



**Installation
& Basic Setup
Instructions**

**With
MeterM@il®
and WebMeter™**

Notices

Danger

During normal operation of this device, hazardous voltages are present which can cause severe injury or death. These voltages are present on the terminal strips of the device, and throughout the connected potential transformer (PT), current transformer (CT), status input, relay, and control power circuits. Installation and servicing should be performed only by qualified, properly trained personnel.

Warning

This device generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this device in a residential area may cause interference in which case the operator will be required to take whatever measures may be required to correct the interference.

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U.S. Patent No's 6186842, 6185508, 6000034, 5995911, 5828576, 5736847, 5650936, D435471, D432934, D429655, D429533.

Canadian Patent No's 2148076, 2148075.

Other patents pending.

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ISO 9002-94
Registration
Cert # 002188

FCC Notice for the Internal Modem

This equipment has been tested and found to comply with the limits for a Class A 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 commercial 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 is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. This equipment complies with Part 68 of the FCC rules. The ION 7600's label contains the FCC registration number and ringer equivalence number (REN) for this equipment. This information must be provided to the telephone company if requested. Connection to the ION 7600's internal modem should be made via an FCC Part 68 compliant telephone cord (not supplied) that mates with the RJ-11 connector on the unit. This equipment is designed to be connected to the telephone network or premises wiring using a compatible modular jack that is Part 68 compliant. The Ringer Equivalence Number (REN) is used to determine the quantity of devices which may be connected to the telephone line. Excessive RENs on the telephone line may result in the device not ringing in response to an incoming call. In most, but not all areas, the sum of RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to a line, as determined by the total RENs, contact the local telephone company. The REN for the ION 7600's optional internal modem is 0.6. If the ION 7600 causes harm to the telephone network, the telephone company will notify you in advance that a temporary discontinuance of service may be required. If advance notice is not practical, the telephone company will notify you as soon as possible. You will also be advised of your right to file a complaint with the FCC if you believe it is necessary. The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the modem within the ION 7600. If this happens the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service. The ION 7600 cannot be used on a public coin phone service or party line services. Contact your telephone company for information. If you experience trouble with the equipment, please contact Power Measurement U.S.A. at 1-248-324-2409. If the equipment causes harm to the telephone network for any reason, the telephone company may request that you disconnect the equipment until the problem is resolved.

Industry Canada Ring Equivalence Number Notice

The Canadian Department of Communications label identifies certified equipment. This verification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, you should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above condition may not prevent degradation of service in some situations.

Repairs to some certified equipment should be made by an authorized maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

You should ensure for your own protection that the ground connections of the power utility, telephone lines and internal metallic water pipe system, are connected together. This precaution may be particularly important in rural areas.

CAUTION

Do not attempt to make such connections yourself. Contact the appropriate electric inspection authority, or electrician.

The Ringer Equivalence Number (REN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the REN of all devices does not exceed 5. The REN for the ION 7600's optional internal modem is 0.6.

Network Compatibility Notice for the Internal Modem

The internal modem is compatible with the telephone systems of most countries in the world, with the exception of Australia and New Zealand. Use in some countries may require modification of the internal modem's initialization strings. If you experience problems using the modem on your phone system, please contact Power Measurement Technical Services.

Installation Considerations

Installation and maintenance of the ION 7600 should only be performed by qualified, competent personnel that have appropriate training and experience with high voltage and current devices. Every effort has been made to ensure the installation instructions presented in this document are clear and easy to understand; however, if you are not sure how to perform any of the instructions provided, DO NOT CONTINUE THE INSTALLATION. The ION 7600 must be installed in accordance with all Local and National Electrical Codes.

WARNING



Failure to observe the following may result in severe injury or death:

- ◆ During normal operation of the ION 7600, hazardous voltages are present on its terminal strips, and throughout the connected potential transformer (PT), current transformer (CT), status input, control power and external I/O circuits. PT and CT secondary circuits are capable of generating lethal voltages and currents with their primary circuit energized. Follow standard safety precautions while performing any installation or service work (i.e. removing PT fuses, shorting CT secondaries, etc).
- ◆ The terminal strips on the ION 7600 base should not be user-accessible after installation.
- ◆ Do not use digital output devices for primary protection functions. These include applications where the device performs energy limiting functions or provides protection of people from injury. If failure of the device can cause injury or death, or cause sufficient energy to be released that a fire is likely, do not use the ION 7600. The ION 7600 can be used for secondary protection functions.
- ◆ Do not HIPOT/Dielectric test the digital inputs, digital outputs, or communications terminals. Refer to the label on the ION 7600 for the maximum voltage level the device can withstand.
- ◆ Terminal strip torque:
Current, voltage, and relay terminals: 1.35Nm torque (max)
Digital Inputs/Outputs, communications, and power supply: 0.90Nm torque (max)

CAUTION



Failure to observe the following may result in permanent damage to the device:

- ◆ The ION 7600 offers a range of hardware options that affect input ratings. The serial number label of the ION 7600 lists all equipped options. Applying current levels incompatible with the current inputs will permanently damage the ION 7600. This document provides detailed installation instructions applicable to each hardware option.
- ◆ The ION 7600 chassis ground must be properly connected to the switchgear earth ground for the noise and surge protection circuitry to function correctly. Failure to do so will void the warranty.
- ◆ The ION 7600 status inputs can only be used for dry contact sensing applications. Connection of an external voltage source to any of the status inputs of a standard equipped ION 7600 can cause permanent damage.

Standards Compliance



CSA: Certified to CAN/CSA C22.2
No.1010-1



Certified to UL 3111



CE: approved

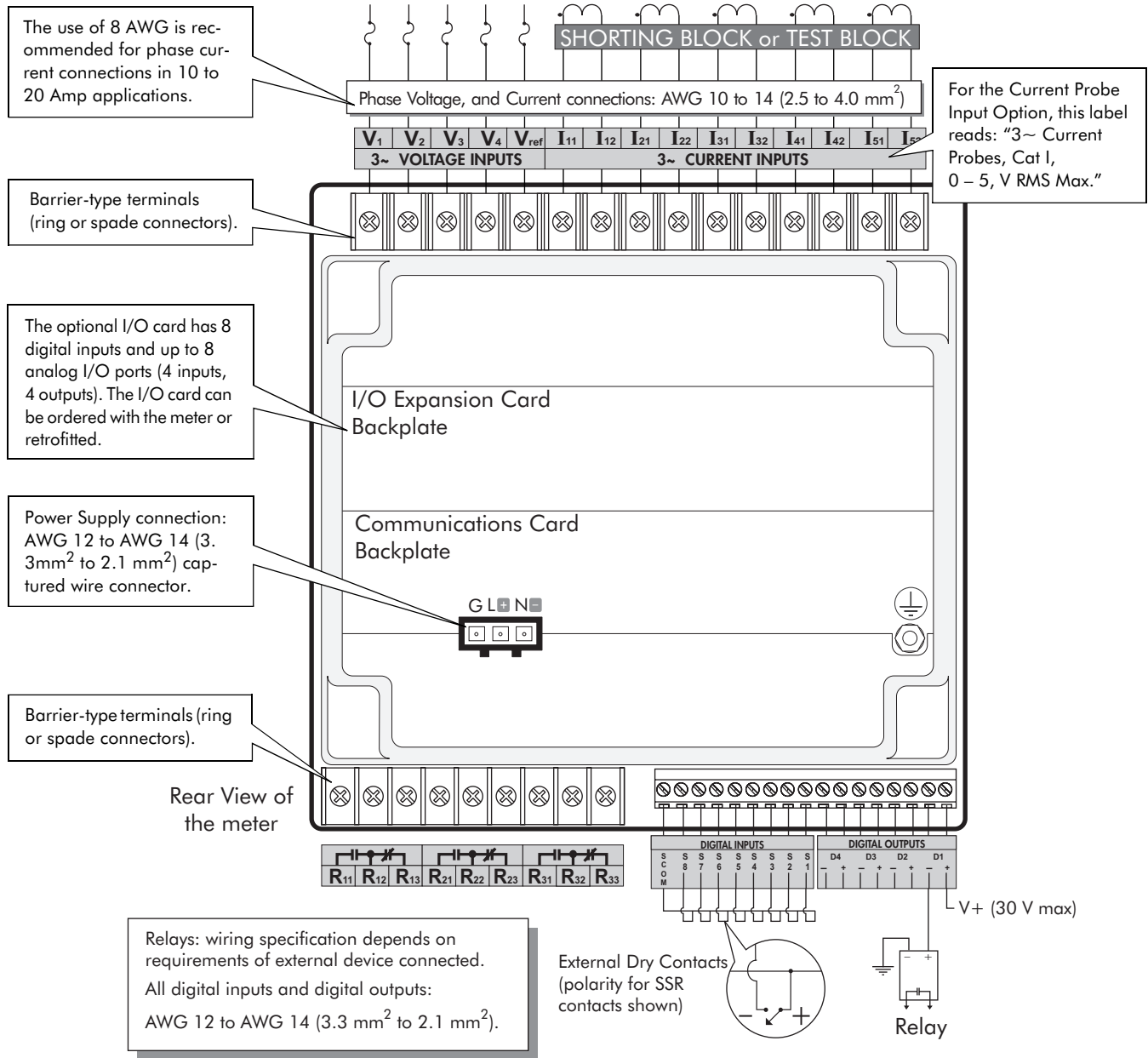
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POWER START

The following pages present a quick reference for experienced installers. Details on each procedure are included later in this guide. A list of reference literature is provided on page 11.

Wiring Connections



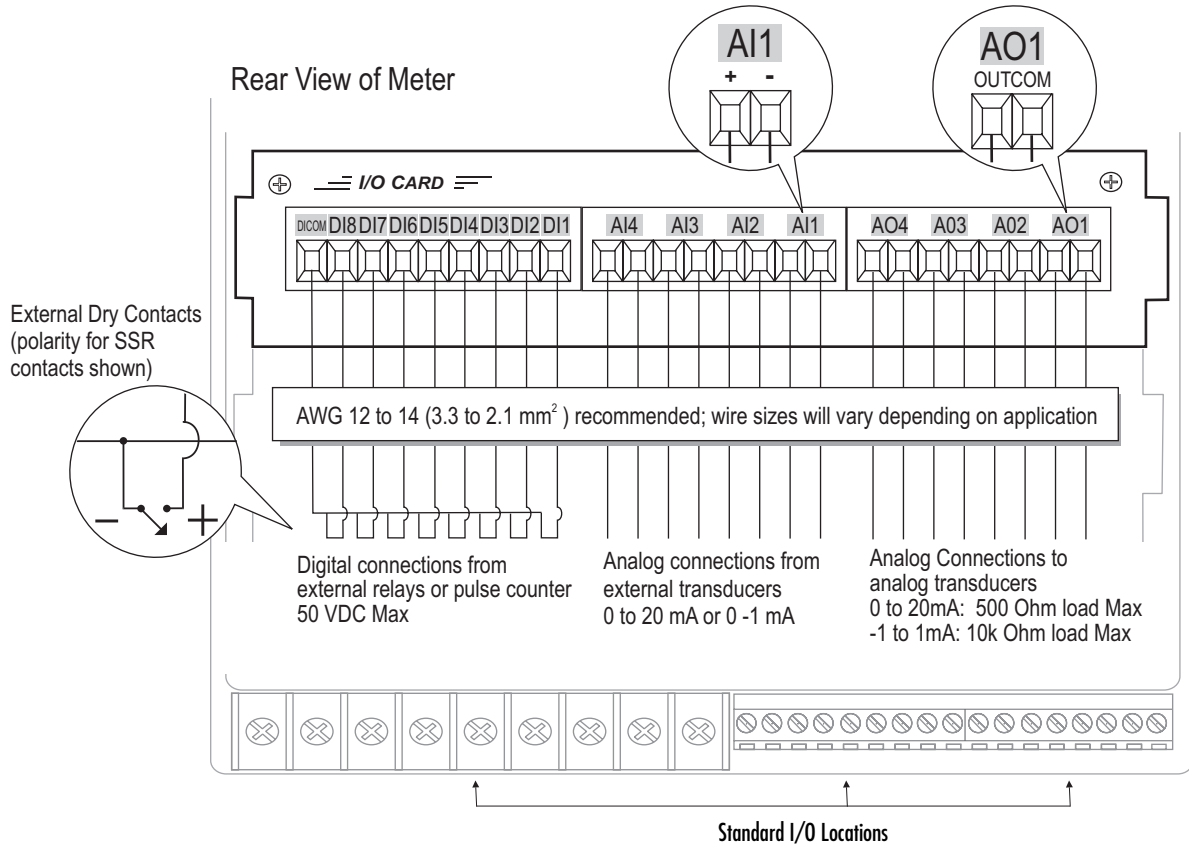
NOTE

Communications connections are shown on page 3.

I/O Card Wiring Connections

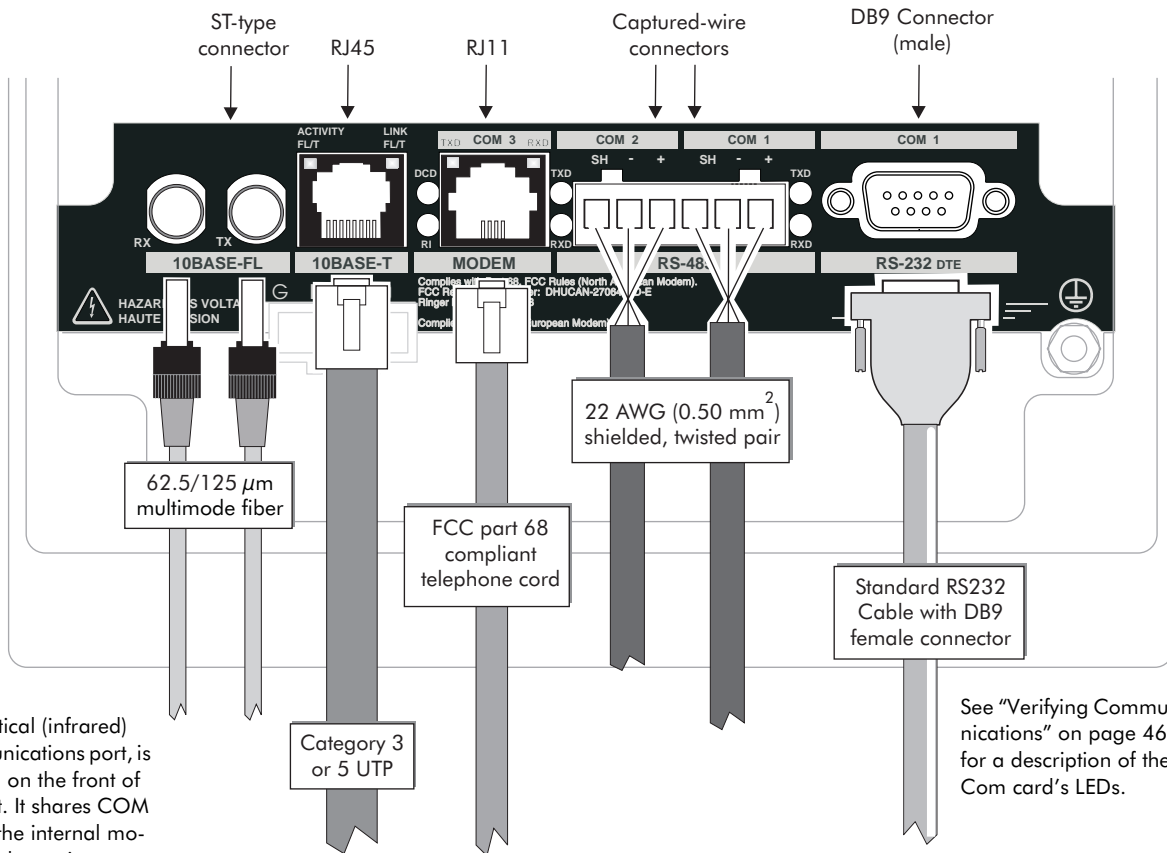
The standard I/O expansion card has 8 digital (status) inputs labelled DI1 to DI8. Depending on what you ordered, the I/O expansion card will also contain either 4 analog inputs, or 4 analog outputs, or both. Check the label on the I/O Card for your I/O specifications.

