



ION[®]

7500 7600

Intelligent metering and control devices

Applications Summary

Compliance Monitoring

Use the ION 7600 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 & Billing

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

Demand & 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 & Control

Improve process yields and extend equipment life. Meter utilities including gas, steam and water.

Preventative Maintenance

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

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: sliding window, predicted, thermal
- ◆ Harmonics: individual & total harmonic distortion up to the 63rd (127th in software)
- ◆ Transient detection, 65 ms @ 60 Hz, (78 ms @ 50 Hz) & sag/swell recording
- ◆ Clamp-on CT option

Communications

- ◆ WebMeter™, MeterM@il® allow distribution of metered data and alarms over the Internet
 - ◆ Optional built-in modem with ModemGate™ to allow modem access for 31 other devices
 - ◆ 10Base-T or 10Base-FL Ethernet port option with EtherGate™ 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 and DNP 3.0 protocol support
- NEW* Modbus Master support

On-Board Data Logging

- ◆ Scheduled or event-driven logging
- ◆ Sequence-of-events & min/max logging

Setpoints for Control and Alarms

- ◆ Setpoint on any parameter or condition
- ◆ 1 second or ½ cycle operation

Inputs and Outputs

- ◆ Up to 16 digital inputs for status/counter functions
- ◆ 7 relay outputs for control/pulse functions
- ◆ Optional analog inputs and outputs

Used at key distribution points and sensitive loads, the ION 7500 and ION 7600 offer unmatched value, functionality, and ease of use.

The ION 7500 features a large graphical display, high accuracy measurements, 1/2 cycle setpoint response, power quality analysis, energy and demand tracking, historical trending, protocol support, web compatibility and control capabilities.

The ION 7600 adds expanded power quality analysis and compliance reporting to help you quickly characterize your power. Other highlights include transient capture, an increased sampling rate, enhanced harmonics, and more memory.

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

Integrate them with our ION Enterprise™ software or other energy management and SCADA systems via multiple communication channels and protocols.

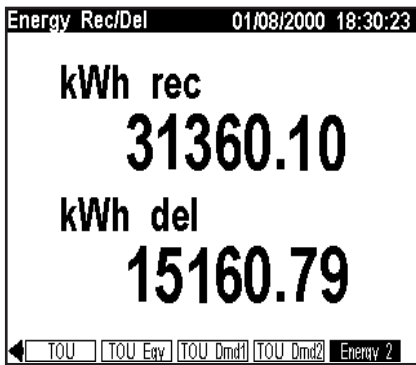
Patented ION technology lets you customize metering or analysis functions at your workstation, without any hard-wiring. Just graphically link a few drag-and-drop icons, or select default setups, and you're ready to go.

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

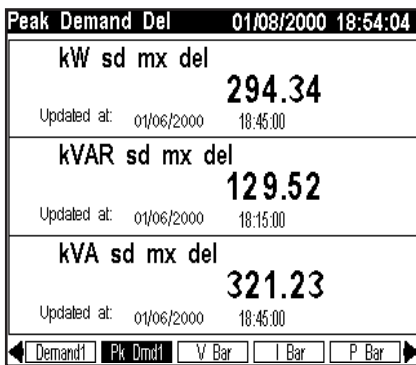


**POWER
MEASUREMENT**

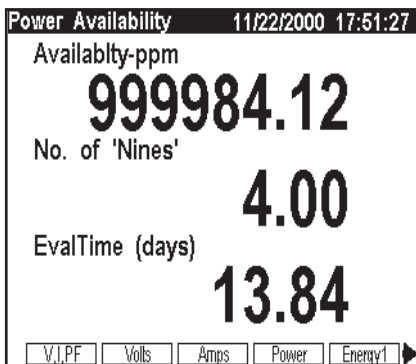
Energy Display



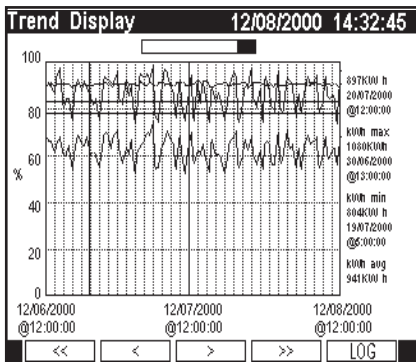
Peak demand with date and time-stamp



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 3½ x 4½ inch, (87 x 112 mm) 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 units are fully bi-directional and meter energy in four quadrants. They provide active, reactive and apparent energy parameters and can integrate any instantaneous power parameter to supply measurements like Volt-Hours, Amp-Hours, etc. Energy registers can be logged automatically on a programmed schedule.

