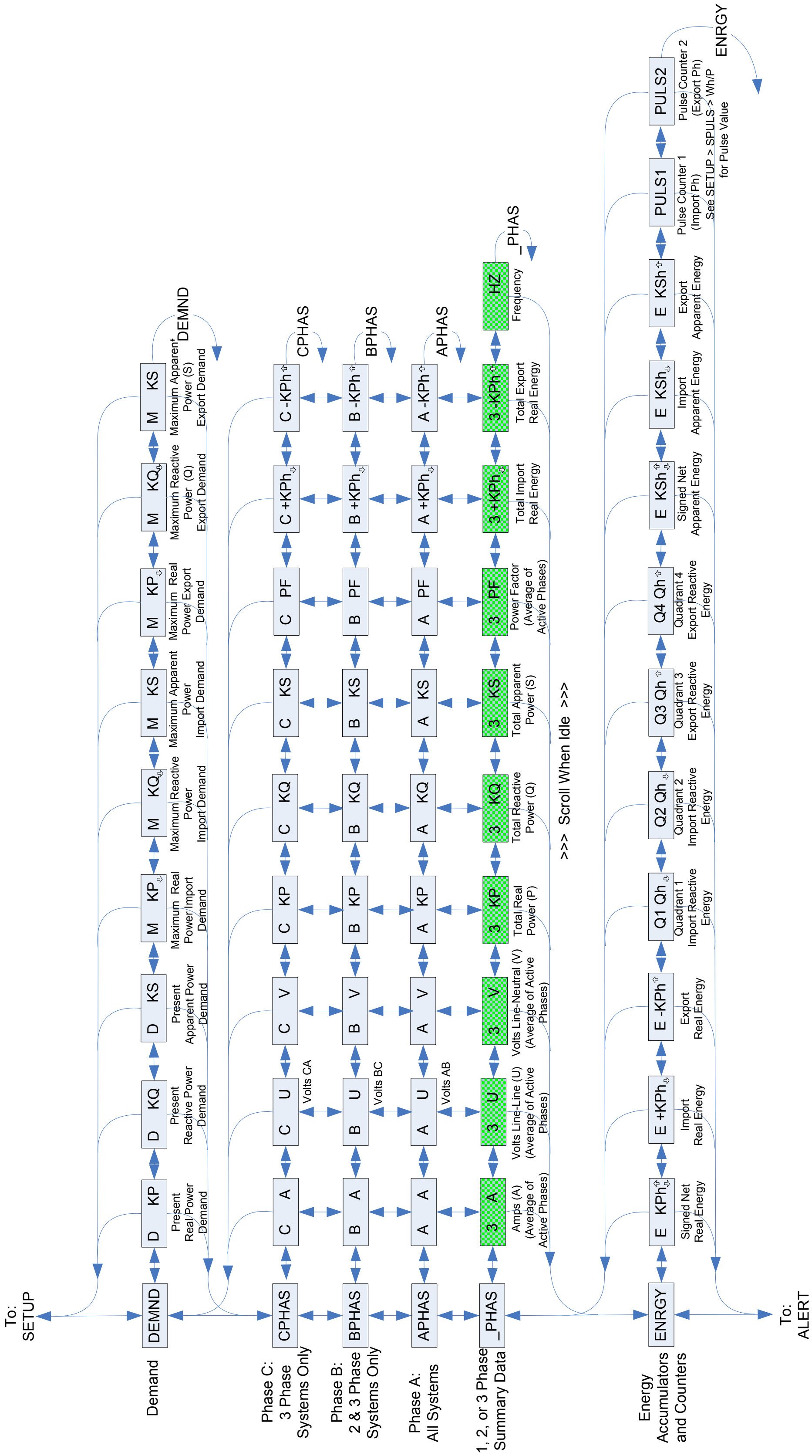
**Set Display Units:** **+/-** to switch between:
**IEEE –** VLL VLN W VAR VA Units.
**IEC -** U V P Q S Units.

**Set Passwords:**
**SETUP -** The Password to enter the SETUP menu.
**RESET -** The Password to enter the RESET menu.

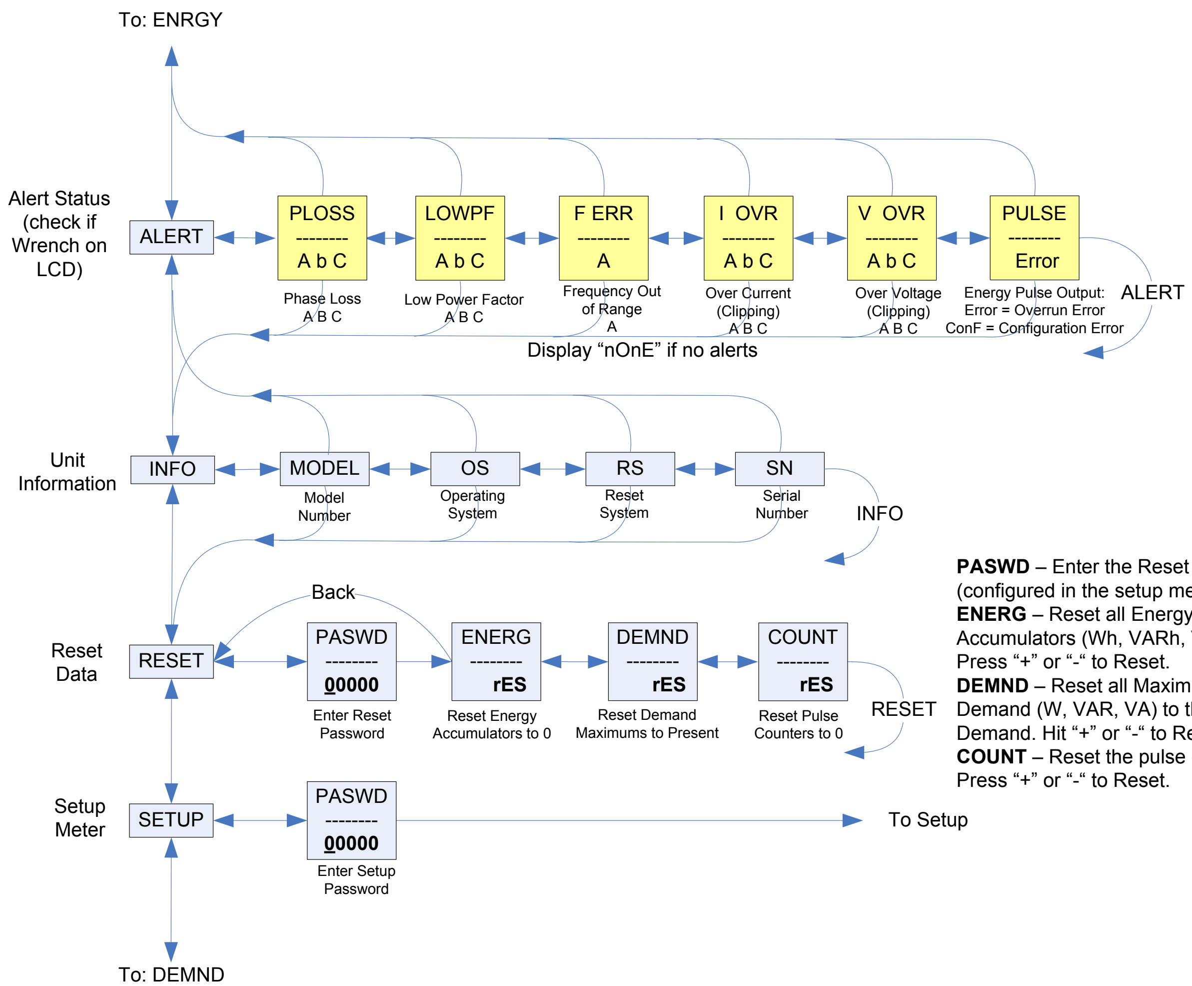
## User Interface for Data Configuration: IQ 35MA2x



## IEC Display Mode

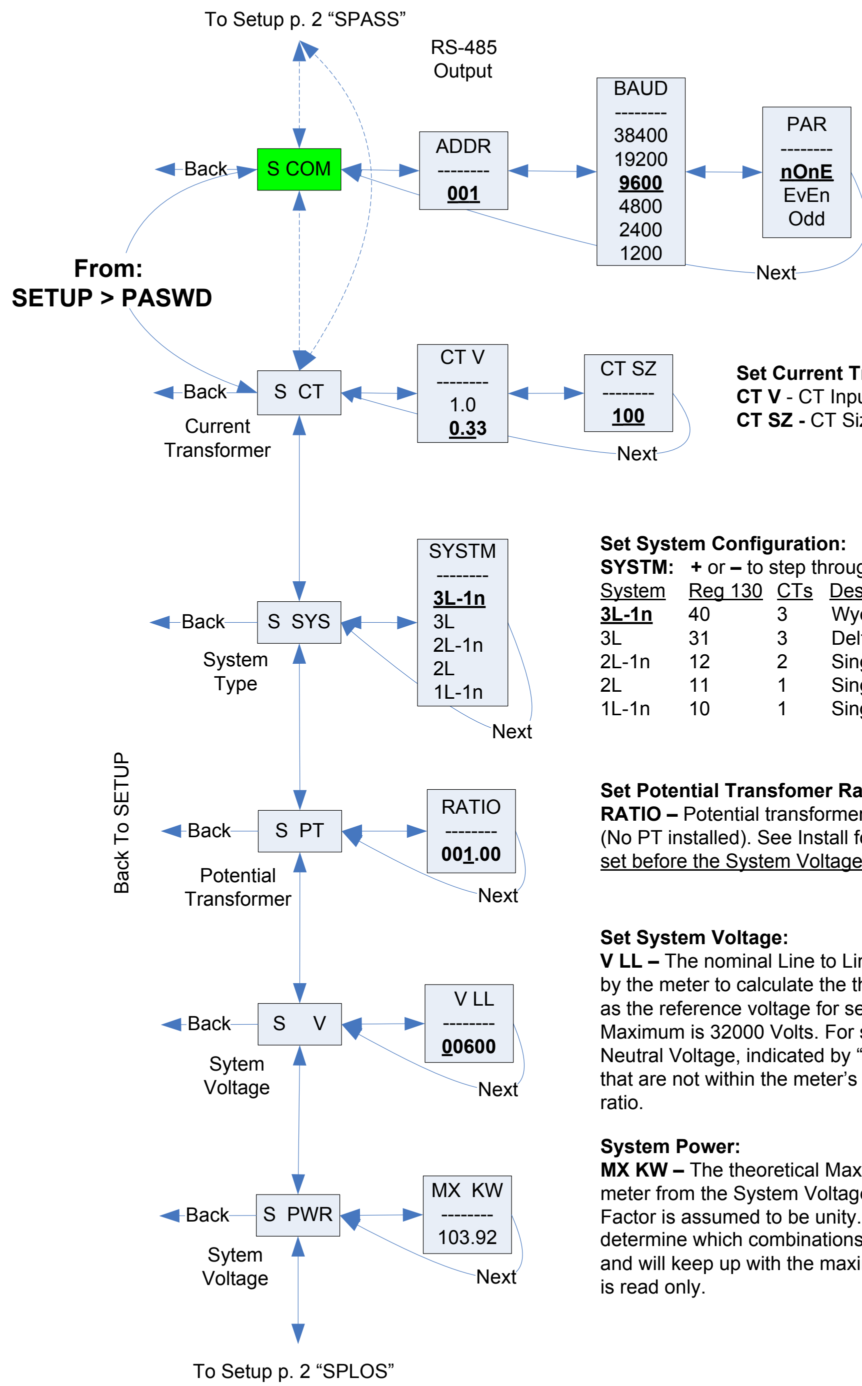


## Alert/Reset Information: IQ 35MA2x




**PASWD** – Enter the Reset Password (configured in the setup menu).
**ENERG** – Reset all Energy Accumulators (Wh, VARh, VAh) to 0. Press "+" or "-" to Reset.
**DEMND** – Reset all Maximum Demand (W, VAR, VA) to the present Demand. Hit "+" or "-" to Reset.
**COUNT** – Reset the pulse counters. Press "+" or "-" to Reset.

# User Interface for Setup: IQ 35MA2x




**Set Communications Parameters:**
**ADDR - Modbus Address:** 1 – 247.
**+** increments the selected (blinking) digit.
**-** selects the digit to the left.
**BAUD - Baud Rate:** 1200 – 38400 Baud
**PAR - Parity:** Odd, Even, None
**+** or **–** to step through the options.

**Set Current Transducer:**
**CT V** - CT Input Voltage: + or **–** to Select 1.0 or .33V.
**CT SZ** - CT Size: in Amps. Maximum is 32000 Amps.

**Set System Configuration:**
**SYSTM:** **+** or **–** to step through the following System Type options:

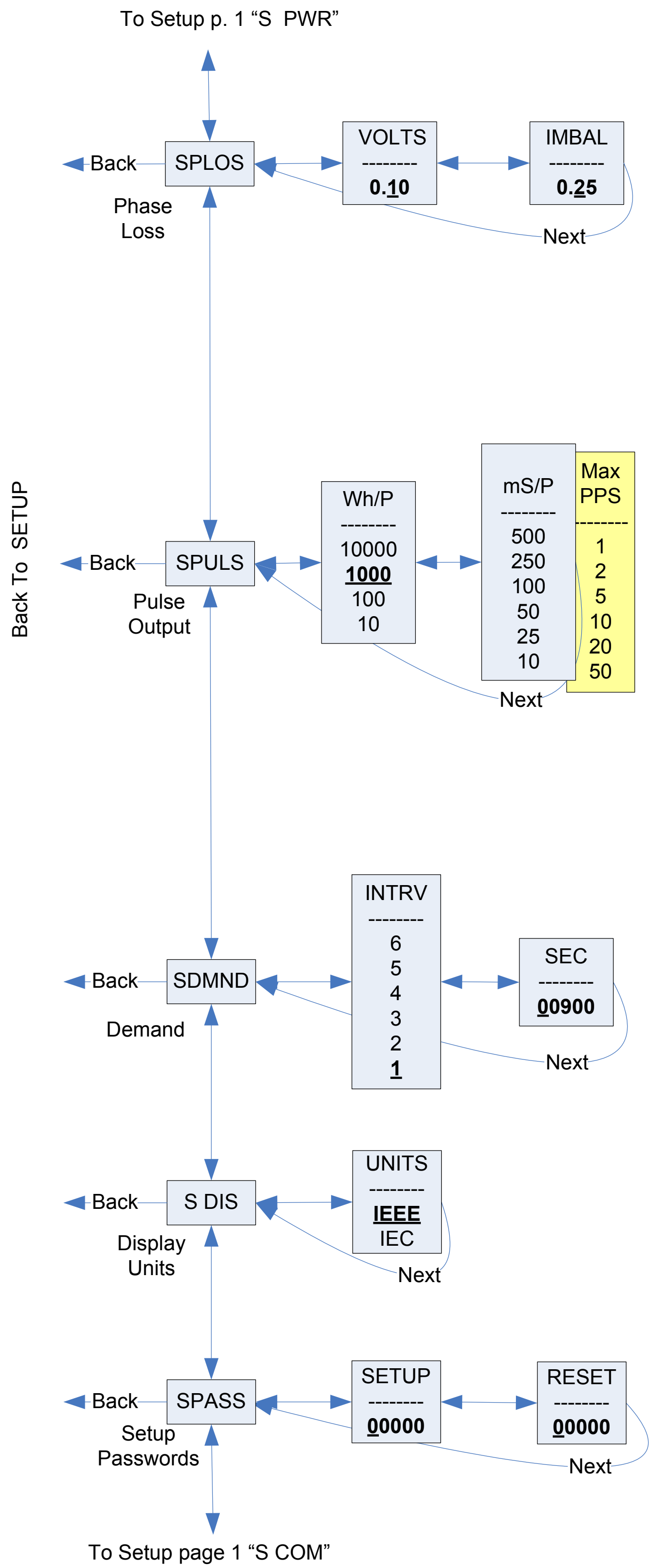
| System | Reg 130 | CTs | Description |
|---|---|---|---|
| **3L-1n** | 40 | 3 | Wye Three Phase: A, B, & C with Neutral (Default). |
| 3L | 31 | 3 | Delta Three Phase: A, B & C; no Neutral |
| 2L-1n | 12 | 2 | Single Split Phase: A & B with Neutral |
| 2L | 11 | 1 | Single Phase: A & B; no Neutral |
| 1L-1n | 10 | 1 | Single Phase: A to Neutral |

**Set Potential Transfomer Ratio:**
**RATIO –** Potential transformer step down is RATIO:1. Default is 1:1 (No PT installed). See Install for wiring diagrams. This value must be set before the System Voltage (if used).

**Set System Voltage:**
**V LL –** The nominal Line to Line Voltage for the system. This is used by the meter to calculate the theoretical maximum system power, and as the reference voltage for setting the Phase Loss threshold. Maximum is 32000 Volts. For system type 1+N (10), this is a Line to Neutral Voltage, indicated by "V LN". Note: the meter will reject settings that are not within the meter's operating range when divided by the PT ratio.

**System Power:**
**MX KW –** The theoretical Maximum System Power is calculated by the meter from the System Voltage, CT size, and System Type. Power Factor is assumed to be unity. The value of System Power is used to determine which combinations of pulse weight and duration are valid and will keep up with the maximum power the meter will see. This value is read only.

Note: **Bold** is the Default.




**Set Phase Loss:**
**VOLTS - Phase Loss Voltage:** The fraction of the system voltage below which Phase Loss Alarm is on. For system types with neutral, the Line to Neutral voltage is also calculated and tested. If the System Voltage is 600 and the fraction is set to 0.10, then the Phase Loss threshold will be 60 volts.
**IMBAL - Phase Loss Imbalance**: The fractional difference in Line to Line voltages above which Phase Loss Alarm is on. For system types with neutral, the Line to Neutral voltages are also tested. For system types 1+N (10) and 2 (11) , imbalance is not tested.

**Set Pulse:**
<u>The System Type , CT size, PT Ratio, and System Voltage must all be configured before setting the Pulse Energy</u>. If any of these parameters are changed, the meter will hunt for a new Pulse Duration, but will not change the Pulse Energy. If it cannot find a solution, the meter will display the wrench, show "ConF" in the ALARM -> PULSE screen, and enable Energy pulse output configuration error bit in the Modbus Diagnostic Alert Bitmap (if equipped).
**Wh/P - Set Pulse Energy:** In Watt Hours (& VAR Hours, if present) per Pulse. When moving down to a smaller energy, the meter will not allow the selection if it cannot find a pulse duration that will allow the pulse output to keep up with Theoretical Maximum System Power (see S_PWR screen). When moving up to a larger energy, the meter will jump to the first value where it can find a valid solution.
**mS/P – Minimum Pulse Duration Time:** This read only value is set by the meter to the slowest duration (in mS per closure) that will keep up with the Theoretical Maximum System Power. The open time is greater than or equal to the closure time. The maximum Pulses Per Second (PPS) is shown in yellow.

**Set Demand Interval:**
**INTRV -** The number of Sub-Intervals (1 to 6) in a Demand Interval. Default is 1 (block demand).
**SEC -** Sub-Interval length in seconds. Default is 900 (15 minutes). Set to 0 for external sync-to-comms (Modbus units only).

**Set Display Units:** **+/-** to switch between:
**IEEE –** VLL VLN W VAR VA Units.
**IEC -** U V P Q S Units.

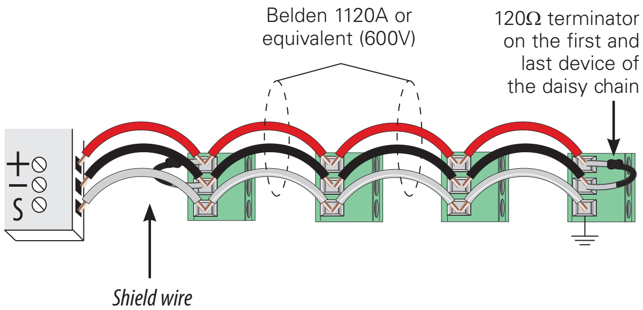
**Set Passwords:**
**SETUP -** The Password to enter the SETUP menu.
**RESET -** The Password to enter the RESET menu.