The following illustration shows the I/O connections.



Communications Connections

The following illustration shows all the possible connections to the communications card.



The optical (infrared) communications port, is located on the front of the unit. It shares COM 3 with the internal modem order option.

See "Verifying Communications" on page 46 for a description of the Com card's LEDs.

The communications card can be replaced in the field. See the *ION 7600 Communications Card Retrofit Installation Instructions* for more details.

Getting More Information

For more information on ION 7600 meter features, refer to the User's Guide documentation or visit our website for the latest product and documentation updates.

The User's Guide describes the ION 7600 meter's operation and usage including: displaying data; making configuration changes; customizing operation; using outputs and relays; using advanced communications features; technical specifications; and revenue metering details.

Location & Mounting

The meter should be mounted in a dry, dirt free location. Once installed, no cleaning of the device is necessary. To operate properly and effectively, environmental conditions should fall within the guidelines listed below.

Environmental Condition	Acceptable Range
Location:	Indoor use
Operating:	-20 to +70 C (no formation of ice)
	TRAN model: -40 to +70 C (no formation of ice)
Display operating range:	-20 C to +60 °C *
Storage:	-40 to +85 °C
Humidity:	5 to 95% non-condensing
* Range of visibility may be adversely affected below 0 °C.	

Enclosure Considerations

The enclosure that the meter is mounted in (typically a switchgear cabinet) should protect the devices from atmospheric contaminants such as oil, moisture, dust, and corrosive vapors, or other harmful airborne substances.

The mounting enclosure should be positioned such that the doors may be opened fully for easy access to the meter's wiring and related components. When choosing the enclosure size, allow for extra space for all wiring, intermediate terminal strips, shorting blocks, or any other required components. The mounting enclosure should not impede ventilation. Refer to the unit dimensions beginning on page 13 when selecting an enclosure.

Field Service Considerations

If the ION 7600 meter requires servicing or field upgrading, you may need to disconnect and remove the unit from its mounting. The initial installation should be done in a way which makes this as convenient as possible:

- ◆ All phase voltage sense leads should be protected by breakers or fuses at their source such that the meter can be safely disconnected.
- ◆ **1A or 5A Option:** A CT shorting block should be provided so that the meter current inputs can be safely disconnected without open circuiting the CTs. The shorting block should be wired so that protective relaying is not affected.
- ◆ **Current Probe Input Option:** CT shorting blocks are NOT required for current probes with voltage output. Current probe inputs do not need to be grounded.
- ◆ All wiring should be routed to allow easy removal of the connections to the meter's terminal strips and cover, as well as the meter itself.
- ◆ If control relays are used with the Relay and Status outputs, there should be a bypass mechanism installed.

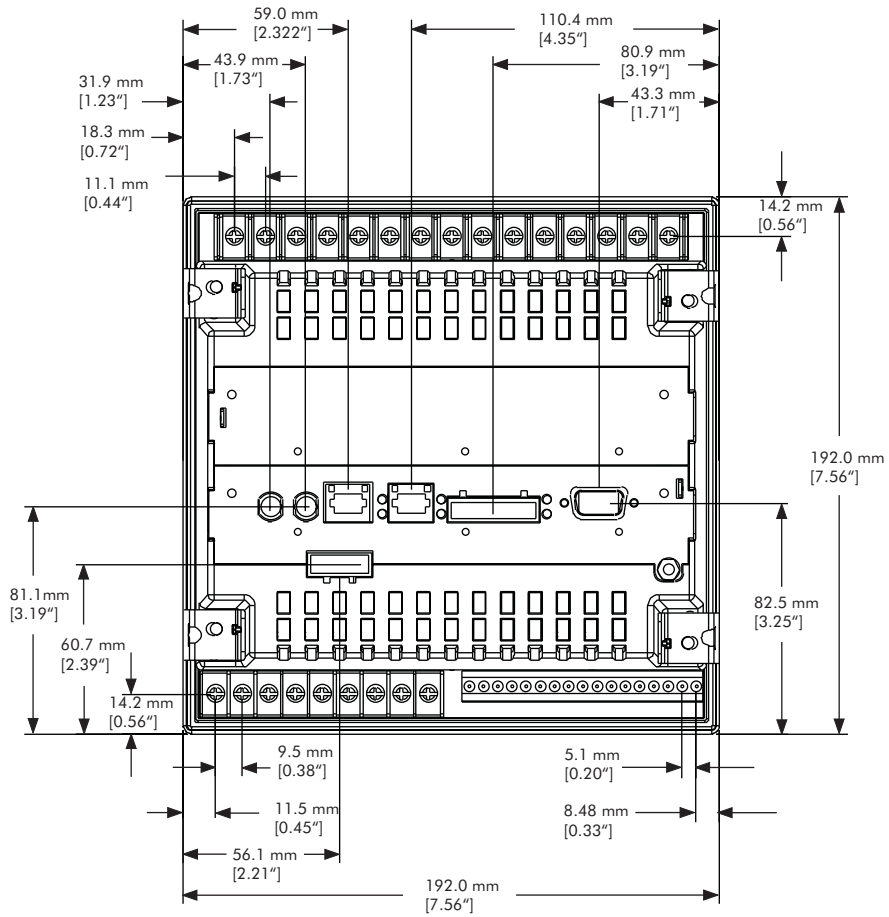
Unit Dimensions



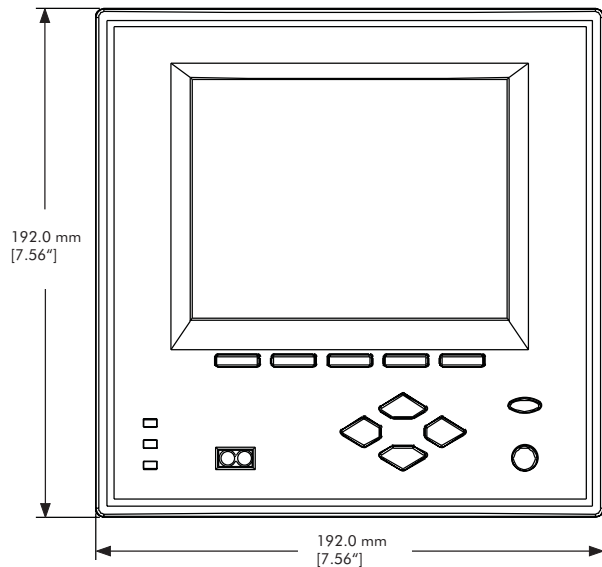
NOTE

Use a panel cut-out size of **185 mm x 185 mm (DIN)**.

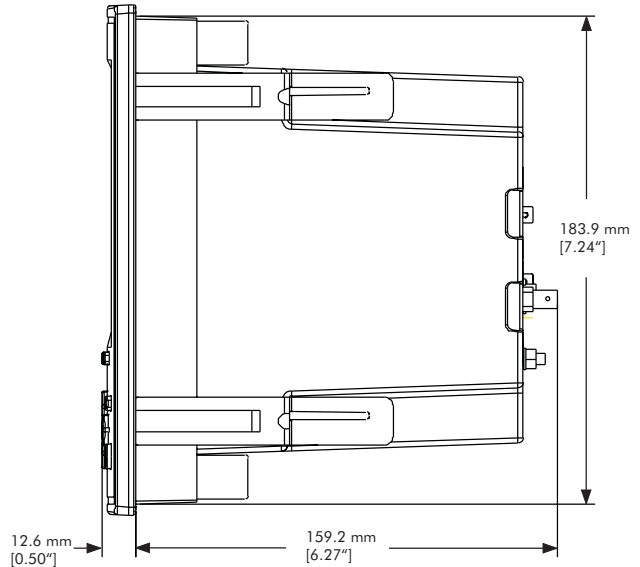
Basic Model – Rear View



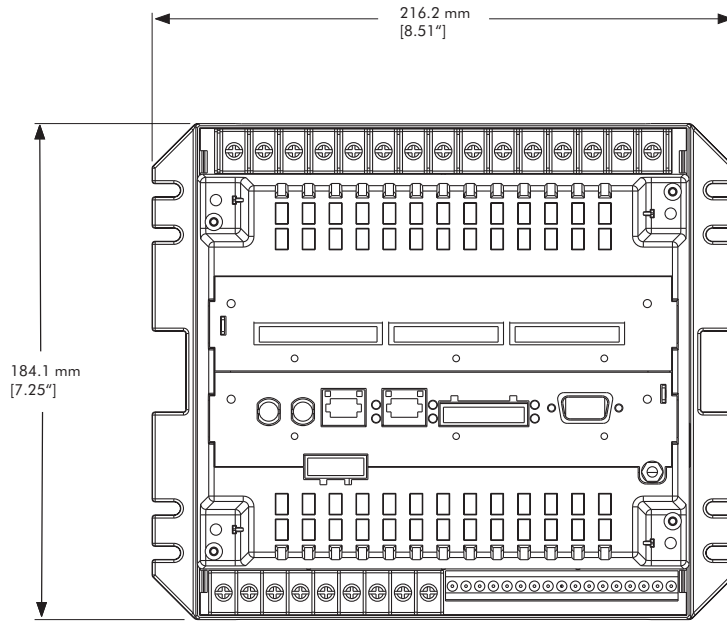
Basic Model – Front View



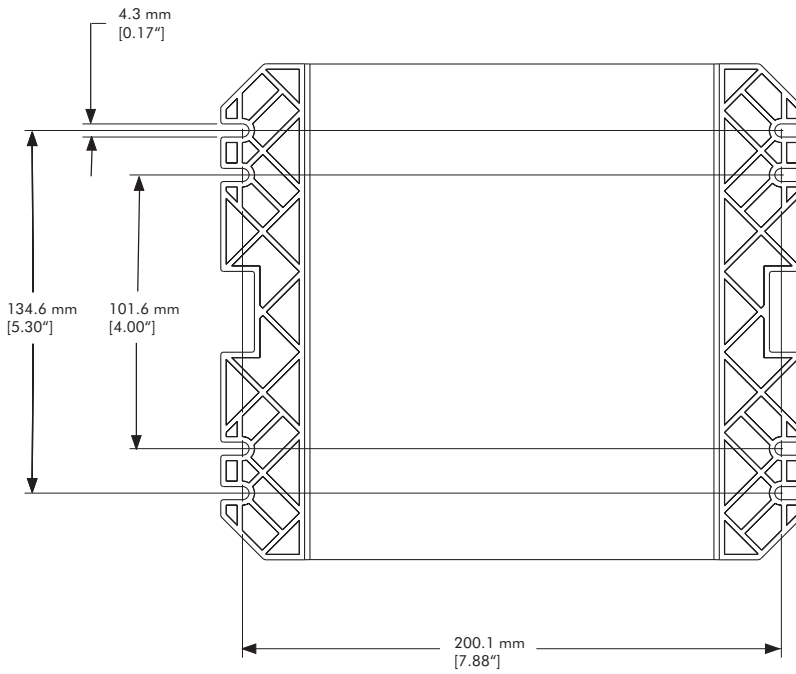
Basic Model – Side View



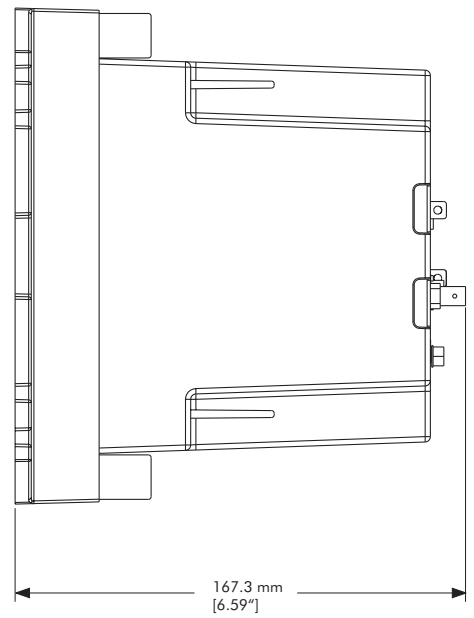
TRAN Model – Rear View



TRAN Model – Front View



TRAN Model – Side View



Mounting the ION 7600

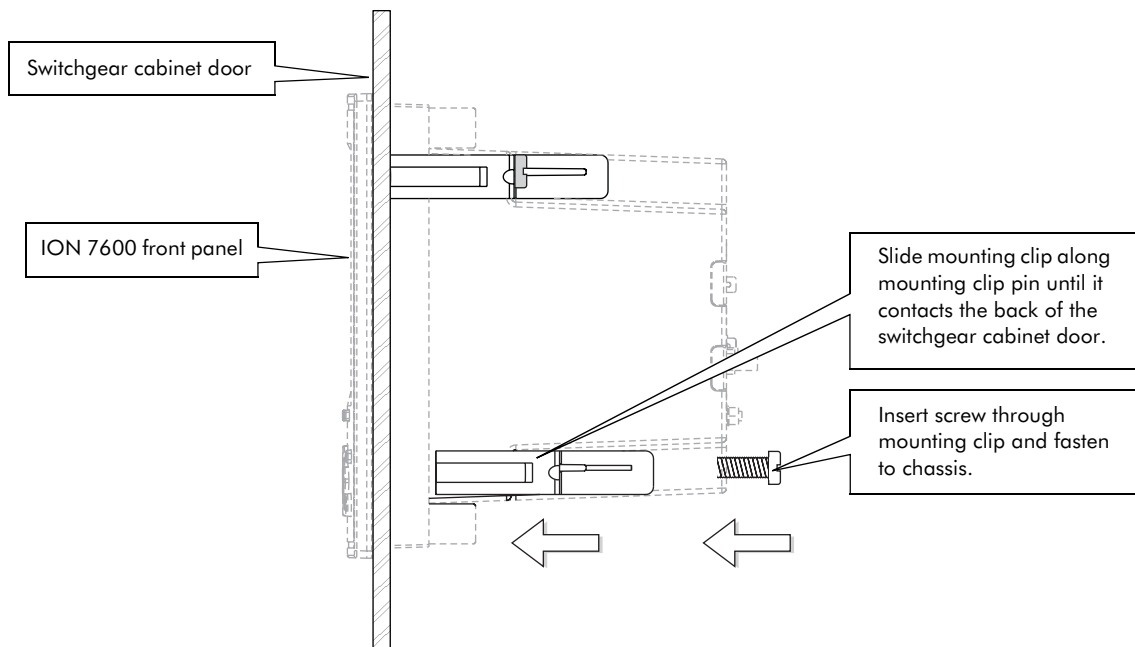
CAUTION

A switch or circuit breaker (for meter control power) should be included in the installation, in close proximity to the unit and within easy reach to the operator. This switch or circuit breaker should be marked as the disconnecting device for the unit.

