

Switchboard Case option



Socket Mount model



ION[®]

8300 8400 8500

Intelligent revenue meters

Applications Summary

Revenue Metering

Monitor compliance with energy supply contracts. Energy suppliers can offer customized rates, flexible billing, transformer/line loss compensation, and web-based reporting. Energy consumers can audit their power requirements and confirm their bills.

Internet Enabled

Easily access meter data through standard browsers and automatically e-mail alarm notifications or logged data.

Compliance Monitoring

Monitor compliance with international flicker and harmonics standards, IEC 61000-4-7 / 4-15 or configure the meter for IEEE 519-1992, IEEE 1159, and SEMI.

Power Quality Analysis

Use the meters to measure percentage of system up-time in nines, (i.e. 99.9% up-time). Find the cause of transients, harmonics and sags. Analyze problems and avoid repeat interruptions.

Demand & Power Factor Control

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

Load Curtailment

Implement load curtailment and distributed generation strategies.

Equipment Monitoring & Control

Base your maintenance schedule on actual operating history. Meter all your utilities including gas, steam, water and more.

Energy Pulsing & Totalization

Use digital I/O for KYZ pulsing, end-of-interval and totalization.

Features Summary

Measurements

- ◆ Advanced, high accuracy revenue metering
- ◆ True RMS 3-phase voltage, current & power
- ◆ Harmonics, K-Factor, symmetrical components, sag/swell

Communications

- ◆ Supports ION, Modbus, DNP 3.0 protocols
- ◆ Compatible with UTS MV-90[®] software
- ◆ Two RS-485 ports, one switchable to RS-232
- ◆ One front panel optical port
- ◆ Optional built-in modem with ModemGate™, allows modem access to RS-485 devices
- ◆ Optional Ethernet port with EtherGate™, allows network access to RS-485 device networks
- ◆ GPS synchronization of meter clock
- ◆ Remote alarm notification

On-Board Data Logging

- ◆ Waveform and fault recording, plus transient detection up to 65 ms @ 60 Hz
- ◆ Sequence-of-events & min/max logging
- ◆ Scheduled or event-driven logging of 640 parameters concurrently

Setpoints for Control and Alarms

- ◆ Setpoint on any parameter or condition
- ◆ 1 second and half-cycle operation
- ◆ Outage dial-back capability

Optional Digital Inputs/Outputs

- ◆ 4 KYZ outputs & 3 form A inputs, on-board
- ◆ 8 digital inputs for status/counter functions, 8 relay outputs for control/pulse functions & 4 analog outputs through external I/O expander
- ◆ Pluggable connection for serial communications

Used to monitor electric power networks, service entrances and substations, the 8000 series are the world's most advanced socket based energy meters.

The ION 8300 features a unique display, high accuracy, four quadrant bidirectional metering, sag/swell, transformer/line loss compensation, trending, communications protocol support, and optional control capabilities.

The ION 8400 adds power quality analysis, web compatibility, Modbus Master, enhanced logging, additional harmonics and an optional Ethernet port with extra multiport communications support.

The ION 8500 adds waveform recording, transient capture, expanded power quality analysis and compliance reporting to help you quickly characterize your power and more memory.

The meters give you the tools to manage complex energy supply contracts that include commitments to power quality. Integrate them with our ION Enterprise™ software or other energy management and SCADA systems through multiple communication channels and protocols.

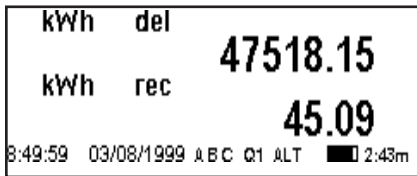
Patented ION technology lets you customize metering or analysis functions at your workstation, without any hard-wiring. Just graphically link a few drag-and-drop icons, or select default setups, and you're ready to go.

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

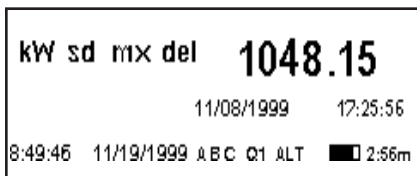


**POWER
MEASUREMENT**

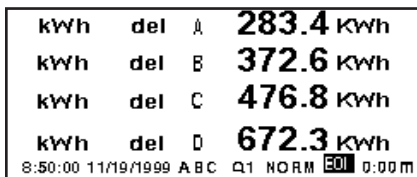
Energy Display



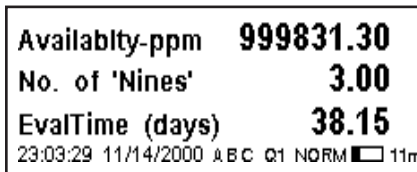
Peak demand with date and time-stamp



View Time-Of-Use data via the front panel



The meters display system reliability in nines, (i.e. 99.9% up-time).