# RS-485 Communications

***(Not Applicable to IQ 35MA11)***

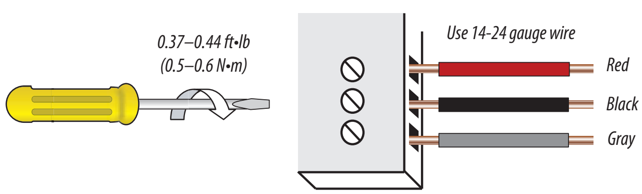
## Daisy-chaining Devices to the Power Meter

The RS-485 slave port allows the power meter to be connected in a daisy chain with up to 63 2-wire devices.




NOTES:

- The terminal's voltage and current ratings are compliant with the requirements of the EIA RS-485 communications standard.
- The RS-485 transceivers are ¼ unit load or less.
- RS-485+ has a 47 kOhm pull up to +5V, and RS-485- has a 47 kOhm pull down to Shield (RS-485 signal ground).
- Wire the RS-485 bus as a daisy chain from device to device, without any stubs. Use 120 ohm termination resistors at each end of the bus (not included).
- Shield is not internally connected to Earth Ground.
- Connect Shield to Earth Ground somewhere on the RS-485 bus.
- Use 14 to 24 gauge wire for all connections.
- When tightening terminals, ensure that the correct torque is applied: 0.37 to 0.44 ft·lb (0.5 to 0.6 N·m).



## Data Logging (IQ 35MAx3)

The IQ 35MAx3 includes a data logging feature that records 10 meter parameters, each in its own buffer.

### Configuration

Use register 150 to set the data logging time subinterval. Writing to the storage buffer is triggered by the subinterval timer. The default subinterval is 15 minutes (at a 15 minute interval setting, the buffers hold 60 days of data). An external timer can be used over Modbus by setting this register to 0.

Use register 159 to select either Single Shot or Continuous mode for data logging. The default mode is Continuous. In Single Shot mode, the meter records data until the buffer is full. When the buffer is full, the meter stops recording new readings. Data for this time period is kept, but newer energy information is lost. In Continuous mode, the meter continues to record energy data as long as the meter is operating. The buffer can only hold 5760 entries at one time, however, so when the number of records exceeds 5760, the oldest entry is deleted to make room for the newest.

Registers 169-178 contain the pointers to 10 data storage buffers. Each buffer is user-configurable with the Modbus address of the 16-bit data output to be stored. 32-bit data, such as floating point data or 32-bit integer energy accumulators, require two buffers. However, the lower 16 bits of an integer energy accumulator can be stored in a single buffer (optional).

When the meter is first installed, the buffers contain QNAN data, with a value of 0x8000. This data is considered invalid. If the buffer is reset at any point, all entries in the buffers are overwritten with this 0x8000 value, indicating that it is invalid. All invalid data is overwritten as the meter fills the buffer with new data entries.

### Reading Data

Use register 158 to choose which buffer to read. When this register value is set to 0, the meter is in data logging mode. Changing this value from 0 to (1 through 10) switches the meter to reading mode and selects a buffer to read. Data from the selected buffer appears in registers 8000 to 13760.

### Read/Write Collision

If the demand sub-interval timeout occurs while the user is reading a page (register 158 ≠ 0), the log data will be held in RAM until the next demand subinterval. At that time, both the saved data from the previous cycle and the new data will be written to the log, whether the page register has been set back to 0 or not. Error bits in the Log Status Register (160) track these conditions. Subsequent log writes will proceed normally. Provided the log read is concluded in less time than the demand sub-interval, this mechanism handles the occasional collision and prevents the user from reading data as the buffer is being updated.

## IQ 35MAx2 and IQ 35MAx3 Modbus Default Settings

| Setting | Value | Modbus Register |
|---|---|---|
| Setup Password | 00000 | – |
| Reset Password | 00000 | – |
| Modbus Parity | None | – |
| System Type | 40 (3 + N) Wye | 130 |
| CT Primary Ratio (if CTs are not included) | 100 A | 131 |
| CT Secondary Ratio | 0.33 V | 132 |
| PT Ratio | 1:1 (none) | 133 |
| System Voltage | 600 V LL | 134 |
| Max. Theoretical Power (Analog Output: full scale (20mA or 5V)) | 104 kW | 135 |
| Display Mode | IEEE | 137 |
| Phase Loss | 10% of System Voltage (60V), 25% Phase to Phase Imbalance | 142, 143 |
| Pulse Energy | 1 kWh/pulse | 144 |
| Demand: number of sub-intervals per interval | 1 (block mode) | 149 |
| Demand: sub-interval length | 900 sec (15 min) | 150 |
| Modbus Address | 001 | – |
| Modbus Baud Rate | 9600 baud | – |
| Log Read Page | 0 | 158 |
| Logging Configuration Register | 0 | 159 |
| Log Register Pointer 1 | 1 (Real Energy MSR) | 169 |
| Log Register Pointer 2 | 2 (Real Energy LSR) | 170 |
| Log Register Pointer 3 | 29 (Reactive Energy MSR) | 171 |
| Log Register Pointer 4 | 30 (Reactive Energy LSR) | 172 |
| Log Register Pointer 5 | 37 (Real Demand) | 173 |
| Log Register Pointer 6 | 38 (Reactive Demand) | 174 |
| Log Register Pointer 7 | 39 (Apparent Demand) | 175 |
| Log Register Pointer 8 | 155 (Month/Day) | 176 |
| Log Register Pointer 9 | 156 (Year/Hour) | 177 |
| Log Register Pointer 10 | 157 (Minutes/Seconds) | 178 |

## Modbus Point Map

The IQ 35MAx2 Data Set (DS) features data outputs such as demand calculations, per phase VA and VAR, and VAh VARh accumulators. IQ 35MAx3 Data Logging model adds configuration registers 155-178 and buffer reading at registers 8000-13760. For security reasons, user interface configuration and resets on all models are protected by a user configurable passcode. The device supports variable CTs and PTs, allowing a much wider range of operation from 90V x 5A up to 32000V x 32000A. To promote this, the meter permits variable scaling via the scale registers.

Integer registers begin at 001 (0x001). Floats at 257 (0x101). Configuration registers at 129 (0x081). Values not supported in a particular System Type configuration will report QNAN (0x8000 in Integer Registers, 0x7FC00000 in Floating Point Registers).

### Supported Modbus Commands

ID String information varies by model. Text shown here is an example.

| Command | Description |
|---|---|
| 0x03 | Read Holding Registers |
| 0x04 | Read Input Registers |
| 0x06 | Preset Single Register |
| 0x10 | Preset Multiple Registers |
| 0x11 | Report ID |
| | Return string:<br>byte0: address<br>byte1: 0x11<br>byte2: #bytes following w/out crc<br>byte3: ID byte = 247<br>byte4: status = 0xFF if the operating system is used; status = 0x00 if the reset system is used<br>bytes5+: ID string = “Eaton IQ 35MAxx Compact Energy Meter” or “Eaton IQ 35MAxx Power Meter - RESET SYSTEM RUNNING RS Version x.xxx” last 2 bytes: CRC |
| 0x2B | Read Device Identification, BASIC implementation (0x00, 0x01 and 0x02 data), Conformity Level 1. |
| | Object values:<br>0x01: “Eaton”<br>0x02: “ IQ 35MAxx”<br>0x03: “Vxx.yyy”, where xx.yyy is the OS version number (reformatted version of the Modbus register #7001, (Firmware Version, Operating System).<br>If register #7001 == 12345, then the 0x03 data would be “V12.345”). |

### Legend

The following table lists the addresses assigned to each data point. For floating point format variables, each data point appears twice because two 16-bit addresses are required to hold a 32-bit float value.

| | | |
|---|---|---|
| R/W | R=read only; R/W=read from either int or float formats, write only to integer format. | |
| NV | Value is stored in non-volatile memory. The value will still be available if the meter experiences a power loss and reset. | |
| Format | UInt | Unsigned 16-bit integer. |
| | SInt | Signed 16-bit integer. |
| | ULong | Unsigned 32-bit integer; Upper 16-bits (MSR) in lowest-numbered / first listed register (001/002 = MSR/LSR). |
| | Float | 32-bit floating point; Upper 16-bits (MSR) in lowest-numbered / first listed register (257/258 = MSR/LSR). Encoding is per IEEE standard 754 single precision. |
| Units | Lists the physical units that a register holds. | |
| Scale Factor | Some Integer values must be multiplied by a constant scale factor (typically a fraction), to be read correctly. This is done to allow integer numbers to represent fractional numbers. | |
| Range | Defines the limit of the values that a register can contain. | |

### SunSpec Alliance Interoperability Specification Compliance (IQ 35MA2x only)

This meter implements the draft SunSpec 1.0 common elements starting at base 1 address 40001, and the proposed SunSpec 1.1 meter model at 40070 (these addresses are not in Modicon notation). See www.sunspec.org for copies of these specifications.

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**Note:** The SunSpec Alliance logo is a trademark or registered trademark of the SunSpec Alliance.

## Modbus Point Map for IQ 35MA12 and 13 Models

| IQ 35MA12 DS | IQ 35MA13 Log | SERIES REG. | R/W | NV | Format | Units | Scale | Range | Description | |
|---|---|---|---|---|---|---|---|---|---|---|
| Integer Data | | | | | | | | | | |
| • | • | 001 | R | NV | ULong | kWh | E | 0-0xFFFF | Real Energy Consumption (MSR) | Clear via reset register |
| • | • | 002 | | | | | | 0-0xFFFF | Real Energy Consumption (LSR) | |
| • | • | 003 | R | | UInt | kW | W | 0-32767 | Total Instantaneous Real Power (3 Phase Total) | |
| • | • | 004 | R | | UInt | kVAR | W | 0-32767 | Total Instantaneous Reactive Power (3 Phase Total) | |
| • | • | 005 | R | | UInt | kVA | W | 0-32767 | Total Instantaneous Apparent Power (3 Phase Total) | |
| • | • | 006 | R | | UInt | Ratio | 0.0001 | 0-10000 | Total Power Factor (Total kW / Total kVA) | |
| • | • | 007 | R | | UInt | Volt | V | 0-32767 | Voltage, L-L, Average of 3 Phases | |
| • | • | 008 | R | | UInt | Volt | V | 0-32767 | Voltage, L-N, Average of 3 Phases | |
| • | • | 009 | R | | UInt | Amp | I | 0-32767 | Current, Average of 3 Phases | |
| • | • | 010 | R | | UInt | kW | W | 0-32767 | Real Power, Phase A | |
| • | • | 011 | R | | UInt | kW | W | 0-32767 | Real Power, Phase B | |
| • | • | 012 | R | | UInt | kW | W | 0-32767 | Real Power, Phase C | |
| • | • | 013 | R | | UInt | Ratio | 0.0001 | 0-10000 | Power Factor, Phase A | |
| • | • | 014 | R | | UInt | Ratio | 0.0001 | 0-10000 | Power Factor, Phase B | |
| • | • | 015 | R | | UInt | Ratio | 0.0001 | 0-10000 | Power Factor, Phase C | |
| • | • | 016 | R | | UInt | Volt | V | 0-32767 | Voltage, Phase A-B | |
| • | • | 017 | R | | UInt | Volt | V | 0-32767 | Voltage, Phase B-C | |
| • | • | 018 | R | | UInt | Volt | V | 0-32767 | Voltage, Phase A-C | |
| • | • | 019 | R | | UInt | Volt | V | 0-32767 | Voltage, Phase A-N | |
| • | • | 020 | R | | UInt | Volt | V | 0-32767 | Voltage, Phase B-N | |
| • | • | 021 | R | | UInt | Volt | V | 0-32767 | Voltage, Phase C-N | |
| • | • | 022 | R | | UInt | Amp | I | 0-32767 | Current, Instantaneous, Phase A | |
| • | • | 023 | R | | UInt | Amp | I | 0-32767 | Current, Instantaneous, Phase B | |
| • | • | 024 | R | | UInt | Amp | I | 0-32767 | Current, Instantaneous, Phase C | |
| • | • | 025 | R | | UInt | | | | Reserved; returns 0x8000 (QNAN) | |
| • | • | 026 | R | | UInt | Hz | 0.01 | 4500-6500 | Frequency (derived from Phase A) | |
| • | • | 027 | R | NV | ULong | kVAh | E | 0-0xFFFF | Apparent Energy Consumption (MSR) | Clear via reset register |
| • | • | 028 | | | | | | 0-0xFFFF | Apparent Energy Consumption (LSR) | |
| • | • | 029 | R | NV | ULong | kVARh | E | 0-0xFFFF | Reactive  Energy Consumption (MSR) | Clear via reset register |
| • | • | 030 | | | | | | 0-0xFFFF | Reactive  Energy Consumption (LSR) | |
| • | • | 031 | R | | UInt | kVA | W | 0-32767 | Apparent Power, Phase A | |
| • | • | 032 | R | | UInt | kVA | W | 0-32767 | Apparent Power, Phase B | |
| • | • | 033 | R | | UInt | kVA | W | 0-32767 | Apparent Power, Phase C | |
| • | • | 034 | R | | UInt | kVAR | W | 0-32767 | Reactive Power, Phase A | |
| • | • | 035 | R | | UInt | kVAR | W | 0-32767 | Reactive Power, Phase B | |
| • | • | 036 | R | | UInt | kVAR | W | 0-32767 | Reactive Power, Phase C | |
| • | • | 037 | R | | UInt | kW | W | 0-32767 | Total Real Power Present Demand | |
| • | • | 038 | R | | UInt | kVAR | W | 0-32767 | Total Reactive Power Present Demand | |
| • | • | 039 | R | | UInt | kVA | W | 0-32767 | Total Apparent Power Present Demand | |
| • | • | 040 | R | NV | UInt | kW | W | 0-32767 | Total Real Power Max Demand | |
| • | • | 041 | R | NV | UInt | kVAR | W | 0-32767 | Total Reactive Power Max Demand | |
| • | • | 042 | R | NV | UInt | kVA | W | 0-32767 | Total Apparent Power Max Demand | |

| IQ 35MA12 DS | IQ 35MA13 Log | SERIES REG. | R/W | NV | Format | Units | Scale | Range | Description | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • | • | 043* | R | NV | ULong | | | 0-0xFFFF | Pulse Counter 1 (Real Energy) | MSR | Contact Closure Counters. Valid for both Pulse inputs and outputs. IQ35MA counts are shown in (). See register 144 (Energy per Pulse) for the Wh per pulse count. Clear via register 129. Inputs are user defined. |
| • | • | 044* | | | | | | | | LSR | |
| • | • | 045* | R | NV | ULong | | | 0-0xFFFF | Pulse Counter 2 (Reactive Energy) | MSR | |
| • | • | 046* | | | | | | | | LSR | |
| • | • | 047* | R | NV | ULong | kWh | E | 0-0xFFFF | Real Energy Consumption Phase A | MSR | Clear via reset register |
| • | • | 048* | | | | | | | | LSR | |
| • | • | 049* | R | NV | ULong | kWh | E | 0-0xFFFF | Real Energy Consumption Phase B | MSR | |
| • | • | 050* | | | | | | | | LSR | |
| • | • | 051* | R | NV | ULong | kWh | E | 0-0xFFFF | Real Energy Consumption Phase C | MSR | |
| • | • | 052* | | | | | | | | LSR | |
| Configuration | | | | | | | | | | | |
| • | • | 129 | R/W | | UInt | | | N/A | Command Register:<br>- Write 30078 (0x757E) to clear all Energy Accumulators to 0 (All).<br>- Write 21211 (0x52DB) to begin new Demand Sub-Interval calculation cycle (IQ 35MA12 and IQ 35MA13 DS Only). Takes effect at the end of the next 1 second calculation cycle. Write no more frequently than every 10 seconds.<br>- Write 21212 (0x52DC) to reset Max Demand values to Present Demand Values (IQ 35MA12 and IQ 35MA13 DS Only). Takes effect at the end of the next 1 second calculation cycle. Write no more frequently than every 10 seconds.<br>- Write 16640 (0x4100) to Reset Logging (IQ 35MA13 only).<br>- Write 16498 (0x4072) to Clear Pulse Counters to 0.<br>- Read always returns 0. | | |
| • | • | 130 | R/W | NV | UInt | | | 10,<br>11,<br>12,<br>31,<br>40 | Single Phase: A + N<br>Single Phase: A + B<br>Single Split Phase: A + B + N<br>3 phase Δ, A + B + C, no N<br>3 phase Y, A + B + C + N | | System Type (See Manual. Note: only the indicated phases are monitored for Phase Loss) |
| • | • | 131 | R/W | NV | UInt | Amps | | 1-32000 | CT Ratio – Primary | | Current Inputs |
| • | • | 132 | R/W | NV | UInt | | | 1, 3 | CT Ratio – Secondary Interface (1 or 1/3 V, may not be user configurable) | | |
| • | • | 133 | R/W | NV | UInt | | 100 | 0.01-320.00 | PT Ratio: The meter scales this value by 100 (i.e. entering 200 yields a potential transformer ratio of 2:1). The default is 100 (1.00:1), which is with no PT attached. Set this value before setting the system voltage (below) | | |
| • | • | 134 | R/W | NV | UInt | | | 82-32000 | System Voltage: This voltage is line to line, except for system type 10 which is line to neutral. The meter uses this value to calculate the full scale power for the analog outputs and pulse configuration (below), and as full scale for phase loss (register 142). The meter will refuse voltages that are outside the range of 82-660 volts when divided by the PT Ratio (above). | | |

* Points 43 through 52 are not available in units with firmware versions 1.018 or earlier.