Mounting the Basic Model

The basic ION 7600 meter (with integrated display) is mounted on the door of the switchgear cabinet, in a DIN 192x192 hole (hole size is 186mm x 186mm, or 7.323" x 7.323"). Note that some electrical codes may prohibit extending voltages greater than 120 VAC line-to-neutral or 208 VAC line-to-line to the door. If this is the case, for higher system voltages use a meter with PTs that provide 120 VAC secondaries (or use a TRAN meter and forego the display).

The basic model is shipped with four mounting clips and four mounting clip screws. It is mounted by sliding the chassis through a cutout in the switchgear cabinet door, then placing the mounting clips on the mounting clip pins and sliding them forward until they contact the rear of the cabinet door. The mounting clips are secured using the supplied screws. Refer to the diagram below.



Mounting the TRAN Model

The ION 7600 TRAN meter can be mounted flush against any flat surface. The unit provides eight slots on its mounting flange for this purpose; however, only four slots need to be used for secure mounting. The base unit is typically mounted inside the switchgear cabinet. It can be mounted in whichever orientation is most convenient.

⚠ DANGER

Be familiar with the warnings presented at the beginning of this document before proceeding with the installation of the ION 7600.

Field Wiring Connections

The ION 7600 Meter's Label

The meter's label provides important safety and input rating information. Read the label before installing the meter.

The order number specifies the options ordered.

Carefully read the warnings and instructions contained in this portion of the label.

Power supply specifications

MAC (Ethernet) address

Current transformer ratio

Primary Watthour constant

Total Power Multiplier (VTR x CTR)

Current Probe Input Option: see the label below.

Current Probe Input Option: The HIPOT/DIELECTRIC TEST CAUTION label warns **NOT** to perform HIPOT/Dielectric testing on Current Probe inputs.

Current Probe Input Option: This label is attached to the current input terminal strip. Remove this label during Current Probe installation and wiring.

CAUTION: CURRENT PROBE INPUTS, CAT 1, 0 - 5 V_{RM} MAX. REFER TO INSTALLATION MANUAL

HIPOT / DIELECTRIC TEST CAUTIONS
DO NOT HIPOT / DIELECTRIC TEST THE DIGITAL INPUTS, DIGITAL OUTPUTS, OR COMMUNICATIONS TERMINALS. CURRENT AND VOLTAGE TERMINALS: MAXIMUM 3250 V- FOR 1 MINUTE. RELAY TERMINALS: MAXIMUM 2200 V- FOR 1 MINUTE. POWER SUPPLY INPUTS: REFER TO INSTALLATION GUIDE

HIPOT / DIELECTRIC TEST CAUTIONS
DO NOT HIPOT / DIELECTRIC TEST THE CURRENT PROBE INPUTS, DIGITAL INPUTS, DIGITAL OUTPUTS, OR COMMUNICATIONS TERMINALS. VOLTAGE TERMINALS: MAXIMUM 3250 V- FOR 1 MINUTE. RELAY TERMINALS: MAXIMUM 2200 V- FOR 1 MINUTE. POWER SUPPLY INPUTS: REFER TO INSTALLATION GUIDE

ORDER NUMBER _____
SERIAL NUMBER _____
CALIBRATION DATE _____ FREQ. _____
POWER SUPPLY _____
CURRENT INPUTS _____
VOLTAGE INPUTS _____
MAC ADDRESS _____
VTR _____ TA _____
CTR _____ CA _____
PKh _____ Kt _____
MULT BY _____ W _____
OPERATING TEMP -20 TO 70°C
Siemens Energy & Automation - PDS, Norcross, GA, USA 1-800-427-2256

LISTED DIGITAL POWER MONITOR 20SJ
NRTL/C
158967
CE
ION TECHNOLOGY
MADE IN CANADA
BY POWER MEASUREMENT LTD.

U.S. PATENTS 5736847, 5650936, 5828576, 6000034. OTHER PATENTS PENDING

The MODEL NO. on the label contains the ordering option code for your particular meter. Refer to our web site for the ordering option codes.

Connecting the Power Supply

The ION 7600 meter can be powered from the voltage source it is monitoring, or from an independent supply. The meter requires a constant supply to maintain monitoring, analysis, data logging, control and COM operations. Powering the meter from the voltage source it is monitoring is not suitable for applications where these operations must be maintained in the event of a power outage.

CAUTION

Do not power the ION 7600 from the voltage source it is monitoring if the frequency is less than 50 Hz. Use a dedicated power supply that conforms to the power supply specifications listed in the Technical Reference section of the *ION 7600 User's Guide*.

If the unit is used to perform control functions or monitor power quality and power disruption events, use an Uninterruptable Power Supply (UPS) to ensure constant supply power.

Power Supply Specifications

The basic model can be powered from a dedicated feed, or from the voltage source it is monitoring, as long as it is within the supply range. The basic model has a power supply range of 85 to 240 VAC \pm 10%. The unit can also be powered by 110 to 330 VDC \pm 10%. Maximum loading is 20 VA (typical is 10 VA).

Connection

If an AC power supply is being used, connect the line supply wire to the L/+ terminal and the neutral supply wire to the N/- terminal. If a DC power supply is being used, connect the positive supply wire to the L/+ terminal and the negative (ground) supply wire to the N/- terminal.



Using Protective Fuses

The meter is internally protected on the L/+ terminal by a 2A IEC Type T (slow blow) fuse. If the unit is powered from a dedicated feed, and your power system consists of a grounded neutral, no other protection is required. If your power system does not have a grounded neutral, the installation of a 2A IEC Type T (slow blow) fuse (or equivalent circuit protector) on the N/- terminal is recommended. This may be installed in the breaker or fuse panel.

HIPOT Testing

The power supply is factory HIPOT tested to withstand 2000 V RMS (60Hz) for one minute. It is protected by high voltage MOVs that act as surge suppressors (the unit will withstand an ANSI C62.41 6kV surge waveform). To perform a dielectric strength test, the MOVs must be disconnected. Disconnecting the MOVs requires the disassembly of the unit (not recommended). Contact PML Customer Service if you require more information.

Connecting the Unit's Chassis Ground Connection

The  terminal of the ION 7600 meter provides the chassis ground connection. This terminal must be connected to earth ground. A good low impedance chassis ground connection is essential for the meter's surge and transient protection circuitry to function effectively. It should be made to the switchgear earth ground using a dedicated AWG 14 (2.1 mm²) or larger wire to a point where there will be no voltage error due to distribution voltage drops. Do not rely on metal door hinges as a ground path. Ensure that the  terminal screw is tightened down securely onto the ground wire.

Connecting the Phase Voltage Inputs

AWG 12 to AWG 14 (3.3 mm² to 2.1 mm²) is recommended for all phase voltage connections. The phase and polarity of the AC voltage inputs and their relationship is critical to the correct operation of the unit. All phase voltage sense leads should be protected by breakers or fuses at their source.

Voltage Input Specifications

The meter's voltage inputs are auto-ranging; the voltage range is selected automatically based on the voltage source. V1, V2, V3 and V4 are all measured with respect to Vref.

Specification	Value
Operating Range	0 to 347 Volts RMS (L-N) and 0 to 600 RMS (L-L)
Steady-State Rating	0 to 347 Volts RMS
Overload Rating	1500 VAC RMS (continuous) and 3250 VAC RMS (one minute)
Input Impedance	5 MΩ

Voltage Reference (Vref) Input Connection

A good, low impedance Vref connection is essential for accurate voltage measurements. Use a dedicated 14 gauge wire (4.0 mm²) to a point where there will be no voltage error due to distribution voltage drops.

V4 Input Connection

This input is optional—ground the V4 input if you do not use it. V4 is typically used to monitor ground in grounded three-wire Wye and four-wire Wye systems (measurement is relative to Vref, so the location of the Vref connection is critical to interpreting the voltages measured at V4). You can connect V4 to any voltage source that you want measured with respect to Vref, provided the voltage source falls within the device's measurement range.

Voltage Overrange Capabilities

The meter is designed to measure and display a very wide voltage range. It measures up to 347 V RMS (L-N) and 600 V RMS (L-L) steady state, and captures voltage transients up to 1400 Volts (peak).

Using Potential Transformers (PTs)

Whether or not PTs are required depends on the nature of the system configuration and voltage levels being monitored.

System Mode	Voltage Range	Requires PTs
Wye	120 VAC line-to-neutral or 208 VAC L-L	no
	277 VAC line-to-neutral or 480 VAC L-L	no
	347 VAC line-to-neutral or 600 VAC L-L	no
	over 347 VAC L-N or 600 VAC L-L	yes
Single Phase	120 VAC line-to-neutral or 240 VAC L-L	no
	277 VAC line-to-neutral or 554 VAC L-L	no
	over 277 VAC L-N or 554 VAC L-L	yes
Delta	up to 480 VAC L-L	recommended*
	over 480 VAC L-L	yes

* To maximize accuracy, the use of PTs is recommended for all delta connections, however, direct connect delta up to 480 V is supported.

CAUTION

In cases where PTs are required, the secondaries should be fused.

Connecting the Phase Current Inputs

You will connect the phase current inputs differently depending on whether you have ordered the 1A/5A Current Input Option or the Current Probe Input Option. Check the label on the meter; refer to “The ION 7600 Meter’s Label” on page 16.

For the Current Probe Input Option connection instructions, refer to the section “Current Probe Installation Instructions” on page 20.

1A/5A Current Input Option

The meter uses CTs to sense the current in each phase of the power feed and (optionally) in the neutral or ground conductor. AWG 12 to AWG 14 (3.3 mm² to 2.1 mm²) is recommended for all phase current connections. CTs should be connected to the device via a shorting block or test block to facilitate the safe connection and disconnection of the CTs.

Current Input Specifications

The specifications for the auto-ranging current inputs are shown in the table below. The values shown are approximate and subject to change.

Specification	5A Option	1A Option
Input Rating	0 to 10 Amps RMS	0 to 2 Amps RMS
Fault Capture	70 Amps Peak RMS	12.5 Amps Peak RMS
Impedance	1.5 m Ω	15 m Ω
Burden	0.15 VA @ 20 Amps RMS	0.15 VA @ 20 Amps RMS
Overload	500 Amps RMS for 1 second, non-recurring	50 Amps RMS for 1 second, non-recurring

Optional I4 and I5 Current Input Connections

The I4 and I5 connections are optional. Either can be used to measure the current flow in the neutral or ground conductor. Typically, I4 will be used for neutral current and I5 will be used for ground current. I5 is useful in 3-Wire Grounded Wye and 4-Wire Wye systems. The primary rating for the CT connected to the I4 and I5 inputs can be different from the other three phase inputs because the scaling for I4 and I5 can be programmed independently.

Using Current Transformers (CTs)

The meter is compatible with CTs with up to 20 Amp full-scale secondaries. The input ratings of all three-phase inputs and the I4 and I5 inputs are equivalent.

The CT secondary should have a burden capacity greater than 3 VA. Instrument (ANSI) accuracy Class 0.3 or better is recommended. The length of the CT cabling should be minimized to prevent inaccuracy. Also, the CT burden rating must exceed the combined burden (the amount of load being fed by the CT, measured in VA) of the ION 7600 plus cabling plus any other connected devices. The ION 7600 burden rating is 0.15 VA @ 20 Amps RMS.

Current Overrange Capability

The meter measures continuous current levels up to 20 Amps RMS. It will measure instantaneous values of up to 70 Amps Peak.

Current Probe Installation Instructions

This section contains instructions for installing optional external current probes (for example, a current-to-voltage transformer) to the ION 7600 meter.

To use external current probes, your meter must be equipped with the Current Probe Inputs hardware option. This option allows you to use current probes with AC voltage output.



CAUTION The internal hardware of the meter's current inputs has been altered to specifically use current probes with voltage output.

DO NOT CONNECT THE CURRENT INPUT TERMINALS OF THIS ION METER TO THE SECONDARY OF A CURRENT TRANSFORMER!

Dangerous voltages may be induced on the meter's external current probe inputs resulting in equipment damage and risk of electrical shock.

DO NOT HI-POT THE METER'S CURRENT INPUTS - these are low voltage inputs and are not designed to withstand High Voltage Dielectric Strength Tests.

Installation Considerations

The meter connects with current probes to sense the current in each phase of the power feed and (optionally) in the neutral and ground conductors. Installation and maintenance of the meter and the current probes should only be performed by qualified and competent personnel who have appropriate training and experience with high voltage and current devices.

Connection

Connect the current probes to the meter using an appropriate wire type specified in your current probe documentation — spade or ring type connectors are recommended for connections to the ION meter. Cable length in excess of 2 meters (approximately 6 feet) may affect measurement accuracy. Specifications of the meter's current probe inputs are as follows:

Description	Specification
Input Impedance	220 k Ω
Nominal Input Voltage	1 Vrms
Max Input Voltage	5.5 Vrms (~7.8V peak)

The current probe output must be compatible with the above specifications.

CAUTION

The current probes used with the ION 7600 meter must comply with the IEC61010-1 overvoltage category III requirements. Wiring between the current probes and the meter inputs must be minimum 600 V rated wires. Alternatively, sleeving can be provided, or the wires can be separated to prevent them from coming into contact with other circuits.

Alternatively, the following current probes may be used, provided that they are installed on an insulated wire and within equipment that provides acceptable enclosure.

Model	Manufacturer
SCT0750-xxx	MAGNELAB*
SCT1250-xxx	MAGNELAB*
H6810-xxx	Veris Industries, Inc.**

* A division of the Solmon Corporation, Longmont, Colorado, USA

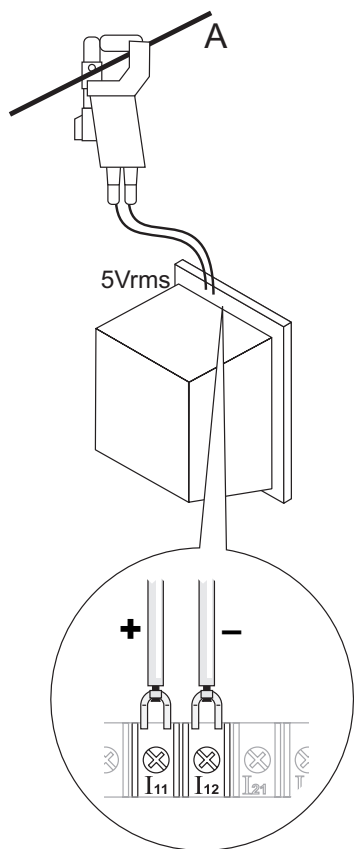
** Portland, Oregon, USA

For current probe installation instructions and safety information, refer to documentation supplied by the current probe manufacturer.

