

PowerLogic® ION8600

Power and energy meters



a brand of
Schneider
Electric



SQUARE D



Features

Meets stringent IEC and ANSI measurement accuracy standards

- ◆ IEC 62053-22 Class 0,2S
- ◆ ANSI C12.20 0.2 Class 2, 10, & 20
- ◆ True RMS 3-phase voltage, current, power

Flexible logging and mastering

- ◆ Onboard data and event logging with non-volatile memory
- ◆ Modbus® master slave devices on two serial communication ports

Multiple socket and switchboard form factors

Power quality and compliance monitoring

- ◆ Flicker¹ to IEC 61000-4-15
- ◆ Transient detection and capture¹: 78 µs at 50 Hz, 65 µs at 60 Hz
- ◆ Individual, total even, total odd harmonics to IEC 61000-4-7
- ◆ CBEMA/ITIC
- ◆ IEEE 519 – 1992, IEEE 1159
- ◆ K-factor, symmetrical components, sag/swell

Digital fault-recording¹

- ◆ Simultaneously capture voltage and current channels for sub-cycle disturbance transients, as well as multi-cycle sags, swells and outages
- ◆ 256 samples/cycle waveform recording
- ◆ 78/65 µs transient capture (50/60 Hz)

Complete communications: Fiber - Ethernet - Serial - Modem

- ◆ Gateway functionality simplifies communications architecture and reduces leased line or connection costs
- ◆ Concurrent, independent ports communicate with a variety of protocols such as ION, DNP 3.0, Modbus® RTU, Modbus® TCP, MV-90
- ◆ Dial-out capability when memory is near full
- ◆ Data push capability through SMTP (email)

Multi-user, multi-level security

- ◆ Control and customize access to sensitive data for up to 16 users
- ◆ Password protection and anti-tamper seal protection enhance meter security

Patented ION® technology

- ◆ Modular, flexible architecture that offers extensive user programmability
- ◆ Uniquely addresses complex monitoring and control applications
- ◆ Adapts to changing needs, avoiding obsolescence

¹ available in Feature Set A only



Intelligent metering and control device

Used to monitor network grid interties, service entrances and substations, PowerLogic® ION8600 meters are ideal for independent power producers and co-generation applications that need to accurately measure energy bi-directionally, in both generation and stand-by modes.

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

Applications

- Revenue metering
- Co-generation and IPP monitoring
- Compliance monitoring
- Power quality analysis
- Demand and power factor control
- Load curtailment
- Equipment monitoring and control
- Energy pulsing and totalization
- Instrument transformer correction
- Transformer/line loss compensation

Connections

Installation

- 4-wire Wye, 3-wire Wye, 3-wire Delta, and single-phase systems
- 3 voltage and 3 current inputs (optional 4th current input)

Voltage and current inputs

- Directly connect ANSI socket mount 9S, 39S, 36S, and 76S systems up to 277 VAC L-N, or 35S system up to 480 VAC L-L
- 3 voltage inputs: auto ranging from 57 V to 277 V (9S) and from 120 V to 480 V (35S)
- Standard current inputs auto-ranging from 0.005 A to 20 A, 50 A overrange
- Optional current inputs auto-ranging from 0.001 A to 10 A, 24 A overrange

Control power supply

The standard power supply has a voltage range of 85 to 240 VAC and 110 to 330 VDC, and can be powered from the blades or through an auxiliary power pigtail.

Optional I/O expander

Powered by the meter, this self-contained unit extends and expands the meter's I/O and communication capabilities.

- 8 digital inputs and 8 digital outputs (4 Form A and 4 Form C solid state outputs)
- Pluggable connection for serial RS-232
- 4 analog outputs can replace 4 Form A digital outputs. 2 analog output options available, 0 to 20 mA (scalable 4 to 20 mA) and -1 to +1 mA (scalable 0 to 1 mA)