<table>
<tr><th>IQ 35MA12 DS</th><th>IQ 35MA13 Log</th><th>SERIES REG.</th><th>R/W</th><th>NV</th><th>Format</th><th>Units</th><th>Scale</th><th>Range</th><th colspan="2">Description</th></tr>
<tr><td>•</td><td>•</td><td>135</td><td>R</td><td>NV</td><td>UInt</td><td>kW</td><td>W</td><td>1-32767</td><td colspan="2">Theoretical Maximum System Power: This read-only value is the theoretical max. power the meter can expect to see on a service. This value is 100% of scale on the analog output (0-5VDC or 4-20mA), if equipped. The meter recalculates this value if the user changes the CT size, system type, or system voltage. This integer value has the same scale as other integer power registers (see register 140 for power scaling).</td></tr>
<tr><td>•</td><td>•</td><td>136</td><td>R</td><td></td><td>UInt</td><td></td><td></td><td></td><td colspan="2">Reserved, always returns 0</td></tr>
<tr><td>•</td><td>•</td><td>137</td><td>R/W</td><td>NV</td><td>UInt</td><td></td><td></td><td>0,1</td><td colspan="2">Display Units: 0 = IEC (U, V, P, Q, S), 1 = IEEE (default: VLL, VLN, W, VAR, VA)</td></tr>
<tr><td>•</td><td>•</td><td>138</td><td>R</td><td></td><td>SInt</td><td></td><td colspan="2" rowspan="4">-4 0.0001<br>-3 0.001<br>-2 0.01<br>-1 0.1<br>0 1.0<br>1 10.0<br>2 100.0<br>3 1000.0<br>4 10000.0</td><td>Scale Factor I (Current)</td><td rowspan="4">Scale Factors<br><br>Note: These registers contain a signed integer, which scales the corresponding integer registers. Floating point registers are not scaled. Scaling is recalculated when the meter configuration is changed.</td></tr>
<tr><td>•</td><td>•</td><td>139</td><td>R</td><td></td><td>SInt</td><td></td><td>Scale Factor V (Voltage)</td></tr>
<tr><td>•</td><td>•</td><td>140</td><td>R</td><td></td><td>SInt</td><td></td><td>Scale Factor W (Power)</td></tr>
<tr><td>•</td><td>•</td><td>141</td><td>R</td><td></td><td>SInt</td><td></td><td>Scale Factor E (Energy)</td></tr>
<tr><td>•</td><td>•</td><td>142</td><td>R/W</td><td>NV</td><td>UInt</td><td>V</td><td></td><td>1-99</td><td>Phase Loss Voltage Threshold in percent of system voltage (register 134). Default is 10 (%). Any phase (as configured in register 130) that drops below this threshold triggers a Phase Loss alert, i.e. if the System voltage is set to 480 V L-L, the L-N voltage for each phase should be 277 V. When the threshold is set to 10%, if any phase drops more than 10% below 277 V, (less than 249 V), or if any L-L voltage drops more than 10% below 480 V (less than 432 V), the corresponding phase loss alarm bit in register 146 will be true.</td><td rowspan="2">Phase Loss Output<br><br>Note: The phases tested are determined by the System Type.</td></tr>
<tr><td>•</td><td>•</td><td>143</td><td>R/W</td><td>NV</td><td>UInt</td><td>%</td><td></td><td>1-99</td><td>Phase Loss Imbalance Threshold in Percent. Default is 25% phase to phase difference. For a 3-phase Y (3 + N) system type (40 in register 130), both Line to Neutral and Line to Line voltages are tested. In a 3-phase system type (31 in register 130), only Line to Line voltages are examined. In a single split-phase (2 + N) system type (12 in register 130), just the line to neutral voltages are compared.</td></tr>
<tr><td>•</td><td>•</td><td>144</td><td>R/W</td><td>NV</td><td>UInt</td><td>Wh</td><td></td><td>10000,<br>1000,<br>100,<br>10</td><td>Wh (& VARh, if equipped with FDS) Energy per Pulse Output Contact Closure. If the meter cannot find a pulse duration that will keep up with the max. system power (register 135), it will reject the new value. Try a larger value.</td><td rowspan="2">kWh Pulse Contacts<br><br>Note: The kWh pulse contact can keep up with a maximum power (Watts) of 1800000 x Wh pulse weight ÷ contact closure duration (in mses)</td></tr>
<tr><td>•</td><td>•</td><td>145</td><td>R</td><td>NV</td><td>UInt</td><td>ms</td><td></td><td>500,<br>250,<br>100,<br>50,<br>25,<br>10</td><td>Pulse Contact Closure Duration in msec. Read-only. Set to the slowest duration that will keep up with the theoretical max. system power (register 135). The open time ≥ the closure time, so the max. pulse rate (pulses per sec) is the inverse of double the pulse time.</td></tr>
</table>

| IQ 35MA12 DS | IQ 35MA13 Log | SERIES REG. | R/W | NV | Format | Units | Scale | Range | Description |
|---|---|---|---|---|---|---|---|---|---|
| • | • | 146 | R | | UInt | | | | Diagnostic Alert Bitmap. 1 = Active:<br>Bit 0: Phase A Voltage out of range<br>Bit 1: Phase B Voltage out of range<br>Bit 2: Phase C Voltage out of range<br>Bit 3: Phase A Current out of range<br>Bit 4: Phase B Current out of range<br>Bit 5: Phase C Current out of range<br>Bit 6: Frequency out of the range of 45 – 65 Hz OR there is insufficient voltage to determine frequency.<br>Bit 7: Reserved for future use<br>Bit 8: Phase Loss A<br>Bit 9: Phase Loss B<br>Bit 10: Phase Loss C<br>Bit 11: Low Power Factor on A with one or more phases having a PF less than 0.5 due to mis-wiring of phases<br>Bit 12: Low Power Factor on B<br>Bit 13: Low Power Factor on C<br>Bit 14: Energy pulse output overrun error. The pulse outputs are unable to keep up with the total real power (registers 3 and 261/262). To fix, increase the pulse energy register (register 144) and reset the energy accumulators (see reset register 129).<br>Bit 15: Energy pulse output configuration error (present pulse energy setting may not keep up with the theoretical max. system power; see register 135). To fix, increase the pulse energy (register 144). |
| • | • | 147 | R | NV | UInt | | | 0-32767 | Count of Energy Accumulator resets |
| • | • | 148 | R | | UInt | | | | Reserved (returns 0) |
| • | • | 149 | R/W | NV | UInt | | | 1-6 | Number of Sub-Intervals per Demand Interval. Sets the number of sub-intervals that make a single demand interval. For block demand, set this to 1. (Demand Calculation) |
| • | • | 150 | R/W | NV | UInt | Seconds | | 0, 10-32767 | Sub-Interval Length in seconds. For sync-to-comms, set this to 0 and use the reset register (129) to externally re-start the sub-interval. On the IQ 35MA13, this is also the logging interval. (Demand Calculation) |
| • | • | 151 | R/W | | UInt | | | 1-32767 | Reserved (returns 0) |
| • | • | 152 | R/W | NV | UInt | | | 0-32767 | Power Up Counter. |
| • | • | 153 | R | NV | UInt | | | 0-32767 | Output Configuration. IQ35MA12 and IQ35MA13 models will always return Zero. |
| • | • | 154 | R | | UInt | | | | Reserved, returns 0 |
| Logging Configuration and Status | | | | | | | | | |
| | • | 155 | R/W | NV | UInt | Day / Month | | See Bytes | *Most Significant Byte (MSB)*: Day 1-31 (0x01-0x1F)<br>*Least Significant Byte (LSB)*: Month 1-12 (0x01-0x0C) |
| | • | 156 | R/W | NV | UInt | Hour / Year | | See Bytes | MSB: Hour 0-23 (0x00-0x17)<br>LSB: Year 0-199 (0x00-0xC7) |
| | • | 157 | R/W | NV | UInt | Seconds / Minutes | | See Bytes | MSB: Seconds 0-59 (0x00-0x3B)<br>LSB: Minutes 0-59 (0x00-0x3B) |

Registers 155–157: Date / Time Clock. Following a power cycle, resets to: Day 01 Month 01 Hour 00 Year (20)00

| IQ 35MA12 DS | IQ 35MA13 Log | SERIES REG. | R/W | NV | Format | Units | Scale | Range | Description |
|---|---|---|---|---|---|---|---|---|---|
| | • | 158 | R/W | NV | UInt | | | 0-10 | Logging Read Page Register. Selects which of the Register Logs to read (see registers 169-178). 1-10 are valid entries that put the meter into log reading mode, temporarily pausing logging. When set to 0 (no variable selected for reading), normal logging resumes. The meter will buffer one set of log entries while in reading mode if a sub-interval timeout occurs (read/write collision). Default is 0.<br>Warning: this buffered data will be written to the log and logging will resume on the following sub-interval timeout whether the page register has been cleared or not, resulting in the appearance of data moving in the buffer during reads. To avoid this, log buffer reads should be completed and this register set back to 0 in less time than the Demand Sub-interval (preferred) or logging should be halted by setting Bit 1 in register 158 (logs may be missed) |
| | • | 159 | R/W | NV | UInt | | | | Logging Configuration Register (Bit Mapped):<br>Bit 0: Clear to 0 for Continuous log buffer mode. Set to 1 for Single Shot logging mode. Default is 0 (Continuous).<br>Bit 1: Clear to 0 to enable Logging. Set to 1 to halt logging. Default is 0 (Log). |
| | • | 160 | R | NV | UInt | | | | Logging Status Register (Bit Mapped):<br>Bit 0: Log buffer full – Set to 1 when one single shot mode has filled the log buffer. In this condition, the Logged Entry Count will continue to increment. Cleared to 0 when logging is restarted (see reset command register 129).<br>Bit 1: Log Buffer Read Collision 1 – Set to 1 if the meter tried to save log data while the user was reading the log (Logging Page Register has been set to something other than 0). On the first collision, the meter holds the data until the next sub-interval and then writes the saved data to the log as well as the data for that interval. This bit is cleared to 0 on the first demand interval with Logging Page Register = 0.<br>Bit 2: Log Buffer Read Collision 2 – Set to 1 on the 2nd attempt to save log data while the user is reading the log (Logging Page Register is set to something other than 0). At this point the meter ignores the read condition and does a double write, first of the values saved from the previous cycle, and then the present values. If the read condition is not removed the meter continues to write the log data as it normally would. This bit is cleared to 0 on the first demand interval with Logging Page Register = 0.<br>Bit 3: Logging Reset – The Log has been reset during the previous demand sub-interval.<br>Bit 4: Logging Interrupted – Logging has been interrupted (power cycled, log configuration change, etc.) during the previous demand sub-interval.<br>Bit 5: RTC Changed – The Real Time Clock has been changed during the previous demand sub-interval.<br>Bit 6: RTC Reset – The Real Time Clock has been reset to the year 2000 and needs to be re-initialized. |
| | • | 161 | R | NV | UInt | | | 0-32767 | Log Buffer Wrap / Missed Log Counter. In continous mode, this counter increments each time the internal circular log buffer wraps and overwrites old data. The total number of logged entries since the last log reset is: (Register 161 x 5760) + Register 163. In single shot mode this counter is the number of log entries lost due to the buffer being full. The counter is cleared on logging reset. |
| | • | 162 | R | NV | UInt | | | 0-32767 | Max Number of Logging Days. Based on the Sub-Interval Length and the depth of the log buffer, this register shows the maximum number of days that data will be logged following a reset until the Buffer is full (Single Shot Mode) or overwrites old data (Continuous). |
| | • | 163 | R | NV | UInt | | | 0-32767 | Number of Logged Entries since the log buffer wrapped or was reset. In single shot mode, this is the total number of valid entries in the buffer. Any entries beyond this will read back as QNAN (0x8000). |

| IQ 35MA12 DS | IQ 35MA13 Log | SERIES REG. | R/W | NV | Format | Units | Scale | Range | Description | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | • | 164 | R | NV | ULong | kWh | E | 0-0xFFFF | Real Energy Consumption (MSR) | Real Energy (Register 001/002) at the time of the most recent log entries. | |
| | • | 165 | | | | | | 0-0xFFFF | Real Energy Consumption (LSR) | | |
| | • | 166 | R | NV | UInt | Month / Day | | See Bytes | Most Significant Byte (MSB) | Least Significant Byte (LSB) | Date & Time of the newest entry in the log. After a power cycle, resets to: Day 01 Month 01 Hour 00 Year (20)00 |
| | | | | | | | | | Day 1-31 (0x01-0x1F) | Month 1-12 (0x01-0x0C) | |
| | • | 167 | R | NV | UInt | Year / Hour | | See Bytes | Hour 0-23 (0x00-0x17) | Year 0-199 (0x00-0xC7) | |
| | • | 168 | R | NV | UInt | Minutes / Seconds | | See Bytes | Seconds 0-59 (0x00-0x3B) | Minutes 0-59 (0x00-0x3B) | |
| | • | 169 | R/W | NV | UInt | | | 1-42, 146, 155-157, 257-336 | Log Register Pointer 1 – Default is 1 (Real Energy MSR) | Log Register Selection – Write the number of the 16 bit register to be logged. To log a 32 bit value (such as accumulators and floating point values) two log registers must be used, one each for the most and least significant register (MSR & LSR). | |
| | • | 170 | R/W | NV | UInt | | | | Log Register Pointer 2 – Default is 2 (Real Energy LSR) | | |
| | • | 171 | R/W | NV | UInt | | | | Log Register Pointer 3 – Default is 29 (Reactive Energy MSR) | | |
| | • | 172 | R/W | NV | UInt | | | | Log Register Pointer 4 – Default is 30 (Reactive Energy LSR) | | |
| | • | 173 | R/W | NV | UInt | | | | Log Register Pointer 5 – Default is 37 (Real Demand) | | |
| | • | 174 | R/W | NV | UInt | | | | Log Register Pointer 6 – Default is 38 (Reactive Demand) | | |
| | • | 175 | R/W | NV | UInt | | | | Log Register Pointer 7 – Default is 39 (Apparent Demand) | | |
| | • | 176 | R/W | NV | UInt | | | | Log Register Pointer 8 – Default is 155 (Month/Day) | | |
| | • | 177 | R/W | NV | UInt | | | | Log Register Pointer 9 – Default is 156 (Year/Hour) | | |
| | • | 178 | R/W | NV | UInt | | | | Log Register Pointer 10 – Default is 157 (Minutes/ Seconds) | | |
| Floating Point Data | | | | | | | | | | | |
| • | • | 257/258 | R | NV | Float | kWh | | | Real Energy Consumption (clear via reset register) | | |
| • | • | 259/260 | R | NV | Float | kWh | | | Real Energy Consumption (clear via reset register) | | |
| • | • | 261/262 | R | | Float | kW | | | Total Instantaneous Real Power | | |
| • | • | 263/264 | R | | Float | kVAR | | | Total Instantaneous Reactive Power | | |
| • | • | 265/266 | R | | Float | kVA | | | Total Instantaneous Apparent Power | | |
| • | • | 267/268 | R | | Float | Ratio | | 0.0-1.0 | Total Power Factor (Total kW / Total kVA) | | |
| • | • | 269/270 | R | | Float | Volt | | | Voltage, L-L, Average of 3 Phases | | |

## Modbus Point Map for IQ 35MA12 and 13 Models

| IQ 35MA12 DS | IQ 35MA13 Log | SERIES REG. | R/W | NV | Format | Units | Scale | Range | Description |
|---|---|---|---|---|---|---|---|---|---|
| • | • | 271/272 | R | | Float | Volt | | | Voltage, L-N, Average of 3 Phases |
| • | • | 273/274 | R | | Float | Amp | | | Current, Average of 3 Phases |
| • | • | 275/276 | R | | Float | kW | | | Real Power, Phase A |
| • | • | 277/278 | R | | Float | kW | | | Real Power, Phase B |
| • | • | 279/280 | R | | Float | kW | | | Real Power, Phase C |
| • | • | 281/282 | R | | Float | Ratio | | 0.0-1.0 | Power Factor, Phase A |
| • | • | 283/284 | R | | Float | Ratio | | 0.0-1.0 | Power Factor, Phase B |
| • | • | 285/286 | R | | Float | Ratio | | 0.0-1.0 | Power Factor, Phase C |
| • | • | 287/288 | R | | Float | Volt | | | Voltage, Phase A-B |
| • | • | 289/290 | R | | Float | Volt | | | Voltage, Phase B-C |
| • | • | 291/292 | R | | Float | Volt | | | Voltage, Phase A-C |
| • | • | 293/294 | R | | Float | Volt | | | Voltage, Phase A-N |
| • | • | 295/296 | R | | Float | Volt | | | Voltage, Phase B-N |
| • | • | 297/298 | R | | Float | Volt | | | Voltage, Phase C-N |
| • | • | 299/300 | R | | Float | Amp | | | Current, Instantaneous, Phase A |
| • | • | 301/302 | R | | Float | Amp | | | Current, Instantaneous, Phase B |
| • | • | 303/304 | R | | Float | Amp | | | Current, Instantaneous, Phase C |
| • | • | 305/306 | R | | Float | | | | Reserved, returns 0x7FC00000 (QNAN) |
| • | • | 307/308 | R | | Float | Hz | | 45.0-65.0 | Frequency (derived from Phase A) |
| • | • | 309/310 | R | NV | Float | kVAh | | | Apparent Energy Consumption |
| • | • | 311/312 | R | NV | Float | kVARh | | | Reactive Energy Consumption |
| • | • | 313/314 | R | | Float | kVA | | | Apparent Power, Phase A |
| • | • | 315/316 | R | | Float | kVA | | | Apparent Power, Phase B |
| • | • | 317/318 | R | | Float | kVA | | | Apparent Power, Phase C |
| • | • | 319/320 | R | | Float | kVAR | | | Reactive Power, Phase A |
| • | • | 321/322 | R | | Float | kVAR | | | Reactive Power, Phase B |
| • | • | 323/324 | R | | Float | kVAR | | | Reactive Power, Phase C |
| • | • | 325/326 | R | | Float | kW | | | Total Real Power Present Demand |
| • | • | 327/328 | R | | Float | kVAR | | | Total Reactive Power Present Demand |
| • | • | 329/330 | R | NV | Float | kVA | | | Total Apparent Power Present Demand |
| • | • | 331/332 | R | NV | Float | kW | | | Total Real Power Max Demand |
| • | • | 333/334 | R | NV | Float | kVAR | | | Total Reactive Power Max Demand |
| • | • | 335/336 | R | NV | Float | kVA | | | Total Apparent Power Max Demand |

| IQ 35MA12 DS | IQ 35MA13 Log | SERIES REG. | R/W | NV | Format | Units | Scale | Range | Description | |
|---|---|---|---|---|---|---|---|---|---|---|
| • | • | 337/338* | R | | Float | | 0 - 4294967040 | Pulse Counter 1 (Real Energy) | Contact Closure Counters. Valid for both Pulse inputs and outputs. IQ35MA1x counts are shown in (). See register 144 (Energy per Pulse) for the Wh per pulse count. Clear via register 129. Inputs are user defined. These values are derived from the 32 bit integer counter and will roll over to 0 when the integer counters do. | |
| • | • | 339/340* | R | | Float | | 0 - 4294967040 | | | |
| • | • | 341/342* | R | NV | Float | kWh | | Real Energy Consumption, Phase A | Clear via reset register | |
| • | • | 343/344* | R | NV | Float | kWh | | Real Energy Consumption, Phase B | | |
| • | • | 345/346* | R | NV | Float | kWh | | Real Energy Consumption, Phase C | | |
| Logging Interface | | | | | | | | | | |
| | • | 8000 | R | NV | | | | | Newest Logged Data Entry | 5760 entries total (60 days at a 15 minute sub-interval) |
| | | (to) | | | | | | | (to) | |
| | • | 13760 | R | NV | | | | | Oldest Logged Data Entry | |

Invalid or Quiet Not A Number (QNAN) conditions are indicated by 0x8000 (negative zero) for 16 bit integers and 0x7FC00000 for 32 bit floating point numbers.

Floating point numbers are encoded per the IEEE 754 32-bit specifications.

* Points 337/338 through 345/346 are not available in units with firmware versions 1.018 or earlier.