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

**Front Panel**

8000 series meters have a bright, easy-to-read, backlit LCD display screen with adjustable contrast that provide a user-friendly interface to configure meter settings or view power system data. The front panel displays all metered values or any of 31 pre-configured data display screens, including phasor diagrams and harmonics histogram, or you can customize the display.

Revenue Metering**Energy**

Measurements are revenue approved, fully bi-directional and the units meter energy in all four quadrants. They provide all traditional active, reactive and apparent energy parameters and can also be configured to integrate any instantaneous power parameter to provide measurements like Volt-Hours, Amp-Hours, etc. Energy registers can be logged automatically or 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 & KQ-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
- ◆ Volts & Amps demand, min/max
- ◆ KQ & Cumulative Demand
- ◆ Demand on any instantaneous measurement

Time-Of-Use

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

- ◆ Active, reactive and apparent energy TOU
- ◆ Active, reactive and apparent demand TOU
- ◆ 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
- ◆ Supports 5 daily profiles per season
- ◆ Supports 4 rate periods per daily profile
- ◆ Automatic mid-season rate change support

Instantaneous

The meters 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
- ◆ Neutral current on form 39S, 76S meters†
- ◆ Voltage and current unbalance
- ◆ Phase reversal

Transformer & Line Loss Compensation

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

Accuracy and Approvals

- ◆ Independent certification to C12.20-1998, class 0.2 by MET Labs.
- ◆ Independent certification to IEC 60687 - Class 0.2S by KEMA
- ◆ Industry Canada Approval (AE-0924)
- ◆ California ISO approved metering device

Power Quality Metering**Compliance Monitoring†**

- ◆ IEC 61000-4-7 harmonics & inter-harmonics
- ◆ IEC 61000-4-15 flicker
- ◆ CBEMA/ITIC

The meters can also be configured to monitor:

- ◆ EN50160
- ◆ IEEE 519 and IEEE 1159

Waveform Recording*

The ION 8500 can simultaneously capture all voltage and current channels.

- ◆ Up to 7 cycles at 256 samples/cycle
- ◆ Up to 96 cycles at 16 samples/cycle
- ◆ Record waveforms for up to several seconds

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 99.999999%, (9 nines or 2 cycles downtime) to effectively run their business model. Measure the number of nines of reliability with the 8000 series.

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.

Harmonic Distortion Metering

The ION 8300 meters percent harmonic distortion to the 31st, the ION 8400 to the 63rd and the ION 8500 to the 127th, (via ION Enterprise software), for voltage, current and neutral inputs.

- Individual to the 40th, (including magnitude, phase and inter-harmonics for the ION 8500)
- Total even or total odd harmonics
- Total harmonics (even + odd)
- K-factor, Crest factor

Sag/Swell Detection

The meters offer a 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
- Excess or deficient energy during the event
- Per phase triggers for waveform recording or control operations
- Analyze sags and swells with our ION Enterprise[®] software.

Transient Capture*

- Detect and record sub-cycle transients as short as 65 μ s @60Hz (78 μ s @50Hz)

Symmetrical Components Metering

The meters measure zero, positive, and negative sequence components including magnitude and phase angle for all voltage and current inputs. Calculation of phase unbalances using symmetrical components can also be performed.

Outage dial-back

When equipped with the outage dial-back option, the 8000 series can notify a pager or MV-90 when control power is disrupted. Please contact Power Measurement for availability.

Data & Event Recording

The ION 8500 is equipped with 4 MB of meter-based nonvolatile memory for historical data storage, the ION 8400 has 1 MB and the ION 8300 has 512k.

Traditional Load Profiling

The ION 8500 incorporates 640 channels via 40 data recorders, the ION 8400 is equipped with 160 channels via 10 recorders and the ION 8300 offers 32 channels via 2 data recorders. Channel assignments are user-configurable for historical trend recording of energy, demand, voltage, current, power quality, or any other measured parameter. Recorders can be triggered on a time interval basis, on a calendar schedule, by an alarm/event condition, or manually.

High-Speed Data Recording†

The ION 8400 and ION 8500 feature high-speed "burst" recording (as fast as 1/2-cycle intervals) to store detailed disturbance or outage characteristics. Recording can be triggered 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

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

Event Recording

Events, sequence-of-events, and alarm conditions are recorded and date/time-stamped to millisecond resolution. Record the details of power quality events, including magnitudes, durations, and equipment status. Use information from multiple GPS equipped meters to correlate system wide events and equipment operation.

Time Synchronization and GPS

The meters have real-time clocks that allow data records and internal events to be date and time-stamped within milliseconds. Synchronize them to:

- The meter's internal crystal (+/- 25ppm)
- The line frequency of the electrical network being metered (+/- 10ppm), default setup
- External GPS receiver with +/- 1 ms accuracy

When in use, the pre-selected COM port is used exclusively for GPS synchronization input.