Measurement specifications	
Parameter	Accuracy \pm (%reading)
Metering	
Voltage (L-L) (L-N)	0.1 %
Frequency V1, V2, V3 (47-63 Hz)	0.005 Hz
I1, I2, I3, I4	0.1 %
kW, kVAR, kVA	IEC 62053-22 (0,2S)
kWh, kVARh, kVAh	IEC 62053-22 (0,2S)
Power Factor	0.5 %
Harmonics	
Highest Reported Harmonic	63
Voltage Magnitude or % of Nominal	IEC 61000-4-7 class 1 (up to 50th)
Current Magnitude or % of Nominal	IEC 61000-4-7 class 2 (up to 50th)
K Factor Current Channels	5 % ¹
Crest Factor Current Channels	1 % ²

¹Fundamental \geq 5 % nominal, harmonics 0-100 % of fundamental

²Fundamental \geq 5 % nominal

User programmable log capacity

Example configurations:

	Feature Set A	Feature Set B	Feature Set C
Memory	10 MB	4 MB	2 MB
Event	500 Events	500 Events	500 Events
Data	1yr ¹ 4yrs ² 280 days ¹ 3 yrs ²	0.5 yr ¹ 2 yrs ²	85 days ¹ 340 days ²
Waveforms	6 ³ 6 ³ 24 ⁴ 24 ⁴	-	-

¹16 parameters recorded every 15 minutes

²16 parameters recorded hourly

³on each of 6 channels at 256 samples per cycle for 14 cycles

⁴on each of 6 channels at 16 samples per cycle for 96 cycles

Standards compliance

Metering

- Energy metering accurate to IEC 62053-22 0,2S
- ANSI C12.20-1998 American National Standard for Electricity Meters 0.2 and 0.5 Accuracy Classes, for current Classes 2 and 20

Utility approvals

- California ISO, ERCOT, and New York State
- Industry Canada approved (AE-0924)

Electromagnetic compatibility

- IEC61000-4-2 (EN61000-4-2/IEC801-2) Electrostatic Discharge
- IEC61000-4-3 (EN61000-4-3/IEC801-3) Radiated EM Field Immunity
- IEC61000-4-4 (EN61000-4-4/IEC801-4) Electric Fast Transient
- IEC61000-4-5 (EN61000-4-5/IEC801-5) Surge Immunity
- IEC61000-4-6 (EN61000-4-6/IEC801-6) Conducted Immunity
- IEC61000-4-12 (EN61000-4-12/IEC801-12) Damped oscillatory waves immunity
- ANSI C62.41
- ANSI/IEEE C.37-90.1-1989 Standard surge withstand capability tests for protective relays and relay systems
- FCC Part 15 Subpart B, Class A: Class A Digital Device, Radiated emissions
- CISPR 14 Electromagnetic Compatibility Requirements for Household Appliances, Electric Tools, and Similar Apparatus

Itron software support

The meters are fully compatible with Itron software platforms including MV-90, MVP, MVRS, MVLT and MVCOMM, and offer a direct Ethernet connection to MV-90.

Operational specifications

Serial RS-232/RS-485 port (COM 1)

- Baud rates: 300 – 115,200 bps (RS-485 limited to 57,600 bps)
- Protocols: ION®, Modbus® RTU, Modbus® Master, DNP 3.0, GPS, EtherGate, ModemGate
- Isolation: Optical
- Duplex: Full (RS-232), Half (RS-485)

Serial RS-485 port (COM 2)¹

- Baud rates: 300 – 57,600 bps
- Protocols: ION, Modbus RTU, Modbus Master, DNP 3.0, GPS, EtherGate, ModemGate
- Isolation: Optical
- Duplex: Half

Internal modem (COM 2)²

- Baud rate: 300 bps - 33.6 kbps (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)
- Approvals:
 - ♦ FCC P68 (USA), Industry Canada CS-03
 - ♦ Also approved for use in: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK

ANSI Type 2 optical port (COM 3)

- Baud rates: 1200 - 19,200 bps
- Protocols: ION, DNP 3.0, Modbus RTU
- Duplex: Half

Ethernet port

- Interface: IEEE 802.3-1993, ISO/IEC 8802-3:1993 (Ethernet) 10BASE-T or 10BASE-FL (optional)
- Baud rates: 10 Mbps, half duplex
- Protocols: TCP/IP, Telnet, ION, Modbus TCP
- 10BASE-T
 - ♦ Connectors: RJ45
 - ♦ Cabling: Unshielded twisted-pair cable, 0.5 mm (24 AWG) max length 100 meters (109 yards)
 - ♦ Isolation: Transformer isolated; min isolation voltage 1500 VAC /2250 VDC
- 10BASE-FL (fiber)
 - ♦ Connectors: ST
 - ♦ Cabling: Fiber optic cable, 62.5/125 µm nominal, wavelength 820 nm max length 2000 meters (2,187 yards)