## Modbus Point Map for IQ 35MA2x Models

| IQ 35MA22 DS | IQ 35MA23 Log | SERIES REG. | R/W | NV | Format | Units | Scale | Range | Description | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Integer Data: Summary of Active Phases | | | | | | | | | | | | |
| • | • | 001 | R | NV | SLong | kWh | E | -2147483647 to +2147483647 | Real Energy: Net (Import - Export) | MSR | Accumulated Real Energy (Ph) | Clear via reset register 129 |
| • | • | 002 | | | | | | | | LSR | | |
| • | • | 003 | R | NV | ULong | kWh | E | 0 to 0xFFFFFFFF | Real Energy: Quadrants 1 & 4 Import | MSR | | |
| • | • | 004 | | | | | | | | LSR | | |
| • | • | 005 | R | NV | ULong | kWh | E | 0 to 0xFFFFFFFF | Real Energy: Quadrants 2 & 3 Export | MSR | | |
| • | • | 006 | | | | | | | | LSR | | |
| • | • | 007 | R | NV | ULong | kVARh | E | 0 to 0xFFFFFFFF | Reactive Energy - Quadrant 1: Lags Import Real Energy (IEC) Inductive (IEEE) | MSR | Accumulated Reactive Energy (Qh): Quadrants 1 + 2 = Import Quadrants 3 + 4 = Export | |
| • | • | 008 | | | | | | | | LSR | | |
| • | • | 009 | R | NV | ULong | kVARh | E | 0 to 0xFFFFFFFF | Reactive Energy - Quadrant 2: Leads Export Real Energy (IEC) Inductive (IEEE) | MSR | | |
| • | • | 010 | | | | | | | | LSR | | |
| • | • | 011 | R | NV | ULong | kVARh | E | 0 to 0xFFFFFFFF | Reactive Energy - Quadrant 3: Lags Export Real Energy (IEC) Capacitive (IEEE) | MSR | | |
| • | • | 012 | | | | | | | | LSR | | |
| • | • | 013 | R | NV | ULong | kVARh | E | 0 to 0xFFFFFFFF | Reactive Energy - Quadrant 4: Leads Import Real Energy (IEC) Capacitive (IEEE) | MSR | | |
| • | • | 014 | | | | | | | | LSR | | |
| • | • | 015 | R | NV | SLong | kVAh | E | -2147483647 to +2147483647 | Apparent Energy: Net (Import - Export) | MSR | Accumulated Apparent Energy (Sh): Import and Export cor-respond with Real Energy | |
| • | • | 016 | | | | | | | | LSR | | |
| • | • | 017 | R | NV | ULong | kVAh | E | 0 to 0xFFFFFFFF | Apparent: Quadrants 1 & 4 Import | MSR | | |
| • | • | 018 | | | | | | | | LSR | | |
| • | • | 019 | R | NV | ULong | kVAh | E | 0 to 0xFFFFFFFF | Apparent: Quadrants 2 & 3 Export | MSR | | |
| • | • | 020 | | | | | | | | LSR | | |
| • | • | 021 | R | | SInt | kW | W | -32767 to +32767 | Total Instantaneous Real (P) Power | | | |
| • | • | 022 | R | | SInt | kVAR | W | 0 to 32767 | Total Instantaneous Reactive (Q) Power | | | |
| • | • | 023 | R | | UInt | kVA | W | 0 to 32767 | Total Instantaneous Apparent (S) Power (vector sum) | | | |
| • | • | 024 | R | | SInt | Ratio | 0.0001 | -10000 to +10000 | Total Power Factor (total kW / total kVA) | | | |
| • | • | 025 | R | | UInt | Volt | V | 0 to 32767 | Voltage, L-L (U), average of active phases | | | |
| • | • | 026 | R | | UInt | Volt | V | 0 to 32767 | Voltage, L-N (V), average of active phases | | | |
| • | • | 027 | R | | UInt | Amp | I | 0 to 32767 | Current, average of active phases | | | |
| • | • | 028 | | | UInt | Hz | 0.01 | 4500 to 6500 | Frequency | | | |
| • | • | 029 | R | | SInt | kW | W | -32767 to +32767 | Total Real Power Present Demand | | | |
| • | • | 030 | | | SInt | kVAR | W | -32767 to +32767 | Total Reactive Power Present Demand | | | |
| • | • | 031 | R | | SInt | kVA | W | -32767 to +32767 | Total Apparent Power Present Demand | | | |

| IQ 35MA22 DS | IQ 35MA23 Log | SERIES REG. | R/W | NV | Format | Units | Scale | Range | Description | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • | • | 032 | R | NV | SInt | kW | W | -32767 to +32767 | Total Real Power Max. Demand | Import | Reset via register 129 |
| • | • | 033 | R | NV | SInt | kVAR | W | -32767 to +32767 | Total Reactive Power Max. Demand | | |
| • | • | 034 | R | NV | SInt | kVA | W | -32767 to +32767 | Total Apparent Power Max. Demand | | |
| • | • | 035 | R | NV | SInt | kW | W | -32767 to +32767 | Total Real Power Max. Demand | Export | |
| • | • | 036 | R | NV | SInt | kVAR | W | -32767 to +32767 | Total Reactive Power Max. Demand | | |
| • | • | 037 | R | NV | SInt | kVA | W | -32767 to +32767 | Total Apparent Power Max. Demand | | |
| • | • | 038 | R | | UInt | | | | Reserved, returns 0x8000 (QNAN) | | |
| • | • | 039 | R | NV | ULong | | | 0 to 0xFFFFFFFF | Pulse Counter 1 (Import Real Energy) | MSR | Contact Closure Counters. Valid for both pulse inputs and outputs. IQ 35MA2x counts are shown in (). See register 144 - Energy Per Pulse for the Wh per pulse count. |
| • | • | 040 | | | | | | | | LSR | |
| • | • | 041 | R | NV | ULong | | | 0 to 0xFFFFFFFF | Pulse Counter 2 (Export Real Energy) | MSR | |
| • | • | 042 | | | | | | | | LSR | |
| Integer Data: Per Phase | | | | | | | | | | | |
| • | • | 043 | R | NV | ULong | kWh | E | 0 to 0xFFFFFFFF | Accumulated Real Energy, Phase A | MSR | Import | Accumulated Real Energy (Ph), per phase |
| • | • | 044 | | | | | | | | LSR | | |
| • | • | 045 | R | NV | ULong | kWh | E | 0 to 0xFFFFFFFF | Accumulated Real Energy, Phase B | MSR | | |
| • | • | 046 | | | | | | | | LSR | | |
| • | • | 047 | R | NV | ULong | kWh | E | 0 to 0xFFFFFFFF | Accumulated Real Energy, Phase C | MSR | | |
| • | • | 048 | | | | | | | | LSR | | |
| • | • | 049 | R | NV | ULong | kWh | E | 0 to 0xFFFFFFFF | Accumulated Real Energy, Phase A | MSR | Export | |
| • | • | 050 | | | | | | | | LSR | | |
| • | • | 051 | R | NV | ULong | kWh | E | 0 to 0xFFFFFFFF | Accumulated Real Energy, Phase B | MSR | | |
| • | • | 052 | | | | | | | | LSR | | |
| • | • | 053 | R | NV | ULong | kWh | E | 0 to 0xFFFFFFFF | Accumulated Real Energy, Phase C | MSR | | |
| • | • | 054 | | | | | | | | LSR | | |

| IQ 35MA22 DS | IQ 35MA23 Log | SERIES REG. | R/W | NV | Format | Units | Scale | Range | Description | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| • | • | 055 | R | NV | ULong | kVARh | E | 0 to 0xFFFFFFFF | Accumulated Q1 Reactive Energy, Phase A | MSR | Import | Accumulated Reactive Energy (Qh), Per Phase |
| • | • | 056 | | | | | | | | LSR | | |
| • | • | 057 | R | NV | ULong | kVARh | E | 0 to 0xFFFFFFFF | Accumulated Q1 Reactive Energy, Phase B | MSR | | |
| • | • | 058 | | | | | | | | LSR | | |
| • | • | 059 | R | NV | ULong | kVARh | E | 0 to 0xFFFFFFFF | Accumulated Q1 Reactive Energy, Phase C | MSR | | |
| • | • | 060 | | | | | | | | LSR | | |
| • | • | 061 | R | NV | ULong | kVARh | E | 0 to 0xFFFFFFFF | Accumulated Q2 Reactive Energy, Phase A | MSR | | |
| • | • | 062 | | | | | | | | LSR | | |
| • | • | 063 | R | NV | ULong | kVARh | E | 0 to 0xFFFFFFFF | Accumulated Q2 Reactive Energy, Phase B | MSR | | |
| • | • | 064 | | | | | | | | LSR | | |
| • | • | 065 | R | NV | ULong | kVARh | E | 0 to 0xFFFFFFFF | Accumulated Q2 Reactive Energy, Phase C | MSR | | |
| • | • | 066 | | | | | | | | LSR | | |
| • | • | 067 | R | NV | ULong | kVARh | E | 0 to 0xFFFFFFFF | Accumulated Q3 Reactive Energy, Phase A | MSR | Export | |
| • | • | 068 | | | | | | | | LSR | | |
| • | • | 069 | R | NV | ULong | kVARh | E | 0 to 0xFFFFFFFF | Accumulated Q3 Reactive Energy, Phase B | MSR | | |
| • | • | 070 | | | | | | | | LSR | | |
| • | • | 071 | R | NV | ULong | kVARh | E | 0 to 0xFFFFFFFF | Accumulated Q3 Reactive Energy, Phase C | MSR | | |
| • | • | 072 | | | | | | | | LSR | | |
| • | • | 073 | R | NV | ULong | kVARh | E | 0 to 0xFFFFFFFF | Accumulated Q4 Reactive Energy, Phase A | MSR | | |
| • | • | 074 | | | | | | | | LSR | | |
| • | • | 075 | R | NV | ULong | kVARh | E | 0 to 0xFFFFFFFF | Accumulated Q4 Reactive Energy, Phase B | MSR | | |
| • | • | 076 | | | | | | | | LSR | | |
| • | • | 077 | R | NV | ULong | kVARh | E | 0 to 0xFFFFFFFF | Accumulated Q4 Reactive Energy, Phase C | MSR | | |
| • | • | 078 | | | | | | | | LSR | | |
| • | • | 079 | R | NV | ULong | kVAh | E | 0 to 0xFFFFFFFF | Accumulated Apparent Energy, Phase A | MSR | Import | Accumulated Apparent Energy (Sh), Per Phase |
| • | • | 080 | | | | | | | | LSR | | |
| • | • | 081 | R | NV | ULong | kVAh | E | 0 to 0xFFFFFFFF | Accumulated Apparent Energy, Phase B | MSR | | |
| • | • | 082 | | | | | | | | LSR | | |
| • | • | 083 | R | NV | ULong | kVAh | E | 0 to 0xFFFFFFFF | Accumulated Apparent Energy, Phase C | MSR | | |
| • | • | 084 | | | | | | | | LSR | | |
| • | • | 085 | R | NV | ULong | kVAh | E | 0 to 0xFFFFFFFF | Accumulated Apparent Energy, Phase A | MSR | Export | |
| • | • | 086 | | | | | | | | LSR | | |
| • | • | 087 | R | NV | ULong | kVAh | E | 0 to 0xFFFFFFFF | Accumulated Apparent Energy, Phase B | MSR | | |
| • | • | 088 | | | | | | | | LSR | | |
| • | • | 089 | R | NV | ULong | kVAh | E | 0 to 0xFFFFFFFF | Accumulated Apparent Energy, Phase C | MSR | | |
| • | • | 090 | | | | | | | | LSR | | |

| IQ 35MA22 DS | IQ 35MA23 Log | SERIES REG. | R/W | NV | Format | Units | Scale | Range | Description | |
|---|---|---|---|---|---|---|---|---|---|---|
| • | • | 091 | R | | SInt | kW | W | -32767 to +32767 | Real Power (P), Phase A | Real Power (P) |
| • | • | 092 | R | | SInt | kW | W | -32767 to +32767 | Real Power (P), Phase B | |
| • | • | 093 | R | | SInt | kW | W | -32767 to +32767 | Real Power (P), Phase C | |
| • | • | 094 | R | | SInt | kVAR | W | -32767 to +32767 | Reactive Power (Q), Phase A | Reactive Power (Q) |
| • | • | 095 | R | | SInt | kVAR | W | -32767 to +32767 | Reactive Power (Q), Phase B | |
| • | • | 096 | R | | SInt | kVAR | W | -32767 to +32767 | Reactive Power (Q), Phase C | |
| • | • | 097 | R | | UInt | kVA | W | 0 to 32767 | Apparent Power (S), Phase A | Apparent Power (S) |
| • | • | 098 | R | | UInt | kVA | W | 0 to 32767 | Apparent Power (S), Phase B | |
| • | • | 099 | R | | UInt | kVA | W | 0 to 32767 | Apparent Power (S), Phase C | |
| • | • | 100 | R | | SInt | Ratio | 0.0001 | -10000 to +10000 | Power Factor (PF), Phase A | Power Factor (PF) |
| • | • | 101 | R | | SInt | Ratio | 0.0001 | -10000 to +10000 | Power Factor (PF), Phase B | |
| • | • | 102 | R | | SInt | Ratio | 0.0001 | -10000 to +10000 | Power Factor (PF), Phase C | |
| • | • | 103 | R | | UInt | Volt | V | 0 to 32767 | Voltage (U), Phase A-B | Line to Line Voltage (U) |
| • | • | 104 | R | | UInt | Volt | V | 0 to 32767 | Voltage (U), Phase B-C | |
| • | • | 105 | R | | UInt | Volt | V | 0 to 32767 | Voltage (U), Phase A-C | |
| • | • | 106 | R | | UInt | Volt | V | 0 to 32767 | Voltage (V), Phase A-N | Line to Neutral Voltage (V) |
| • | • | 107 | R | | UInt | Volt | V | 0 to 32767 | Voltage (V), Phase B-N | |
| • | • | 108 | R | | UInt | Volt | V | 0 to 32767 | Voltage (V), Phase C-N | |
| • | • | 109 | R | | UInt | Amp | I | 0 to 32767 | Current, Phase A | Current |
| • | • | 110 | R | | UInt | Amp | I | 0 to 32767 | Current, Phase B | |
| • | • | 111 | R | | UInt | Amp | I | 0 to 32767 | Current, Phase C | |
| • | • | 112 | R | | UInt | | | | Reserved, Returns 0x8000 (QNAN) | |
| Configuration | | | | | | | | | | |
| • | • | 129 | R/W | | UInt | | | N/A | Reset:<br>- Write 30078 (0x757E) to clear all Energy Accumulators to 0 (All).<br>- Write 21211 (0x52DB) to begin new Demand Sub-Interval calculation cycle. Takes effect at the end of the next 1 second calculation cycle. Write no more frequently than every 10 seconds.<br>- Write 21212 (0x52DC) to reset Max Demand values to Present Demand Values. Takes effect at the end of the next 1 second calculation cycle. Write no more frequently than every 10 seconds.<br>- Write 16640 (0x4100) to reset Logging (IQ 35MA23 only).<br>- Write 16498 (0x4072) to clear Pulse Counts to zero.<br>- Read always returns 0. | |

| IQ 35MA22 DS | IQ 35MA23 Log | SERIES REG. | R/W | NV | Format | Units | Scale | Range | Description | |
|---|---|---|---|---|---|---|---|---|---|---|
| • | • | 130 | R/W | NV | UInt | | | 10,<br>11,<br>12,<br>31,<br>40 | Single Phase: A + N<br>Single Phase: A + B<br>Single Split Phase: A + B + N<br>3 phase Δ, A + B + C, no N<br>3 phase Y, A + B + C + N | System Type<br>(See Manual. Note: only the indicated phases are monitored for Phase Loss) |
| • | • | 131 | R/W | NV | UInt | Amps | | 1-32000 | CT Ratio – Primary | Current Inputs |
| • | • | 132 | R/W | NV | UInt | | | 1, 3 | CT Ratio – Secondary Interface (1 or 1/3 V, may not be user configurable) | |
| • | • | 133 | R/W | NV | UInt | | 100 | 0.01-320.00 | PT Ratio: The meter scales this value by 100 (i.e. entering 200 yields a potential transformer ratio of 2:1). The default is 100 (1.00:1), which is with no PT attached. Set this value before setting the system voltage (below) | |
| • | • | 134 | R/W | NV | UInt | | | 82-32000 | System Voltage: This voltage is line to line, unless in system type 10 (register 130), which is line to neutral. The meter uses this value to calculate the full scale power for the pulse configuration (below), and as full scale for phase loss (register 142). The meter will refuse voltages that are outside the range of 82-660 volts when divided by the PT Ratio (above). | |
| • | • | 135 | R | NV | UInt | kW | W | 1-32767 | Theoretical Maximum System Power – This read only register is the theoretical maximum power the meter expects to see on a service. It is calculated by the meter from the System Type (register 130), CT size (register 131), and System Voltage (register 134) and is updated whenever the user changes any of these parameters. It is used to determine the maximum power the pulse outputs can keep up with. This integer register has the same scale as other integer power registers (see register 140 for power scaling). | |
| • | • | 136 | R | | UInt | | | | Reserved, always returns 0 | |
| • | • | 137 | R/W | NV | UInt | | | 0,1 | Display Units: 0 = IEC (U, V, P, Q, S), 1 = IEEE (default: VLL, VLN, W, VAR, VA) | |
| • | • | 138 | R | | SInt | | -4 0.0001<br>-3 0.001<br>-2 0.01<br>-1 0.1<br>0 1.0<br>1 10.0<br>2 100.0<br>3 1000.0<br>4 10000.0 | | Scale Factor I (Current) | Scale Factors<br><br>Note: These registers contain a signed integer, which scales the corresponding integer registers. Floating point registers are not scaled. Scaling is recalculated when the meter configuration is changed. |
| • | • | 139 | R | | SInt | | | | Scale Factor V (Voltage) | |
| • | • | 140 | R | | SInt | | | | Scale Factor W (Power) | |
| • | • | 141 | R | | SInt | | | | Scale Factor E (Energy) | |
| • | • | 142 | R/W | NV | UInt | V | | 1-99 | Phase Loss Voltage Threshold in percent of system voltage (register 134). | Phase Loss Output<br><br>Note: The phases tested are determined by the System Type. |
| • | • | 143 | R/W | NV | UInt | % | | 1-99 | Phase Loss Imbalance Threshold in Percent. Default is 25% phase to phase difference. For System type 40 (3+N), both line to neutral and line to line voltages are tested. For System type 31, only only line to line voltages are examined. In System type 12 (2+N), just the two line to neutral voltages are compared. | |

<table>
<tr><th>IQ 35MA22 DS</th><th>IQ 35MA23 Log</th><th>SERIES REG.</th><th>R/W</th><th>NV</th><th>Format</th><th>Units</th><th>Scale</th><th>Range</th><th colspan="2">Description</th></tr>
<tr><td>•</td><td>•</td><td>144</td><td>R/W</td><td>NV</td><td>UInt</td><td>Wh</td><td></td><td>10000,<br>1000,<br>100,<br>10</td><td>Wh (& VARh, if equipped) Energy per Pulse Output Contact Closure. If the meter cannot find a pulse duration that will keep up with the max. system power (register 135), it will reject the new value. Check the meter configuration and/or try a larger value.</td><td rowspan="2">kWh (& VARh, if equipped) Pulse Contacts<br><br>Note: The kWh pulse contact can keep up with a maximum power (Watts) of 1800000 x Wh pulse weight ÷ contact closure duration (in msec)</td></tr>
<tr><td>•</td><td>•</td><td>145</td><td>R</td><td>NV</td><td>UInt</td><td>msec</td><td></td><td>500,<br>250,<br>100,<br>50,<br>25,<br>10</td><td>Pulse Contact Closure Duration in msec. Read-only. Set to the slowest duration that will keep up with the theoretical max. system power (register 135). The open time ≥ the closure time, so the max. pulse rate (pulses per sec) is the inverse of double the pulse time.</td></tr>
<tr><td>•</td><td>•</td><td>146</td><td>R</td><td></td><td>UInt</td><td></td><td></td><td></td><td colspan="2">Error Bitmap. 1 = Active:<br>Bit 0: Phase A Voltage out of range<br>Bit 1: Phase B Voltage out of range<br>Bit 2: Phase C Voltage out of range<br>Bit 3: Phase A Current out of range<br>Bit 4: Phase B Current out of range<br>Bit 5: Phase C Current out of range<br>Bit 6: Frequency out of the range of 45 to 65 Hz -OR- insufficient voltage to determine frequency.<br>Bit 7: Reserved for future use<br>Bit 8: Phase Loss A<br>Bit 9: Phase Loss B<br>Bit 10: Phase Loss C<br>Bit 11: Low Power Factor on A with one or more phases having a PF less than 0.5 due to mis-wiring of phases<br>Bit 12: Low Power Factor on B<br>Bit 13: Low Power Factor on C<br>Bit 14: Energy pulse output overrun error. The pulse outputs are unable to keep up with the total real power (registers 3 and 261/262). To fix, increase the pulse energy register (register 144) and reset the energy accumulators (see reset register 129).<br>Bit 15: Energy pulse output configuration error (present pulse energy setting may not keep up with the theoretical max. system power; see register 135). To fix, increase the pulse energy (register 144).</td></tr>
<tr><td>•</td><td>•</td><td>147</td><td>R</td><td>NV</td><td>UInt</td><td></td><td></td><td>0-32767</td><td colspan="2">Count of Energy Accumulator resets</td></tr>
<tr><td>•</td><td>•</td><td>148</td><td>R</td><td></td><td>UInt</td><td></td><td></td><td></td><td colspan="2">Reserved (returns 0)</td></tr>
</table>

