



Integrated display model

TRAN option

ION®

7500

7600

Intelligent Metering and Control Devices

Used at key distribution points and sensitive loads, the ION 7500™ and ION 7600™ meters offer unmatched functionality including advanced power quality analysis coupled with revenue accuracy, multiple communications options, web compatibility, and control capabilities.

The meters come with an extensive selection of pre-configured data screens and measurements that you can use right out of the box, or customize to fit your unique requirements.

For an energy enterprise management solution, the meters can be integrated with our ION Enterprise™ software, or other energy management and SCADA systems via multiple communication channels and protocols.

The ION 7500 RTU option provides a fully configurable low-cost data concentrator, complete with a full range of I/O options and multiple communication protocols. The RTU offers an all-in-one solution for integrating facility-wide operations data into an energy management system.

Patented ION® technology lets you customize metering or analysis functions at your workstation, without any hard-wiring. Just graphically link a few drag-and-drop icons, or select default setups, and you're ready to go.

Not all features listed are available with every model. Please refer to the detailed descriptions within for a complete list of feature availability.



Applications Summary

Compliance Monitoring

Use the ION 7600 meter to summarize power quality measurements into simple pass/fail indicators. Monitor compliance with international standards such as EN50160, IEC 61000-4-7 (harmonics), and IEC 61000-4-15 (flicker). Or configure the unit for IEEE 519-1992, IEEE 1159 and SEMI F47.

Disturbance Analysis

Unique dynamic-ranging inputs maintain revenue accuracy at the regular measurement range while simultaneously capturing large-scale disturbances other meters can miss. Discover the sources of power quality events, harmonics, and voltage sags/swells. Analyze problems and avoid repeat interruptions.

Cost Allocation and Billing

Determine cost centers, identify demand control opportunities and check energy consumption patterns.

Demand and Power Factor Control

Avoid penalties with automated load shedding, scheduling, peak shaving or capacitor bank control.

Load Studies/Circuit Optimization

Determine the capacity of your electric network and run at peak efficiency. Perform load trending.

Equipment Monitoring and Control

Improve process yields and extend equipment life. Extensive analog and digital I/O enables system monitoring and control.

Preventative Maintenance

Set up alarms to warn of pending problems. Log events and alarms for all critical conditions.

Integrated Utility Metering

Collect, scale, and log "WAGES" (water, air, gas, electricity, and steam) readings from connected meters or transducers, and deliver the information to one or more head-end systems.

Features Summary

Measurements

- ◆ Exceeds Class 0.2 revenue accuracy
- ◆ Instantaneous 3-phase voltage, current, frequency, power factor
- ◆ Energy: bi-directional, absolute, net, time-of-use, loss compensation
- ◆ Demand: rolling block, predicted, thermal
- ◆ Harmonics: individual and total harmonic distortion up to the 63rd (127th in software)
- ◆ Transient detection, 65us at 60Hz, (78us at 50Hz) and sag/swell recording
- ◆ Clamp-on CT option

Internet-Enabled Communications

- ◆ WebMeter™, MeterM@il® allow distribution of metered data and alarms over the Internet
- ◆ Optional built-in modem with ModemGate™ allows modem access for 31 other devices
- ◆ 10Base-T or 10Base-FL Ethernet port option with EtherGate™ allows for direct data transfer from Ethernet to RS-485
- ◆ Two RS-485 ports, one switchable to RS-232
- ◆ One front panel optical port
- ◆ Modbus™ RTU/TCP and DNP 3.0 support
- ◆ Modbus Master support

On-Board Data Logging

- ◆ Scheduled or event-driven logging
- ◆ Sequence-of-events, min/max, waveform, faults, and transient logging

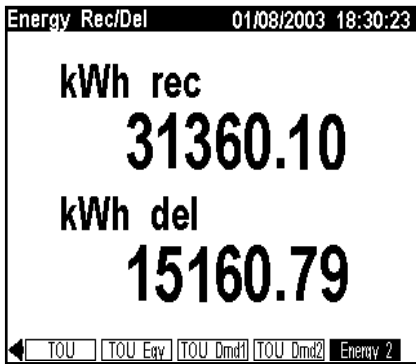
Setpoints for Control and Alarms

- ◆ Setpoint on any parameter or condition
- ◆ 1 second or 1/2 cycle operation

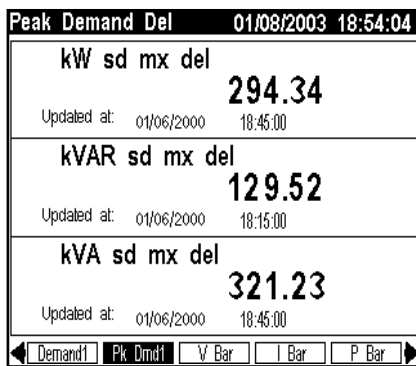
Inputs and Outputs

- ◆ Standard format includes 8 digital inputs, 3 Form C relay outputs (electromechanical) for control functions, and 4 Form A digital outputs (solid state) for pulse functions
- ◆ Also available with 8 additional digital inputs, 4 analog outputs, and/or 4 analog inputs

Energy Display



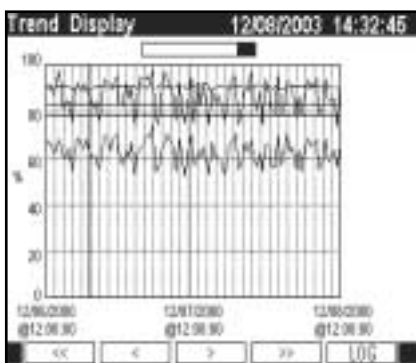
Peak demand with date and time-stamp



The meters display system reliability in nines, (e.g. 99.99% up-time).