Current Probe Installation Overview

CAUTION

Installation and maintenance of ION meters and the current probes should only be performed by qualified, competent personnel that have appropriate training and experience with high voltage and current devices. If you are not sure how to perform any of the instructions provided, DO NOT CONTINUE WITH THE INSTALLATION. The ION meter and the current probes must be installed in accordance with all Local and National Electrical Codes.



Installing current probes with your ION meter

1. Connect the external current probes to the meter using appropriate wire types — refer to “Installation Considerations” above.
2. Ensure both leads from a current probe match the polarity of the corresponding current input. For example, connect the phase A current probe [+] (usually black) wire to the I11 terminal, and the phase A current probe [-] (usually white) wire to I12.
3. Clamp the current probe to the line according to the manufacturer’s specifications. Attach each current probe with the same orientation to ensure that all phase currents have the same polarity.
4. Mount the device in an appropriate enclosure.
5. Power up the meter, and perform basic setup if required.

Basic setup and your Current Probe Input Option

There are two Current Probe Input Option configurations available:

- A. Meters calibrated and shipped with probes: the meter is pre-configured and calibrated at the factory with three Universal Technic 10A current probes, meeting IEC 1036 Class 1 accuracy levels which includes the meter and the current probes accuracy. The current probes can be used for monitoring 1A or 5A secondaries.
- B. Meters calibrated, but not with probes: this option allows you to order a meter that is calibrated for use with current probes. You then supply your own probes (as long as they match the input specifications of the meter) or select one of the several compatible models available from PML as accessories. Probes and probe cables must be compliant with IEC 61010-1 CATIII protection requirements and not require more than 220k Ohm of load impedance.

Whether basic setup is necessary depends on your Current Probe Input Option.

Basic Setup is NOT required:

If your ordering option includes factory supplied current probes and a meter factory-calibrated to match the current probe specifications (option “A” above).

Basic Setup IS required:

If your meter ordering option does **not** include current probes that have been factory-calibrated with the meter (option “B” above). In this case, you need to set up the transformation ratio for the current probes you will be using. If energy readings *accuracy* is important, then you need to set up the phase angle specified by the current probes manufacturer.

Performing basic setup

Basic setup for current probes involves programming the meter with the current probe transformation ratio, and if necessary, the phase angle provided by the current probe manufacturer (phase angle correction is necessary for energy readings *accuracy*). These parameters are saved to the meter as *User Defined 1* or *User Defined 2* and are activated on the meter with the meter front panel or software. Follow these steps:

1. Set up the current probe transformation ratio including phase angle correction (if required) in a Telnet or HyperTerminal session, and save this to the meter as *User Defined 1* or *User Defined 2*.

Refer to the technical note *Telnet and HyperTerminal Access to ION Meters* for information on how to run a Telnet or HyperTerminal session. Refer to the technical note *Basic Setup for the Current Probes Input Option* to learn how to set up the current probe parameters.

2. With the meter front panel or software, activate the current probe parameters set in step 1:
 - ◆ Meter front panel: select *Basic Setup > Current Probe > User Defined 1* (or 2*).
 - ◆ Designer software: access the Power Meter module *Current Probe* setup register and set it to *User Defined 1* (or 2*).

*Choose *User Defined 1* or *User Defined 2* depending on how you saved your setup in step 1.

 **NOTE**

CT shorting blocks are NOT required for current probes with voltage output. Current probe inputs do not need to be grounded.

Troubleshooting***The current polarity is wrong***

- ◆ Ensure that each current probe is oriented properly on the line.
- ◆ Check the leads to make sure the + lead is connected to first current probe input of each pair: I11, I21, I31 (and I41, I51 if installed).
- ◆ Ensure that the input polarity is properly set in the Basic Setup menu.

The current reading is not what I expect

- ◆ Ensure that the correct current probe is selected. Check the *Current Probe* setting on the meter front panel (or with software).
- ◆ With a Telnet or HyperTerminal session, verify that the selected current probe setup registers contain the correct nominal primary current value, and the correct nominal secondary value. Refer to the manufacturer’s current probe specifications if necessary.

4-Wire Wye, 3-Element Direct Connection Diagram

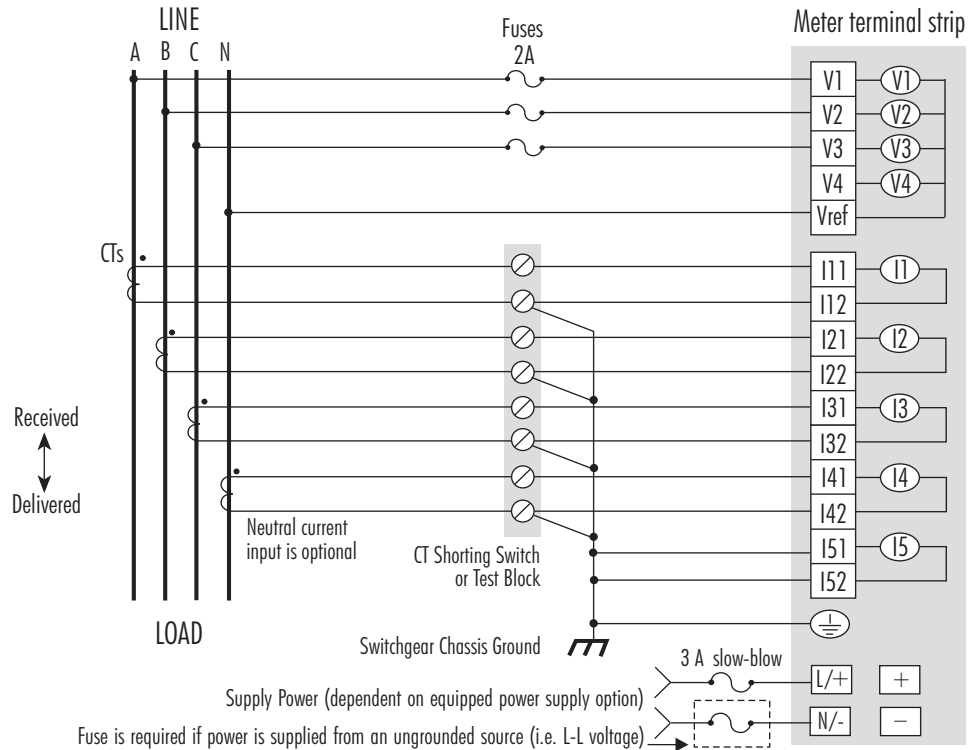
 **NOTE**

The ION 7600 senses the line-to-neutral (or ground) voltage and current for each phase, creating an equivalent three-element metering configuration.

Set the VOLTS MODE setting to 4W-Wye. See "ION 7600 Meter Basic Setup" on page 39.

CT shorting blocks are NOT required for current probes with voltage output.

Current probe inputs do not need to be grounded.



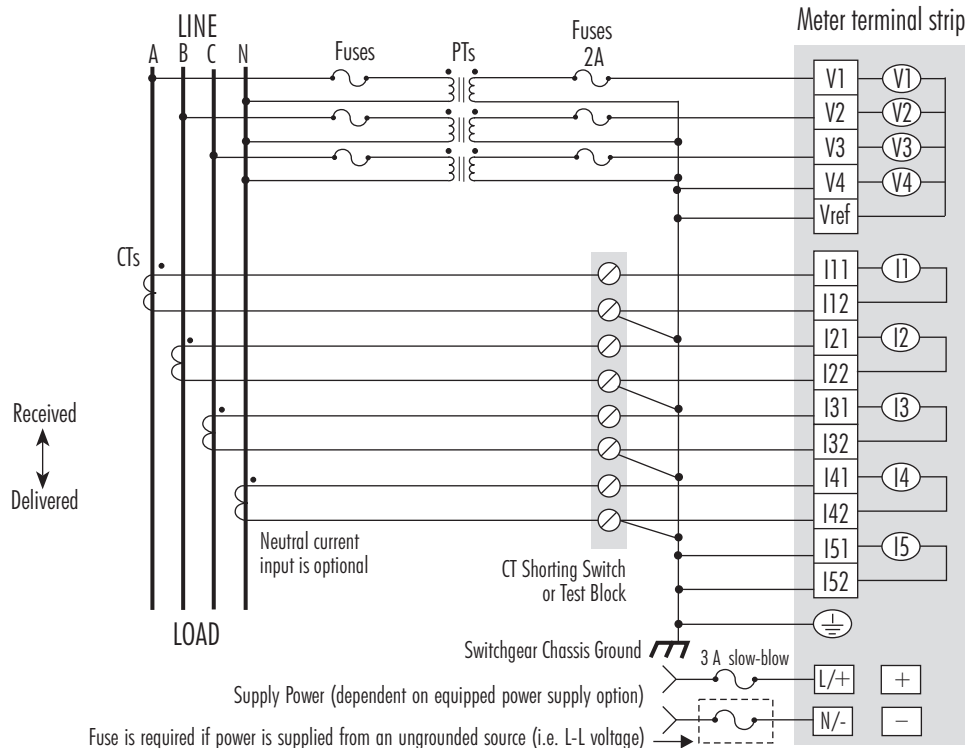
4-Wire Wye, 3-Element, 3 PT Connection Diagram

 **NOTE**

PTs must be used for 4-wire Wye systems with voltages over 347 VAC line-to-neutral / 600 VAC Line-to-line. Both the PT primary and secondary must be wired in a Wye (star) configuration. Voltage sense leads should be protected by breakers or fuses at their source. Wiring must be exactly as shown for correct operation.

Set the VOLTS MODE setting to 4W-Wye. See "ION 7600 Meter Basic Setup" on page 39.

CT shorting blocks are NOT required for current probes with voltage output. Current probe inputs do not need to be grounded.



4-Wire Wye, 2½-Element, 2 PT Connection Diagram

NOTE

This 2½-element scheme requires only 2 PTs. In this configuration, the phase B voltage displayed by the meter is derived from the phase A and C voltages.

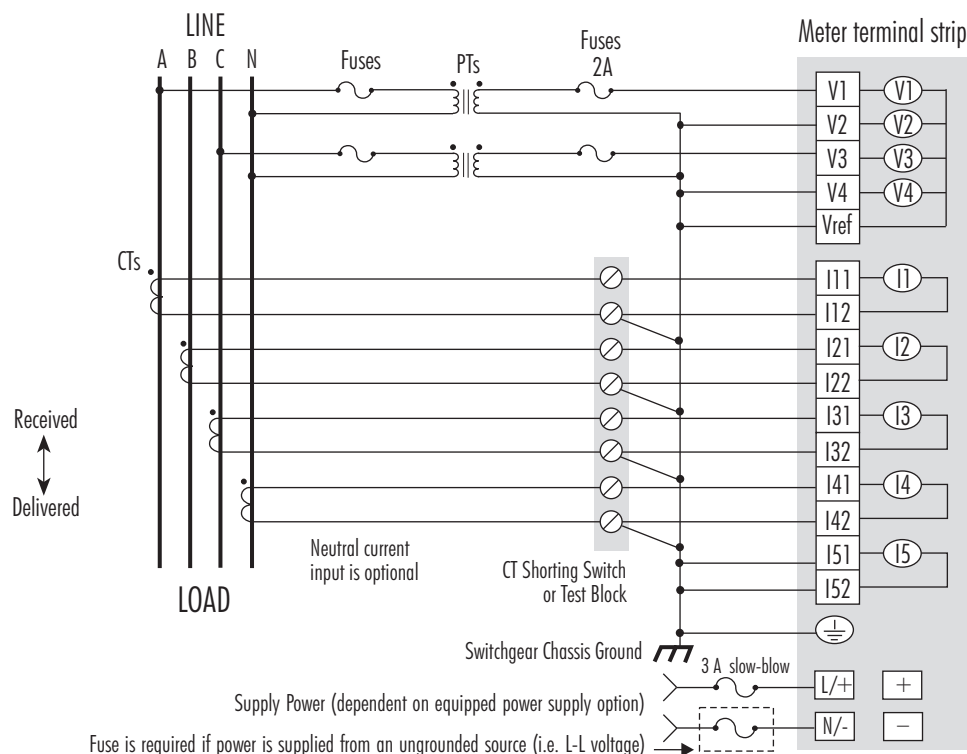
Set the VOLTS MODE setting to 3W-Wye. See "ION 7600 Meter Basic Setup" on page 39.

CT shorting blocks are NOT required for current probes with voltage output.

Current probe inputs do not need to be grounded.

CAUTION

In this configuration, the ION 7600 calculates and displays V2 even if Phase B is open circuited (there is no connection to Phase B).



3-Wire Solid Grounded Wye, 3-Element Direct Connection Diagram

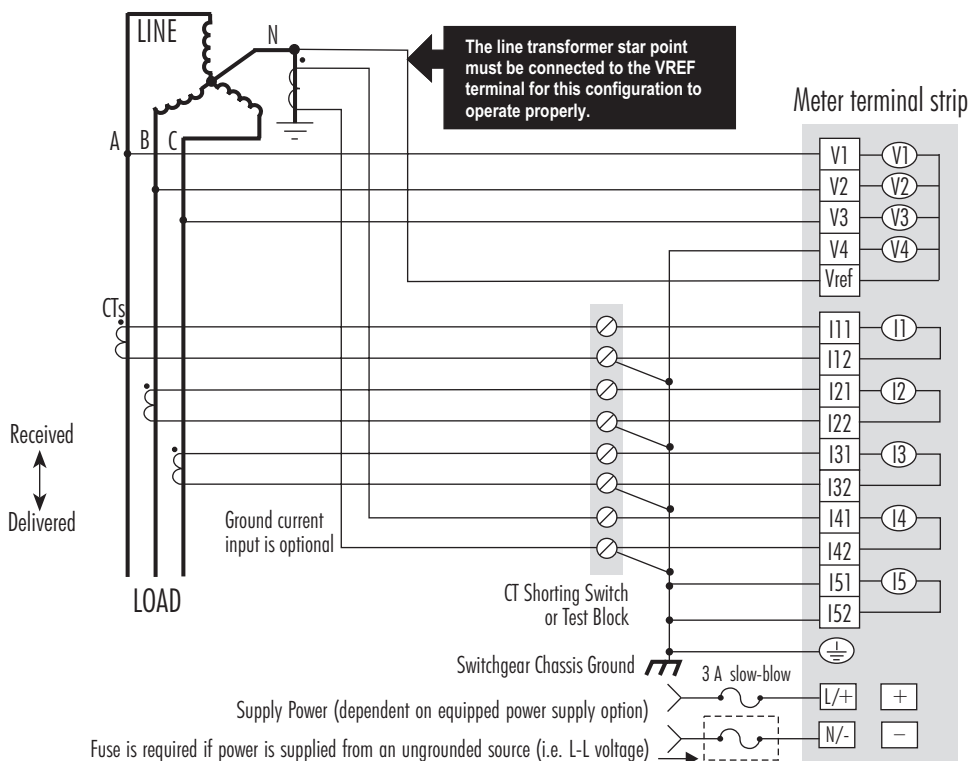
NOTE

When the common or star point of a 3 wire Wye system is grounded, the ION 7600 may be connected directly without the use of PTs, provided the phase voltages are within the device's range.