# Modbus Point Map for IQ 35MA2x Models

<table>
<tr><th>IQ 35MA22 DS</th><th>IQ 35MA23 Log</th><th>SERIES REG.</th><th>R/W</th><th>NV</th><th>Format</th><th>Units</th><th>Scale</th><th>Range</th><th colspan="3">Description</th></tr>
<tr><td>•</td><td>•</td><td>149</td><td>R/W</td><td>NV</td><td>UInt</td><td></td><td></td><td>1-6</td><td colspan="2">Number of Sub-Intervals per Demand Interval. Sets the number of sub-intervals that make a single demand interval. For block demand, set this to 1. Default is 1. When Sub-Interval Length register #150 is set to 0 (sync-to-comms mode), this register is ignored.</td><td rowspan="2">Demand Calculation</td></tr>
<tr><td>•</td><td>•</td><td>150</td><td>R/W</td><td>NV</td><td>UInt</td><td>Seconds</td><td></td><td>0, 10-32767</td><td colspan="2">Sub-Interval Length in seconds. For sync-to-comms, set this to 0 and use the reset register (129) to externally re-start the sub-interval. On the IQ 35MA23, this is also the logging interval.</td></tr>
<tr><td>•</td><td>•</td><td>151</td><td>R/W</td><td></td><td>UInt</td><td></td><td></td><td>1-32767</td><td colspan="3">Reserved (returns 0)</td></tr>
<tr><td>•</td><td>•</td><td>152</td><td>R</td><td>NV</td><td>UInt</td><td></td><td></td><td>0-32767</td><td colspan="3">Power Up Counter.</td></tr>
<tr><td>•</td><td>•</td><td>153</td><td>R</td><td>NV</td><td>UInt</td><td></td><td></td><td>0-32767</td><td colspan="3">Output Configuration. IQ35MA22 and IQ35MA23 models will always return Zero.</td></tr>
<tr><td>•</td><td>•</td><td>154</td><td>R</td><td></td><td>UInt</td><td></td><td></td><td></td><td colspan="3">Reserved, returns 0</td></tr>
<tr><td colspan="12">Logging Configuration and Status</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">•</td><td rowspan="2">155</td><td rowspan="2">R/W</td><td rowspan="2">NV</td><td rowspan="2">UInt</td><td rowspan="2">Day / Month</td><td rowspan="2"></td><td rowspan="2">See Bytes</td><td>Most Significant Byte (MSB)</td><td>Least Significant Byte (LSB)</td><td rowspan="4">Date / Time Clock. Following a power cycle, resets to:<br>Day 01 Month 01<br>Hour 00 Year (20)00<br>Note that this is the only time Month goes to 0.</td></tr>
<tr><td>Day 1-31 (0x01-0x1F)</td><td>Month 1-12 (0x01-0x0C)</td></tr>
<tr><td></td><td>•</td><td>156</td><td>R/W</td><td>NV</td><td>UInt</td><td>Hour / Year</td><td></td><td>See Bytes</td><td>Hour 0-23 (0x00-0x17)</td><td>Year 0-199 (0x00-0xC7)</td></tr>
<tr><td></td><td>•</td><td>157</td><td>R/W</td><td>NV</td><td>UInt</td><td>Seconds / Minutes</td><td></td><td>See Bytes</td><td>Seconds 0-59 (0x00-0x3B)</td><td>Minutes 0-59 (0x00-0x3B)</td></tr>
<tr><td></td><td>•</td><td>158</td><td>R/W</td><td>NV</td><td>UInt</td><td></td><td></td><td>0-10</td><td colspan="3">Logging Read Page Register. Selects which of the Register Logs to read (see registers 169-178). 1-10 are valid entries that put the meter into log reading mode, temporarily pausing logging. When set to 0 (no variable selected for reading), normal logging resumes. The meter will buffer one set of log entries while in reading mode if a sub-interval timeout occurs (read/write collision). Default is 0.<br>Warning: this buffered data will be written to the log, and logging will resume on the following sub-interval timeout whether the page register has been cleared or not, resulting in the appearance of data moving in the buffer during reads. To avoid this, log buffer reads should be completed and this register set back to 0 in less time than the Demand Sub-interval (preferred) or logging should be halted by setting Bit 1 in register 158 (logs may be missed)</td></tr>
<tr><td></td><td>•</td><td>159</td><td>R/W</td><td>NV</td><td>UInt</td><td></td><td></td><td></td><td colspan="3">Logging Configuration Register (Bit Mapped):<br>Bit 0: Clear to 0 for Circular log buffer mode. Set to 1 for single shot logging mode. Default is 0 (Circular).<br>Bit 1: Clear to 0 to enable Logging. Set to 1 to halt logging. Default is 0 (Log).</td></tr>
</table>

<table>
<tr><th>IQ 35MA22 DS</th><th>IQ 35MA23 Log</th><th>SERIES REG.</th><th>R/W</th><th>NV</th><th>Format</th><th>Units</th><th>Scale</th><th>Range</th><th colspan="3">Description</th></tr>
<tr><td></td><td>•</td><td>160</td><td>R</td><td>NV</td><td>UInt</td><td></td><td></td><td></td><td colspan="3">Logging Status Register (Bit Mapped):<br>Bit 0: Log buffer full – Set to 1 when one single shot mode has filled the log buffer. In this condition, the Logged Entry Count will continue to increment. Cleared to 0 when logging is restarted (see reset command register 129).<br>Bit 1: Log Buffer Read Collision 1 – Set to 1 if the meter tried to save log data while the user was reading the log (Logging Page Register has been set to something other than 0). On the first collision, the meter holds the data until the next sub-interval and then writes the saved data to the log as well as the data for that interval. This bit is cleared to 0 on the first demand interval with Logging Page Register = 0.<br>Bit 2: Log Buffer Read Collision 2 – Set to 1 on the 2nd attempt to save log data while the user is reading the log (Logging Page Register is set to something other than 0). At this point the meter ignores the read condition and does a double write, first of the values saved from the previous cycle, and then the present values. If the read condition is not removed the meter continues to write the log data as it normally would. This bit is cleared to 0 on the first demand interval with Logging Page Register = 0.<br>Bit 3: Logging Reset – The log has been reset during the previous demand sub-interval.<br>Bit 4: Logging Interrupted – Logging has been interrupted (power cycled, log configuration change, etc.) during the previous demand sub-interval.<br>Bit 5: RTC Changed – The real time clock had been changed during the previous demand subinterval.<br>Bit 6: RTC Reset - The Real Time Clock has been reset to the year 2000 and needs to be re-initialized.</td></tr>
<tr><td></td><td>•</td><td>161</td><td>R</td><td>NV</td><td>UInt</td><td></td><td></td><td>0-32767</td><td colspan="3">Log Buffer Wrap / Missed Log Counter. In continous mode, this counter increments each time the internal circular log buffer wraps and overwrites old data. The total number of logged entries since the last log reset is: (Register 161 x 5760) + Register 163. In single shot mode this counter is the number of log entries lost due to the buffer being full. The counter is cleared on logging reset.</td></tr>
<tr><td></td><td>•</td><td>162</td><td>R</td><td>NV</td><td>UInt</td><td></td><td></td><td>0-32767</td><td colspan="3">Max Number of Logging Days. Based on the Sub-Interval Length and the depth of the log buffer, this register shows the maximum number of days that data will be logged following a reset until the Buffer is full (Single Shot Mode) or overwrites old data (Continuous).</td></tr>
<tr><td></td><td>•</td><td>163</td><td>R</td><td>NV</td><td>UInt</td><td></td><td></td><td>0-32767</td><td colspan="3">Number of Logged Entries since the log buffer wrapped or was reset. In single shot mode, this is the total number of valid entries in the buffer. Any entries beyond this will read back as QNAN (0x8000).</td></tr>
<tr><td></td><td>•</td><td>164</td><td rowspan="2">R</td><td rowspan="2">NV</td><td rowspan="2">ULong</td><td rowspan="2">kWh</td><td rowspan="2">E</td><td>0-0xFFFF</td><td>Real Energy Consumption (MSR)</td><td colspan="2" rowspan="2">Real Energy (Register 001/002) starting value. Corresponds to when logging is started, reset, or rolls.</td></tr>
<tr><td></td><td>•</td><td>165</td><td>0-0xFFFF</td><td>Real Energy Consumption (LSR)</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">•</td><td rowspan="2">166</td><td rowspan="2">R</td><td rowspan="2">NV</td><td rowspan="2">UInt</td><td rowspan="2">Month / Day</td><td rowspan="2"></td><td rowspan="2">See Bytes</td><td>Most Significant Byte (MSB)</td><td>Least Significant Byte (LSB)</td><td rowspan="4">Date & Time of the newest entry in the log. After a power cycle, resets to:<br>Day 01 Month 01<br>Hour 00 Year (20)00</td></tr>
<tr><td>Day 1-31 (0x01-0x1F)</td><td>Month 1-12 (0x01-0x0C)</td></tr>
<tr><td></td><td>•</td><td>167</td><td>R</td><td>NV</td><td>UInt</td><td>Year / Hour</td><td></td><td>See Bytes</td><td>Hour 0-23 (0x00-0x17)</td><td>Year 0-199 (0x00-0xC7)</td></tr>
<tr><td></td><td>•</td><td>168</td><td>R</td><td>NV</td><td>UInt</td><td>Minutes / Seconds</td><td></td><td>See Bytes</td><td>Seconds 0-59 (0x00-0x3B)</td><td>Minutes 0-59 (0x00-0x3B)</td></tr>
</table>

<table>
<tr><th>IQ 35MA22 DS</th><th>IQ 35MA23 Log</th><th>SERIES REG.</th><th>R/W</th><th>NV</th><th>Format</th><th>Units</th><th>Scale</th><th>Range</th><th colspan="3">Description</th></tr>
<tr><td></td><td>•</td><td>169</td><td>R/W</td><td>NV</td><td>UInt</td><td></td><td></td><td rowspan="10">1-42,<br>146,<br>155-157,<br>257-336</td><td>Log Register 1 –<br>Default is 3 (Import Real Energy MSR)</td><td colspan="2" rowspan="10">Log Register Selection – Write the number of the 16 bit register to be logged. To log a 32 bit value (such as accumulators and floating point values) two log registers must be used, one each for the most and least significant register (MSR & LSR).</td></tr>
<tr><td></td><td>•</td><td>170</td><td>R/W</td><td>NV</td><td>UInt</td><td></td><td></td><td>Log Register 2 –<br>Default is 4 (Import Real Energy LSR)</td></tr>
<tr><td></td><td>•</td><td>171</td><td>R/W</td><td>NV</td><td>UInt</td><td></td><td></td><td>Log Register 3 –<br>Default is 5 (Export Real Energy MSR)</td></tr>
<tr><td></td><td>•</td><td>172</td><td>R/W</td><td>NV</td><td>UInt</td><td></td><td></td><td>Log Register 4 –<br>Default is 6 (Export Real Energy LSR)</td></tr>
<tr><td></td><td>•</td><td>173</td><td>R/W</td><td>NV</td><td>UInt</td><td></td><td></td><td>Log Register 5 –<br>Default is 29 (Real Demand)</td></tr>
<tr><td></td><td>•</td><td>174</td><td>R/W</td><td>NV</td><td>UInt</td><td></td><td></td><td>Log Register 6 –<br>Default is 30 (Reactive Demand)</td></tr>
<tr><td></td><td>•</td><td>175</td><td>R/W</td><td>NV</td><td>UInt</td><td></td><td></td><td>Log Register 7 –<br>Default is 31 (Apparent Demand)</td></tr>
<tr><td></td><td>•</td><td>176</td><td>R/W</td><td>NV</td><td>UInt</td><td></td><td></td><td>Log Register 8 –<br>Default is 155 (Month/Day)</td></tr>
<tr><td></td><td>•</td><td>177</td><td>R/W</td><td>NV</td><td>UInt</td><td></td><td></td><td>Log Register 9 –<br>Default is 156 (Year/Hour)</td></tr>
<tr><td></td><td>•</td><td>178</td><td>R/W</td><td>NV</td><td>UInt</td><td></td><td></td><td>Log Register 10 –<br>Default is 157 (Minutes/ Seconds)</td></tr>
<tr><td colspan="12">Floating Point Data: Summary of Active Phases</td></tr>
<tr><td>•</td><td>•</td><td>257/258</td><td>R</td><td>NV</td><td>Float</td><td>kWh</td><td></td><td></td><td>Accumulated Real Energy: Net (Import - Export)</td><td rowspan="3">Accumulated Real Energy (Ph)</td><td rowspan="10">Clear via register 129</td></tr>
<tr><td>•</td><td>•</td><td>259/260</td><td>R</td><td>NV</td><td>Float</td><td>kWh</td><td></td><td></td><td>Real Energy: Quadrants 1 & 4<br>Import</td></tr>
<tr><td>•</td><td>•</td><td>261/262</td><td>R</td><td></td><td>Float</td><td>kWh</td><td></td><td></td><td>Real Energy: Quadrants 2 & 3<br>Export</td></tr>
<tr><td>•</td><td>•</td><td>263/264</td><td>R</td><td></td><td>Float</td><td>kVARh</td><td></td><td></td><td>Reactive Energy: Quadrant 1<br>Lags Import Real Energy (IEC) Inductive (IEEE)</td><td rowspan="4">Accumulated Reactive Energy (Qh):<br>Quadrants 1+2= Import<br>Quadrants 3+4= Export</td></tr>
<tr><td>•</td><td>•</td><td>265/266</td><td>R</td><td></td><td>Float</td><td>kVARh</td><td></td><td></td><td>Reactive Energy: Quadrant 2<br>Leads Export Real Energy (IEC) Inductive (IEEE)</td></tr>
<tr><td>•</td><td>•</td><td>267/268</td><td>R</td><td></td><td>Float</td><td>kVARh</td><td></td><td></td><td>Reactive Energy: Quadrant 3<br>Lags Export Real Energy (IEC) Capacitive (IEEE)</td></tr>
<tr><td>•</td><td>•</td><td>269/270</td><td>R</td><td></td><td>Float</td><td>kVARh</td><td></td><td></td><td>Reactive Energy: Quadrant 4<br>Leads Import Real Energy (IEC) Capacitive (IEEE)</td></tr>
<tr><td>•</td><td>•</td><td>271/272</td><td>R</td><td>NV</td><td>Float</td><td>kVAh</td><td></td><td></td><td>Apparent Energy: Net (Import - Export)</td><td rowspan="3">Accumulated Apparent Energy (Sh): Import and Export correspond with Real Energy</td></tr>
<tr><td>•</td><td>•</td><td>273/274</td><td>R</td><td>NV</td><td>Float</td><td>kVAh</td><td></td><td></td><td>Apparent Energy: Quadrants 1 & 4<br>Import</td></tr>
<tr><td>•</td><td>•</td><td>275/276</td><td>R</td><td>NV</td><td>Float</td><td>kVAh</td><td></td><td></td><td>Apparent Energy: Quadrants 2 & 3<br>Export</td></tr>
</table>

| IQ 35MA22 DS | IQ 35MA23 Log | SERIES REG. | R/W | NV | Format | Units | Scale | Range | Description | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| • | • | 277/278 | R | | Float | kW | | | Total Net Instantaneous Real (P) Power | | | |
| • | • | 279/280 | R | | Float | kVAR | | | Total Net Instantaneous Reactive (Q) Power | | | |
| • | • | 281/282 | R | | Float | kVA | | | Total Net Instantaneous Apparent (S) Power | | | |
| • | • | 283/284 | R | | Float | Ratio | | 0.0-1.0 | Total Power Factor (Total kW / Total kVA) | | | |
| • | • | 285/286 | R | | Float | Volt | | | Voltage, L-L (U), average of active phases | | | |
| • | • | 287/288 | R | | Float | Volt | | | Voltage, L-N (V), average of active phases | | | |
| • | • | 289/290 | R | | Float | Amp | | | Current, average of active phases | | | |
| • | • | 291/292 | R | | Float | Hz | | 45.0-65.0 | Frequency | | | |
| • | • | 293/294 | R | | Float | kW | | | Total Real Power Present Demand | | | |
| • | • | 295/296 | R | | Float | kVAR | | | Total Reactive Power Present Demand | | | |
| • | • | 297/298 | R | | Float | kVA | | | Total Apparent Power Present Demand | | | |
| • | • | 299/300 | R | NV | Float | kW | | | Total Real Power Max. Demand | Import | | |
| • | • | 301/302 | R | NV | Float | kVAR | | | Total Reactive Power Max. Demand | | | |
| • | • | 303/304 | R | NV | Float | kVA | | | Total Apparent Power Max. Demand | | | |
| • | • | 305/306 | R | NV | Float | kW | | | Total Real Power Max. Demand | Export | | |
| • | • | 307/308 | R | NV | Float | kVAR | | | Total Reactive Power Max. Demand | | | |
| • | • | 309/310 | R | NV | Float | kVA | | | Total Apparent Power Max. Demand | | | |
| • | • | 311/312 | R | | Float | | | | Reserved, reports QNAN (0x7FC00000) | | | |
| • | • | 313/314 | R | | Float | | 1 | 0-4294967040 | Pulse Counter 1 (Import Real Energy) | Contact closure counters. Valid for both pulse inputs and outputs. IQ 35MA2x counts are shown in (). See register 144 for the weight of each pulse output count. These values are derived from the 32 bit integer counter and will roll over to 0 when the integer counters do. Inputs are user defined. | | |
| • | • | 315/316 | R | | Float | | 1 | 0-4294967040 | Pulse Counter 2 (Export Reactive Energy | | | |
| Floating Point Data: Per Phase | | | | | | | | | | | | |
| • | • | 317/318 | R | | Float | kWh | | | Accumulated Real Energy, Phase A | Import | Accumulated Real Energy (Ph) | |
| • | • | 319/320 | R | | Float | kWh | | | Accumulated Real Energy, Phase B | | | |
| • | • | 321/322 | R | | Float | kWh | | | Accumulated Real Energy, Phase C | | | |
| • | • | 323/324 | R | | Float | kWh | | | Accumulated Real Energy, Phase A | Export | | |
| • | • | 325/326 | R | | Float | kWh | | | Accumulated Real Energy, Phase B | | | |
| • | • | 327/328 | R | | Float | kWh | | | Accumulated Real Energy, Phase C | | | |
| • | • | 329/330 | R | | Float | kVARh | | | Accumulated Q1 Reactive Energy, Phase A | Quadrant 1 | Import | Accumulated Reactive Energy (Qh) |
| • | • | 331/332 | R | | Float | kVARh | | | Accumulated Q1 Reactive Energy, Phase B | | | |
| • | • | 333/334 | R | | Float | kVARh | | | Accumulated Q1 Reactive Energy, Phase C | | | |
| • | • | 335/336 | R | | Float | kVARh | | | Accumulated Q2 Reactive Energy, Phase A | Quadrant 2 | | |
| • | • | 337/338 | R | | Float | kVARh | | | Accumulated Q2 Reactive Energy, Phase B | | | |
| • | • | 339/340 | R | | Float | kVARh | | | Accumulated Q2 Reactive Energy, Phase C | | | |
| • | • | 341/342 | R | | Float | kVARh | | | Accumulated Q3 Reactive Energy, Phase A | Quadrant 3 | Export | |
| • | • | 343/344 | R | | Float | kVARh | | | Accumulated Q3 Reactive Energy, Phase B | | | |
| • | • | 345/346 | R | | Float | kVARh | | | Accumulated Q3 Reactive Energy, Phase C | | | |
| • | • | 347/348 | R | | Float | kVARh | | | Accumulated Q4 Reactive Energy, Phase A | Quadrant 4 | | |
| • | • | 349/350 | R | | Float | kVARh | | | Accumulated Q4 Reactive Energy, Phase B | | | |
| • | • | 351/352 | R | | Float | kVARh | | | Accumulated Q4 Reactive Energy, Phase C | | | |