Display kWh usage trends directly on the meter's front panel



Front Panel Display

The meters offer unique, easy-to-read 3 1/2 x 4 1/2 inch, (87 x 112mm) LCD display screens with bright back lighting and adjustable contrast. They can show TOU, harmonics, event logs, phasors, and instantaneous power parameters. A selection of character sizes enhance visibility under difficult lighting conditions or at long distances. It provides a user-friendly interface with a screen-based menu system to configure meter settings and an extensive choice of pre-configured display screens, for common applications.

Metering

Energy

The meters are fully bi-directional and monitor energy in four quadrants. They provide active, reactive and apparent energy parameters and can integrate any instantaneous power parameter to supply measurements like:

- ◆ kWh delivered and received
- ◆ kWh, kVARh, kVAh net (delivered - received)
- ◆ kWh, kVARh, kVAh total (delivered + received)
- ◆ kVARh, kVAh delivered and received
- ◆ Volt-hours and Amp-hours
- ◆ Integration of any instantaneous measurement

Energy registers can be logged automatically on a programmed schedule.

Demand

The meters support all standard demand calculation methods, including block, rolling block, thermal (exponential), and predicted demand. They can measure demand on any instantaneous value and record peak (maximum) and minimum demand with date and time stamps to the second. Peak demand registers can be reset manually (password protected) or logged and reset automatically on a programmed schedule. Measurements include:

- ◆ kW, kVAR, kVA demand, min/max
- ◆ Amps, Volts demand, min/max
- ◆ Demand on any instantaneous measurement

Transformer/Line Loss Compensation

- ◆ Flexible compensation methods
- ◆ Easy configuration
- ◆ Updated every second
- ◆ Available through all supported protocols

Instantaneous

Both meters provide a choice of high accuracy, 1 second or high-speed, 1/2 cycle measurements, including true RMS, per phase and total for:

- ◆ Voltage and current
- ◆ Active power (kW) and reactive power (kVAR)
- ◆ Apparent power (kVA)
- ◆ Power factor and frequency
- ◆ Voltage and current unbalance
- ◆ Phase reversal

Time-Of-Use

The meters offer comprehensive time-of-use (TOU) metering. A 20 year calendar is configurable in accordance with virtually any utility tariff structure. TOU register values can be automatically recorded at user-specified time intervals, at pre-scheduled dates and times, or when internal or external events occur.

Trending

Both meters offer access to historical data right at the front panel. The meters display, trend and continuously update historical data with date and timestamps for up to four parameters simultaneously.

Power Quality Metering

Compliance Monitoring*

- ◆ EN 50160 compliance monitoring
- ◆ IEC 61000-4-7 harmonics and inter-harmonics
- ◆ IEC 61000-4-15 flicker
- ◆ CBEMA/ITIC
- ◆ IEEE 519 and IEEE 1159

Waveform Recording

The meters can simultaneously capture all voltage and current channels.

- ◆ Sub-cycle disturbance capture
- ◆ The maximum number of cycles for contiguous waveform capture is 171,000 (based on 16 samples/cycle x 96 cycles, and the largest capacity of meter memory)
- ◆ Up to 256 samples/cycle with the ION 7600 meter
- ◆ Up to 128 samples/cycle with the ION 7500 meter
- ◆ Dynamic range: Voltage inputs - 14 bits effective; Current inputs - 18 bits effective

Measure Up-time Using Nines

The current electricity supply infrastructure can typically provide electricity with 99.9% reliability, (3 nines or 8.8 hours downtime a year). However, any disruption is unacceptable for businesses in the digital economy that can require up to 99.9999999%, (9 nines or 2 cycles downtime *per year*) to effectively run their business model. Measure the number of nines of reliability with the ION 7500 and ION 7600.

Out-of-Limit Detection

Detect, record, and report the specifics of voltage or current imbalances and loss, frequency/power factor variations, over and undervoltages, etc.

Performance Indicators

The meters can be configured to monitor a wide range of utility performance indicators, including:

- ◆ Total outage time (in seconds)
- ◆ Out-of-tolerance duration for total harmonic distortion, voltage, frequency, power factor and hundreds of other definable indices

Harmonic Distortion Metering

Complete harmonic distortion metering, recording and real-time reporting, up to the 63rd harmonic, (127th for ION 7600 via ION Enterprise software), for all voltage and current inputs.

- Individual harmonics, (including magnitude, phase and inter-harmonics for the ION 7600)
- Total even harmonics and total odd harmonics
- Total harmonics (even + odd)
- K-factor, Crest factor

Symmetrical Components*

Zero, negative and positive sequences including phase and magnitude for voltage and current inputs. Identify harmful voltage and current unbalances in equipment before they cause damage.