Logic, Math & Control

The meters can perform on-board calculations for any measured value. Calculate true quantities from pulse inputs (e.g. BTU calculations). You can also implement real-time billing schemes.

Mathematical Functions

Customize formulas using the following operators:

- Arithmetic (+, -, \times , \div)
- Comparison (<, >, =, \neq , \leq , \geq)
- 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 and Setpoints

The meters offer 24 setpoints configurable for 1-second or 1/2-cycle[†] operation. Use them to trigger:

- Audible and visible alarms
- Modem/pager dial-back
- Data logging and/or Waveform recording*
- Relays
- Clearing and reset functions
- Relative Setpoints

3-phase and neutral voltage

VIn a	347.94 V
VIn b	343.13 V
VIn c	342.51 V
VIn avg	345.52 V
8:50:20 03/08/1999 A B C Q1 ALT 2:22m	

3-phase and neutral current

Ia	277.2 A
Ib	473.9 A
Ic	590.4 A
In	122.4 A
18:33:33 98/12/02 A B C Q1 TEST 2:42m	

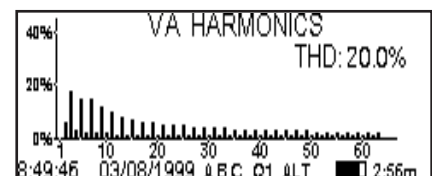
Displays a complete range of power parameters

kW tot	118.090 kW
kVAR tot	4.296 kVAR
kVA tot	125.662 kVA
PF sign tot	93.97 LG
8:50:05 03/08/1999 A B C Q1 ALT 2:37m	

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

VC	IC	VA	120.56 V	0.0
		VB	119.21 V	240.6
		VC	122.03 V	120.7
		IA	5.140 A	331.1
		IB	5.050 A	209.9
		IC	4.980 A	90.1
8:50:24 03/08/1999 A B C Q1 ALT 2:18m				

View THD and individual harmonics through the front panel display screen



† Available only on ION 8400 and ION 8500

* Available only on ION 8500

Modbus Master[†]

The 8400 and ION 8500 meters can both read and write data to Modbus slave devices. This powerful feature lets the meters collect data from a Modbus network, process it, then deliver the information through any of the units communication channels. Modbus master read capability lets you perform detailed sub-metering using low-cost instruments (like our ION 6200 or other Modbus slave devices). The meters can use the data from the Modbus network for recording, trending, alarming and will also display parameters like energy, reactive energy, power factor, frequency, voltage unbalance etc. Modbus master write capability allows control commands or data to be sent directly to Modbus slave devices (e.g. control I/O points, reset parameters, etc.).

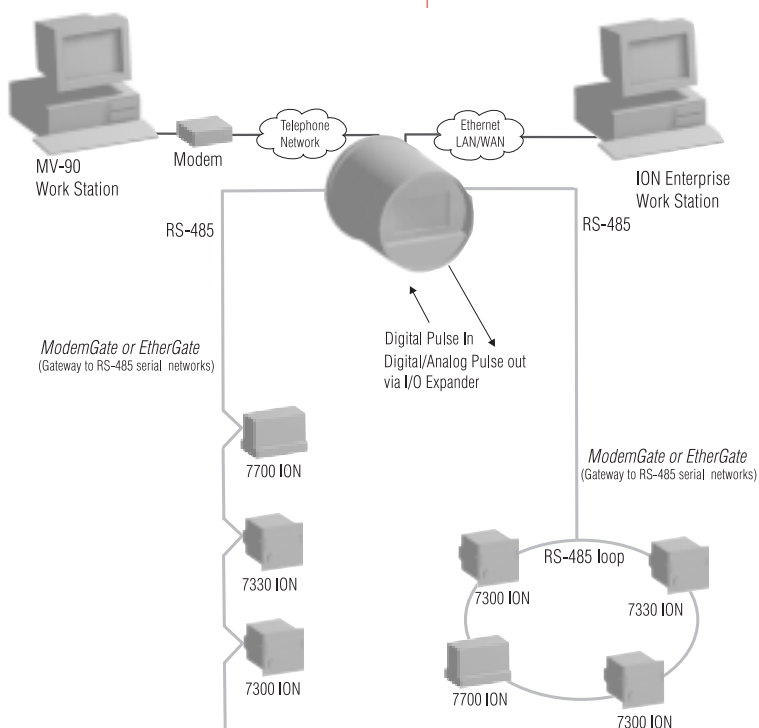
Modbus mastering allows for detailed facility monitoring so customers can now achieve a better understanding of where inefficiencies are located and develop strategic load shedding applications.

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.