## Modbus Point Map for IQ 35MA2x Models

| IQ 35MA22 DS | IQ 35MA23 Log | SERIES REG. | R/W | NV | Format | Units | Scale | Range | Description | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • | • | 353/354 | R | | Float | kVAh | | | Accumulated Apparent Energy, Phase A | Import | Accumulated Apparent Energy (Sh) |
| • | • | 355/356 | R | | Float | kVAh | | | Accumulated Apparent Energy, Phase B | | |
| • | • | 357/358 | R | | Float | kVAh | | | Accumulated Apparent Energy, Phase C | | |
| • | • | 359/360 | R | | Float | kVAh | | | Accumulated Apparent Energy, Phase A | Export | |
| • | • | 361/362 | R | | Float | kVAh | | | Accumulated Apparent Energy, Phase B | | |
| • | • | 363/364 | R | | Float | kVAh | | | Accumulated Apparent Energy, Phase C | | |
| • | • | 365/366 | R | | Float | kW | | | Real Power, Phase A | Real Power (P) | |
| • | • | 367/368 | R | | Float | kW | | | Real Power, Phase A | | |
| • | • | 369/370 | R | | Float | kW | | | Real Power, Phase A | | |
| • | • | 371/372 | R | | Float | kVAR | | | Reactive Power, Phase A | Reactive Power (Q) | |
| • | • | 373/374 | R | | Float | kVAR | | | Reactive Power, Phase A | | |
| • | • | 375/376 | R | | Float | kVAR | | | Reactive Power, Phase A | | |
| • | • | 377/378 | R | | Float | kVA | | | Apparent Power, Phase A | Apparent Power (S) | |
| • | • | 379/380 | R | | Float | kVA | | | Apparent Power, Phase A | | |
| • | • | 381/382 | R | | Float | kVA | | | Apparent Power, Phase A | | |
| • | • | 383/384 | R | | Float | Ratio | | 0.0-1.0 | Power Factor, Phase A | Power Factor (PF) | |
| • | • | 385/386 | R | | Float | Ratio | | 0.0-1.0 | Power Factor, Phase A | | |
| • | • | 387/388 | R | | Float | Ratio | | 0.0-1.0 | Power Factor, Phase A | | |
| • | • | 389/390 | R | | Float | Volt | | | Voltage, Phase A-B | Line to Line Voltage (U) | |
| • | • | 391/392 | R | | Float | Volt | | | Voltage, Phase B-C | | |
| • | • | 393/394 | R | | Float | Volt | | | Voltage, Phase A-C | | |
| • | • | 395/396 | R | | Float | Volt | | | Voltage, Phase A-N | Line to Neutral (V) | |
| • | • | 397/398 | R | | Float | Volt | | | Voltage, Phase B-N | | |
| • | • | 399/400 | R | | Float | Volt | | | Voltage, Phase C-N | | |
| • | • | 401/402 | R | | Float | Amp | | | Current, Phase A | Current | |
| • | • | 403/404 | R | | Float | Amp | | | Current, Phase B | | |
| • | • | 405/406 | R | | Float | Amp | | | Current, Phase C | | |
| • | • | 407/408 | R | | Float | | | | Reserved, Reports QNAN (0x7FC00000) | | |
| Logging Interface | | | | | | | | | | | |
| | • | 8000 | R | NV | | | | | Newest Logged Data Entry | 5760 entries total (60 days at a 15 minute sub-interval) | |
| | | (to) | | | | | | | (to) | | |
| | • | 13760 | R | NV | | | | | Oldest Logged Data Entry | | |

Invalid or Quiet Not A Number (QNAN) conditions are indicated by 0x8000 (negative zero) for 16 bit integers and 0x7FC00000 for 32 bit floating point numbers.

Floating point numbers are encoded per the IEEE 754 32-bit specifications.

## SunSpec Compliant Common and Meter Model Register Blocks for IQ 35MA2x Models

See www.sunspec.org for the original specifications.

| IQ 35MA22 FDS | IQ 35MA23 Log | Register | R/W | NV | Format | Units | Scale | Range | SunSpec Name | Description |
|---|---|---|---|---|---|---|---|---|---|---|
| **SunSpec 1.0 Common Model** | | | | | | | | | | |
| • | • | 40001 | R | NV | ULong | | | 0x5375 6e53 | C_SunSpec_ID | ASCII "SunS". Identifies this as the beginning of a SunSpec Modbus point |
| • | • | 40002 | | | | | | | | |
| • | • | 40003 | R | NV | UInt | | | 1 | C_SunSpec_DID | SunSpec common model Device ID |
| • | • | 40004 | R | NV | UInt | | | 65 | C_SunSpec_Length | Length of the common model block |
| • | • | 40005 to 40020 | R | NV | String (32) | ASCII | | | C_Manufacturer | null terminated ASCII text string = "EATON Corporation" |
| • | • | 40021 to 40036 | R | NV | String (32) | ASCII | | | C_Model | null terminated ASCII text string = "IQ 35MA2x" |
| • | • | 40037 to 40044 | R | NV | String (16) | ASCII | | | C_Options | null terminated ASCII text string |
| • | • | 40045 to 40052 | R | NV | String (16) | ASCII | | | C_Version | null terminated ASCII text string |
| • | • | 40053 to 40068 | R | NV | String (32) | ASCII | | | C_SerialNumber | null terminated ASCII text string |
| • | • | 40068 | R | NV | UInt | ASCII | | | C_SunSpec_Length | Modbus address |
| **SunSpec 1.1 Integer Meter Model** | | | | | | | | | | |
| **Identification** | | | | | | | | | | |
| • | • | 40070 | R | NV | UInt | | | 201 to 204 | C_SunSpec_DID | SunSpec Integer meter model device IDs. Meter configuration by device ID:<br>201 = single phase (A-N or A-B) meter<br>202 = split single phase (A-B-N) meter<br>203 = Wye-connect 3-phase (ABCN) meter<br>204 = delta-connect 3-phase (ABC) meter |
| • | • | 40071 | R | NV | UInt | | | 105 | C_SunSpec_Length | Length of the meter model block |
| **Current** | | | | | | | | | | |
| • | • | 40072 | R | | SInt | Amps | M_AC_Current_SF | -32767 to +32767 | M_AC_Current | AC Current (sum of active phases) |
| • | • | 40073 | R | | SInt | Amps | M_AC_Current_SF | -32767 to +32767 | M_AC_Current_A | Phase A AC current |
| • | • | 40074 | R | | SInt | Amps | M_AC_Current_SF | -32767 to +32767 | M_AC_Current_B | Phase B AC current |
| • | • | 40075 | R | | SInt | Amps | M_AC_Current_SF | -32767 to +32767 | M_AC_Current_C | Phase C AC current |
| • | • | 40076 | R | NV | SInt | | 1 | | M_AC_Current_CN | AC Current Scale Factor |
| **Voltage: Line to Neutral** | | | | | | | | | | |
| • | • | 40077 | R | | SInt | Volts | M_AC_Voltage_SF | -32767 to +32767 | M_AC_Voltage_LN | Line to Neutral AC voltage (average of active phases) |
| • | • | 40078 | R | | SInt | Volts | M_AC_Voltage_SF | -32767 to +32767 | M_AC_Voltage_AN | Phase A to Neutral AC Voltage |
| • | • | 40079 | R | | SInt | Volts | M_AC_Voltage_SF | -32767 to +32767 | M_AC_Voltage_BN | Phase B to Neutral AC Voltage |
| • | • | 40080 | R | | SInt | Volts | M_AC_Voltage_SF | -32767 to +32767 | M_AC_Voltage_CN | Phase C to Neutral AC Voltage |

# SunSpec Compliant Common and Meter Model Register Blocks for IQ 35MA2x Models

| IQ 35MA22 FDS | IQ 35MA23 Log | Register | R/W | NV | Format | Units | Scale | Range | SunSpec Name | Description |
|---|---|---|---|---|---|---|---|---|---|---|
| **Voltage: Line to Line** | | | | | | | | | | |
| • | • | 40081 | R | | SInt | Volts | M_AC_Voltage_SF | -32767 to +32767 | M_AC_Voltage_LL | Line to Line AC voltage (average of active phases) |
| • | • | 40082 | R | | SInt | Volts | M_AC_Voltage_SF | -32767 to +32767 | M_AC_Voltage_AB | Phase A to Phase B AC Voltage |
| • | • | 40083 | R | | SInt | Volts | M_AC_Voltage_SF | -32767 to +32767 | M_AC_Voltage_BC | Phase B to Phase C AC Voltage |
| • | • | 40084 | R | | SInt | Volts | M_AC_Voltage_SF | -32767 to +32767 | M_AC_Voltage_CA | Phase C to Phase A AC Voltage |
| • | • | 40085 | R | NV | SInt | | 1 | | M_AC_Voltage_SF | AC Voltage Scale Factor |
| **Frequency** | | | | | | | | | | |
| • | • | 40086 | R | | SInt | Hertz | M_AC_Freq_SF | -32767 to +32767 | M_AC_Freq | AC Frequency |
| • | • | 40087 | R | NV | SInt | SF | 1 | | M_AC_Freq_SF | AC Frequency Scale Factor |
| **Power** | | | | | | | | | | |
| Real Power | | | | | | | | | | |
| • | • | 40088 | R | | SInt | Watts | M_AC_Power_SF | -32767 to +32767 | M_AC_Power | Total Real Power (sum of active phases) |
| • | • | 40089 | R | | SInt | Watts | M_AC_Power_SF | -32767 to +32767 | M_AC_Power_A | Phase A AC Real Power |
| • | • | 40090 | R | | SInt | Watts | M_AC_Power_SF | -32767 to +32767 | M_AC_Power_B | Phase B AC Real Power |
| • | • | 40091 | R | | SInt | Watts | M_AC_Power_SF | -32767 to +32767 | M_AC_Power_C | Phase A AC Real Power |
| • | • | 40092 | R | NV | SInt | SF | 1 | | M_AC_Power_SF | AC Real Power Scale Factor |
| Apparent Power | | | | | | | | | | |
| • | • | 40093 | R | | SInt | Volt-Amps | M_AC_VA_SF | -32767 to +32767 | M_AC_VA | Total AC Apparent Power (sum of active phases) |
| • | • | 40094 | R | | SInt | Volt-Amps | M_AC_VA_SF | -32767 to +32767 | M_AC_VA_A | Phase A AC Apparent Power |
| • | • | 40095 | R | | SInt | Volt-Amps | M_AC_VA_SF | -32767 to +32767 | M_AC_VA_B | Phase B AC Apparent Power |
| • | • | 40096 | R | | SInt | Volt-Amps | M_AC_VA_SF | -32767 to +32767 | M_AC_VA_C | Phase A AC Apparent Power |
| • | • | 40097 | R | NV | SInt | SF | 1 | | M_AC_VA_SF | AC Apparent Power Scale Factor |
| Reactive Power | | | | | | | | | | |
| • | • | 40098 | R | | SInt | VAR | M_AC_VAR_SF | -32767 to +32767 | M_AC_VAR | Total AC Reactive Power (sum of active phases) |
| • | • | 40099 | R | | SInt | VAR | M_AC_VAR_SF | -32767 to +32767 | M_AC_VAR_A | Phase A AC Reactive Power |
| • | • | 40100 | R | | SInt | VAR | M_AC_VAR_SF | -32767 to +32767 | M_AC_VAR_B | Phase B AC Reactive Power |
| • | • | 40101 | R | | SInt | VAR | M_AC_VAR_SF | -32767 to +32767 | M_AC_VAR_C | Phase A AC Reactive Power |
| • | • | 40102 | R | NV | SInt | SF | 1 | | M_AC_VAR_SF | AC Reactive Power Scale Factor |
| Power Factor | | | | | | | | | | |
| • | • | 40103 | R | | SInt | % | M_AC_PF_SF | -32767 to +32767 | M_AC_PF | Average Power Factor (average of active phases) |
| • | • | 40104 | R | | SInt | % | M_AC_PF_SF | -32767 to +32767 | M_AC_PF_A | Phase A Power Factor |
| • | • | 40105 | R | | SInt | % | M_AC_PF_SF | -32767 to +32767 | M_AC_PF_B | Phase B Power Factor |

| IQ 35MA22 FDS | IQ 35MA23 Log | Register | R/W | NV | Format | Units | Scale | Range | SunSpec Name | Description |
|---|---|---|---|---|---|---|---|---|---|---|
| • | • | 40106 | R | | SInt | % | M_AC_PF_SF | -32767 to +32767 | M_AC_PF_C | Phase A Power Factor |
| • | • | 40107 | R | NV | SInt | SF | 1 | | M_AC_PF_SF | AC Power Factor Scale Factor |
| **Accumulated Energy** | | | | | | | | | | |
| Real Energy | | | | | | | | | | |
| • | • | 40108 | R | NV | ULong | Watt-hours | M_Energy_W_SF | 0x0 to 0xFFFFFFFF | M_Exported_W | Total Exported Real Energy |
| • | • | 40109 | | | | | | | | |
| • | • | 40110 | R | NV | ULong | Watt-hours | M_Energy_W_SF | 0x0 to 0xFFFFFFFF | M_Exported_W_A | Phase A Exported Real Energy |
| • | • | 40111 | | | | | | | | |
| • | • | 40112 | R | NV | ULong | Watt-hours | M_Energy_W_SF | 0x0 to 0xFFFFFFFF | M_Exported_W_B | Phase B Exported Real Energy |
| • | • | 40113 | | | | | | | | |
| • | • | 40114 | R | NV | ULong | Watt-hours | M_Energy_W_SF | 0x0 to 0xFFFFFFFF | M_Exported_W_C | Phase C Exported Real Energy |
| • | • | 40115 | | | | | | | | |
| • | • | 40116 | R | NV | ULong | Watt-hours | M_Energy_W_SF | 0x0 to 0xFFFFFFFF | M_Imported_W | Total Imported Real Energy |
| • | • | 40117 | | | | | | | | |
| • | • | 40118 | R | NV | ULong | Watt-hours | M_Energy_W_SF | 0x0 to 0xFFFFFFFF | M_Imported_W_A | Phase A Imported Real Energy |
| • | • | 40119 | | | | | | | | |
| • | • | 40120 | R | NV | ULong | Watt-hours | M_Energy_W_SF | 0x0 to 0xFFFFFFFF | M_Imported_W_B | Phase B Imported Real Energy |
| • | • | 40121 | | | | | | | | |
| • | • | 40122 | R | NV | ULong | Watt-hours | M_Energy_W_SF | 0x0 to 0xFFFFFFFF | M_Imported_W_C | Phase C Imported Real Energy |
| • | • | 40123 | | | | | | | | |
| • | • | 40124 | R | NV | SF | SF | 1 | | M_Energy_W_SF | Real Energy Scale Factor |
| Apparent Energy | | | | | | | | | | |
| • | • | 40125 | R | NV | ULong | VA-hours | M_Energy_VA_SF | 0x0 to 0xFFFFFFFF | M_Exported_VA | Total Exported Apparent Energy |
| • | • | 40126 | | | | | | | | |
| • | • | 40127 | R | NV | ULong | VA-hours | M_Energy_VA_SF | 0x0 to 0xFFFFFFFF | M_Exported_VA_A | Phase A Exported Apparent Energy |
| • | • | 40128 | | | | | | | | |
| • | • | 40129 | R | NV | ULong | VA-hours | M_Energy_VA_SF | 0x0 to 0xFFFFFFFF | M_Exported_VA_B | Phase B Exported Apparent Energy |
| • | • | 40130 | | | | | | | | |
| • | • | 40131 | R | NV | ULong | VA-hours | M_Energy_VA_SF | 0x0 to 0xFFFFFFFF | M_Exported_VA_C | Phase C Exported Apparent Energy |
| • | • | 40132 | | | | | | | | |
| • | • | 40133 | R | NV | ULong | VA-hours | M_Energy_VA_SF | 0x0 to 0xFFFFFFFF | M_Imported_VA | Total Imported Apparent Energy |
| • | • | 40134 | | | | | | | | |
| • | • | 40135 | R | NV | ULong | VA-hours | M_Energy_VA_SF | 0x0 to 0xFFFFFFFF | M_Imported_VA_A | Phase A Imported Apparent Energy |
| • | • | 40136 | | | | | | | | |
| • | • | 40137 | R | NV | ULong | VA-hours | M_Energy_VA_SF | 0x0 to 0xFFFFFFFF | M_Imported_VA_B | Phase B Imported Apparent Energy |
| • | • | 40138 | | | | | | | | |
| • | • | 40139 | R | NV | ULong | VA-hours | M_Energy_VA_SF | 0x0 to 0xFFFFFFFF | M_Imported_VA_C | Phase C Imported Apparent Energy |
| • | • | 40140 | | | | | | | | |
| • | • | 40141 | R | NV | UInt | SF | 1 | | M_Energy_VA_SF | Real Energy Scale Factor |
| Reactive Energy | | | | | | | | | | |
| • | • | 40142 | R | NV | ULong | VAR-hours | M_Energy_VAR_SF | 0x0 to 0xFFFFFFFF | M_Import_VARh_Q1 | Quadrant 1: Total Imported Reactive Energy |
| • | • | 40143 | | | | | | | | |
| • | • | 40144 | R | NV | ULong | VAR-hours | M_Energy_VAR_SF | 0x0 to 0xFFFFFFFF | M_Import_VARh_Q1A | Phase A - Quadrant 1: Total Imported Reactive Energy |
| • | • | 40145 | | | | | | | | |
| • | • | 40146 | R | NV | ULong | VAR-hours | M_Energy_VAR_SF | 0x0 to 0xFFFFFFFF | M_Import_VARh_Q1B | Phase B - Quadrant 1: Total Imported Reactive Energy |
| • | • | 40147 | | | | | | | | |

| IQ 35MA22 FDS | IQ 35MA23 Log | Register | R/W | NV | Format | Units | Scale | Range | SunSpec Name | Description |
|---|---|---|---|---|---|---|---|---|---|---|
| • | • | 40148<br>40149 | R | NV | ULong | VAR-hours | M_Energy_VAR_SF | 0x0 to 0xFFFFFFFF | M_Import_VARh_Q1C | Phase C - Quadrant 1: Total Imported Reactive Energy |
| • | • | 40150<br>40151 | R | NV | ULong | VAR-hours | M_Energy_VAR_SF | 0x0 to 0xFFFFFFFF | M_Import_VARh_Q2 | Quadrant 2: Total Imported Reactive Energy |
| • | • | 40152<br>40153 | R | NV | ULong | VAR-hours | M_Energy_VAR_SF | 0x0 to 0xFFFFFFFF | M_Import_VARh_Q2A | Phase A - Quadrant 2: Total Imported Reactive Energy |
| • | • | 40154<br>40155 | R | NV | ULong | VAR-hours | M_Energy_VAR_SF | 0x0 to 0xFFFFFFFF | M_Import_VARh_Q2B | Phase B - Quadrant 2: Total Imported Reactive Energy |
| • | • | 40156<br>40157 | R | NV | ULong | VAR-hours | M_Energy_VAR_SF | 0x0 to 0xFFFFFFFF | M_Import_VARh_Q2C | Phase C - Quadrant 2: Total Imported Reactive Energy |
| • | • | 40158<br>40159 | R | NV | ULong | VAR-hours | M_Energy_VAR_SF | 0x0 to 0xFFFFFFFF | M_Export_VARh_Q3 | Quadrant 3: Total Exported Reactive Energy |
| • | • | 40160<br>40161 | R | NV | ULong | VAR-hours | M_Energy_VAR_SF | 0x0 to 0xFFFFFFFF | M_Export_VARh_Q3A | Phase A - Quadrant 3: Total Exported Reactive Energy |
| • | • | 40162<br>40163 | R | NV | ULong | VAR-hours | M_Energy_VAR_SF | 0x0 to 0xFFFFFFFF | M_Export_VARh_Q3B | Phase B - Quadrant 3: Total Exported Reactive Energy |
| • | • | 40164<br>40165 | R | NV | ULong | VAR-hours | M_Energy_VAR_SF | 0x0 to 0xFFFFFFFF | M_Export_VARh_Q3C | Phase C - Quadrant 3: Total Exported Reactive Energy |
| • | • | 40166<br>40167 | R | NV | ULong | VAR-hours | M_Energy_VAR_SF | 0x0 to 0xFFFFFFFF | M_Export_VARh_Q4 | Quadrant 4: Total Exported Reactive Energy |
| • | • | 40168<br>40169 | R | NV | ULong | VAR-hours | M_Energy_VAR_SF | 0x0 to 0xFFFFFFFF | M_Export_VARh_Q4A | Phase A - Quadrant 4: Total Exported Reactive Energy |
| • | • | 40170<br>40171 | R | NV | ULong | VAR-hours | M_Energy_VAR_SF | 0x0 to 0xFFFFFFFF | M_Export_VARh_Q4B | Phase B - Quadrant 4: Total Exported Reactive Energy |
| • | • | 40172<br>40173 | R | NV | ULong | VAR-hours | M_Energy_VAR_SF | 0x0 to 0xFFFFFFFF | M_Export_VARh_Q4C | Phase C - Quadrant 4: Total Exported Reactive Energy |
| • | • | 40174 | R | NV | UInt | SF | 1 | | M_Energy_VA_SF | Reactive Energy Scale Factor |

| IQ 35MA22 FDS | IQ 35MA23 Log | Register | R/W | NV | Format | Units | Scale | Range | SunSpec Name | Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **Events** | | | | | |
| • | • | 40175 | R | NV | ULong | Flags | | | M_Events | Bit Map. See M_EVENT_flags. 0 = no event |
| • | • | 40176 | | | | | | | | |

| Event | Bit | Description |
|---|---|---|
| M_EVENT_Power_ Failure | 0x00000004 | Loss of power or phase |
| M_EVENT_Under_ Voltage | 0x00000008 | Voltage below thresh- old (phase loss) |
| M_EVENT_Low_PF | 0x00000010 | Power factor below threshold (can indi- cate misassociated voltage and current inputs in 3-phase systems) |
| M_EVENT_Over_Current | 0x00000020 | Current input over threshold (out of mea- surement range) |
| M_EVENT_Over_Voltage | 0x00000040 | Voltage input over threshold (out of mea- surement range) |
| M_EVENT_Missing_ Sensor | 0x00000080 | Sensor not connected (not supported) |
| M_EVENT_Reserved1-8 | 0x00000100 to 0x00008000 | Reserved for future SunSpec use |
| M_EVENT_OEM1-15 | 0x7FFF000 | Reserved for OEMs (not used) |

| IQ 35MA22 FDS | IQ 35MA23 Log | Register | R/W | NV | Format | Units | Scale | Range | SunSpec Name | Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **End of SunSpec Block** | | | | | |
| • | • | 40177 | R | NV | UInt | | | 0xFFFF | | C_SunSpec_DID = 0xFFFF<br>Uniquely identifies this as the last SunSpec block |
| • | • | 40178 | R | NV | UInt | | | 0x0000 | | C_SunSpec_Length = 0<br>Last block has no length |