Sag/Swell Detection

The ION 7500 and ION 7600 meters' sag/swell capture capability can help you analyze the severity/potential impact of sags and swells.

- Magnitude and duration data suitable for plotting on voltage tolerance curves
- Per-phase triggers for waveform recording or control operations

Transient Capture*

- The ION 7600 meter can detect and record sub-cycle transients as short as 65us at 60Hz (78us at 50Hz)

Data and Event Recording

The ION 7600 meter offers 4MB (up to 8MB optional — must specify at order time) of configurable, nonvolatile memory for waveform, event and log storage. The ION 7500 is equipped with 1MB standard with 4MB and 8MB order options.

Load Profiling

The ION 7500 and ION 7600 meters incorporate 800 channels via 50 data recorders. Channel assignments are configurable for historical trend recording of energy, demand, voltage, current, power quality, or any other measured parameter. Trigger recorders based on time interval, calendar schedule, alarm/event condition, or manually.

High-Speed Data Recording

High-speed "burst" recording (as fast as 1/2-cycle intervals) stores detailed characteristics of disturbances or outages. Trigger recording by a user-defined setpoint, or from external equipment. Gated recording logs data only during the critical event so that memory is conserved.

Coincident Min/Max Recording

Log the values of key parameters or equipment conditions coincident with an extreme condition, complete with date/time stamping. For example, record all feeder voltages and currents at the moment a peak demand condition occurs.

Time Synchronization and GPS

A real-time clock allows internal events and data records to be date-stamped and time-stamped to millisecond resolution. The clock can be synchronized to any one of three sources:

- The meter's internal crystal (+/- 50ppm)
- The line frequency of the electrical network being metered
- An external GPS receiver with an accuracy of +/- 1 millisecond

The serial port used for GPS time synchronization is dedicated exclusively as a GPS input.

Logic, Math and Control

Perform on-board calculations on any measured value, calculate true quantities from pulse inputs (e.g. BTUs) and calculate transformer loss compensation values. You can also implement real-time billing schemes.

Mathematical Functions

Define formulas using the following operators:

- Arithmetic (+, x, -, ÷)
- Comparison (>, <, =, ≥, ≤, ≠)
- Logical (AND, OR, NOT, TRUE, FALSE, IF)
- Trigonometric (SIN, COS, TAN, ASIN, ACOS, ATAN)
- Math (PI, SORT, POWER, SUM, SUMSQ, AVG, RMS, LOG10, LN, MAX, MIN)

Programmable Logic and Setpoints

24 setpoints can be set for 1-second or 1/2-cycle operation and can be triggered by any over or under condition. Setpoints can trigger:

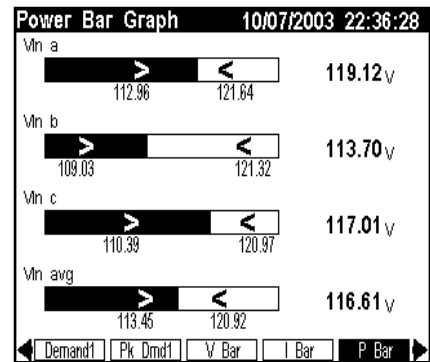
- Audible, (through software) and visible alarms
- Modem/pager dial-back
- Data logging
- Waveform recording with control over pre-event and post-event capture
- Relay control
- Clearing and reset functions
- Relative Setpoints

ION 7500 RTU Option

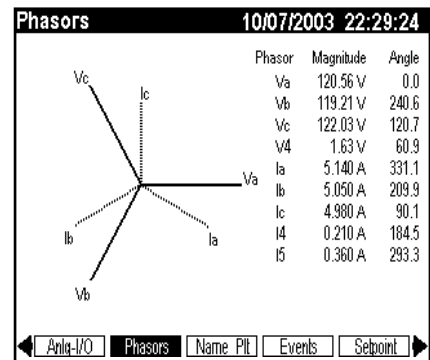
When voltage and current connections are not required, the intelligent, web-enabled RTU option of the ION 7500 provides an economical all-in-one solution for many applications. The RTU:

- Acts as a low-cost data concentrator, delivering all collected information over public or private networks.
- Provides extensive analog and digital I/O options.
- Supports multiple communication protocols (ION, Modbus Master/Slave, DNP 3.0), as well as WebMeter and MeterM@il capabilities.
- Collects, scales, and logs data from devices that meter water, air, gas, electricity, and steam ("WAGES").
- Offers a large, highly visible display.

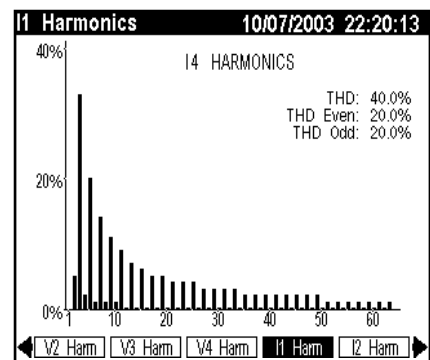
Multiple display formats are available, including bar graphs with min/max indicators



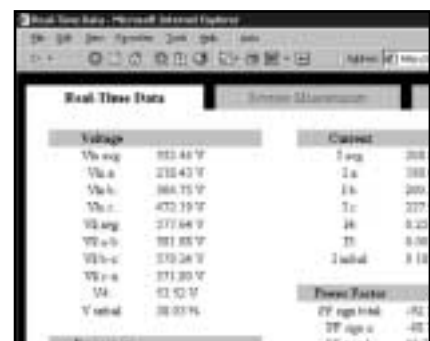
Unique vector diagram with magnitude and phase angle can help reduce installation time



View THD and individual harmonics through the front panel display screen



Built-in Web server provides browser access to extensive real-time meter data



Software Integration

Extensive communication capabilities enable the meters to be easily integrated into energy management and distribution control systems.