Multiport Communications



WebMeter™

For Ethernet equipped meters an on-board Web server offers quick and easy access to real-time values and basic power quality information without special software. Built-in web pages display a range of energy and basic power quality information through web-enabled devices and even supports basic meter configuration.

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

The meters offer multi-port access that provides secure, simultaneous data sharing with utility systems and customers directly at the hardware level using a choice of communication standards and protocols.

Serial Ports

1 RS-232/485 and 1 additional RS-485 port depending on the ordering options selected, (see page 8 for a complete list)

- ◆ Protocols: ION, DNP 3.0, Modbus RTU, GPS
- ◆ Baud rate: (RS-232) 300 bps to 115,200 bps (RS-485) 300 bps to 57,600 bps

Infrared Data Port:

Front panel ANSI C12.13 Type 2

- ◆ Protocols: ION, Modbus RTU, DNP 3.0
- ◆ Baud rate: Up to 19,200 bps.

Internal Modem

Available internal telephone modem features fast connect, and ModemGate™, a gateway letting up to 31 additional devices share a meter's internal modem through a serial port.

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

Ethernet Port

Optional 10Base-T 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 31 devices via the meter's serial ports.

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

UTS Software Support

The meters are fully compatible with UTS software platforms including MV-90[®], MVP, MVLT and MVCOMM. Our 8000 series are the only socket meters with a direct Ethernet connection to MV-90.

Flash-Based Firmware

- ◆ Perform upgrades via communications without removing the unit from the site.
- ◆ Easily add new ION modules as they become available**

Meter Security

In addition to traditional meter anti-tamper mechanisms, the meters offer a number of advanced security functions for automatic detection, recording and annunciation of:

- ◆ Loss of PT or CT phase due to transformer wiring tampering or transformer failure.
- ◆ PT or CT phase reversal tampering or installation error.
- ◆ Resets of peak demand registers.
- ◆ Meter power up/down.

Multi-level Security

The 8000 series meters offer multi-user, multi-level security. Access to meter information can be controlled and customized for up to 16 designated users with security levels ranging from read access up to Administrative rights.

Diagnostics

The 8000 series perform advanced self diagnostic checks of hardware, firmware, and logged data at startup and on a continual basis. Monitoring is continuous and irregularities are logged for retrieval via communications. Critical warnings or errors are indicated immediately on the front panel.

The Power of ION

Thanks to patented ION[®] technology, you can quickly add or rearrange functions with drag-and-drop icons and a few clicks of a mouse. Imagine any new feature and build it with ION.

Installation \ Connections

Installation

- ◆ 4-wire Wye, 3-wire Delta
- ◆ 3 voltage and 3 current inputs
- ◆ Optional fourth current input†
- ◆ All inputs pass ANSI/IEEE C37.90-1989 surge withstand and fast transient tests.

Voltage and Current Inputs

- ◆ Direct connect 9S Wye system up to 277 VAC line-to-neutral, or 35S system up to 480 VAC line-to-line.
- ◆ 3 voltage inputs: auto ranging from 57-277 V (9S) and from 120-480 V (35S)
- ◆ 4 current inputs auto ranging from 0 - 20 A on I1, I2, I3, I4. (Class 20)

- ◆ Optional 1/10 A option.. (1 Amp nominal current, 10 Amp max current), for IEC 687 In= 1A, 2A or ANSI class 2 applications. Switchboard models only.

Forms

- ◆ ION 8400/ION 8500: 9S, 39S, 35S, 36S, 76S
- ◆ ION 8300: 9S, 35S, 36S

Power Supply

8000 series meters can be powered by the voltage source being monitored, from an auxiliary power pigtail, an AC or DC supply, low-voltage supply or through standard voltage operating ranges. Pick the power supply option that meets your needs.

Auxiliary Power Input

An optional external power supply input lets the meters be powered by a separate AC or DC supply, allowing the units to continue functioning before, during and after an outage. Avoid damage to meter's power supply from spikes when monitoring high voltage networks.

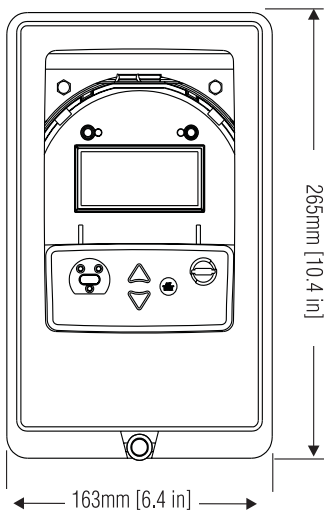
Switchboard Draw-out Case

The Switchboard Case option gives you all the benefits of the socket meters in a compact, switchboard mount, draw-out configuration. Quick disconnect system lets you "rack out" the meter electronics in one easy action, without having to manually disconnect wires, including I/O wiring.