## IQ 35MA15 BACnet Default Settings

| Setting | Default Value* | BACnet Object |
|---|---|---|
| Setup Password | 00000 | n/a |
| Reset Password | 00000 | n/a |
| System Type | 40 (3 + N) Wye | AV2 |
| CT Primary Ratio | 100A | AV3 |
| CT Secondary Ratio | 0.33 V | AV4 |
| PT Ratio | 1:1 (none) | AV5 |
| System Voltage | 600 V L-L | AV6 |
| Max. Theoretical Power | Calculated from AV2, AV3, AV5 & AV6 (with all default settings, this would be 103.92 kW) | AI45 |
| Display Mode | 1 (IEEE Units) | AV7 |
| Phase Loss Voltage Threshold | 10% of System Voltage | AV8 |
| Phase Loss Voltage Threshold | 25% Phase to Phase Imbalance | AV9 |
| Demand: number of subintervals per interval | 1 (block mode) | AV10 |
| Demand: sub-interval length | 900 sec (15 min)<br>(AV11 default value is 90000 [1/100 seconds]) | AV11 |
| BACnet MAC Address | 001 | n/a |
| BACnet MS/TP Baud Rate | 76.8 kBaud | n/a |
| BACnet MS/TP Max_Master | 127 | Device |
| BACnet Device_ID | Pseudo-random value<br>from 1,000,000 to 3,097,151 | Device |
| BACnet Device Location | Installed location not yet identified | Device |
| Trend_Log Object 1<br>Log_Device_Object_Property | AI1 (Real Energy) | TL1 |
| Trend_Log Object 2<br>Log_Device_Object_Property | AI27 (Reactive Energy) | TL2 |
| Trend_Log Object 3<br>Log_Device_Object_Property | AI34 (Total Real Present Demand) | TL3 |

* Default values are preset at the factory. Once changed, there is no way to automatically reset defaults. They must be restored individually. The baud rate and MAC address are set through the user-interface screens, and the others are set by re-writing each Object (see BACnet Programming Information section, next page).

# BACnet Programming Information

The IQ 35MA15 is programmable via BACnet MS/TP protocol and can easily be connected to a BACnet IP network using an off-the shelf BACnet router. It uses five types of BACnet objects. A standard PICS (below) describes the required characteristics of the BACnet implementation, but this additional descriptive context may be helpful to the integrator.

In addition to the required properties, the device object utilizes some optional properties to support other functionality, Time Synchronization (primarily used for data/trend logging on the device) and Description and Location properties to simplify installation and maintenance. Configure all of the meter's functions, other than Data Logging and writable Device Properties, by writing the Present_Value of the 11 Analog_Value objects. These values (except for the configuration register, AV1, which will always return zero when read) are all readable and stored in nonvolatile memory so that they are retained if power to the device is interrupted.

Data values other than log information and alerts are all accessed by reading the Present_Value of the 52 Analog_Input objects. Most of these values are instantaneous readings of measured service parameters. Some of them, (AI1, AI26, AI27, AI37-AI45, AI47, AI50 and AI51) represent accumulated values and are stored in nonvolatile memory as well. If power to the device is interrupted, these values are retained, but no additional information is accumulated until the device completes its re-initialization.

Alerts are used to indicate conditions of potential concern to the installer or the system, such as input voltage or current on any phase that exceeds the meter's measurement range, phase voltage below the Phase Loss Threshold set by the user, or Power Factor below 0.5 on any phase. Alerts are accessible individually by reading the Present_Value of the 15 Binary_Input objects or as a group by reading the Present_Value of Analog_Input object 52. Alerts are not latched and do not generate events to system. They indicate presence of these conditions at the time they are read, but the device does not latch and store them until they are read (if the condition changes before they are read, the alert will go away).

All Analog_Value, Analog_Input, and Binary_Input objects implement the reliability property and use it to indicate that the Present_Value properties are functional, valid and current. For complete assurance, check the Reliabilty property for a No_ Fault_Detected status before reading the Present_Value of any AV, AI or BI objects.

Data Logging is implemented using three Trend_Log objects, which are described in more detail in the section on Data Logging.

## BACnet Protocol Implementation Conformance Statement (PICS)

| | |
|---|---|
| Date: | Feb 1, 2011 |
| Vendor Name: | Eaton Corporation |
| Product Name: | IQ 35MA15 Energy Meter |
| Product Model Number: | IQ 35MA15 |
| Applications Software Version: | 1 |
| Firmware Revision: | x.xxx |
| BACnet Protocol Revision: | 4 |
| Product Description: | 3-phase electrical energy meter |

**BACnet Standardized Device Profile (Annex L):** BACnet Application Specific Controller (B-ASC)

**List all BACnet Interoperability Building Blocks Supported (Annex K):** DS-RP-B, DS-RPM-B, DS-WP-B, DM-DDB-B, DM-DOB-B, DM-DCC-B, T-VMT-I-B, DM-TS-B

**Segmentation Capability:** Segmentation not supported

**Standard Object Types Supported:** No dynamic Creation or Deletion supported; no proprietary properties or object types

1. Device Object:

    Optional Properties Supported: Max_Master, Max_Info_Frames, Description, Location, Local_Time, Local_Date
    Writable Properties: Object_Identifier, Object_Name, Max_Master, Location
    Property Range Restrictions: Object_Identifier – May only write values from 1 to 4,193,999; Location – (limited to 64 characters); Max_Master – May only write values from 1 to 127

2. Analog_Input Objects:

    Optional Properties Supported: Description, Reliability
    No Writable Properties.

3. Analog_Value Objects:

    Optional Properties Supported: Description, Reliability
    Writable Properties: Only the Present_Value is writable.
    Property Range Restrictions:
    AV1: May only write 30078, 21211, 21212 and 16498.
    AV2: May only write 10, 11, 12, 31 and 40.
    AV3: May only write values from 5 to 32000.
    AV4: May only write values 1 and 3.
    AV5: May only write values from 0.01 to 320.0
    AV6: May only write values such that AV6/AV5 is from 82 to 660 (absolute range is 82-32000). To ensure AV6 accepts/rejects the proper values, AV5 should be set (written) first.
    AV7: May only write values 0 and 1.
    AV8: May only write values from 1 to 99.
    AV9: May only write values from 1 to 99.
    AV10: May only write values from 1 to 6.
    AV11: May only write the value 0 or a value from 1000 to 3276700 in multiples of 100.
    Note that all accumulated values (AI1, AI26-27, AI37-45, AI47 and AI50-51) and the Record_Count of the Trend_Logs (TL1 to TL3) will be reset when this object is written.

4. Binary_Input Objects:

    Optional Properties Supported: Description, Reliability
    No Writable Properties

5. Trend_Log Objects:

    Optional Properties Supported: Description,
    Writable Properties: Log_Enable, Start_Time, Stop_Time, Log_DeviceObjectProperty, Log_Interval, Stop_When_Full, Record_Count
    Property Range Restrictions:
    Log_DeviceObjectProperty: May only be set to the Present_Value of local objects AI1 through AI44 (only the Present_Value of objects AI1 through AI44 may be logged).
    Log_Interval: May only write the value 0 or values from 1000 to 3276700 in multiples of 100.

**Data Link Layer Options:** MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800, 115200

**Device Address Binding:** Static device binding is not supported. (No client functionality is included).

**Networking Options:** None

**Character Sets Supported:** ANSI X3.4

## Legend

R/W R=read only; R/W=read or write
NV Value is stored in non-volatile memory. The value will still be available if the meter experiences a power loss and reset.
Units Lists the physical units that a register holds.

## Device Object

| Property | R/W | NV | Value Returned | Additional information |
|---|---|---|---|---|
| Object_Identifier | R/W | NV | Device<n> | n is the 7 digit ID # set in the ID1 & ID2 Setup screens on the meter. The BACnet Device ID is a Decimal number from 1 to 4,193,999 that can be entered or viewed on the user screens or through this property. The default value set at the factory is a psuedo-random number from 1,000,000 to 3,097,151 to reduce the likelihood of conflicts if multiple units are installed using their default IDs. |
| Object_Type | R | NV | Device (8) | |
| Object_Name | R/W | NV | Eaton IQ35M Series Energy Meter - S/N: <serial number> | |
| Vendor_Name | R | NV | Eaton Corporation | |
| Vendor_Identifier | R | NV | 191 | |
| Model_Name | R | NV | IQ 35MA15 Energy Meter | |
| Firmware_Revision | R | NV | <Current Revision #> | "xyyy". This is the BACnet processor firmware version in the format <xyyy>, with an implied decimal point between the first two digits (x.yyy) |
| Application_Software_ Version | R | NV | <Current version #> | "RS= xyyy, OS=xyyy, BACnet Gateway=xyyy" The format <xyyy> has an implied decimal point between the first two digits (x.yyy) |
| Location | R/W | NV | <Location> | Limted to 64 Characters - Default value is "Installed location not yet identified" |
| Description | R | NV | Eaton IQ 35MA15 DIN-Rail Energy Meter S/N: <serial number> | |
| Protocol_Version | R | NV | 1 | BACnet Protocol Version 1 |
| Protocol_Revsion | R | NV | 4 | BACnet Protocol Revision 4 |
| Local_Date | R | | Date | Set via BACnet Time Synchronization only - reverts to Jan 1, 2000 if control power drops |
| Local_Time | R | | Time | Set via BACnet Time Synchronization only - reverts to 12:00:00 AM if control power drops |
| Segmentation_Supported | R | NV | NO_SEGMENTATION (3) | Segmentation is not supported |
| Max_Master | R/W | NV | 1-127 (Factory Default is 127) | Highest possible MAC Address for Master nodes on the local MS/TP network |
| Max_Info_Frames | R | NV | 1 | Maximum number of information frames allowed before passing the MS/TP token |
| Max_APDU_Length_Accepted | R | NV | 480 | |
| APDU_Timeout | R | NV | 60000 | |
| Number_of_APDU_Retries | R | NV | 0 | |
| System_Status | R | NV | Operational (0) | |
| Protocol_Sevices_Supported | R | NV | 0b0000000000000101101000000000000000 11110000 | |
| Protocol_Object_Types_ Supported | R | NV | 0b10110000100000000000010000000000 | |

| Property | R/W | NV | Value Returned | Additional information |
|---|---|---|---|---|
| Object_List | R | NV | DE1,AI1,AI2,AI3,AI4,AI5,AI6,AI7,AI8,AI9,AI10,AI11,AI12,AI13,AI14,AI15,AI16,AI17,AI18,AI19,AI20,AI21,AI22,AI23,AI24,AI25,AI26,AI27,AI28,AI29,AI30,AI31,AI32,AI33,AI34,AI35,AI36,AI37,AI38,AI39,AI40,AI41,AI42,AI43,AI44,AI45,AI46,AI47,AI48,AI49,AI50,AI51,AI52,AV1,AV2,AV3,AV4,AV5,AV6,AV7,AV8,AV9,AV10,AV11,BI1,BI2,BI3,BI4,BI5,BI6,BI7,BI8,BI9,BI10,BI11,BI12,BI13,BI14,BI15,TR1,TR2,TR3 | |
| Device_Address_Binding | R | NV | {} | |
| Database_Revsion | R | NV | 0 | |

### *Analog_Value Objects*

Use the Present_Value property of the Analog_Value object for all writable variables in the meter other than those used specifically for BACnet configuration or Time Synchronization (in the Device Object) or Data Logging (in the Trend_Log objects).

Values are checked when written, and errors are returned for invalid entries. This table describes how those variables are used by the meter, what values are valid, what their defaults are, and how to use them. When writing values to the Present_Value properties of Analog_Value BACnet objects, there can be a delay of up to about two seconds to validate and store the new value. An immediate read of the same property before that delay has elapsed can return the prior value (even if the new value was accepted). To read a value immediately after it is written, check the Reliability property first. When it reports a No_Fault_Detected status, the Present_Value of the object will be current.

These objects support the Description and Reliability object properties and all required Analog_Value object properties, but Present_Value is the only writable property.

| # | Name | Description | R/W | NV | Units | Range | Factory Default Value | Additional information |
|---|---|---|---|---|---|---|---|---|
| AV1 | Config | Configuration | R/W | | n/a | n/a | Always returns "0" when read | Command Register:<br>- Write 30078 (0x757E) to clear all energy accumulators to 0 (All).<br>- Write 21211 (0x52DB) to begin new Demand Sub-Interval calculation cycle and log another data value on Trend_Log objects TL1-TL3 (when the meter is in Manual "Sync-to Comms" mode). This takes effect at the end of the next 1 second calculation cycle. Write no more frequently than every 10 seconds.<br>- Write 21212 (0x52DC) to reset Max Demand values to Present Demand Values. Takes effect at the end of the next 1 second calculation cycle. Write no more frequently than every 10 seconds.<br>- Write 16498 (0x4072) to clear pulse counters to 0. |
| AV2 | System_ Type | System Type | R/W | NV | n/a | 40, 31, 12, 11, 10 | 40 | System_Type:<br>- Write 10 for Single-Phase: A + N<br>- Write 11 for Single-Phase: A + B<br>- Write 12 for Split-Phase: A + B + N<br>- Write 31 for 3-Phase ΔA + B + C, no N<br>- Write 40 for 3-Phase Y: A + B + C + N |
| AV3 | CT_Ratio_ Primary | CT Ratio - Primary | R/W | NV | Amps | 5-32000 | 100 | Current Transducer Size - Primary Current Range (Default is set for 100A CTs) |
| AV4 | CT_Ratio_ Secondary | CT Ratio - Secondary | R/W | NV | 1/Volts | 1,3 | 1 | Current Transducer Type – Secondary Interface<br>- Enter 1 for CTs with 1V outputs<br>- Enter 3 for CTs with 1/3V outputs (Default) |
| AV5 | PT_Ratio | PT Ratio | R/W | NV | Value | 0.01 - 320.0 | 1 | Potential Transformer Ratio - The default is 1.00 (1:1), which is no PT attached. Set this value before setting the System Voltage (below). |

| # | Name | Description | R/W | NV | Units | Range | Factory Default Value | Additional information |
|---|---|---|---|---|---|---|---|---|
| AV6 | System_ Voltage | System Voltage | R/W | NV | Volts | from 82 (times the PT_Ratio in AV5) to 660 (times the PT_Ratio in AV5 - absolute limits are 82-32000) | 600 | System Voltage – This voltage is Line to Line unless in System Type 10 (in object AV2), in which case it is Line to Neutral. This value is used to by the meter to calculate the full scale power for the analog outputs and pulse configuration (see below), and as full scale for phase loss (in object AV8). Do not set the meter to voltages outside the range of 82-660 volts times the PT Ratio in object AV5. |
| AV7 | Display_ Units | Display Units | R/W | NV | n/a | 0,1 | 1 | Display Units: 0 = IEC (U, V, P, Q, S), 1 = IEEE (default: VLL, VLN, W, VAR, VA) |
| AV8 | Phase_ Loss_ Voltage_ Threshold | Phase Loss Voltage Threshold | R/W | NV | Percent | 1-99 | 10 | Phase Loss Voltage Threshold in percent of System Voltage (in object AV6). Default is 10 (10%). Any phase (as configured in AV2) whose level drops below this threshold triggers a Phase Loss alert - i.e. if the System voltage is set to 480 V L-L, the L-N voltage for each phase should be 277 V. When the threshold is set to 10%, if any phase drops more than 10% below 277 V, (less than 249 V), or if any L-L voltage drops more than 10% below 480 V (less than 432 V) the corresponding phase loss alarm bit will be true. |
| AV9 | Phase_ Loss_ Imbalance_ Threshold | Phase Loss Imbalance Threshold | R/W | NV | Percent | 1-99 | 25 | Phase Loss Imbalance Threshold in Percent. Default is 25% phase to phase difference. For a 3-phase Y (3 + N) system type (40 in object AV2), both Line to Neutral and Line to Line voltages are tested. In a 3-phase Δ System type (31 in object AV2), only Line to Line voltages are examined. In a single split-phase (2 + N) system type (12 in object AV2), just the line to neutral voltage are compared. |
| AV10 | Subintervals | Number of Subintervals Per Demand Interval | R/W | NV | | 1-6 | 1 | Number of Sub-Intervals per Demand Interval. Sets the number of sub-intervals that make a single demand interval. For block demand, set this to 1. Default is 1. When Sub-Interval Length (in object AV11) is set to 0 (sync-to-comms mode), the value of this object is ignored. |
| AV11 | Subinterval_ Length | Subinterval Length | R/W | NV | hundreths of a second | 0, 10-32767 | 90000 | Sub-Interval Length in hundredths of a second. For sync-to-comms mode, which allows manual triggerring of demand intervals and the logging of another Trend_Log record, set this value to 0 and write 21211 to the reset register (object AV1) each time the sub-interval must be externally reset. Default is 90000 (15 minutes). This variable is tied directly to the Log_Interval property of all three Trend_Log objects (their value is always the same as this one). Changing any of these four properties will change all of them. |

### *Analog_Input Objects*

Use the Present_Value property of the Analog_Input objects for all read-only numeric variables in the meter other than those used specifically for device configuration (in the Device Object) or Data Logging (in the Trend_Log objects).