ION Enterprise

Both meters are compatible with our Windows 2000-based ION Enterprise power monitoring software. ION Enterprise displays real-time and logged data and offers manual control/configuration capabilities. It provides enterprise-wide data sharing in a secure networked environment.

ION Setup™ Software

The meters are further enhanced by ION Setup for Windows, a software solution that displays real-time data from your power monitoring devices and provides device configuration capabilities.

ION Setup lets you create a network of sites and devices, so that the meters are easy to find and the communication links are ready whenever you want to make changes to your meters or network.

Modbus Master

The meters can read and write data to Modbus slave devices through a designated serial port. This powerful feature allows meters to collect data from Modbus devices, process it, then deliver condensed information in a variety of ways.

Modbus Master read capability lets you perform detailed sub-metering by acquiring data from nearby, low-cost meters. Data acquired from attached Modbus slave devices (such as voltage, current, power factor and energy) can be recorded in on-board memory, presented on the graphical display or monitored using built-in setpoints.

Modbus Master write capability lets you send commands and data to attached Modbus slave devices. Applications for this capability include controlling remote I/O points, resetting setpoint or configuration parameters on PLCs, and simple data exchange with other information systems.

Internet Connectivity

MeterMail®

Meters equipped with an Ethernet port can automatically e-mail alarm notifications or scheduled system-status updates. MeterMail messages can be received like any e-mail message, at a workstation, cell phone, pager or PDA. Data logs can also be sent on an event-driven or scheduled basis via e-mail, while conveniently accommodating firewall restrictions.

WebMeter™

An on-board Web server, combined with an Ethernet port offers quick and easy access to real-time energy and basic power quality information without special software. Built-in web pages display a range of energy and basic power quality information through any web-enabled device and even support basic meter configuration tasks.

XML Compatibility

The meters can also exchange information using industry-standard XML format. Its simple machine readable-format supports easy integration with custom reporting, spreadsheet, database and other applications.

Communications

Multi-Port, Multi-Protocol Access
Simultaneous communication on up to 4 ports provides secure, data sharing with a variety of energy management systems using a choice of communication standards and protocols.

RS-232/RS-485 Port

Selectable between RS-232 and RS-485

- ◆ Protocols: ION, DNP 3.0, Modbus RTU, GPS, EtherGate™, ModemGate™, or Modbus Master
- ◆ Baud rate: 300 bps to 115,200 bps

RS-485 Port

- ◆ Protocols: ION, DNP 3.0, Modbus RTU, GPS, EtherGate™, ModemGate™, or Modbus Master
- ◆ Baud rate: 300 bps to 57,600 bps

Infrared Data Port

IrDA compliant front panel infrared data port can download real-time data to a portable PC.

- ◆ Protocols: ION, Modbus RTU, DNP 3.0
- ◆ Baud rate: Up to 115,200 bps

Internal Modem

Available internal telephone modem features fast connect time, and ModemGate, a gateway letting up to 31 additional devices share a meter's internal modem via the remaining serial ports. (IrDA and Internal Modem cannot be operated simultaneously.)

- ◆ Protocols: ION, Modbus RTU and DNP 3.0
- ◆ Baud rate: Up to 33.6 kbps

Ethernet Port

Optional 10Base-T or 10Base-FL port offers direct access through an Ethernet LAN/WAN and features EtherGate, which permits the direct transfer of data between an Ethernet network and up to 62 devices via the meter's 2 serial ports.