Set the VOLTS MODE setting to 4W-Wye. See "ION 7600 Meter Basic Setup" on page 39.

CT shorting blocks are NOT required for current probes with voltage output.

Current probe inputs do not need to be grounded.



3-Wire Delta, 2½-Element, Direct Connection Diagram

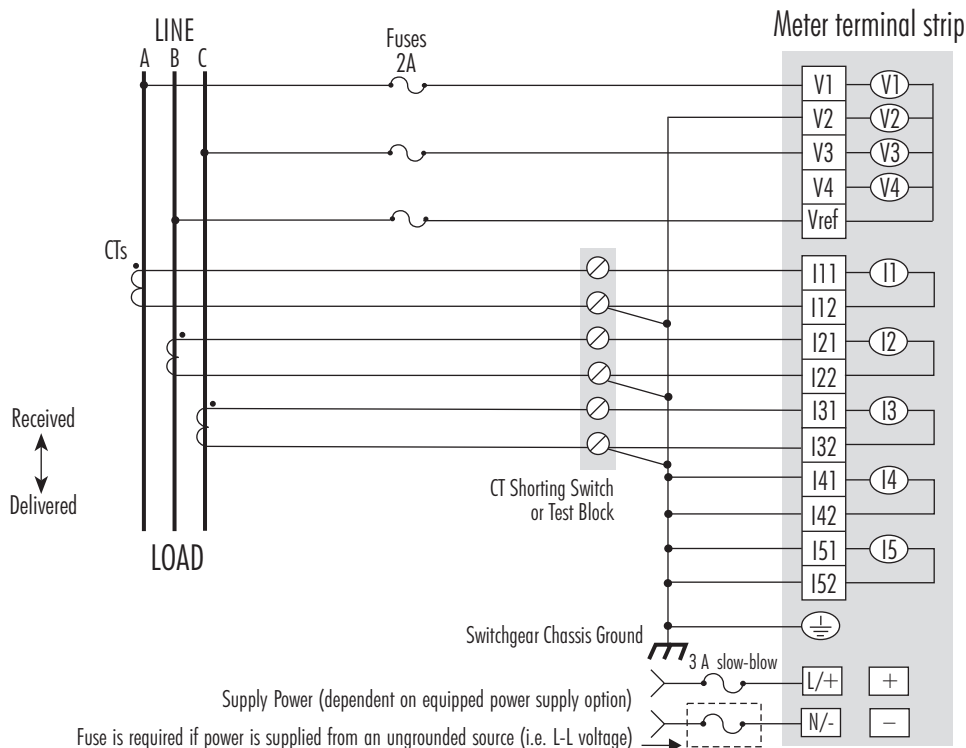
NOTE

Direct connection to delta configurations is supported for voltage ranges up to 480 V (line-to-line). The ION 7600 can be connected using 3 CTs or 2 CTs (see below). The direct delta configuration reduces the accuracy of measurement readings by 0.15%. To maximize accuracy, the use of potential transformers is recommended for delta configurations.

Set the VOLTS MODE setting to DELTA. See "ION 7600 Meter Basic Setup" on page 39.

CT shorting blocks are NOT required for current probes with voltage output.

Current probe inputs do not need to be grounded.



3-Wire Delta, 2-Element, 2PT & 2 CT Connection Diagram

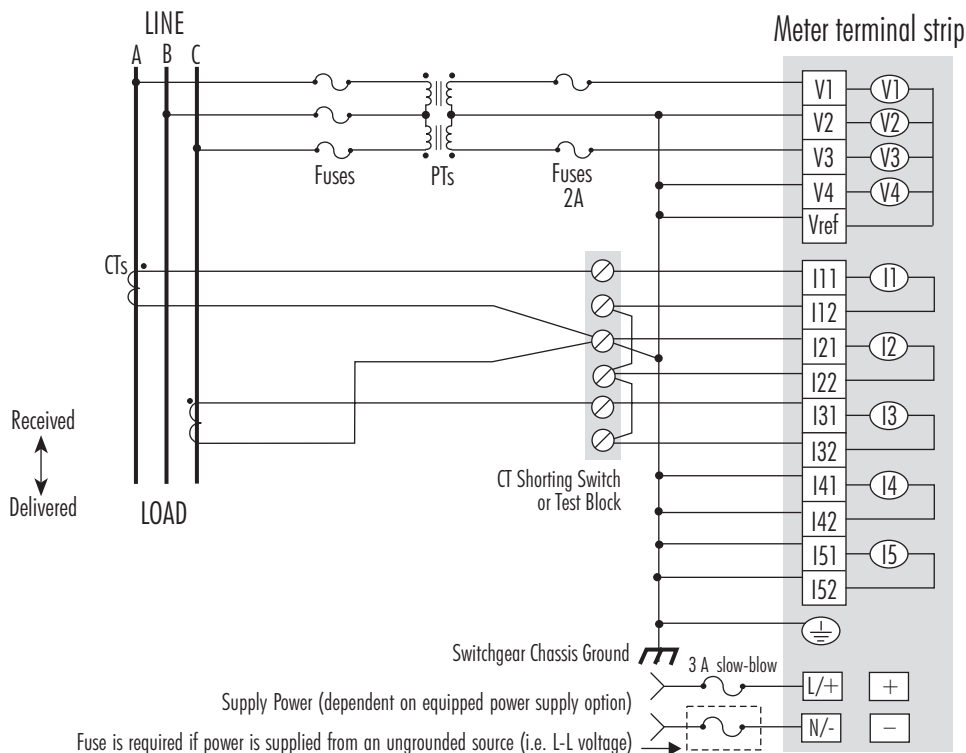
NOTE

To maximize accuracy, the use of potential transformer is recommended for delta configurations. However, direct connection to delta configurations is supported for voltage ranges up to 480 V (line-to-line). The ION 7600 can be connected using 3 CTs or 2 CTs (see above).

Set the VOLTS MODE setting to DELTA. See "ION 7600 Meter Basic Setup" on page 39.

CT shorting blocks are NOT required for current probes with voltage output.

Current probe inputs do not need to be grounded.



Single Phase Connection Diagram

NOTE

Connect the two voltage phases (each at 180 degrees with respect to each other) to the V1 and V2 inputs of the meter, and the outputs of the two corresponding CTs to the I1 and I2 input pairs. V3, I31 and I32 are unused and should be grounded.

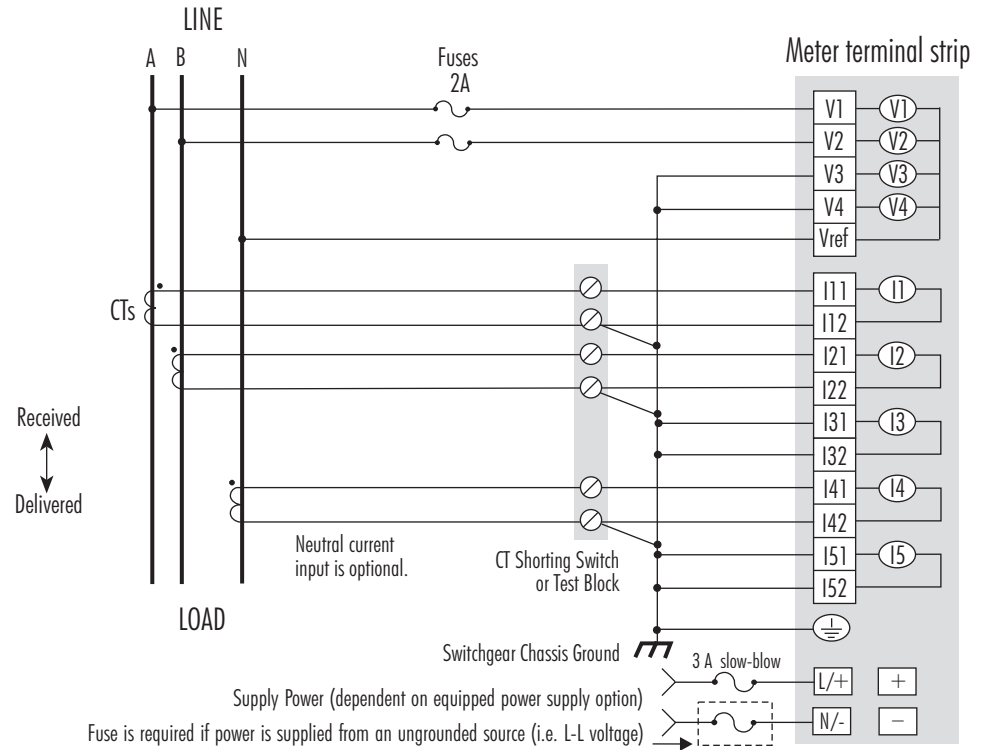
Set the VOLTS MODE setting to SINGLE. See "ION 7600 Meter Basic Setup" on page 39.

CT shorting blocks are NOT required for current probes with voltage output.

Current probe inputs do not need to be grounded.

CAUTION

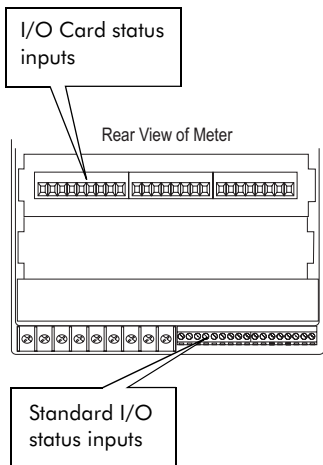
Contact Technical Services if you intend to connect to a single phase system that is different than this.



I/O Connections

This section outlines how to connect the ION 7600 meter's standard I/O (digital inputs/outputs) and the I/O provided by the optional I/O expansion card (digital inputs/outputs; analog inputs/outputs). Refer to the diagrams on page 9 and page 10.

Connecting the Status Inputs



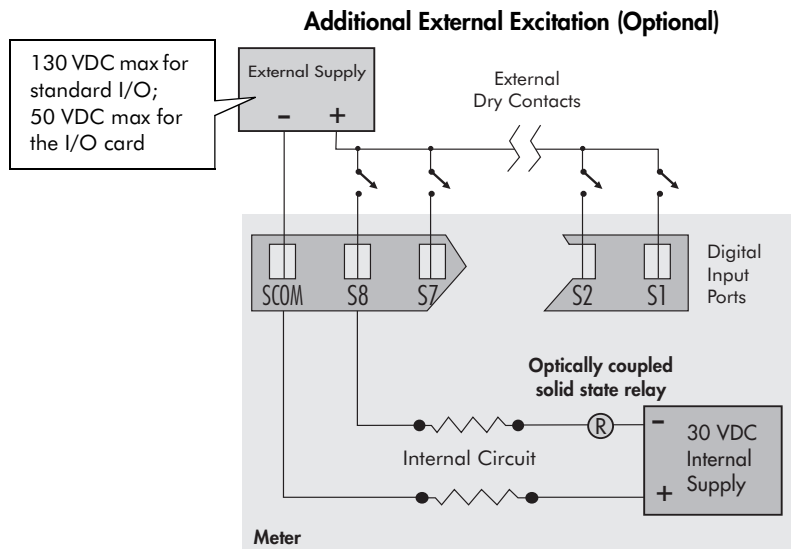
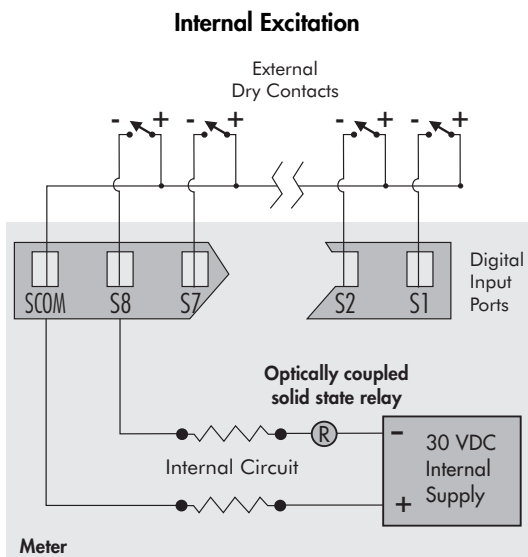
The unit's standard I/O provides eight digital (status) inputs (S1 to S8) as does the optional I/O expansion card (DI1 to DI8). Specifications are as follows:

Specification	Standard I/O	Expansion Card I/O
Min Pulse Width	1 millisecond	20 milliseconds
Max Pulse Rate	20 Hz	25 Hz
Scan Time	1 millisecond for all inputs (min)	20 milliseconds for all inputs (min)
Isolation	300 Volts for 10 seconds at 60 Hz	300 Volts for 10 seconds at 60 Hz
Timestamp Accuracy	1 millisecond	2 milliseconds

Connection

Connections to the digital inputs are made via a captured-wire type terminal block on the meter. AWG 12 to AWG 14 (3.3 mm² to 2.1 mm²) wire is recommended for all digital input connections.

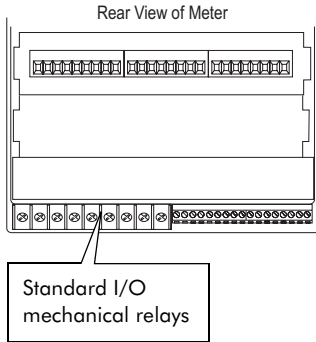
The inputs are primarily intended for *dry* contact sensing applications. For *self-excitation*, the meter uses a current sensing technique to monitor contact status by providing an internal 30 VDC supply. Note that no ground or external voltage connections are required. For voltage sensing applications, external excitation can be applied with an external supply (130 VDC max for standard I/O; 50 VDC max for the I/O card) placed in series with the internal 30 VDC supply.



ION Enterprise users can control the digital inputs with the Digital Input modules. Refer to the *ION 7600 User's Guide* for more details.