IRIG-B port

- Accuracy: +/- 1 ms.
- Format: IRIG-B00x format (unmodulated IRIG-B time code)
- Nominal voltage: 5 VDC +/- 10%
- Maximum voltage: 8 VDC
- Isolation: Optical
- Input impedance: 425 kΩ at 5 VDC

Current inputs

Standard (IEC 5 A & 10 A; ANSI current class 10 & 20)

- Rated nominals: 5 A and/or 10 A
- Starting current: 0.005 A RMS
- Fault capture: 50 A (instantaneous) peak
- Overload: 500 A RMS for 1 second, non-recurring
- Dielectric withstand: 2500 VAC, 60 Hz for 1 minute
- Burden (switchboard): 0.20 VA per phase (at 5 A)
- Burden (socket): 0.05 VA per phase (at 5 A)
- Impedance: 0.002 Ω/phase (phase-Vref)

Optional (IEC 1 A to 10 A; ANSI current class 2 & 10)

- Rated nominals: 1 A, 2 A, 5 A, and/or 10 A
- Starting current: 0.001 A RMS
- Fault capture: 24 A (instantaneous) peak
- Overload: 200 A RMS for 1 second, non-recurring
- Dielectric withstand: 2500 VAC, 60 Hz for 1 minute
- Burden: 0.015 VA per phase (at 1 A)
- Impedance: 0.015 Ω

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

The screenshot shows a web browser window titled "Real-Time Data - Microsoft Internet Explorer". The address bar shows "http://10...". The main content area displays "Real-Time Data" and "Revenue Measurements".

Voltage		Current	
V _{ln} avg:	352.46 V	I avg:	208.8
V _{ln} a:	218.43 V	I a:	198.0
V _{ln} b:	366.75 V	I b:	200.3
V _{ln} c:	472.19 V	I c:	227.9
V _{ll} avg:	577.64 V	I4:	0.25
V _{ll} a-b:	581.88 V	I5:	0.00
V _{ll} b-c:	579.24 V	I unbal:	9.18
V _{ll} c-a:	571.80 V		
V4:	53.52 V		
V unbal:	38.03 %		

Power Factor	
PF sign total:	-92.5
PF sign a:	-68.7
PF sign b:	99.73

¹If the modem is present, COM 2 serial port is unavailable. ²In Feature Set C, if Ethernet and modem options are chosen, no serial port is available.

Operational specifications cont.

Digital inputs

- 8 Inputs: S1-S8, SCOM self-excited, dry contact sensing, no external voltage required
- Minimum pulse width: 20 ms
- Maximum input transition rate: 50 transitions/sec.
- Scan time: 20 ms
- Timing resolution: 1 ms with 2 ms accuracy
- Isolation: 1000 V RMS, 60 Hz 1 minute to meter
- 3 additional internal inputs available through optional on-board I/O

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: 30 Ohms (typical), 50 Ohms (max)
- Off resistance: 400 M Ohms (min)
- Isolation: 3750 V RMS, 60 Hz for 1 minute to meter
- 1000 V RMS, 60 Hz for 1 minute (between outputs)
- Update rate: 20 ms
- Max output transition rate: 50 transitions/s
- 4 additional internal outputs available through optional on-board I/O

Analog outputs

- 4 analog outputs: supported through I/O Expander
Output range: 0 to 20 mA (scaleable from 4 to 20 mA) or -1 to +1 mA (scaleable from 0 to 1 mA)
- Max. load: 500 Ohms (0 to 20 mA),
10 K Ohms (-1 to +1mA)
- Isolation: 3750 V RMS, 60 Hz for 1 minute to meter
2000 V RMS, 60 Hz for 1 minute
- Accuracy: +/- 0.3% (% of Reading) at 23° C
- Accuracy drift: 100 ppm/° K
- Update rate: 1 second

Power supply

ION8600 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.