- ◆ Protocols: TCP/IP, ION, Modbus TCP, Telnet
- ◆ Baud rate: Up to 10 Mbps

Interoperability

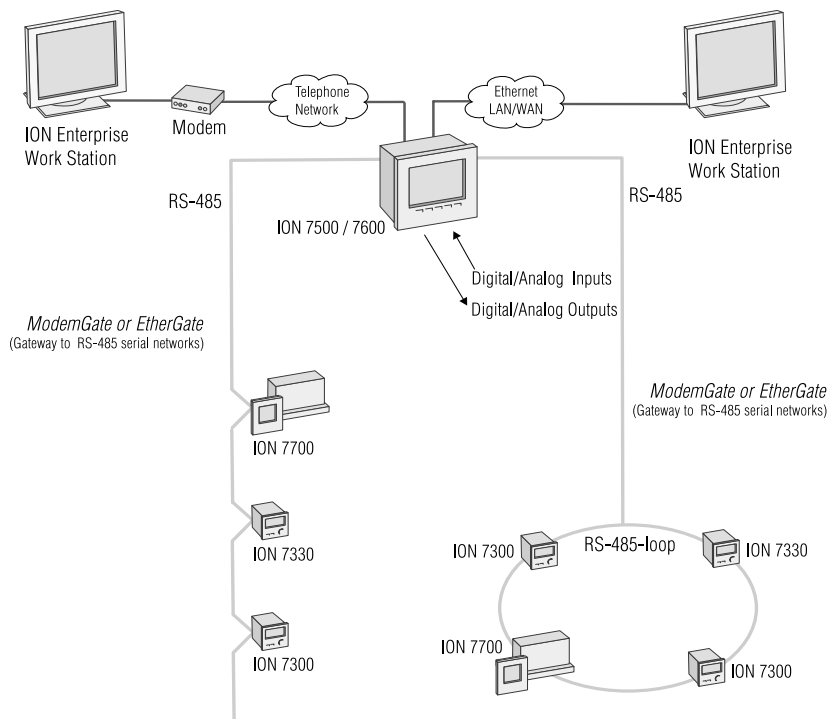
Concurrent communications ability via multiple protocols allows you to use the advanced features of either meter to extend an existing Modbus, DNP or ION Enterprise network. Logs and real-time values are also available through Modbus.

UTS Software Support

The meters are fully compatible with UTS software platforms including MV-90®, MVP, MVRS, MVLT and MVCOMM, and are unique in offering a direct Ethernet connection to MV-90.

Flash-Based Firmware

Perform upgrades via communications without removing the meter from the site.



Inputs/Outputs

Standard digital and optional analog I/O let you monitor a wide range of conditions, such as flow rates, RPM, fluid levels, oil pressures and transformer temperatures. You can output energy pulses to an RTU or perform equipment control operations.

Digital Inputs/Outputs

- 8 digital inputs can monitor status or count pulses from external "volts free" dry contact
- 4 solid state output ports and 3 on-board relays can be controlled automatically by internal setpoints or manually via a communications port

Analog Inputs/Outputs

Either meter can be equipped with an optional analog I/O card featuring:

- 8 digital inputs
- 4 analog inputs accepting 0 to 1mA or 0 to 20mA, (scalable from 4 to 20mA)
- 4 analog outputs accepting -1 to 1mA or 0 to 20mA, (scalable from 4 to 20mA)
- 4 analog inputs accepting 0 to 20mA, and 4 analog output accepting 0 to 20mA
- 4 analog inputs accepting 0 to 1mA, and 4 analog outputs accepting -1 to 1mA

Contact Power Measurement for I/O combinations supported.

The Power of ION

The meters are based on our patented object-oriented ION® technology, which ensures the longevity of your metering solution because it can adapt as your needs change and lets you take advantage of our ongoing advances in technology.

The measurements and other functions of both meters are provided by ION modules. You can quickly add or rearrange functions with drag-and-drop icons and a few clicks of a mouse. Imagine new features and build them with ION.

Mounting

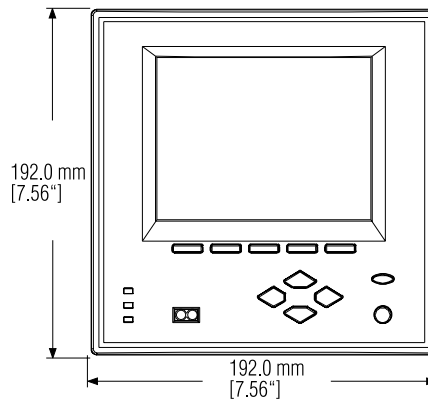
The ION 7500 and ION 7600 meters can be panel-mounted in a single DIN standard 186mm x 186mm cutout.

- Bezel size: 192mm x 192mm (DIN)
- A distance of 160mm (6-1/2 inches) clearance is required behind the panel (plus allowance for connectors and cables)
- An adapter plate is available to facilitate the conversion from our 3000 series meters to the ION 7600 and ION 7500 meters. Please contact us for more information.

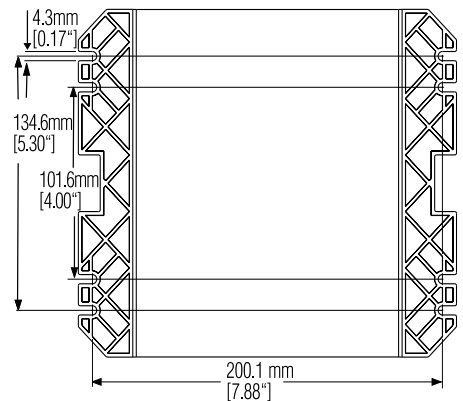
TRAN models have no integrated display and can be flush-mounted against any flat surface.