Connecting the Mechanical Relay Outputs

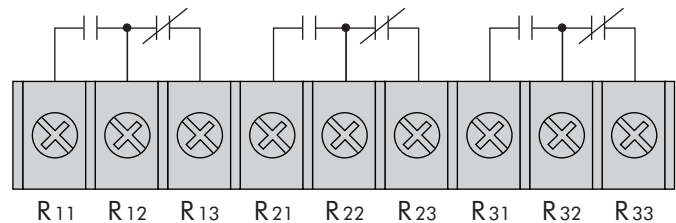
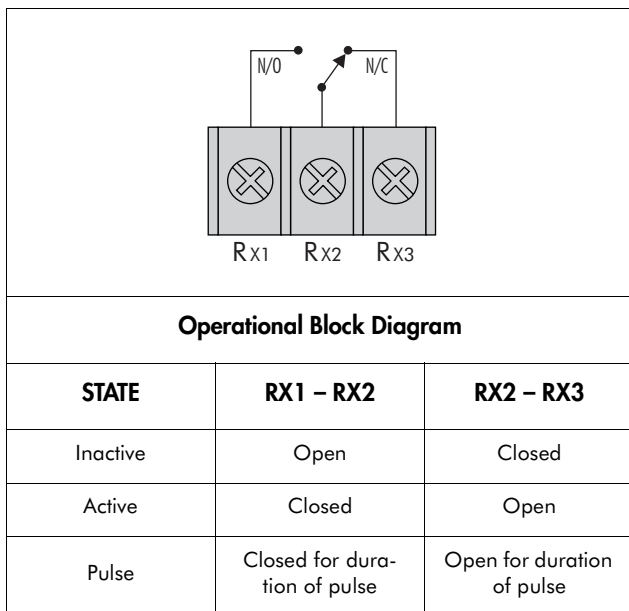
The ION 7600 meter's standard I/O provides three Form C relays, R1, R2 and R3. See "Wiring Connections" on page 9. Specifications are as follows:



Specification	Standard I/O
Max Voltage	250 VAC / 30 VDC
Max Current	10 Amp resistive
Turn-On Time	8.3 ms Max (60 Hz)
Turn-Off Time	8.3 ms Max (60 Hz)

Connection

Wiring used for connection to the relay outputs depends on the device being connected. Use the appropriate gauge wire for the amount of current that could be drawn by the connected device. Consult the device's operating instructions or manufacturer for assistance if required. A typical connection and operational details are illustrated below.



The mechanical relays should be protected by external fuses.

ION software users can control the mechanical relay outputs with the Digital Output and Pulser modules. Refer to the *ION 7600 User's Guide* for more details.

Connecting the Solid-State Relay Outputs

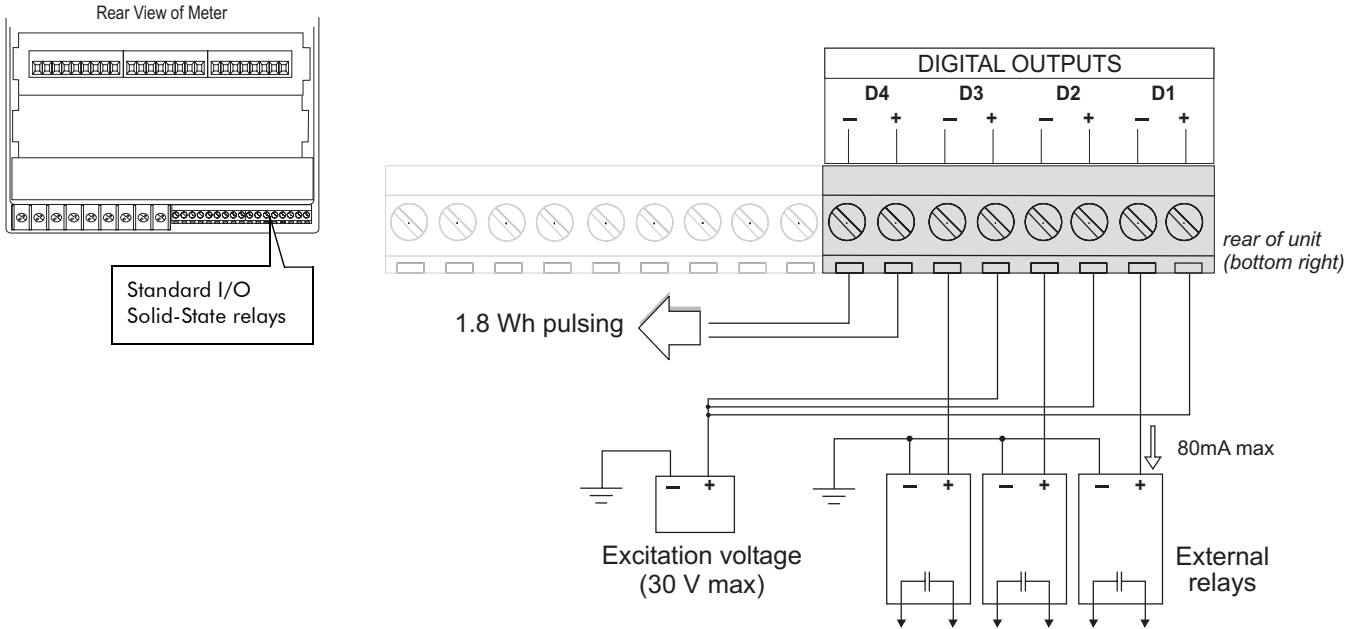
 **NOTE**

Digital output D4 is configured at the factory to emit pulses for calibration testing purposes. Refer to the ION 7600 User's Guide for more details.

The ION 7600 meter's standard I/O provides four digital relay (Form A) outputs, D1 through D4. The outputs can be configured to deliver either a continuous signal or a pulse.

Connection

AWG 16 to 28 wire (1.3 mm² to 0.08 mm²) is recommended for all connections. Connections to the terminal strip are made as shown in the following diagram.



The function of each output is controlled by the ION Digital Output, Pulser, or Calibration Pulser modules — refer to the *ION 7600 User's Guide* for more details.

Relay Application Precautions

If the meter's digital outputs are used to perform critical equipment control operation (i.e breaker tripping), make note of the following:

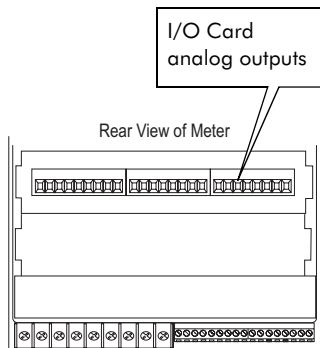
- ◆ Make connections to the external equipment through an intermediate mechanism that allows relay control to be completely disabled for commissioning and servicing.
- ◆ Anytime the meter is powered down and powered back up, test the digital outputs to ensure that all of your control conditions are occurring as expected.

Only use Power Measurement-approved external relays with the digital outputs of the meter. Contact us for information regarding relay applications.

Connecting to the Analog Outputs

⚠ CAUTION

Due to internal circuit design, it is recommended that the analog inputs of the I/O Card NOT be driven with the outputs on the same card.



The I/O expansion card provides 4 analog outputs that can deliver a continuous DC signal. Two varieties are available:

0-20 mA Analog Outputs (scalable to 4-20 mA)

Capable of driving up to 500 Ω

-1 to 1 mA Analog Outputs (scalable to 0-1 mA)

Capable of driving up to 10 k Ω

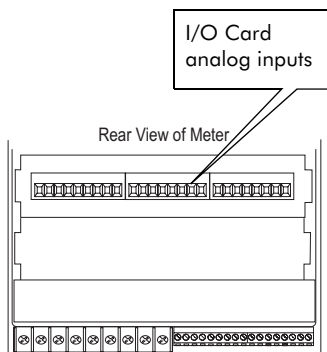
Both types of analog output provide DC outputs at an accuracy of $\pm 0.30\%$ of full scale. Connection to the analog outputs is made through a set of captured wire connectors.

ION software users can control the analog outputs with the Analog Output modules. Refer to the *ION 7600 User's Guide* for more details.

Connecting to the Analog Inputs

⚠ CAUTION

Due to internal circuit design, it is recommended that the analog inputs of the I/O Card not be driven with the outputs on the same card.



The I/O expansion card can be ordered with 4 unidirectional analog inputs. Two varieties are available with accuracy of 0.3% of full scale:

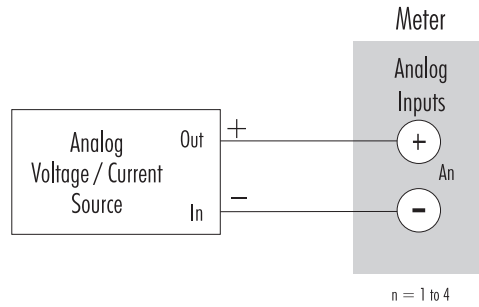
0-20 mA Analog Inputs (scalable to 4-20 mA)

- ◆ Input impedance of 25 Ω
- ◆ Isolation impedance (channel/channel) > 400 k Ω

0-1 mA Analog Inputs

- ◆ Input impedance of 475 Ω
- ◆ Isolation impedance (channel/channel) > 400 k Ω

These inputs are capable of measuring DC signals from various transducers within the system.



Connection to the analog inputs is made through a set of captured wire connectors.

ION software users can control the analog inputs with the Analog Input modules. Refer to the *ION 7600 User's Guide* for more details.

Communications Connections

The ION 7600 standard model includes a selectable RS-232/RS-485 port (COM 1), a dedicated RS-485 port (COM 2), and an IrDA optical port (COM 3). An internal modem as well as a 10Base-T (or -FL) Ethernet port are available as order options. Connection details and specifications are provided below.

RS-232 Connections



NOTE

The RS-232 and RS-485 ports at COM 1 are multiplexed – you cannot use both ports simultaneously.

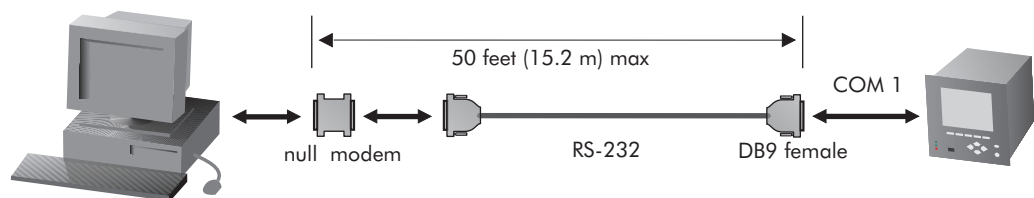
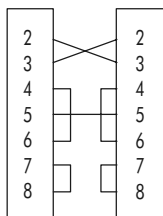
RS-232 connection is made at the male DB9 connector (COM 1). The meter acts as a DTE device in all RS-232 connections. Specifications are as follows:

Specification	Value
Baud Rates	300 to 115, 200 bps (default is 9600 bps)
Duplex	Full
Supported Protocols	ION, Modbus RTU, DNP 3.0, FACTORY, GPS: Arbiter, GPS: TRUE TIME DATUM, EtherGate, ModemGate (default is ION)
Isolation	Optical isolation from all other inputs and outputs (excluding the COM 1 RS-485 port); isolation voltage is 750 V peak for 10 seconds @ 60 Hz.

ION 7600 – Computer Connections

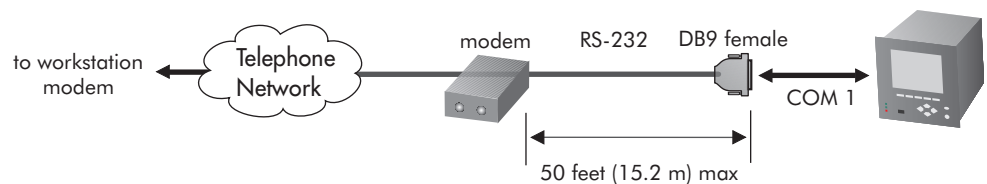
Use a null modem cable for connecting a meter to a workstation. One end of the cable must be equipped with DB9 female connector for mating with the DB9 male connector on the meter. Cable length is 50 feet (15.2 m) maximum.

DB9 Null Modem Wiring Diagram:



ION 7600 – External Modem Connections

Use a standard straight-through RS-232 cable for connecting a to an external modem. The cable must be equipped with DB9 female end for mating with the DB9 male connector on the ION 7600. Cable length is 50 feet (15.2 m) maximum.



RS-485 Connections



NOTE

The RS-232 and RS-485 ports at COM 1 are multiplexed – you cannot use both ports simultaneously.

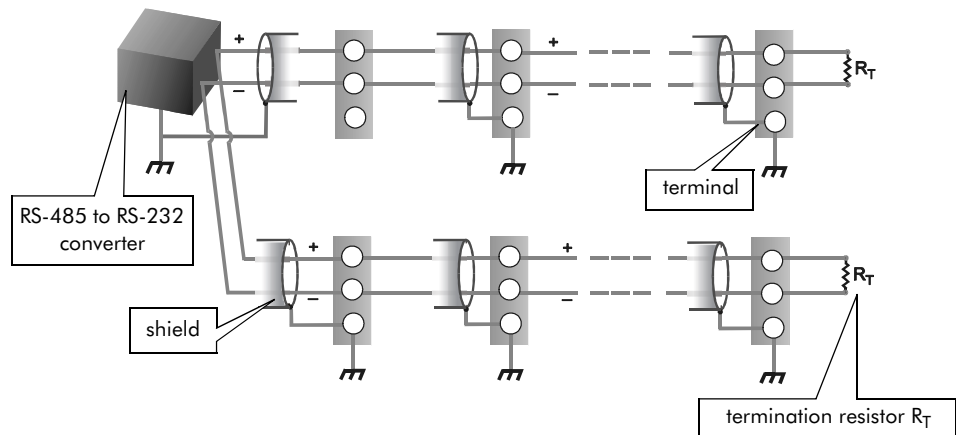
RS-485 connections are made via the captured-wire connectors on the rear of the ION 7600 meter. See “Communications Connections” on page 11. Specifications for COM 1 RS-485 and COM 2 are as follows:

Specification	Value
Baud Rates	300 to 57 600 bps (default is 9600 bps)
Duplex	Half
Supported Protocols	ION, Modbus RTU, DNP 3.0, FACTORY, GPS: Arbiter, GPS: TRUE TIME DATUM, EtherGate, ModemGate (default is ION)
Isolation	Optical isolation from all other inputs and outputs (the COM 1 RS-485 port is not isolated from the COM 1 RS-232 port); isolation voltage is 750 V peak for 10 seconds @ 60 Hz.