These objects support the Description and Reliability object properties and all required Analog_Input object properties. None of them are writable. The values that are not instantaneous (i.e., Accumulated Energy, Max Demand, Pulse Input Counts) are non-volatile. They are not updated while Control Power is inactive, but their past values are retained when Control Power is restored.

For complete assurance, check the Reliabilty property for a No_Fault_Detected status before reading the Present_Value. If the line voltage or input frequency of the system being monitored falls out of the supported range, the corresponding alert bits (BI1-BI7) will be set and the reliability property of any values that cannot be accurately measured under those conditions will return Unreliable_Other.

| # | Object_Name | Description | R/W | NV | Units | Range | Additional information |
|---|---|---|---|---|---|---|---|
| AI1 | Energy | Real Energy Consumption | R | NV | kWh | 0 - 3.4+E38 | Resolution is limited by data type (when value exceeds 7 digits; reset more often to maximize resolution) |
| AI2 | kW_Total | Total Real Power | R | | kW | 0 - Max_Power (AI45) | |
| AI3 | kVAR_Total | Total Reactive Power | R | | kVAR | 0 - Max_Power (AI45) | |
| AI4 | kVA_Total | Total Apparent Power | R | | kVA | 0 - Max_Power (AI45) | |
| AI5 | PF_Total | Total Power Factor | R | | Power Factor | 0.00 - 1.00 | 1.00 for 100% |
| AI6 | Volts_LL_Avg | Voltage L-L Average | R | | Volts | | |
| AI7 | Volts_LN_Avg | Voltage L-N Average | R | | Volts | | |
| AI8 | Current_Avg | Current Average | R | | Amps | | |
| AI9 | kW_A | Real Power Phase A | R | | kW | 0 - Max_Power (AI45) | |
| AI10 | kW_B | Real Power Phase B | R | | kW | 0 - Max_Power (AI45) | |
| AI11 | kW_C | Real Power Phase C | R | | kW | 0 - Max_Power (AI45) | |
| AI12 | PF_A | Power Factor Phase A | R | | Power Factor | 0.00 - 1.00 | 1.00 for 100% |
| AI13 | PF_B | Power Factor Phase B | R | | Power Factor | 0.00 - 1.00 | 1.00 for 100% |
| AI14 | PF_C | Power Factor Phase C | R | | Power Factor | 0.00 - 1.00 | 1.00 for 100% |
| AI15 | Volts_AB | Votlage Phase A-B | R | | Volts | | |
| AI16 | Volts_BC | Voltage Phase B-C | R | | Volts | | |
| AI17 | Volts_AC | Voltage Phase A-C | R | | Volts | | |
| AI18 | Volts_AN | Voltage Phase A-N | R | | Volts | | |
| AI19 | Volts_BN | Voltage Phase B-N | R | | Volts | | |
| AI20 | Volts_CN | Voltage Phase C-N | R | | Volts | | |
| AI21 | Current_A | Current Phase A | R | | Amps | | |
| AI22 | Current_B | Current Phase B | R | | Amps | | |
| AI23 | Current_C | Current Phase C | R | | Amps | | |

| # | Object_Name | Description | R/W | NV | Units | Range | Additional information |
|---|---|---|---|---|---|---|---|
| AI24 | Reserved_AI24 | Reserved | R | | n/a | QNAN | |
| AI25 | Frequency | Frequency | R | | Hz | 45.0-65.0 | Will return QNAN if frequency is out of range (or no voltage input present on Phase A) |
| AI26 | kVAh | Apparent Energy Consumption | R | NV | kVAh | 0 - 3.4+E38 | The UNITS property of object AI26 will report that these units are kWh because there is no unit type in the BACnet standard for kVAh. |
| AI27 | kVARh | Reactive Energy Consumption | R | NV | kVARh | 0 - 3.4+E38 | The UNITS property of object AI27 will report that these units are kWh because there is no unit type in the BACnet standard for kVARh. |
| AI28 | kVA_A | Apparent Power Phase A | R | | kVA | 0 - Max_Power (AI45) | |
| AI29 | kVA_B | Apparent Power Phase B | R | | kVA | 0 - Max_Power (AI45) | |
| AI30 | kVA_C | Apparent Power Phase C | R | | kVA | 0 - Max_Power (AI45) | |
| AI31 | KVAR_A | Reactive Power Phase A | R | | kVAR | 0 - Max_Power (AI45) | |
| AI32 | KVAR_B | Reactive Power Phase B | R | | kVAR | 0 - Max_Power (AI45) | |
| AI33 | KVAR_C | Reactive Power Phase C | R | | kVAR | 0 - Max_Power (AI45) | |
| AI34 | KW_Present_ Demand | Total Real Power Present Demand | R | | kW | 0 - Max_Power (AI45) | |
| AI35 | KVAR_Present_ Demand | Total Reactive Power Present Demand | R | | kVAR | 0 - Max_Power (AI45) | |
| AI36 | KVA_Present_ Demand | Total Apparent Power Present Demand | R | | kVA | 0 - Max_Power (AI45) | |
| AI37 | KW_Max_ Demand | Total Real Power Maximum Demand | R | NV | kW | 0 - Max_Power (AI45) | This retains the largest value measured for Total Real Power Demand (AI34) for any single demand interval since the Max Demand were last explicitly reset via AV1 (this is also reset when the demand interval is changed). |
| AI38 | KVAR_Max_ Demand | Total Reactive Power Maximum Demand | R | NV | kVAR | 0 - Max_Power (AI45) | This retains the largest value measured for Total Reactive Power Demand (AI35) for any single demand interval since the Max Demand were last explicitly reset via AV1 (this is also reset when the demand interval is changed). |
| AI39 | KVA_Max_ Demand | Total Apparent Power Maximum Demand | R | NV | kVA | 0 - Max_Power (AI45) | This retains the largest value measured for Total Apparent Power Demand (AI36) for any single demand interval since the Max Demand were last explicitly reset via AV1 (this is also reset when the demand interval is changed). |
| AI40 | Pulse_Count_1 | Pulse Count #1 | R | NV | # | 0 - 4294967040 | Running count of contact closures on Pulse1 input since last reset. Write 16498 (0x4072) to the Present_Value property of Analog_Value object AV1 to reset both Pulse Counters to 0. |
| AI41 | Pulse_Count_2 | Pulse Count #2 | R | NV | # | 0 - 4294967040 | Running count of contact closures on Pulse2 input since last reset. Write 16498 (0x4072) to the Present_Value property of Analog_Value object AV1 to reset both Pulse Counters to 0. |

| # | Object_Name | Description | R/W | NV | Units | Range | Additional information |
|---|---|---|---|---|---|---|---|
| AI42 | KWH_A | Real Energy Consumption Phase A | R | NV | kWh | 0 - 3.4+E38 | |
| AI43 | KWH_B | Real Energy Consumption Phase B | R | NV | kWh | 0 - 3.4+E38 | |
| AI44 | KWH_C | Real Energy Consumption Phase C | R | NV | kWh | 0 - 3.4+E38 | |
| AI45 | Max_Power | Theoretical Maximum System Power | R | NV | kW | 0 - 1.84467e19 | Theoretical Maximum System Power – This is the theoretical maximum power the meter expects to see on a service. It is calculated by the meter from the System Type (in object AV2), CT Size (in object AV3), and System Voltage (in object AV6) - Power Factor is assumed to be unity. The register is updated whenever the user changes any of these parameters. |
| AI46 | Reserved_AI46 | Reserved | R | | | 0 | will return “0” |
| AI47 | Energy Resets | Count of Energy Accumulator Resets | R | NV | | 0 - 32767 | Running count of how many times the energy counter has been reset |
| AI48 | Reserved_AI48 | Reserved | R | | | 0 | will return “0” |
| AI49 | Reserved_AI49 | Reserved | R | | | 0 | will return “0” |
| AI50 | Power Up Count | Power Up Counter | R | NV | | 0 - 32767 | Running count of product power-up cycles (Control Power) |
| AI51 | Ouput Config | Ouput Configuration | R | NV | | 0 - 15 | IQ 35MA15 models will return “0” |
| AI52 | Reserved_AI52 | Alert Summary Register | R | | | 0 - 32767 | This contains a decimal value that represents the status of all 15 Binary_Object alert values in one number. It can be read without having to access mulitple objects. It is a decimal representation of a 15-bit hexidecimal value produced by combining the 15 alert bits into one number, where the bit value of Object BI1 is the least significant bit and BI15 is the most significant bit. |

### *Binary_Input Objects*

Use the Present_Value properties of the Binary_Input objects as alerts for conditions of potential concern regarding to the system measurement. These values are dynamic and are not latched, so if the condition is resolved, the alert will go inactive, whether it has been read or not.

These objects support the Description and Reliability object properties and all required Binary_Input object properties. None of them are writable. For complete assurance, check the Reliabilty property for a No_Fault_Detected status before reading the Present_Value.

To test the meter's alert status, read the Present_Value of each of the Binary_Objects representing the alert bits of interest, or read the Present_Value of AI52, which combines all 15 bits into a single decimal value. AI52 represents the status of all 15 Binary_Input object alert values in one number that can be read without having to access mulitple objects. The bit value of Object BI1 is the least significant bit and BI15 is the most significant bit.

| # | Name | Description | R/W | Range | Additional information |
|---|---|---|---|---|---|
| BI1 | Volts_Error_A | Voltage Out of Range Phase A | R | 0=INACTIVE, 1=ACTIVE | Phase A Input Voltage exceeds meter's measurement range |
| BI2 | Volts_Error_B | Voltage Out of Range Phase B | R | 0=INACTIVE, 1=ACTIVE | Phase B Input Voltage exceeds meter's measurement range |
| BI3 | Volts_Error_C | Voltage Out of Range Phase C | R | 0=INACTIVE, 1=ACTIVE | Phase C Input Voltage exceeds meter's measurement range |
| BI4 | Current_Error_A | Current Out of Range Phase A | R | 0=INACTIVE, 1=ACTIVE | Phase A Current out of range |
| BI5 | Current_Error_A | Current Out of Range Phase B | R | 0=INACTIVE, 1=ACTIVE | Phase B Current out of range |
| BI6 | Current_Error_A | Current Out of Range Phase C | R | 0=INACTIVE, 1=ACTIVE | Phase C Current out of range |
| BI7 | Frequency_Error | Frequency Error | R | 0=INACTIVE, 1=ACTIVE | Phase A Frequency out of range |
| BI8 | Reserved_BI8 | Reserved | R | 0=INACTIVE, 1=ACTIVE | will always return "INACTIVE" |
| BI9 | Phase_Loss_A | Phase Loss Phase A | R | 0=INACTIVE, 1=ACTIVE | Phase Loss - Phase A voltage dropped below the Phase Loss Threshold set by user |
| BI10 | Phase_Loss_B | Phase Loss Phase B | R | 0=INACTIVE, 1=ACTIVE | Phase Loss - Phase B voltage dropped below the Phase Loss Threshold set by user |
| BI11 | Phase_Loss_C | Phase Loss Phase C | R | 0=INACTIVE, 1=ACTIVE | Phase Loss - Phase C voltage dropped below the Phase Loss Threshold set by user |
| BI12 | Power_Factor_A | Low Power Factor Phase A | R | 0=INACTIVE, 1=ACTIVE | Phase A Power Factor less than 50% (commonly due to mis-wiring of CTs/PTs to meter) |
| BI13 | Power_Factor_B | Low Power Factor Phase B | R | 0=INACTIVE, 1=ACTIVE | Phase B Power Factor less than 50% (commonly due to mis-wiring of CTs/PTs to meter) |
| BI14 | Power_Factor_C | Low Power Factor Phase C | R | 0=INACTIVE, 1=ACTIVE | Phase C Power Factor less than 50% (commonly due to mis-wiring of CTs/PTs to meter) |
| BI15 | RTC_Reset | RTC Reset | R | 0=INACTIVE, 1=ACTIVE | Real-Time Clock reset. This goes active when Control Power is applied to the meter after an interruption (since it does not use a battery backup), and it stays active until a Time_Synchronization occurs. It indicates that the Real-Time clock has re-initialized to a default setting (00:00:00:00 on Jan 1, 2000) and should not be relied upon. The clock will be running; the meter will operate and even log data, but the date and time will not be correct until a Time_Synchronization occurs. |

# Data Logging

The IQ 35MA15 includes a data logging feature that records three meter parameters, accessible via BACnet using Trend_Log objects. All three Trend_Log objects utilize shared data logging resources in the meter, so all three are controlled in unison. All writable properties other than Log_Device_Property_Object are common to all three Trend_Log obects. Changes to these properties (Log_Enable, Start_Time, Stop_Time, Log_Interval, Stop_When_Full or Record_Count) for any one of the objects will be reflected in the corresponding property of all three objects. The Log_Interval property is also common with the Demand_Subinterval (Present_Value of AV11), since logging records are updated synchronously with demand calculations.

Default settings cause logging to begin immediately, with 15 minute intervals and no stop time. When full, the buffer will wrap and overwrite the oldest data first (unless the Stop_When_Full property is used).

### *Configuration:*

Use Log_Device_Object_Property to select the meter parameter to log with each object. Set this property to point to Present_Value property of any of the Analog_Input objects. The default the values for the Log_Device_Object_Property of the three Trend_Log objects are set as follows:

- TL1 = Real Energy Consumption (AI1 Present_Value)
- TL2 = Reactive Energy Consumption (AI27 Present_Value)
- TL3 = Total Real Power Present Demand (AI34 Present_Value)

The Log_Interval (& Demand Subinterval) can be set from 10 seconds to 32767 seconds (values of 1000 to 3276700). The subinterval timer, which determines how often the meter's demand accumulators are updated, also triggers writing to the Trend_Log log buffers. Use the Log_Interval property to set the data logging time subinterval, in units of hundredths of a second (0.01 seconds). The default subinterval is 15 minutes (a value of 90000 in the Log_Interval property). The Buffer_Length is fixed at 5760, so at a 15 minute interval setting, the buffers hold 60 days of data.

Use the Stop_When_Full property to select either Single Shot (Stop_When_Full = TRUE) or Continuous mode (Stop_When_Full = FALSE) for data logging. The default mode is Continuous. In Single Shot mode, the meter records data only until the buffer is full. Data for this time period is kept, but newer energy information is lost. In Continuous mode, the meter continues to record energy data as long as the meter is operating. The buffer can only hold 5760 entries at one time, however, so when the number of records exceeds 5760, the oldest entry is deleted to make room for the newest.

To start data logging with any of the three Trend_Log objects, set the Log_Enable property to TRUE or set the Start_Time and Stop_Time properties appropriately and wait for logging to commence at Start_Time.

By default, the Record_Count property of the Trend_Log objects is initialized to Zero.

### *Reading Data:*

Access logged data with corresponding timestamps via the Log_Buffer property of the Trend_Log object using the BACnet ReadRange service. The IQ 35MA15- supports both the "by Position" and "by Sequence Number" modes of the ReadRange service, but not the "by Time" mode.

### *Trend_Log*

| Trend_Log Properties Used | R/W | Units | Additional information |
|---|---|---|---|
| Object_Name | R | Trend_Log<n> | Where n is 1-3 (there are three instances of Trend_Log objects available) |
| Description | R | Trend_Log<n> | Where n is 1-3 (there are three instances of Trend_Log objects available) |
| Log_Enable | W | Binary | Set this to TRUE to enable logging or FALSE to disable logging. The default is TRUE.<br>The value is set to FALSE internally if logging stops for other reasons (i.e. buffer is full). |
| Start_Time | W | Date/Time | Sets the Date/Time when data logging will Start (if Log_enable is TRUE). Set to a Date/Time earlier than the Local_Date/Local_Time properites of the Device object and Set Log_Enable TRUE to start logging immediately. |
| Stop_Time | W | Date/Time | Sets the Date/Time when data Logging will STOP (if still running).<br>Stop_Time will be ignored if “”wildcard”” values are used in any of the fields. |
| Log_Device_Object_ Property | W | BACnetDeviceObjectProptertyReference | Set (point) this to the Present_Value of any of objects AI1 through AI49 to establish which parameter to log. Default values are:<br>TL1 = Real Energy Consumption (Array of AI1 Present_Value)<br>TL2 = Reactive Energy Consumption (Array of AI27 Present_Value)<br>TL3 = Total Real Power Present Demand (Array of AI34 Present_Value) |
| Log_Interval | W | 0.01 seconds | Logging period in hundredths of a second.<br>Default is 90000 (15 minute intervals); minimum value is 1000 (10 seconds). This property can also be set to Zero, which will change all three Trend_Logs and the Demand calculation to a manual mode (sometimes referred to as “Sync to Comms”. In manual mode, the demand interval is updated and another record is logged upon a manual command, which is issued by writing the value 21211 to the Present_Value of object AV1. |
| Stop_When_Full | W | Binary | Set this to TRUE to stop logging when the buffer is full (single-shot mode) or FALSE to continue when full (wrap & overwtrite oldest data entries). |
| Buffer_Size | R | 5760 | Length of Log Data buffer (# of records). |
| Log_Buffer | R | List of BACnetLongRecord | Contains the data values logged, with timestamps |
| Record_Count | W | Unsigned 32-bit integer | This is an integer count of how many records logged since the Trend_Log objects were last reset. Writing a Zero to this property resets the logs of all three objects. This value defaults to Zero, but, by default, logging will start automatically at 15 minute intervals. |
| Total_Record_Count | R | Unsigned 32-bit integer | This is an integer count of how many records logged since the Trend log objects were created (the factory state of the meter). This count is unaffected by resetting the Record Count or by power failures. |
| Event_State | R | Binary | |

## Troubleshooting

| Problem | Cause | Solution |
| --- | --- | --- |
| The maintenance wrench icon appears in the power meter display. | There is a problem with the inputs to the power meter. | See the Alert sub-menu or the Diagnostic Alert Modbus Register 146 |
| The display is blank after applying control power to the meter. | The meter is not receiving adequate power. | Verify that the meter control power are receiving the required voltage.<br>Verify that the heart icon is blinking.<br>Check the fuse. |
| The data displayed is inaccurate. | Incorrect setup values | Verify the values entered for power meter setup parameters (CT and PT ratings, system type, etc.). See the Setup section. |
| | Incorrect voltage inputs | Check power meter voltage input terminals to verify adequate voltage. |
| | Power meter is wired improperly. | Check all CTs and PTs to verify correct connection to the same service, PT polarity, and adequate powering. See the Wiring Diagrams section for more information. |
| Cannot communicate with power meter from a remote personal computer. | Power meter address is incorrect. | Verify that the meter is correctly addressed (see Setup section). |
| | Power meter baud rate is incorrect. | Verify that the baud rate of the meter matches that of all other devices on its communications link (see Setup section). |
| | Communications lines are improperly connected. | Verify the power meter communications connections (see the Communications section).<br>Verify the terminating resistors are properly installed on both ends of a chain of units. Units in the middle of a chain should not have a terminator.<br>Verify the shield ground is connected between all units. |
| Sign of one phase (real power) is incorrect | CT orientation is reversed (IQ 35MA2x only) | Remove CT, reverse orientation, reconnect (qualified personnel only) |

## China RoHS Compliance Information (EFUP Table)

| 部件名称 | 产品中有毒有害物质或元素的名称及含量Substances | | | | | |
|---|---|---|---|---|---|---|
| | 铅 (Pb) | 汞 (Hg) | 镉 (Cd) | 六价铬 (Cr(VI)) | 多溴联苯(PBB) | 多溴二苯醚(PBDE) |
| 电子线路板 | X | 0 | 0 | 0 | 0 | 0 |

0 = 表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下.

X = 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T11363-2006标准规定的限量要求.

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**Eaton Corporation**
Electrical Sector
1111 Superior Ave.
Cleveland, OH 44114
United States
877-ETN-CARE (877-386-2273)
Eaton.com


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