Standard power supply, 120-277 VAC

- Type: 3-phase powered from voltage sensing inputs
- Burden: max 4 W, 6.6 VA/phase
- Form 9 S/39S, 36S/76S: 120-277 VLN RMS (-15%/+20%) 47-63 Hz
- Form 35S: 120-480 VLN RMS (-15%/+20%) 47-63 Hz
- Dielectric withstand: 2000 VAC RMS, 60 Hz for 1 min.
- Ride-through: min 100 ms (6 cycles at 60 Hz at 96 VAC), 200 ms (12 cycles at 60 Hz at 120 VAC), 800 ms (48 cycles at 60 Hz at 240 VAC)
- Surge withstand: 6 kV/0.5 kA peak (100 kHz Ring Wave) ANSI C62.41 6 kV/3 kA peak (1.2/50-8/20 us) voltage surge L-L and L-GND ANSI C62.41

Standard (low voltage) power supply, 57-70 VAC

- Type: 3-Phase supply, drawing off voltage inputs
- Burden: Typical: 3 W, 5 VA/phase, 3-Phase operation Max: 4 W, 6.6 VA/phase, 3-phase operation
- Form 9S/36S/39S/76S: 57-70 (-15%/+20%) VLN RMS, 47-63 Hz
- Form 35S: unavailable
- Ride-through: min 100 ms or 6 cycles 60 Hz at 46 VAC
- Surge withstand: 6 kV/0.5 kA peak (100 kHz Ring Wave) — ANSI C62.41, 6 kV/3 kA peak (1.2/50-8/20 us) voltage surge L-L and L-GND ANSI C62.41

Auxiliary power cable assembly, 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: Typ. 10 VA, max 20 VA
- Ride-through: min. 100 ms 6 cycles 60 Hz at 46 VAC
- Surge withstand: 6 kV/0.5 kA peak (100 kHz Ring Wave) ANSI C62.41
6 kV/3 kA peak (1.2/50-8/20 us) voltage surge L-L and L-GND ANSI C62.41

Auxiliary power cable assembly, 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: typ. 10 VA, max 20 VA
- Ride-through: min 100 ms 6 cycles, 60 Hz at 96 VAC
- Surge withstand: 6 kV/0.5 kA peak (100 kHz Ring Wave) ANSI C62.41
6 kV/3 kA 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 (no formation of ice) (-40° F to 185° F)
- Display operating temp: -20° C to 60° C (-4° F 140° F)
- Storage: -40° C to +85° C (-40° F to 185° F)
- Humidity: 5% to 95% non-condensing

Front panel display

- Type: FSTN Liquid Crystal Display (LCD)
- Resolution: 240 x 67 pixels
- Size: 72 mm (2.83 ") (H) x 32 mm (1.26 ") (W)
- Backlight: LED (Green)
- Backlight timeout: 0 (always on) - 120 min

Metering

Four-quadrant energy

- kWh (delivered & received), (in & out)
- kWh, kVARh and kVAh net (delivered - received)
- kWh, kVARh and kVAh total (delivered + received)
- kVARh, kVAh (delivered & received)
- Volt-hours, Amp-hours and KQ-hours
- Integrate instantaneous measurements

Demand

- kW, kvar and kVA demand, min/max
- Volts and Amps demand, min/max
- KQ and cumulative demand
- Demand on any instantaneous measurement

Time-of-use

- 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 seasonal adjustments
- Calendar supports 4 season division
- Supports 5 daily profiles per season
- Supports 4 rate periods per daily profile
- Automatic mid-season rate change support

Instantaneous

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

Instrument and transformer/line loss compensation

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

Meter security

- 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

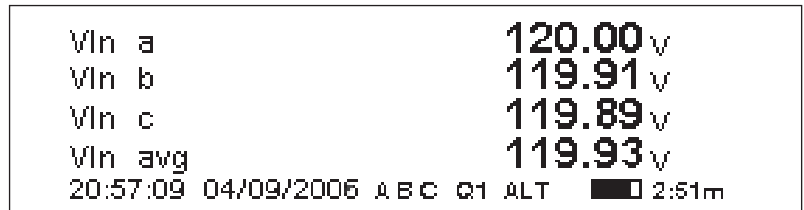
- Access controlled and customized for up to 16 users, from read access to administrative rights