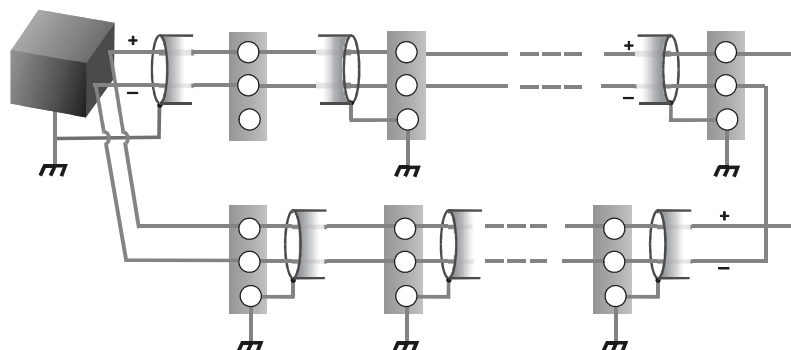
Up to 32 devices can be connected on a single RS-485 bus. Use good quality shielded twisted pair cable, AWG 22 (0.33 mm²) or larger. The overall length of the RS-485 cable connecting all devices cannot exceed 4000 ft. (1219 m). The lengths of all (+ and -) cable segments must be counted including those that connect devices to terminal blocks. Terminal connections on the meter are marked as follows:

Marking	Terminal Function
SHLD	RS-485 Shield
-	RS-485 Data Minus
+	RS-485 Data Plus

Straight-Line Topology



Loop Topology



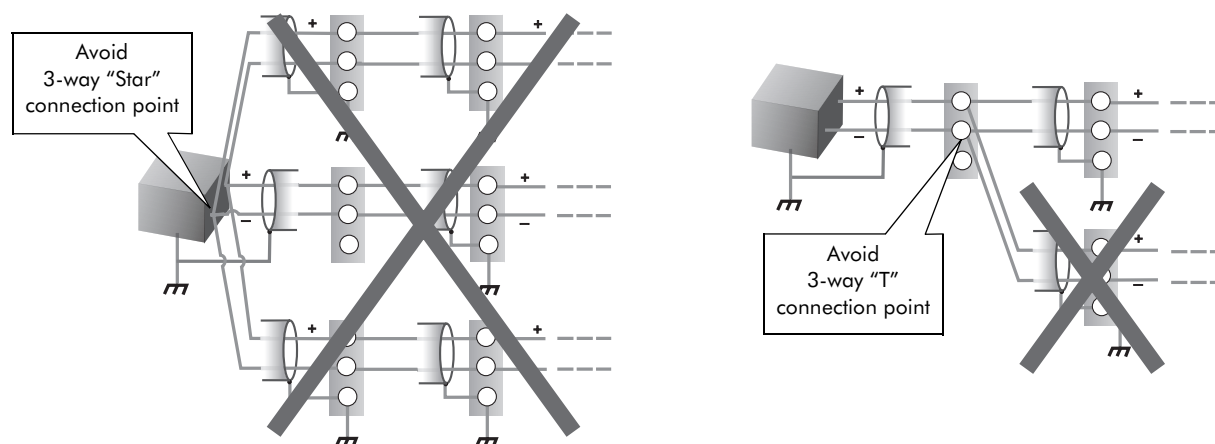
General Bus Wiring Considerations

Devices connected on the bus, including the meter, converter(s) and other instrumentation, must be wired as follows:

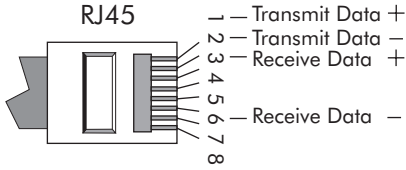
- ◆ Connect the shield of each segment of the cable to ground at *one end only*.
- ◆ Isolate cables as much as possible from sources of electrical noise.
- ◆ Use an intermediate terminal strip to connect each device to the bus. This allows for easy removal of a device for servicing if necessary.
- ◆ Install a ¼ Watt termination resistor (**RT**) between the (+) and (-) terminals of the device at each end point of a straight-line bus. The resistor should match the nominal impedance of the RS-485 cable (typically 120 ohms – consult the manufacturer’s documentation for the cable’s impedance value).

RS-485 Connection Methods to Avoid

Any device connection that causes a branch in the main RS-485 bus should be avoided. This includes *star* and *tee (T)* methods. These wiring methods cause signal reflections that may cause interference. At any connection point on the RS-485 bus, no more than two cables should be connected. This includes connection points on instruments, converters, and terminal strips. Following this guideline ensures that both star and tee connections are avoided.



Ethernet Connections



This section only applies if your ION 7600 meter has the Ethernet option. Connection to the 10Base-T Ethernet port is made via the RJ45 modular connector on the rear of the unit. See “Communications Connections” on page 11. Use high quality Category 3 or 5 UTP (CAT 5 unshielded twisted pair recommended) cable with a male RJ45 modular connector for connection to the 10Base-T port.

The optional 10Base-FL Ethernet connection is made via the ST-type connectors located on the rear of the unit. (Note that the 10Base-FL option will only be available if -FL was specified when the ION 7600 was ordered.) Use 62.5/125µm multimode fiber cable with ST-type connectors for connection to the 10Base-FL port. Using the fiber port disables the standard RJ45 port. Specifications for the Ethernet ports are as follows:

Specification	Value
Data Rate	10 Mbps
Supported Protocols over TCP/IP	ION, Telnet, Modbus RTU*, Modbus TCP*, FACTORY
Isolation	Transformer isolated to 1500 VAC RMS / 2250 VDC

* The unit ID for Modbus RTU and Modbus TCP over Ethernet is 100.

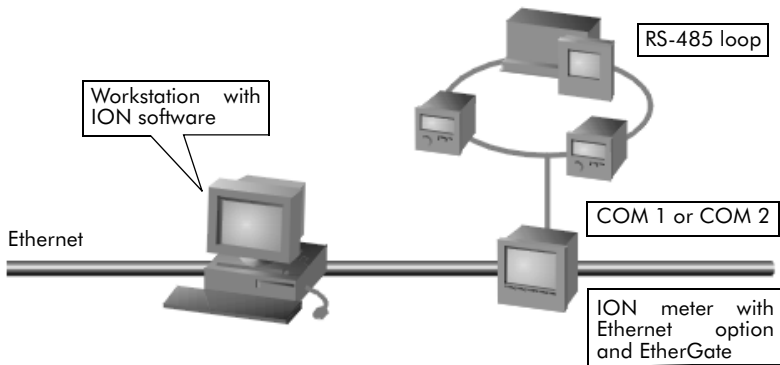
IP Service Ports

Connect to the following IP Service Ports for communications over the Ethernet.

- ◆ ION: TCP/IP Port 7700
- ◆ Modbus RTU: TCP/IP Port 7701
- ◆ Modbus TCP: TCP/IP Port 502
- ◆ EtherGate connections through COM1: TCP/IP Port 7801
- ◆ EtherGate connections through COM2: TCP/IP Port 7802

EtherGate Connections

The EtherGate protocol allows the meter to act as a gateway, transferring data directly between Ethernet and RS-485 networks.



When the protocol on COM1 or COM 2 is set to EtherGate, the transfer of data between the Ethernet network and the RS-485 loop is handled automatically. Refer to “RS-485 Connections”, above, for wiring guidelines. See “Serial COM Settings” on page 42 for the appropriate port settings.

Internal Modem Connections

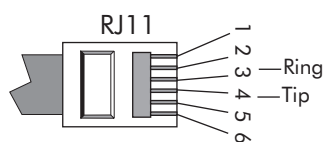
This section only applies if the unit you are installing has an internal modem (FCC or CTR21 compliant). Refer to the Notices at the start of this document for more details. The internal modem shares the communications channel with the optical port. It is factory-configured to respond (and the optical port is disabled).

Data Rates

The internal modem is capable of using all standard modem protocols from 300 bps to 33600 bps. The baud rate used between connected modems is independent of the baud rate used for communication between the modem and the ION 7600. Higher data rates can be achieved if data compression is enabled in the modem.

Connection

Once the meter has been installed and all the voltage and current connections have been made, connect to the internal modem via the female RJ-11 jack located on the back of the meter. For FCC complaint modems, use an FCC Part 68 compliant telephone cord.



CAUTION

The CTR21 Compliant Modem does not support Pulse dialing.

The CTR21 Compliant Modem should be the only device on the telephone line. Attaching devices on the same line may cause one or more of these devices to operate incorrectly.

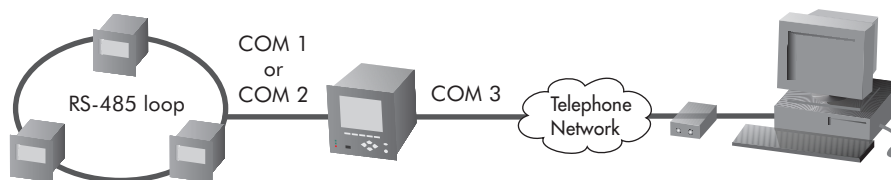
If your meter has the CTR21 Compliant internal modem option, you may also require an adapter to interface with your particular European telephone line connection. The adapter type will depend on the telephone line standards in your country or region (several standards may be in use in the same country).

Internal Modem Setup

The front panel of the meter allows you to configure the number of rings that the internal modem will wait before answering. See "Serial COM Settings" on page 42 for more details.

ModemGate Connections

ModemGate creates a communications connection between the telephone network and an RS-485 loop of devices connected to COM 1 or COM 2 of the meter.



Wire the devices on the RS-485 loop according to guidelines presented on page 34.

NOTE

You cannot run ModemGate out of both COM 1 and COM 2 simultaneously.

Configuring the Gated Devices

For all devices connected to the ModemGate (COM 1 or COM 2 of the meter)...

- ◆ The baud rates of their serial communications ports match the baud rate of the ION 7600 meter's COM 1 or COM 2 port.
- ◆ They must each have a **unique** Unit ID number.
- ◆ They must all have the RS-485 serial protocol selected for connections to multiple devices along the same bus.

To configure the dial-in connection, your system administrator will require the common baud rate of the devices at the modem site as well as a record of the Unit ID numbers for every device.

Refer to "ION 7600 Meter Basic Setup" on page 39 for details on setting up the meter.

Optical (Infrared) Connections

The IRDA optical port located on the front of the meter permits infrared communications. The optical port shares the communications channel with the optional internal modem. If you have the internal modem option, ensure that the optical port is enabled through the front panel's COM 3 *Mode Setup* item. See "Serial COM Settings" on page 42 for instructions on enabling and setting up infrared communications.

Specifications for the optical port are as follows:

Specification	Value
Baud Rate	9600 to 115, 200 bps (default is 9600 bps)
Duplex	Half
Operating Distance	less than 1 meter (3 feet)
Optical Range	$\pm 15^\circ$ (minimum), $\pm 30^\circ$ (maximum)
Supported Protocols	ION, Modbus RTU, DNP 3.0, FACTORY (default is ION)

No physical connection is required to use the infrared port. Any device with an IRDA-compliant port that is positioned within the operating distance and optical range specified above can receive data.

The port can be used to communicate real-time measurements via ION, DNP3.0, or Modbus RTU protocols. Typically, a laptop computer running ION software is used.

ION 7600 Meter Basic Setup

ION 7600 TRAN Model

You communicate with the TRAN meter using ION software.

There is no front panel on the TRAN meter, so you must know the COM settings. Initially, or “out of the box” you must use the default Com port settings. Refer to “Serial COM Settings” on page 42 for the default settings and other information.

Once you have established communications with the TRAN meter, you can perform basic setup. If you change the meter communications settings, you should record the changes for future use.

ION 7600 Basic Model

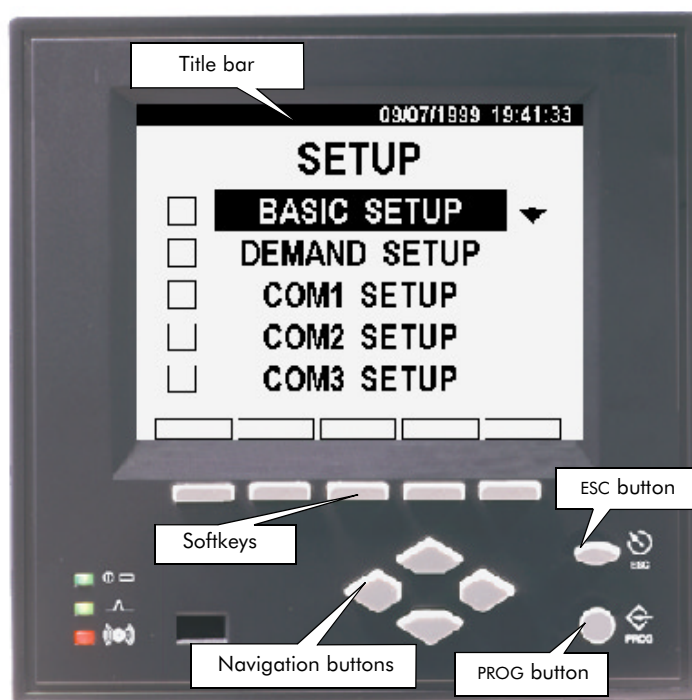
If your ION 7600 meter requires settings other than the factory default settings to communicate with your power-monitoring network, then you must set up the meter through the front panel. Basic setup determines how the ION 7600 meter interprets the power system it is connected to, as well as how the meter communicates with connected networks or workstations.

Accessing the ION 7600's Setup Menu

Press the PROG/SELECT button to access the main Setup menu.

To access a menu item:

1. Highlight the menu item with the Up and Down Navigation buttons.
2. Press PROG/SELECT button again to access the menu item.



Button Functions

Use the front panel buttons in the following ways to make changes to the settings:



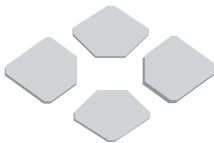
PROG/SELECT

Once in programming mode, the PROG/SELECT button functions just like an Enter key the keyboard of a computer. Press the PROG/SELECT button to accept changes.



ESC

Pressing the ESC (escape) button allows you to return to a higher menu or discontinue a configuration change.



NAVIGATION

- ◆ Highlight menu items with the Up and Down buttons (then press the PROG/SELECT button to select the item)
- ◆ Enter numbers — when a digit is highlighted, pressing the Up button will increment the number by one, and pressing the Down button will decrement it. Move the cursor to an adjacent digit with the Left or Right buttons.



SOFTKEY

Press a Softkey button when Softkey options become available (when titles appear in the Softkey title bar). Use the Sofkeys to select the parameters that you want to configure from the various sub-menus.

Passwords

All configuration functions in the front panel are password protected. The password is set in the factory to 0 (zero). With the password you can access the Security setup menu and disable or change the password to a custom value (see “Security Settings” on page 45). The front panel will only prompt you for the meter password before you make your first configuration change.

Setup Mode Timeout

Once the meter has been configured, the front panel automatically exits the Setup menu five minutes after the last button press is detected. If the front panel returns to data display mode, you will have to re-enter the Setup menu and provide the valid meter password to resume making configuration changes.

Confirming Configuration Changes

This screen appears every time you attempt to change the meter’s settings through the front panel. It allows you to abort an unwanted configuration change. Note that the front panel will also inform you when an entry is out of range. In either case, you must press the PROG button to return to the setup screen.



WRITING ERROR Screen

If the CONFIRM screen does not appear for a valid entry, or the display reports a WRITING ERROR, repeat the configuration change. If the problem persists, contact Technical Services.