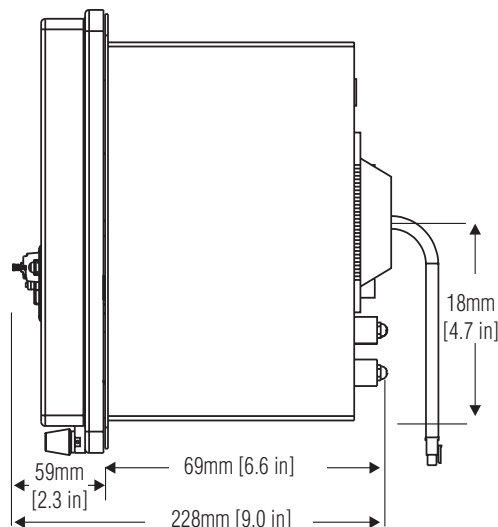
Mounting & Dimensions

8000 Series Switchboard Case

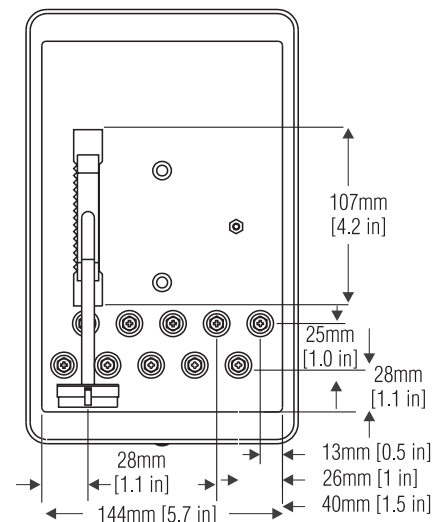
Front view



Side view

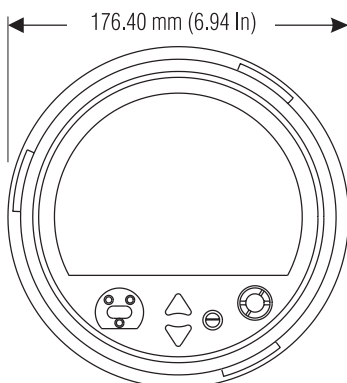


Rear View

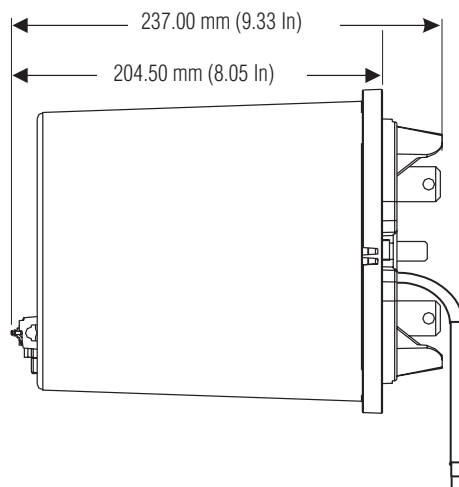


8000 Series Socket Mount

Front view

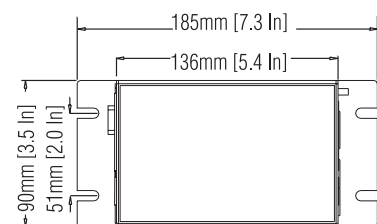


Side view

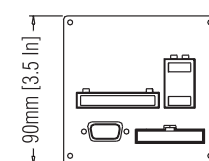


I/O Box

Top view



End View



† Available only on ION 8400 and ION 8500

Inputs/Outputs

8000 series meters can be ordered with optional built-in I/O comprising 4, KYZ outputs and 3, form A inputs.

An optional external I/O Expander provides additional I/O capabilities and standard serial port connections for the meters. The I/O Expander offers an easy connection to external equipment and a physical interface for energy management systems. Meter operation remains unaffected during installation and configuration of I/O. The I/O Expander can be equipped with:

- ◆ 8 digital inputs and 8 digital outputs (4 Form A and 4 Form C solid state outputs)
- ◆ Pluggable connections for serial communications
- ◆ 4 analog outputs can replace the 4 Form A digital outputs. 2 signaling options are available, 0 to 20 mA (scalable 4 to 20 mA) and -1 to +1 mA (scalable 0 to 1 mA).

Software Integration

With their extensive communication capabilities, the meters can be integrated into energy management or automation control systems.

ION Enterprise Software

8000 series meters are compatible with Power Measurement's ION Enterprise software. ION Enterprise is a comprehensive PC based power monitoring, analysis and control system that lets you take advantage of all the advanced features of the 8000 Series.

Meter Shop™ Software

The meters are further enhanced by Meter Shop software. Meter Shop has been designed specifically for Meter Configuration Specialists and Meter Technicians who need to program custom meter functions, configure and test meters, and display data.