Dimensions

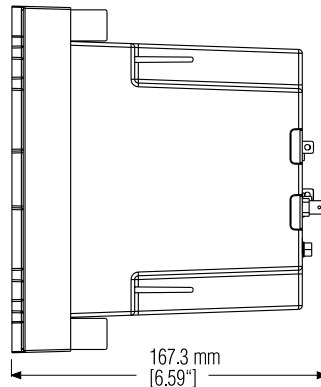
Front view



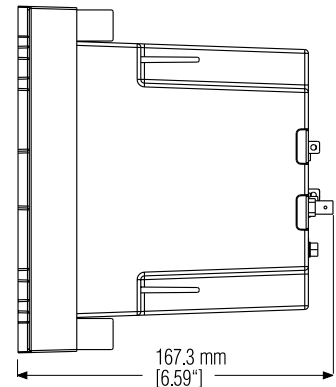
Front view, TRAN model



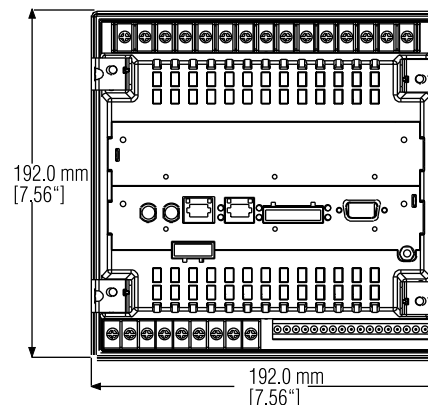
Side view



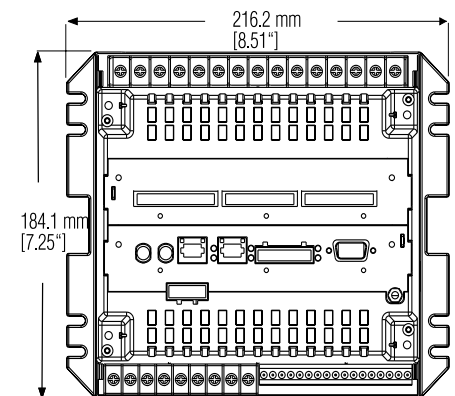
Side view, TRAN model



Rear view

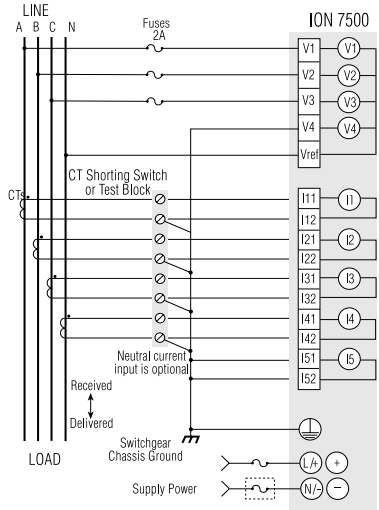


Rear view, TRAN model



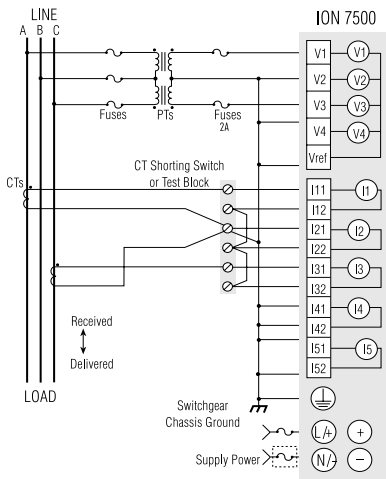
Example Connections

4-Wire Wye (Direct Connection)



NOTE: Fuse is required if power is supplied from an ungrounded source (i.e. L-L voltage)

3-Wire Delta (2 PTs and 2 CTs)



NOTE: Fuse is required if power is supplied from an ungrounded source (i.e. L-L voltage)

Connections

Installation

- 4-Wire Wye, 3-Wire Wye, 3-Wire Delta, Direct Delta and single phase systems
- 4 voltage and 5 current inputs
- All inputs pass ANSI/IEEE C37.90-1989 surge withstand and fast transient tests

Voltage and Current Inputs

- Autoranging 57V through 347V LN/600V LL inputs
- No PTs needed for Wye systems up to 347/600VAC
- Standard 5 to 20A current inputs
- Optional 1A current inputs
- Low voltage current probe option

Control Power

The ION 7500 and ION 7600 standard power supply has a voltage range of 85 to 240VAC and 110 to 330VDC, and can be powered from a dedicated fused feed.

Measurement Specifications†

Parameter	Accuracy ± (%reading)	Register Bounds
	1 second	1 second
Voltage (L-L) (L-N)	0.1%	0 to 1x10 ⁶ V
Frequency	±0.01Hz	18 to 72Hz
Current (I1, I2, I3)	0.1%	0 to 1x10 ⁶ A
Current (I4, I5)	0.4%	0 to 1x10 ⁶ A
kW, kVAR, kVA	class 0.2*	0 to ± 3.3x10 ⁷
kWh, kVARh, kVAh	class 0.2*	0 to ± 10 ³⁷
KW, KVA Demands	class 0.2*	0 to ± 3.3x10 ⁷
Power Factor (at Unity PF)	0.5%	-0.01 to -100.00, 100.00 to 0.01
Harmonics (to 40th)#	IEC 61000-4-7	0 to 1x10 ⁶
Harmonics (to 63rd)	1% Full Scale	0.3% to 100.00%
K Factor	5% Full Scale	0 to 1x10 ⁶
Crest Factor	1% Full Scale	0 to 10.0
Symmetrical Components#	Voltage: 0.2% FS**, Current: 0.4% FS**	Magnitude: 0 to 1x10 ⁶ ; Phase: -180 to 180

† Accuracy is valid for 47Hz to 63Hz * Refer to Compliance section on page 7

ON 7600 only

** FS = Full Scale

Display resolution meets or exceeds accuracy.