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

Demand

The units support all standard demand calculation methods, including block, sliding window (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.

- ◆ 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 units provide a choice of high accuracy, 1 second or high-speed, ½ cycle measurements, including true RMS, per phase and total for:

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

Time-Of-Use

The meters offer comprehensive time-of-use (TOU) metering, configurable in accordance with virtually any utility tariff structure. Automatically record TOU register values at user-specified time intervals, at pre-scheduled dates and times, or when internal or external events occur. TOU registers can be reset manually (password protected) or on a pre-programmed schedule.

- ◆ Active, reactive and apparent energy
- ◆ Active, reactive and apparent demand
- ◆ Automatic recording of maximum (peak) demand during each tariff period
- ◆ 20 year calendar with automatic leap-year and daylight savings time adjustment
- ◆ Calendar supports division into 4 seasons
- ◆ 5 daily profiles per season
- ◆ 4 rate periods per daily profile (A, B, C, D)
- ◆ Automatic change to mid-season rate structure

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 & 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
- ◆ Record back-to-back waveforms for up to several seconds
- ◆ Display and compare multiple waveforms in ION Enterprise software
- ◆ Record 7 cycles at 256 samples/cycle to 96 cycles at 16 samples/cycle with the ION 7600
- ◆ Record 14 cycles at 128 samples/cycle to 96 cycles at 16 samples/cycle with the ION 7500

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) 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 units can be configured to meter 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 & magnitude for voltage & current inputs. Identify harmful voltage & current unbalances in equipment before they cause damage.

Sag/Swell Detection

The ION 7500 and ION 7600 incorporate a dedicated sag/swell capture capability that can be used to analyze the severity and 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 can detect and record sub-cycle transients as short as 65 ms @ 60 Hz, (78 ms @ 50 Hz)

Data & Event Recording

The ION 7600 offers 4 MB (up to 8 MB 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 upgrades optional.

Load Profiling

The ION 7600 incorporates 640 channels via 40 data recorders, the ION 7500 provides 320 channels via 20 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 & 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:

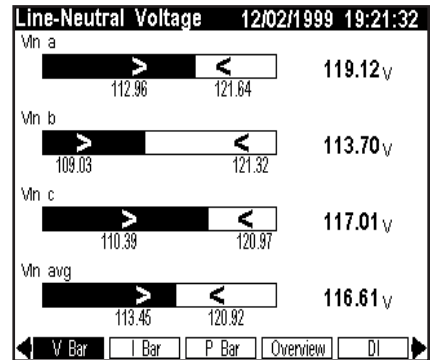
- Arithmetic (+, x, -, ÷)
- Comparison (>, <, =, ≥, ≤, ≠)
- Logical (AND, OR, NOT, TRUE, FALSE, IF)
- Trigonometric (SIN, COS, TAN, ASIN, ACOS, ATAN)
- Math (PI, SQRT, POWER, SUM, SUMSQ, AVG, RMS, LOG10, LN, MAX, MIN)

Programmable Logic & Setpoints

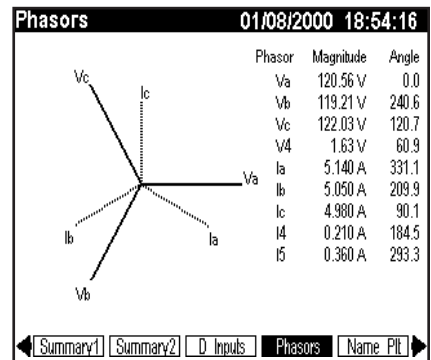
24 setpoints can be set for 1-second or 1/2-cycle operation and can be triggered by any over or under condition. Setpoints can trigger:

- 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

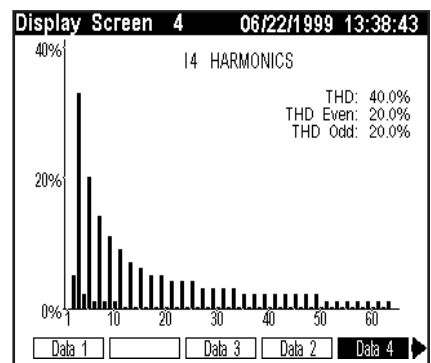
Multiple display formats are available, including bar graphs with min/max indicators



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



* Available only on ION 7600

Software Integration

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

ION Enterprise

Both units 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.