The software offers an intuitive graphical interface for designing and archiving custom templates, installing templates into the meters, performing basic meter setup, and verifying the meter's calibration and measurements. The software can be used to view all real-time readings and reset accumulated values.

Measurement Specifications

Parameter	Accuracy ± (%reading)	Register Bounds
	1 second	1 second
Voltage (L-I) (L-n)	0.1%	0 to 1x10 ⁶ V
Frequency	0.01%	47 to 63 Hz
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*	
Power Factor @ Unity PF	0.5%	-0.01 to -100.00, 100.00 to 0.01
Harmonics (to 63rd)	1% Full Scale	0.0001 to 100.00
K Factor	5% Full Scale	0 to 1x10 ⁶
Crest Factor	1% Full Scale	0 to 10

*Refer to Compliance section on page 7

Display resolution meets or exceeds accuracy.

User Programmable Log Capacity

Example Log Configurations:

	ION 8300		ION 8400		ION 8500		
Event	500 Events		500 Events		500 Events		
Data	35 days ^A	140 days ^B	85 days ^A	340 days ^B	320 days ^A	3.5 years ^B	280 days ^A 3.0 years ^B
Waveform	-		-		6 ^C	6 ^C	24 ^D 24 ^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 96 cycles

Specifications

Voltage Inputs

- ◆ Inputs: Va, Vb, Vc, Vref (9S/39S), Vab, Vcb, Vref (35S), Va, Vc, Vref (36S/76S)
- ◆ Form 9S/36S/39S/76S steady state: Standard 57-277 (±15%) VLN rms.
- ◆ Form 9S/36S/39S/76S overload: Standard power supply: 120-277 (+/- 20%) VLN rms. Low voltage PS.: 57.7-69.3 (+/- 20%) VLN rms
- ◆ Form 35S steady state: 120-480 (+/-15%) VLL rms
- ◆ Form 35S overload: 120-480 (+/-20%) VLL rms for 6 hrs max.
- ◆ Dielectric Withstand: 2500 Vrms, 60Hz for 1 min. (ANSI C12.1-1995/C12.16-1991/C12.20-1998)
- ◆ Surge withstand: 6kV peak (1.2/50 uS) voltage surge L-L and L-GND (IEC 255-4) ANSI/IEEE C37.90.1-1989 SWC and Fast Transient Common and Transverse modes. ANSI C62.41
- ◆ Impedance: 5 MΩ/phase

Current Inputs

- ◆ Inputs: Ia, Ib, Ic, I neutral (39S, 76S only)
- ◆ Class 2 Inputs: Rated Inputs: 1/10 A RMS. (1A nominal, 10A max) Overload: 50 A RMS for 1 sec., non-recurring
- ◆ Class 20 Inputs: Rated Inputs: 5/20 A RMS. (5A nominal, 20A max) Overload: 500 A RMS for 1 sec. non-recurring
- ◆ Dielectric Withstand: 2500 Vrms, 60 Hz, for 1 min.
- ◆ Surge withstand: 6kV peak (1.2/50 uS) voltage surge L-L & L-GND Common and Transverse modes

- ◆ Starting Current: Class 2 - 0.001 A RMS Class 20: 0.005 A RMS
- ◆ Burden: Class 2 - 0.15 VA @ 2A Class 20 - 0.15VA @ 20A

Waveform Recording*

- ◆ Sampling Resolution: 256 samples/cycle
- ◆ Resolution: 13 bits for each input range

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, MNP2-4,
- ◆ Data Compression: V.42 bis/MNP 5
- ◆ Interface: RJ11 (Tip & Ring), or RJ31
- ◆ Governmental Approvals: FCC Part 68 (USA), Industry Canada CS-03 (CAN)

Power Supply

Standard Power Supply, 120-277 VAC

- ◆ Type: 3-Phase Powered from voltage sensing inputs
- ◆ Burden: Max, 4W, 6.6 VA / phase
- ◆ Form 9S/39S, 36S/76S: 120-277 +/- 20% VLN rms, 47-63Hz
- ◆ Form 35S: 120-480 (+/- 20%) VLL rms, 47-63 Hz
- ◆ Ride-through: Min:100ms 6 cycles @60Hz @96 VAC
- ◆ Surge withstand: 6kV/0.5kA peak (100 kHz Ring Wave) – ANSI C62.41 6kV/3kA peak (1.2/50-8/20 uS) voltage surge L-L and L-GND ANSI C62.41