User Programmable Log Capacity

Example Configurations:

Event	ION 7500 (equipped with 1MB memory)				ION 7600 (equipped with 8MB memory)			
	500 Events				500 Events			
Data	86 days ^A	345 days ^B	86 days ^A	344 days ^B	2 years ^A	8 years ^B	1.8 years ^A	7.2 years ^B
Waveforms	6 ^C	6 ^C	24 ^D	24 ^D	16 ^C	16 ^C	180 ^D	180 ^D

^A 16 parameters recorded every 15 minutes

^B 16 parameters recorded hourly

^C on each of 6 channels at 128 samples per cycle for 14 cycles

^D on each of 6 channels at 16 samples per cycle for 22 cycles

Specifications

Voltage Inputs

- Inputs: V1, V2, V3, V4, VREF
- Rated input: 347 LN/600 LL VAC RMS
- Overload: 1500 VAC RMS continuous
- Dielectric withstand: 3250VAC RMS, 60Hz for 1 minute
- Impedance: 5M Ohms/phase
- Fault capture: 1400 Vpeak

Current Inputs

- Inputs: I1, I2, I3, I4, I5

Standard Current Transformers:

- **Class 2:**
 - Rated nominal: 1A, 2A, 5A, and/or 10A
 - Starting current: 0.001A RMS
 - Fault capture: 17.5A (instantaneous) peak
 - Max. voltage: 600V RMS (CAT III IEC61010-1)
 - Overload: 50A RMS for 1 second, non-recurring
 - Dielectric withstand: 3250VAC, 60Hz for 1 minute
 - Burden: 0.015VA per phase (at 1A)
 - Impedance: 0.015 Ohms per phase

• **Class 20:**

- Rated nominal: 5A, 10A, and/or 20A
- Starting current: 0.005A RMS
- Fault capture: 70A (instantaneous) peak
- Max. voltage: 600V RMS (CAT III IEC61010-1)
- Overload: 500A RMS for 1 second, non-recurring
- Dielectric withstand: 3250VAC, 60Hz for 1 minute
- Burden: 0.05VA per phase (at 5A)
- Impedance: 0.002 Ohms per phase

Current Probes with AC Voltage Output

- Rated inputs: 1V RMS
- Overload: 5.5V (CAT I IEC 61010-1)
- Impedance: 220k Ohms max.
- 2 options:
 - Current Probe Inputs for use with 0-1 VAC current probes. Probes sold separately. Accuracy depends on probe specs.
 - Current Probe Inputs with 3 calibrated Universal Technic 10A clamp-on CTs, meeting IEC 61036 accuracy.

Digital Inputs

- 8 Inputs: S1-S8, SCOM Self-excited, dry contact sensing, no external voltage required.
- Minimum pulse width: 1ms
- Maximum pulse rate: 20 pulses/sec.
- Timing resolution: 1ms
- Update rate† : ½ cycle (after timing resolution)
- Isolation: 300V/peak for 10s, 60Hz.

Electromechanical Relays

- 3 Form C relays: R1 - R3
- Form C contacts: NO, K, NC
NO, K and NC are abbreviations for "Normally Open," "Common," and "Normally Closed" - they correspond to terminals R11, R12, and R13 respectively on relay #1.
- Rated voltage: 250VAC / 30VDC
- Rated load at rated voltage:
 - Resistive: 10A AC/DC
 - Inductive: 7.5A (AC, PF = 0.4) / 5A (DC, L/R = 7ms)
- Max. voltage: 380VAC / 125VDC
- MOV protection: 300V max between NO and NC
- Max. load at max. voltage: 0.2A (DC) / 3A (AC)
- Turn-on time: 15ms max.
- Turn-off time: 5ms max.
- Isolation: 5,000VAC for 1 minute
- Lifetime:
 - 10,000,000 operations (no load)
 - 100,000 operations (rated voltage and load)
- Update rate[‡]: ½ cycle or 1 second

Solid State Outputs

- 4 Form A outputs: D1-D4
- Maximum voltage: 30VDC
- Maximum current: 80mA
- Isolation: Optically isolated. Max. 5000V RMS isolation (UL:E64380)
- Update rate[‡]: ½ cycle or 1 second

Analog Outputs (optional)

- Outputs: 4: AO1 - AO4
- Signal type: DC current
- Range: 0-20mA (scalable 4-20), or -1-1mA (scalable 0-1)
- Driving capability: 500 Ohms (20mA), or 10k Ohms (1mA)
- Accuracy: +/-0.3% of full scale
- Update rate[‡]: ½ cycle or 1 second
- Isolation: 750V to earth

Analog Inputs (optional)

- Inputs: 4: AI 1 to AI 4
- Signal type: DC Current
- Range: 0 to 20mA (scalable 4 to 20), or 0 to 1mA
- Input impedance: 24 Ohms (20mA), or 475 Ohms (1mA)
- Accuracy: +/-0.3% of full scale
- Update rate: 1 second
- Isolation: 750V to earth
- Common mode: Max. 400k Ohms (channel to channel)