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

MeterM@il®

Meters equipped with an Ethernet port can automatically e-mail alarm notifications or scheduled system-status updates. MeterM@il 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 units can also exchange information using industry-standard XML format. It's 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™, or ModemGate™
- ◆ Baud rate: 300 bps to 115,200 bps

RS-485 Port

- ◆ Protocols: ION, DNP 3.0, Modbus RTU, GPS, EtherGate™, or ModemGate™
- ◆ 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

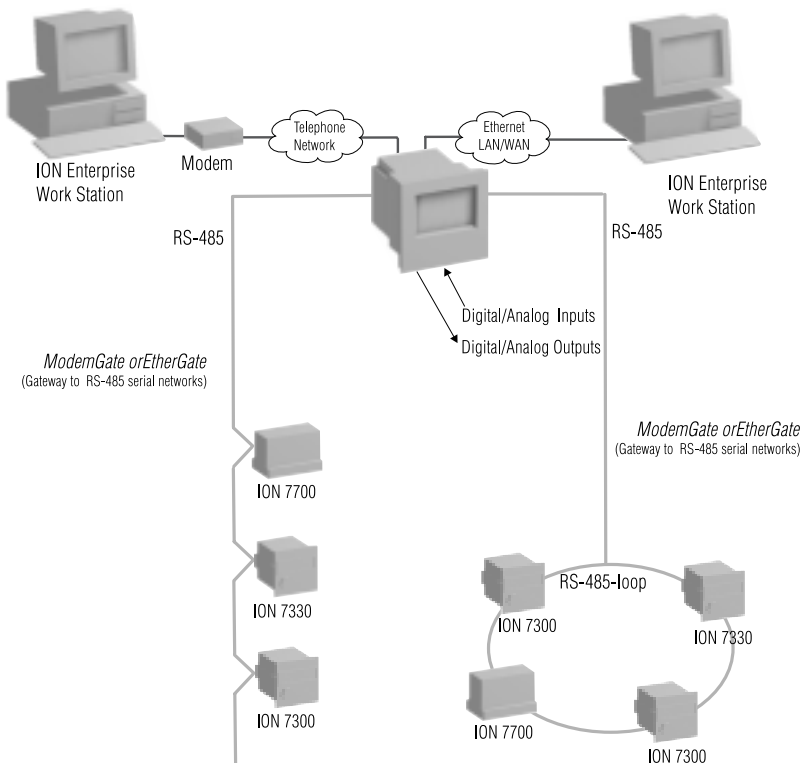
Concurrent communications ability via multiple protocols allows you to use the advanced features of either meter to extend an existing Modbus, DNP or ION Enterprise network. Logs and real-time values are also available through Modbus.

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 unit 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 relay 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 0–1mA or 0–20 mA, (scalable to 4-20mA)
- 4 analog outputs accepting -1–1mA or 0–20 mA, (scalable to 4-20mA)
- 4 analog inputs accepting 0-20 mA and 4 analog output accepting 0-20 mA
- 4 analog inputs accepting 0 to 1mA and 4 analog outputs accepting -1 to 1 mA

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 units 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

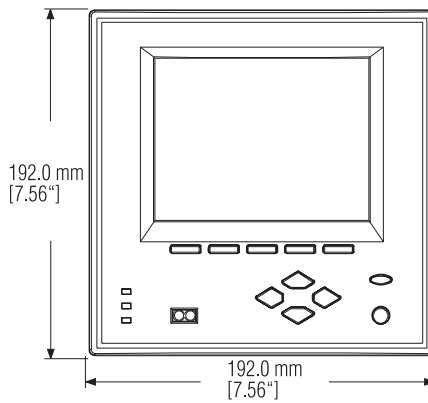
The ION 7500 and ION 7600 can be panel-mounted in a single DIN standard 186 mm X 186 mm cutout.

- Bezel size: 192 x 192 mm (DIN)
- A distance of 160 mm (6-½ 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 . Please contact us for more information.

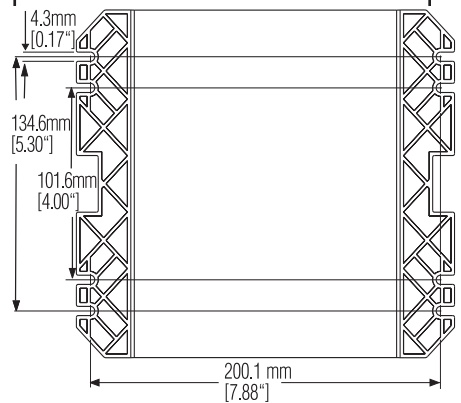
TRAN models have no integrated display and can be flush-mounted against any flat surface.