Standard Power Supply, 57-70 VAC

- ◆ Type: 3-Phase supply, drawing off voltage inputs
- ◆ Burden: Typical: 3 W, 5 VA/phase, 3-Phase operation
Max: 4W, 6.6 VA/phase, 3-Phase operation
- ◆ Form 9S/36S/39S/76S: 57-70 (+/- 20%) VLN rms, 47-63 Hz
- ◆ Form 35S: Unavailable
- ◆ Ride-through: Min 100ms 6 cycles 60Hz @ 46 VAC
- ◆ Surge withstand: 6kV/0.5kA peak (100 kHz Ring Wave) – ANSI C62.41, 6kV/3kA peak (1.2/50-8/20 uS) voltage surge L-L and L-GND ANSI C62.41

Auxiliary Power Pigtail, 65-120 VAC

- ◆ Type: 1-Phase supply, powered through external cable with Grounded U-Plug
- ◆ AC: 65-120 (+/- 15%) VLN rms, 47-63 Hz
DC: 80-160 (+/- 20%) VDC
- ◆ Burden: Typical: 10VA, Max: 20VA
- ◆ Ride-through: Min: 100ms 6 cycles 60Hz @ 46 VAC
- ◆ Surge withstand: 6kV/0.5kA peak (100 kHz Ring Wave) ANSI C62.41 6kV/3kA peak (1.2/50-8/20 uS) voltage surge L-L and L-GND ANSI C62.41

Auxiliary Power Pigtail, 160-277 VAC

- ◆ Type: 1-Phase supply, powered through external cable with Grounded U-Plug
- ◆ AC: 160-277 (+/- 20%) VLN rms, 47-63 Hz
DC: 200-350 (+/- 20%) VDC
- ◆ Burden: Typical 10VA, Max: 20VA
- ◆ Ride-through: Min: 100ms 6 cycles, 60Hz @ 96 VAC
- ◆ Surge withstand: 6kV/0.5kA peak (100 kHz Ring Wave) – ANSI C62.41 6kV/3kA peak (1.2/50-8/20 uS) voltage surge L-L and L-GND ANSI C62.41

Environmental Conditions

- ◆ Operating Temp: -40°C to 85°C (-40°F to 185°F)
- ◆ Display Operating Temp: -20°C to 60°C (-4°F to 140°F)
- ◆ Storage Temp: -40°C to 85°C (-40°F to 185°F)
- ◆ Humidity: 5%-95% non-condensing

Digital Inputs

- ◆ 8 Inputs: S1 - S8, SCOM (Through I/O Expander)
Self-excited, dry contact sensing, no external voltage required. +30 VDC differential between SCOM and S1 through S8 inputs. Or 24-130 VDC externally excited.
- ◆ Minimum pulse width: 20 ms
- ◆ Maximum input transition rate: 50 transitions/second
- ◆ Scan Time: 20 ms
- ◆ Timing resolution: 1 ms, with 2 ms accuracy
- ◆ Isolation: 1000 Vrms, 60 Hz for 1 minute to meter

Solid State Outputs

- ◆ 8 Solid State Outputs: C-1, C-2, C-3, C-4 (Form C) - Through I/O Expander A-1, A-2, A-3, A-4 (Form A) - Supported through I/O Expander
- ◆ Max. Load Voltage: 200 VAC/DC
- ◆ Max. Load Current: 100 mA
- ◆ On Resistance: 30Ω (typical), 50Ω (max)
- ◆ Off Resistance: 400 MΩ (minimum)
- ◆ Isolation: 3750 Vrms, 60 Hz for 1 minute to meter
1000 Vrms, 60 Hz for 1 minute (between outputs)
- ◆ Update rate: 20 ms
- ◆ Maximum output transition rate: 50 transitions/s

Analog Outputs

- ◆ 4 Analog Outputs: Supported through I/O Expander
Output range: 0 - 20 mA (scaleable to 4 - 20 mA) or -1 to +1 mA (scaleable to 0 - 1 mA)
- ◆ Max. Load: 500Ω (0-20 mA), 10 KΩ (-1 to +1 mA)
- ◆ Isolation: 3750 Vrms, 60 Hz for 1 minute to meter
2000 Vrms, 60 Hz for 1 minute
- ◆ Accuracy: +/- 0.3% (% of Reading) @ 23° C
- ◆ Accuracy drift: 100 ppm/° C
- ◆ Resolution: 12 bits
- ◆ Update rate: 1 second

Packaging

- ◆ Socket meters: Forms 9S, 35S, 36S, 39S, 76S (ANSI C12.10-1997)
- ◆ Switchboard Case: (FT-21 style) Forms 9, 35, 36
- ◆ Sealing/Cover: ANSI C12.1-1995/ANSI C12.10-1997/ANSI C12.16-1991
- ◆ Weatherproof: Dustproof, raintight (as per UL50-1987 raintightness test)
- ◆ Base Finish: Reinforced plastic UV and Corrosion resistant (Class II)
- ◆ Cover Finish: Polycarbonate, UV and Corrosion resistant (Class II)