Power Supply

- Rated inputs: AC: 85 to 240VAC (+/-10%), 47 to 63Hz; DC: 110 to 330VDC (+/-10%)
- Dielectric withstand: 2000VAC RMS, 60Hz for 1 min.
- Burden: Typical 10VA; Max. 20VA
- Ride-through: Min: 100ms (6 cycles at 60Hz at 96VAC), 200ms (12 cycles at 60Hz at 120VAC), 800ms (48 cycles at 60Hz at 240VAC)

Communications

Serial Ports

- 1 RS-232/485 and 1 additional RS-485 port
- Protocols: ION, DNP 3.0, Modbus RTU, GPS, EtherGate, ModemGate, Modbus Master
- Baud rate: RS-232: 300bps to 115,200bps
- RS-485: 300bps to 57,600bps

Infrared Port

- IrDA compliant
- Distance: 0 to 1 meter
- Optical range: +/- 15 degrees (min.), +/- 30 degrees (max.)
- Baud rate: Up to 115,200bps
- Protocols: ION, Modbus RTU, DNP 3.0

Internal Modem

- Data rate: 300bps - 33.6kbps (V.3.4, V.32 bis, V.32, V.22 bis, V.22 A/B, V.23, V.21, Bell 212A, Bell 103)
- Automatic data rate detection is supported
- Error correction: V.42 LAPM, MNP 2-4, MNP 10
- Data compression: V.42 bis/MNP 5
- Interface: RJ11 (tip and ring)
- Governmental approvals: FCC P68 (USA), Industry Canada CS-03, CTR21 (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK)

Ethernet Port

- Protocols: TCP/IP, Telnet, ION, Modbus TCP
- Interface: IEEE 802.3-1993, ISO/IEC 8802-3:1993 (Ethernet) 10Base-T or 10Base-FL (optional)
- 10Base-T:
 - Cabling: Unshielded twisted pair cable, 0.5mm (24 AWG), max. length 100 meters
 - Connector: RJ45
 - Isolation: Transformer isolated, min. isolation voltage: 1500VAC RMS/2250VDC
- 10Base-FL
 - Cabling: Fiber optic cable, 62.5/125um nominal, wavelength 820nm, max. length 2000 meters
 - Connector: ST
 - Isolation: Optical

Environmental Conditions

- Operating temp: -20°C to +70°C (no formation of ice) (-4°F to 158°F)
- Storage: -40°C to +85°C (-40°F to 185°F)
- Humidity: 5 to 95% non-condensing

Shipping

- 7.1 lbs / 3.2 kg
- 17 x 10 x 11 inches (0.98 cu. ft.)
- 40.8 x 24 x 27.9 cm (0.0235 cu. m)

Display

- Type: FSTN Liquid Crystal Display (LCD)
- Resolution: 320 x 240 pixels (1/4 VGA)
- Temperature: Display operational 0 to +60°C
- Backlight: Cold Cathode Fluorescent (CCFT)

Standards Compliance

Accuracy[†]

- Independent Compliance with IEC60687 0.2S, 1A and 5A tested by KEMA
- Complies with ANSI C12.20, Class 10 & Class 20
- Complies with Measurement Canada AE-1021

[†] Products meet or exceed the accuracy requirements of the standards listed. All products tested internally by Power Measurement. Some products tested by third-party laboratory. Due to form factor of some meters, not all ANSI/IEC compliance tests may apply. Contact Power Measurement for further clarification.

Safety/Construction

- IEC1010-1 (EN61010-1) Safety requirements for electrical equipment for measurement, control and laboratory use
- CSA C22.2 No 1010-1 Canadian Standards Association
- UL3111-1 Measuring, Testing and Signal Generation Equipment

Electromagnetic Immunity

- IEEE C.37-90.1-1989 IEEE Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems (ANSI) (All inputs except for the network communication port)
- IEC1000-4-2 (EN61000-4-2/IEC801-2) Electrostatic Discharge (B)
- IEC1000-4-3 (EN61000-4-3/IEC801-3) Radiated EM Field Immunity (A)
- IEC1000-4-4 (EN61000-4-4/IEC801-4) Electric Fast Transient (B)
- IEC1000-4-5 (EN61000-4-5/IEC801-5) Surge Immunity (B)
- IEC1000-4-6 (EN61000-4-6/IEC801-6) Conducted Immunity
- ANSI C62.41 Surge Immunity
- IEC1000-3-2 (EN61000-3-2) Limits for harmonic currents emissions (equipment input current < 16 amps per phase).
- IEC1000-3-3 (EN61000-3-3) Limitation of voltage fluctuations and flicker in low voltage supply systems for equipment with rated current < 16 amps
- ENV51040 Radiated EM Field Immunity (A)
- ENV51041 Conducted EM Field Immunity (A)
- EN50082-2 Electromagnetic Compatibility, immunity

Electromagnetic Emission

- FCC Part 15 Subpart B, Class A Digital Device, Radiated Emissions
- EN55011 (CISPR 11) Radiated/Conducted Emissions (Group 1, Class A)
- EN55022 (CISPR 22) Radiated/Conducted Emissions (Class A)
- EN50081-2 Electromagnetic Compatibility, emissions



Certificate No. 002188

[‡] For the RTU option only, assume a 60Hz frequency