Dimensions

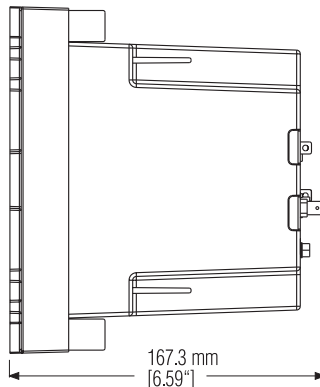
Front view



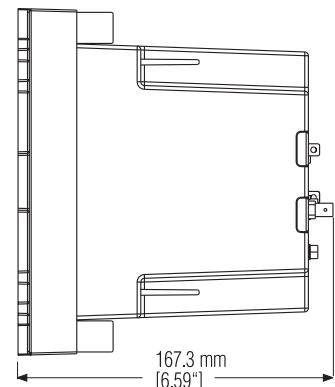
Front view, TRAN model



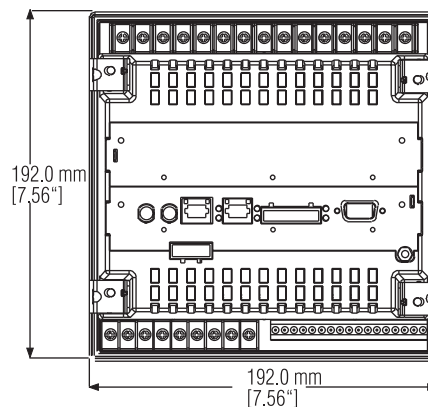
Side view



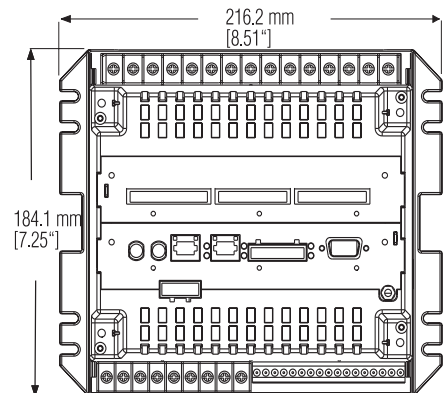
Side view, TRAN model



Rear view



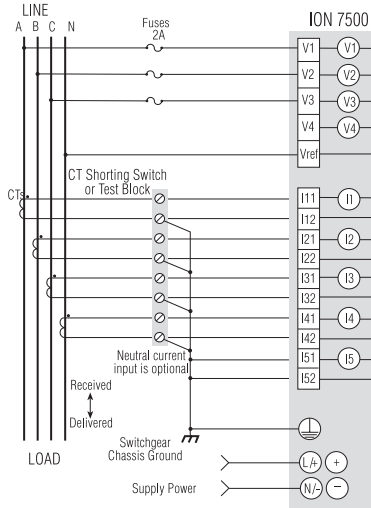
Rear view, TRAN model



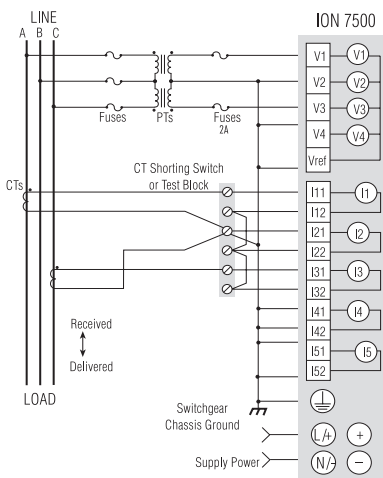
* Available only on ION 7600

Example Connections

4-Wire Wye (Direct Connection)



3-Wire Delta (2 PTs and 2 CTs)



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 57 through 347 I-n/600 I-I inputs
- No PTs needed for Wye systems up to 347/600 VAC
- Standard 5 to 20 Amp current inputs
- Optional 1Amp current inputs
- Low voltage current option