Basic Setup Menu

The ION 7600 meter's Basic Setup menu contains those values that will typically not need to be reconfigured once the meter is put into service. The Basic Setup menu item provides access to the following power monitoring system settings:

Sub-Menu	Register	Default	Description
PT/CT Setup	Volts Mode	4 Wire Wye	The power system's configuration
	PT Primary	120	The Potential Transformer's primary winding voltage rating for VA, VB, and VC
	PT Secondary	120	The Potential Transformer's secondary winding voltage rating for VA, VB, and VC
	CT Primary	5	The Current Transformer's primary winding current rating for IA, IB, and IC
	CT Secondary	5	The Current Transformer's secondary winding current rating for IA, IB, and IC
V4 Setup	V4 Primary	120	The potential transformer's primary winding rating on input V4
	V4 Secondary	120	The potential transformer's secondary winding rating on input V4
I4/I5 Setup	I4 Primary	5	The current transformer's primary winding rating on input I4
	I4 Secondary	5	The current transformer's secondary winding rating on input I4
	I5 Primary	5	The current transformer's primary winding rating on input I5
	I5 Secondary	5	The current transformer's secondary winding rating on input I5
V Polarity*	VA Polarity	Normal	The polarity of the potential transformer on VA
	VB Polarity	Normal	The polarity of the potential transformer on VB
	VC Polarity	Normal	The polarity of the potential transformer on VC
	V4 Polarity	Normal	The polarity of the potential transformer on V4
I Polarity*	IA Polarity	Normal	The polarity of the current transformer on IA
	IB Polarity	Normal	The polarity of the current transformer on IB
	IC Polarity	Normal	The polarity of the current transformer on IC
	I4 Polarity	Normal	The polarity of the current transformer on I4
	I5 Polarity	Normal	The polarity of the current transformer on I5
Current Probe	Probe Type	Factory Default	Current Probe Input setting – selects factory default phase angle correction for I1, I2, I3

* Polarities can be normal or inverted.

All Basic Setup menu items are setup registers in the Power Meter module. See the *ION 7600 User's Guide* for details.

Current Probe Input Option

The *Current Probe* calibration registers are setup registers in the Factory module that can be configured in a Telnet or HyperTerminal session. (See "Basic setup and your Current Probe Input Option" on page 22). Up to three separate groups of registers (*Factory Default*, *User Defined 1*, and *User Defined 2*)* can be available for three different Current Probe types. In the Basic Setup menu, the *Probe Type* register is used to activate one of those register groups. Only the selected group is used in calculations performed by the meter.

* *Factory Default* parameters are fixed; *User Defined 1* or *User Defined 2* parameters can be configured in the Factory module.

Serial COM Settings

The current configurations of COM 1 (RS-232/RS-485), COM 2 (RS-485), and COM 3 (optical port) are found in the COM Setup menu items.

Serial Port	Setting	Options	Default
all	Protocol	ION, Modbus RTU, Factory, DNP 3.0, GPS Arbiter [‡] , and GPS:TrueTime/Datum [‡] , EtherGate [†] , ModemGate [†]	ION
all	Baud Rate	300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200 bps	9600 bps
all	Tran Delay	Transmit delay-the bounds are 0.0 to 1.0 s.	0.01s (10ms)
all	Unit ID	Sets the ION 7600's Unit ID; a unique Unit ID is required for each device (including all the deives ona ModemGate or EtherGate serial loop).	COM1: Unit ID is based on the serial number.* COM 2: 101 COM 3: 102
COM 1 and COM 3	Mode or Comm Mode	The communications mode selected: COM 1: RS-232 or RS-485 COM 3: IRDA optical port or internal modem	COM 1: RS-232 COM 3: Modem
COM 1 (RS-232) only	Flow Control	'RTS/CTS' or 'RTS with Delay'; this setting is located in the COM1 Hardware sub-menu	'RTS with Delay'
COM 3 (internal modem) only	Answer HR Rings	The number of rings during defined answer hours– Valid entries for this register are 0-255 rings; an entry of 0 rings will disable answering.	1
COM 3 (internal modem) only	Non-Answer HR Rings	The number of rings during defined non-answer hours.	5

[‡] See "Using Time Synchronization" in the ION 7600 User's Guide for more details about GPS settings.

[†] Refer to "Ethernet Connections" on page 36 and "Internal Modem Connections" on page 37 for more details.

* The factory set Unit ID for COM 1 is based on the serial number of the meter, using the last four numbers before the dash. For example, if the serial number is PA-0009B263-01, the Unit ID is set in the factory to **9263**. After a factory reset, the unit ID number will default to **100**.

COM 3 Internal Modem Setup

If you have the internal modem order option, the modem shares COM 3 with the IRDA optical port. The modem is factory configured to answer in the number of rings specified by Answer HR Rings (the Non-Answer HR Rings value is ignored by default). The modem initialization string can only be altered via software communications. More details on configuring the internal modem are provided in the *ION 7600 User's Guide*.

Network Settings

This menu item allows you to configure the Ethernet 10Base-T (or optional 10Base-FL) communications channel. The following settings can be configured in this item:

Setting	Description	Default
IP BootP Option	A BootP server automatically sets the IP Address, Subnet Mask, Gateway, and SMTP Mail Server IP Address – see your Network Administrator to determine if BootP is used	BootP
IP Address	Sets the IP Address for the ION 7600	If a BootP server has been correctly set up, the IP Address number appears. If no BootP server has been set up (e.g. you wish to configure settings through the front panel) then the default is None.
Subnet Mask	Used if subnetting applies to your network – see your Network Administrator to determine if Subnet Mask is used	If a BootP server has been correctly set up, and Subnet Mask is used, then the Subnet Mask address number appears. If Subnet Mask is not used, then the default is None. If no BootP server has been set up (e.g. you wish to configure through the front panel) then the default is None.
Gateway	Used in multiple network configurations – see your Network Administrator to determine if Gateway is used	If a BootP server has been correctly set up, and Gateway is used, then the Gateway address number appears. If Gateway is not used, then the default is None. If no BootP server has been set up (e.g. you wish to configure through the front panel) then the default is None.
SMTP Address	Sets the IP Address for the SMTP Mail Server that is configured to forward mail from the meter to the final destination – see your Network Administrator to determine if the SMTP Mail Server is used	If a BootP server has been correctly set up, and an SMTP Address is used, then the SMTP Address address number appears. If an SMTP Address is not used, then the default is None. If no BootP server has been set up (e.g. you wish to configure through the front panel) then the default is None.

Network settings can be configured in one of two ways: automatically with BootP, or manually through the front panel.

Configuring Network Settings with BootP

The BootP network setting is enabled by default. When a BootP server is set up with the correct information, the network settings (IP Address, Subnet Mask, Gateway, and SMTP Mail Server IP Address) automatically configure.

Ask your Network Administrator whether a BootP server has been set up on your network. If it has, and your Network Administrator has allocated the required network settings on the BootP server, then all of the network settings (that your facility requires) automatically appear on the Network Setup screen.

Configuring Network Settings Through the Front Panel

To configure network settings through the meter’s front panel, you must change IP Boot Option from (the default) BootP to Manual.

 **CAUTION**

Configuring the IP Address, Subnet Mask, and Gateway registers incorrectly can cause network disruptions. See your network administrator for more information.

Typically, your Network Administrator will provide you with the appropriate IP Address for the ION 7600 meter. The Subnet Mask and Gateway settings are only required if you have communications between multiple Ethernet networks and if subnetting is implemented.

Use the four Navigation buttons to edit the values of the network settings so that they match your system addresses. Refer to “Button Functions” on page 40 for instructions on using these buttons.

As you configure the network addresses, the front panel automatically discards unnecessary leading zeroes from each three-digit grouping. The hidden leading zeroes appear (and disappear again) as you move the position of cursor across the network address.

89.123.40.056

In the example above, the highlighted zero is discarded as soon as you change the position of the cursor.

Communicating via Modbus RTU over Ethernet

You can configure the meter to communicate in Modicon Modbus systems through the Ethernet connection. A Modbus host must connect to port 7701 for Modbus RTU communications over Ethernet. The Modbus Unit ID number of the meter over Ethernet is 100. Refer to the *ION 7600 User’s Guide* for details on implementing the ION 7600 in 3rd-party systems.

 **NOTE**

This is not Modbus/TCP.

Security Settings

The ION 7600 meter's eight-digit password allows you to configure the meter through the front panel, with ION software, and with the embedded web server.

The settings in Security menu item allow you to:

- ◆ modify the existing meter password
- ◆ disable the password security check
- ◆ disable web browser configuration of the ION 7600



NOTE

The password enables users to change the configuration of the meter. It is recommended that you change your password from the default when you put the meter into service.

You require the valid password to enter this menu. The default password is 0 (zero).

If have not yet entered your password, the meter's front panel requires that you enter it before you can view the Security Setup menu. Refer to "Button Functions" on page 40 for instructions on using the Navigation buttons to enter numerical data. If you enter an incorrect password, the front panel will display an "invalid password" message and you will have to try again.

PASSWORD

Use this setting to change the current password to any eight-digit number. As with all configuration changes, you are required to confirm the change. By default, the password is set to 0 (zero) in the factory.

ENABLED

Use this setting to enable and disable password security on the ION 7600. Disabling the password allows changes to all the meter's settings through the front panel without a security check.

CAUTION

Non-secure access to critical settings in the meter, such as PT and CT ratios, is not advisable. It is highly recommended that any ION 7600 in the field have the password security check enabled.

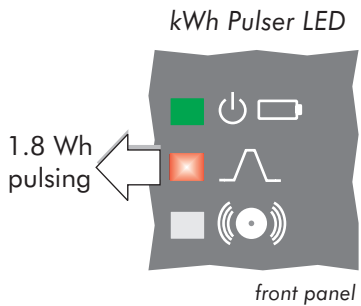
When you re-enable password security, the password is reset to the factory default of 0 (zero). You should re-enter a custom password at this point.

Disabling the Password Security Check is necessary to write to the meter when it is a Modbus Slave device. Refer to the *ION 7600 User's Guide* for details about configuring your ION 7600 for third-party systems.

WEB CONFIG

Use this setting to disable web browser configuration of the meter.

Verifying ION 7600 Meter Operation

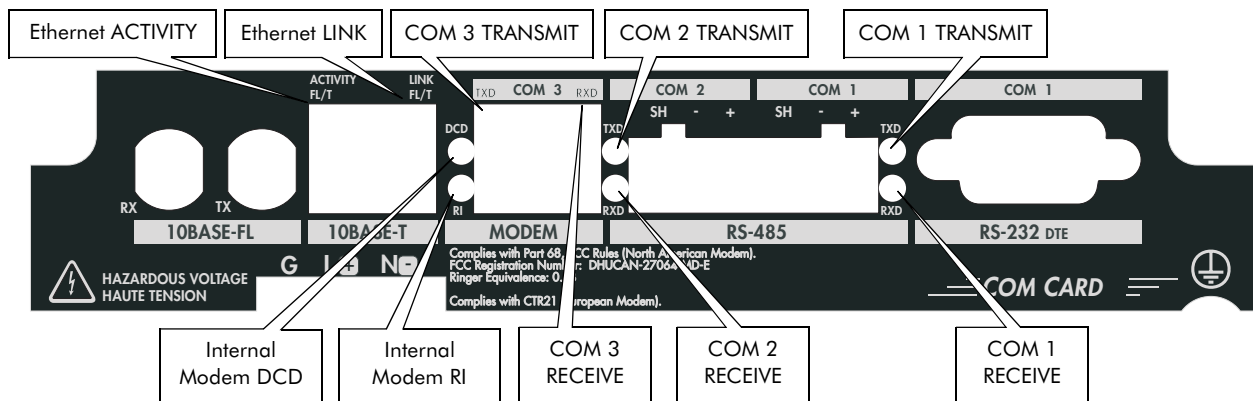


Observe the three LEDs on the front panel of the meter to verify operation, ensure that the meter is receiving power, and observe the alarm status.

- ◆ The green operation LED (the top LED) should always be on when the ION 7600 is in service. Contact Technical Services if this is not the case.
- ◆ The middle green LED is a 1.8 Wh pulser. During the course of normal operation, this LED should blink intermittently as the ION 7600 measures power system energy. Refer to the *ION 7600 User's Guide* for details.
- ◆ The red LED (the bottom LED) is user-programmable (for Alarm notification, for example). Refer to the *ION 7600 User's Guide* for details.

Verifying Communications

Observe the 10 LEDs on the back of the ION 7600 to verify that the communications channels are functioning properly.



LED	Color	Function
Ethernet ACTIVITY	Red	Flashes as signals are transmitted and received for both Ethernet 10 Base-T and 10 Base-FL ports
Ethernet LINK	Green	On as long as there is an active connection to either the 10 Base-T or 10 Base-FL ports
Internal Modem DCD	Green	Carrier Detect- Indicates the presence of a carrier signal (active connection to the modem)
Internal Modem RI	Green	Flashes to when the modem detects rings (Ring Indicator)
COM 3 TRANSMIT	Red	Flashes as signals are transmitted from the COM3 internal modem
COM 3 RECEIVE	Red	Flashes as signals are received on COM3 internal modem
COM 2 TRANSMIT	Red	Flashes as signals are transmitted from the COM2 RS-485 loop
COM 2 RECEIVE	Red	Flashes as signals are received on COM2 RS-485 loop
COM 1 TRANSMIT	Red	Flashes as signals are transmitted from the COM1 RS-232 connection or the COM 1 RS-485 loop
COM 1 RECEIVE	Red	Flashes as signals are received on COM1 RS-232 connection or the COM 1 RS-485 loop

Firmware Revision History

The table below lists the features related to a particular firmware release for your meter.

Firmware Version	Release Date	Firmware Enhancements	Template Improvements
v201	Aug. 10, 2000	◆ Initial release of the ION 7600 meter	
v202	Feb. 13, 2000	Maintenance release	
v203	Apr. 14, 2000	◆ Implemented the ModemGate protocol	
v204	May 5, 2000	Maintenance release	
v205	Sept. 19, 2000	Maintenance release	
v206	Jan. 12, 2001	<ul style="list-style-type: none"> ◆ WebMeter ◆ MeterM@il ◆ new and enhanced ION Modules ◆ Hardware improvements: 1 Amp current input option, Modicon Modbus TCP communications 	<ul style="list-style-type: none"> ◆ Revenue Log Module enhancements ◆ Sag/Swell Events on V4 ◆ Number of Nines display screen ◆ 9 additional DNP Slave modules ◆ 4 additional Calibration Pulser modules
v207	Feb. 22, 2001	◆ Trending Display feature	◆ New Trend Display Module
v208	Apr. 20, 2001	Maintenance release	
v210	May 16, 2001	◆ NICT and TRAN support added	
v211	June 15, 2001	Maintenance release	
v212	Sept. 14, 2001	Maintenance release	
v222	Nov. 28, 2001	<ul style="list-style-type: none"> ◆ Modbus Master capability ◆ DNP enhancements ◆ Hardware improvements: Option to order ION 7500 with 4 MB or 8 MB of Log Memory 	<p>The maximum allowable number of the following ION Modules has been increased (see addendum for actual numbers):</p> <ul style="list-style-type: none"> ◆ Integrator, Data Recorder, Sliding Window Demand, External Boolean, Minimum, Maximum, Display, Set Point
v223	Feb. 20, 2002	Maintenance release	

To check the meter's firmware revision:

1. Scroll the Softkey options using the navigation buttons on the meter's front panel.
2. Press the Softkey labelled "Name Plt."

MRP: 70000-0136-09

Revision Date: June 6, 2002