Shipping

- ◆ 15 lbs / 7 kg
- ◆ 17 x 10 x 10 inches (0.98 cu. ft.)
40.8 x 24 x 24 cm (0.0235 cu. m)

Communications**Serial ports (Via breakout cable or I/O box)**

- ◆ RS-232E (DTE) or RS-485 (shielded twisted pair)
- ◆ Duplex: Full (RS232E), Half (RS485)
- ◆ Isolation: Optical

Internal Modem

- ◆ Interface: 33.6 Kbps internal modem
- ◆ Duplex: Half

Infrared Data Port:

- ◆ Interface: ANSI C12.13 Type 2 Optical Port
- ◆ Baud Rates: 300 - 19200 bps
- ◆ Duplex: Half
- ◆ Protocols: ION 2.0, Modbus RTU, DNP 3.0
- ◆ Location: Front of Meter

Ethernet

- ◆ Interface: IEEE 802.3-1993, ISO/IEC 8802-3:1993 (Ethernet) 10BASE-T
- ◆ Cabling: Unshielded twisted-pair cable, 0.5 mm (24 AWG). Max. segment length: 100 m
- ◆ Connectors: RJ45
- ◆ Data rates: 10 Mbps, half duplex

Display

- ◆ Type: FSTN Liquid Crystal Display (LCD)
- ◆ Resolution: 240 x 67 pixels
- ◆ Size: 72 (H) x 32 (W) mm
- ◆ Temperature: Operational from -20°C to +60°C
- ◆ Backlight: LED (Green)
- ◆ Backlight timeout: 0 (always on) - 120 min
- ◆ Standards Compliance: Exceeds ANSI C12.16-1991, IEC 687

Standards Compliance**Accuracy and Approvals**

- ◆ Independent certification to C12.20-1998, class 0.2 by MET Labs.
- ◆ Independent certification to IEC 60687 - Class 0.2S by KEMA
- ◆ Industry Canada Approval (AE-0924)
California ISO approved metering device
- ◆ All inputs pass ANSI/IEEE C37.90-1989 surge withstand and fast transient tests.

Safety/Construction

- ◆ ANSI C12.20-1998 American National Standard for Electricity Meters 0.2 and 0.5 Accuracy Classes

Electromagnetic Immunity

- ◆ IEEE C.37-90.1-1989: IEEE Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems (ANSI)
- ◆ ANSI C12.20-1998: American National Standard for Electricity Meters 0.2 and 0.5 Accuracy Classes
- ◆ 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

Electromagnetic Emission

- ◆ FCC Part 15 Subpart B, Class A: Class A Digital Device, Radiated Emissions

Modem

- ◆ FCC Part 68
- ◆ Industry Canada CS-03

Miscellaneous

- ◆ Optical Communications Port: ANSI C12.13-1991 Type 2
- ◆ Quality Assurance: ISO 9002-1994

Warranty

- 3 years parts and labor



ISO 9002-94
Registration Cert# 002188

Features List

	ION 8300	ION 8400	ION 8500
Power Quality			
Sag/Swell Monitoring	■	■	■
Symmetrical Components: zero, positive, negative	■	■	■
Transient detection, microseconds			65
Harmonics: individual, even, odd, total up to	31 st	63 rd	63 rd
Harmonics: magnitude, phase and inter-harmonics			■
Sampling rate, maximum samples per cycle	128	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	512K	1.6MB	4MB
Min/max logging for any parameter	■	■	■
Historical logs, maximum # of channels	32	320	640
Waveform logs, maximum # of cycles			96
Timestamp resolution in seconds	0.001	0.001	0.001
GPS time synchronization	■	■	■
Communications and I/O			
RS-232/485 ports	1	1	1
RS-485 ports	1	1	1
Ethernet ports		1	1
Infrared optical port	1	1	1
Internal Modem	1	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		■	■
KYZ Outputs	4	4	4
Form A Inputs	3	3	3
External Analog Outputs	4	4	4
External Digital status inputs/counter	8	8	8
Digital relay outputs	8	8	8
Setpoints, Alarming, & Control			
Setpoints, minimum response time	1 second	½ cycle	½ cycle
Setpoints, number of	24	24	24
Math, logic, trig, log, linearization formulas	■	■	■
Single & multi-condition alarms	■	■	■
Call-out on alarms	■	■	■
Dial-out on outage	■	■	■
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	■	■	■
ANSI class 2, IEC 1/10 (1A nominal, 10A max)	■	■	■
ANSI class 20, IEC 5/20 (5A nominal, 20A max)	■	■	■
MV-90 on serial, modem & Ethernet ports	■	■	■
Multi-year scheduling: hourly activity profiles	■	■	■
Transformer/line loss compensation	■	■	■

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Revision Date: October 31, 2001

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Printed in Canada 70100-0120

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