Control Power

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

Measurement Specifications

Parameter	Accuracy ± (%reading)	Register Bounds
	1 second	1 second
Voltage (I-I) (I-n)	0.1%	0 to 1×10^6 V
Frequency	0.01%	47 to 63 Hz
Current (I1, I2, I3)	0.1%	0 to 1×10^6 A
Current (I4, I5)	0.4%	0 to 1×10^6 A
kW, kVAR, kVA*	class 0.2*	0 to $\pm 3.3 \times 10^7$
kWh, kVARh, kVAh*	class 0.2*	0 to $\pm 10^{37}$
KW, KVA Demands	class 0.2*	0 to $\pm 3.3 \times 10^7$
Power Factor @ Unity PF	0.5%	-0.01 to -100.00, 100.00 to 0.01
Harmonics (to 40th)	IEC 61000-4-7	0 to 1×10^6
Harmonics (to 63rd)	1% Full Scale	0.0001 to 100.00
K Factor	5% Full Scale	0 to 1×10^6
Crest Factor	1% Full Scale	0 to 10
Symmetrical Components	Voltage: 0.2% FS**, Current: 0.4% FS	Magnitude: 0 to 1×10^6 ; Phase: -180 to 180

*Refer to Compliance section on page 7

**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	74 days ^A	300 days ^B	35 days ^A	140 days ^B	1.8 years ^A	7.5 years ^B	1.3 years ^A	5.4 years ^B
Waveform	6 ^C	6 ^C	24 ^D	24 ^D	24 ^C	24 ^C	100 ^D	100 ^D

^A 16 parameters recorded every 15 minutes

^B 16 parameters recorded hourly

^C 6 channels @ 128 samples per cycle for 14 cycles

^D 6 channels @ 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: 3250 VAC RMS, 60Hz for 1 minute
- Impedance: 5 MW/phase
- Fault Capture: 1400 Vpeak

Current Inputs

- Inputs: I1, I2, I3, I4, I5
- Standard Current Transformers
- Rated Inputs: 1A or 10A RMS, Max voltage: 600V RMS (CAT III IEC61010-1)
- Overload: 50A (1A model) or 500 A (10A model) RMS for 1 second, non-recurring
- 10A (1A model) or 20A (10A model) continuous
- Dielectric Withstand: 3250 VAC, 60Hz for 1 minute
- Starting current: 0.001A (1A) or 0.005A (10A) RMS
- Burden: 0.15 VA

Current Probes with AC Voltage Output*

- Rated Inputs: 1V, Max: 5.5V RMS (CAT I IEC 61010-1)
- Impedance: 220 kΩ

Waveform Recording

- Sampling Rate: 7600 ION, 256 samples/cycle from 47-63 Hz
- Dynamic range: Voltage Inputs: 14 bits effective (V1, V2, V3)
- Current Inputs: 18 bits effective (I1, I2, I3)
- Sampling Rate: 7500 ION, 128 samples/cycle
- Waveform recording options range from 16 samples/cycle (96 cycles) to 128 samples/cycle (14 cycles)

Digital Inputs

- 8 Inputs: S1-S8, SCOM Self-excited, dry contact sensing, no external voltage required.
- Minimum pulse width: 1msec
- Maximum pulse rate: 20 pulses/sec.
- Scan Time: 1/2 cycle
- Timing resolution: 1 ms
- Isolation: 300 Vpeak for 10s, 60 Hz.

Relays

- 3 Relays: R1 - R3
- Contacts: Form C
- Rated voltage: 250 VAC / 30 VDC
- Max. voltage: 380 VAC, 125 VDC
- Rated load @ 10 A AC/DC resistive, Rated voltage: 7.5 A (AC) / 5 A (DC) Inductive (p.f. = 0.4)
- Max. switching load: 2500 VA resistive, 1875 VA inductive (p.f. = 0.4)
- Turn-on time: 15 ms max
- Turn-off time: AC: 10ms max, DC: 5 ms max
- Isolation: 5,000 VAC for 1 minute
- Lifetime: 10,000,000 operations (no load), 100,000 operations (rated voltage and load)
- Update Time: ½ cycle or 1-second

Solid State Outputs

- 4 Solid State Outputs: D1-D4
- Contacts: Form A
- Maximum voltage: 30 V
- Maximum current: 100 mA
- Isolation: Optically isolated. Max 5000 Vrms isolation (UL:E64380)
- Scan Time: ½ cycle or 1-second

Power Supply

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

Communications

COM 1

- Interface: RS-232E DTE (male DB9 connector) or RS-485 (captured wire connector)
- Duplex: Full (RS232E), Half (RS485)
- Isolation: Optical

COM 2

- Interface: RS-485 (captured wire connector)
- Duplex: Half
- Isolation: Optical