Diagnostics

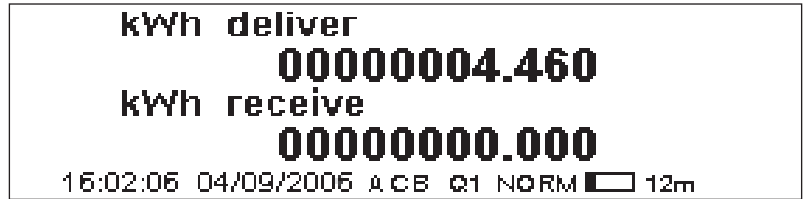
Advanced self-diagnostic checks of hardware, firmware, and logged data

Sample displays

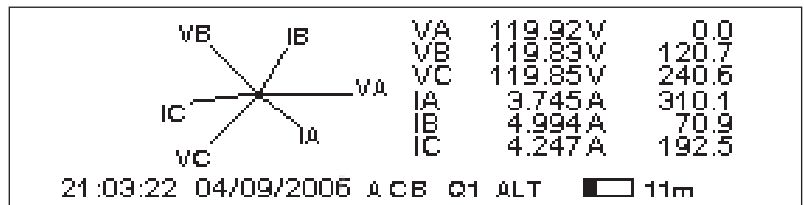
3-phase average voltage and current



Energy display



Unique vector diagram with magnitude and phase angle helps to reduce installation time



View THD and individual harmonics through the front panel display screen



Features sets	A	B	C
Metering			
Power, energy & demand	■	■	■
Power quality			
Sag/Swell, harmonics monitoring	■	■	■
Harmonics: individual, even, odd, up to	63rd	63rd	31st
Harmonics: magnitude, phase & inter-harmonics	40th		
Symmetrical components: zero, positive, negative	■	■	■
Transient detection, microseconds	78/65		
Sampling rate, maximum samples per cycle	256	256	256
Uptime in number of nines	■	■	■
Logging and recording			
Memory standard/optional	10 MB	4 MB	2 MB
Min/max logging for any parameter	■	■	■
Timestamp resolution in seconds	0.001	0.001	0.001
GPS time synchronization	■	■	■
Communications and I/O			
RS-232/485; RS-485; Ethernet; Optical; IRIG-B	■	■	■
Internal modem	1	1	1
3-port DNP 3.0 via serial, modem, Ethernet, I/R ports	■	■	■
Modbus RTU slave/master; Modbus TCP via Ethernet	■	■	■
EtherGate, ModemGate, MeterM@il, WebMeter	■	■	■
Internal KYZ outputs/Form A inputs	4/3	4/3	4/3
Ext. digital status inputs/counter/solid state outputs	8/8	8/8	8/8
Setpoints, alarming, and control			
Setpoints, number/minimum response time	65/1/2-cyc	65/1/2-cyc	65/1 sec
Math, logic, trig, log, linearization formulas	■	■	■
Call-out on single & multi-condition alarms	■	■	■
Revenue metering			
MV-90 on serial, modem & Ethernet ports (if present)	■	■	■
Multi-year scheduling: hourly activity profiles	■	■	■
Transformer/line loss compensation; ITC	■	■	■

Software integration

PowerLogic® ION Enterprise® Software

ION® Setup Software

Modbus® Master

Internet Connectivity

XML Compatibility

Flash-based firmware

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

PowerLogic® and ION®

Power Measurement and its ION® products were recently acquired by Schneider Electric and integrated within our PowerLogic® range of software and hardware, creating the world's largest line of power and energy management solutions.



Certificate No. 002188



Schneider Electric - North America
295 Tech Park Drive
LaVergne, TN 37086
Ph: 615-287-3500
<http://www.PowerLogic.com>

Document#3000BR0603 November 2006



SQUARE D

As standards, specifications and designs develop from time, always ask for confirmation of the information given in this publication. PowerLogic, ION, ION Enterprise, MeterM@il and Modbus are either trademarks or registered trademarks of Schneider Electric or its affiliates. Other marks used herein may be the property of their respective owners.