COM 3

- Interface: IrDA Compliant, or 33.6 kbps internal modem
- Duplex: Half
- Distance: 0 - 1 meter
- Optical range: +/- 15 degrees (min), +/- 30 degrees (max)
- Location: Front of Meter (IrDA), Com Card (MODEM)

COM 4 (NETWORK)

- Interface: IEEE 802.3-1993, ISO/IEC 8802-3:1993 (Ethernet) 10Base-T or 10Base-FL (optional)
- Cabling: 10Base-T Unshielded twisted-pair cable, 0.5 mm (24 AWG). Max. length: 100 meters
10Base-FL Fiber optic cable, 62.5/125 um nominal, wavelength: 820 nm Max. length: 2000 meters

- Connectors: RJ45 10Base-T, ST 10Base-FL
- Isolation: 10Base-T: Transformer isolated. Min. isolation voltage: 1500 VAC RMS/2250 VDC
10Base-FL: Optical
- Protocols: TCP/IP, Telnet, ION, Modbus TCP

Internal Modem

- Data Rate: 300 bps-33.6 kbps (V.34, 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 & Ring)
- Governmental Approvals: FCC Modem: FCC P68 (USA), Industry Canada CS-03 (CAN)
- CE Modem: CTR21 (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK)

Environmental Conditions

- Operating Temp: -20 to +70 C (no formation of ice) (-4°F to 158°F)
- Storage: -40 to +85 C (-4°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 -20 to +60 C
- Backlight: Cold Cathode Fluorescent (CCFT)

Standards Compliance

Accuracy

- Independent Compliance with IEC60687 0.2S tested by KEMA
- Complies with ANSI C12.20 0.2

† 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

Markings



ISO 9002-94

Registration Cert# 002188

Miscellaneous

Quality Assurance: ISO 9002-1994

Warranty

3 years parts and labor

Features List

	ION 7500	ION 7600
Power Quality		
Sag/Swell Monitoring	■	■
Symmetrical Components: zero, positive, negative		■
Transient detection, microseconds		65
Harmonics: individual, even, odd, total up to	63 rd	63 rd
Harmonics: magnitude, phase and inter-harmonics		■
Sampling rate, maximum samples per cycle	128	256
Flicker, (harmonics to EN50160, IEC 6100-4-7/4-15)		■
Configurable for IEEE 519 - 1992, IEEE159, SEMI		■
Uptime in number of nines	■	■
Logging and Recording		
Standard memory capacity	1MB	4MB
Maximum optional memory capacity	8MB	8MB
Min/max logging for any parameter	■	■
Historical logs, maximum # of channels	320	640
Waveform logs, maximum # of cycles	96	96
Timestamp resolution in seconds	0.001	0.001
Historical trend information via front panel display	■	■
GPS time synchronization	■	■
Communications and I/O		
RS-232/485 ports	1	1
RS-485 ports	1	1
Ethernet ports	1	1
Infrared optical port	1	1
Internal Modem	1	1
DNP 3.0 through serial, modem and I/R ports	■	■
Modbus RTU slave on serial, modem and I/R ports	■	■
Modbus RTU Master on serial ports	■	■
Modbus TCP through Ethernet	■	■
EtherGate, data transfer between Ethernet & RS-485	■	■
ModemGate, data transfer between internal modem & RS-485	■	■
MeterM@il, logged data and alarms via e-mail	■	■
WebMeter, on board web server	■	■
Analog Inputs	4	4
Analog Outputs	4	4
Digital status inputs/counter	16	16
Digital relay outputs	7	7
Setpoints, Alarming, & Control		
Setpoints, minimum response time	½ cycle	½ cycle
Setpoints, number of	24	24
Math, logic, trig, log, linearization formulas	■	■
Single & multi-condition alarms	■	■
Call-out on alarms	■	■
Revenue Metering & Standards		
ANSI C12.16 accuracy compliant	■	■
ANSI C12.20 0.2 compliant	■	■
IEC 60687 0.2S compliant	■	■
IEC 60687 accuracy class 0.5S compliant	■	■
Measurement Canada Approved	■	■
ANSI class 2, IEC 1/10 (1A nominal, 10A max)	■	■
ANSI class 20, IEC 5/20 (5A nominal, 20A max)	■	■
MV-90 on serial, Ethernet ports	■	■
Multi-year scheduling: hourly activity profiles	■	■
Transformer/line loss compensation	■	■

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**POWER
MEASUREMENT**

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