

Energy & power quality meter

PowerLogic® ION8800



Merlin Gerin



Intelligent transmission and distribution network meter

Providing high accuracy and a wide range of features for transmission and distribution metering, the PowerLogic® ION8800 is the world's most advanced power and energy meter with the flexibility to change as your needs change.

This meter provides the information necessary to perform network capacity planning and stability analysis and to monitor power quality compliance, supply agreements and regulatory requirements.

Integrate with your existing wholesale settlement system, use ION Enterprise® software, or share operations data with existing SCADA systems through multiple communication channels and protocols.



Applications

- Transmission and distribution metering
- Revenue and tariff metering
- Power quality compliance monitoring
- Power quality analysis
- Load management
- System stability monitoring
- Energy pulsing and totalization
- Instrument transformer correction
- Transformer/line loss calculation
- Real-time system loss measurements



Features

- Rackmount design to DIN 43862 standard allows for easy retrofit into existing systems
 - Essailec® connector with common measurement and energy pulsing pin-out greatly reduces installation costs
- IEC 62053-22 Class 0,2S compliance for metering accuracy
 - One second loss calculation and error correction capabilities establish system losses and correct for measurement errors in real time
- Power quality compliance monitoring for international quality-of-supply standards plus specific data for localized and custom compliance agreements and network connection requirements
 - EN 50160
 - IEC 61000-4-30 class A
 - IEC 61000-4-7 harmonics & inter-harmonics
 - IEC 61000-4-15 flicker
 - CBEMA/ITIC, SARFI
 - IEEE 1159
- Digital fault-recording capabilities simultaneously capture voltage and current channels for sub-cycle disturbance transients as well as multi-cycle dips, swells and outages
 - 1024 samples/cycle waveform recording
 - 20 µs transient capture (50 Hz)
- Complete communications: Fibre - 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, DLMS (IEC 62056), and IEC 60870-5-102¹
- Multi-user, multi-level security to 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 provides a modular, flexible architecture that offers extensive user programmability
 - Uniquely addresses complex monitoring and control applications
 - Adapts to changing needs, avoiding obsolescence
- Onboard data and event logging with 5 MB (standard) or 10 MB (optional) non-volatile memory
 - Dial-out capability when memory is near full
 - Data push capability through SMTP (email)

¹ This feature is currently unavailable. Contact your sales representative for the availability date.

Connections

Installation

- 4-wire Wye, 3-wire Wye, 3-wire Delta, and Single-phase systems
- 3 voltage and 4 current inputs
- IEC/DIN 43862 with Essaielc connectors
- Sealing capabilities
- Field replaceable communication options

Voltage and current inputs

- Directly connect (no PTs needed) systems up to 288 V AC (500 V L-L)
- Autoranging 57 - 288 V L-N (500 L-L) inputs
57 - 288 V AC L-N RMS (99 - 500 V AC L-L RMS)
- Standard 5 A nominal current inputs
- Optional 1 A nominal current inputs

Control power supply

The meter's single-phase auxiliary power supply has a voltage range of 85 – 240 V AC and 95 – 270 V DC.

Clock backup battery

A field-replaceable 3.6 V lithium cell maintains the real-time clock if the operating power is removed from the meter.

Measurement specifications (IEC standards 1A, 2A and 5A)	
Parameter	Accuracy
Metering	
Voltage (L-L) (L-N)	0.1% Reading
Frequency U1,U2,U3 (42-69 Hz)	0.005 Hz
I1, I2, I3, I4	0.1% Reading
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 ¹ (up to 50th)
Current Magnitude or % of Nominal	IEC 61000-4-7 class 2 ¹ (up to 50th)
K Factor Current Channels	5% ²
Crest Factor Current Channels	1% ³

¹ Only applicable for ION8800A and ION8800B

² Fundamental >= 5% nominal, harmonics 0-100% of fundamental

³ Fundamental >= 5% nominal, peak current limited to +/- 14 A

Communication features

WebMeter®

An on-board web server provides access to real-time values and PQ data through any web-enabled device and even support basic meter configuration tasks.

MeterM@il®

Automatically send alarm notifications or scheduled system-status updates via email to a workstation, cell phone, pager or PDA. Data logs can also be sent on an event-driven or scheduled basis via email, while conveniently accommodating firewall restrictions.

EtherGate & ModemGate

The meter can provide gateway functionality depending on the its communication options. The EtherGate feature provides communications both to an Ethernet connected device and through that device to a connected serial network. The ModemGate feature creates a communications connection between the telephone network and an RS-485 serial network of devices.

Standards compliance

Accuracy

- Independent Compliance with IEC62053-22 1st.ed. 2003-01: Electricity metering equipment (AC) - particular requirements - part 22: Static meters for active energy 0.2S and 0.5S. Tested by KEMA.

Safety/Construction

- IEC62052-11

Electromagnetic compatibility

- IEC1000-4-2 (EN61000-4-2/IEC801-2) Electrostatic Discharge
- IEC1000-4-3 (EN61000-4-3/IEC801-3) Radiated EM Field Immunity
- IEC1000-4-4 (EN61000-4-4/IEC801-4) Electric Fast Transient
- IEC1000-4-5 (EN61000-4-5/IEC801-5) Surge Immunity
- IEC1000-4-6 (EN61000-4-6/IEC801-6) Conducted Immunity
- IEC1000-4-12 (EN61000-4-12/IEC801-12) Damped oscillatory waves immunity
- IEC 62052-11 1st.ed. 2003-02: Electricity metering equipment (AC) - part 11: General requirements, tests and conditions
 - CISPR 22 Radiated/Conducted Emissions (Class B)
- EN55011 (CISPR 11) Radiated/Conducted Emissions (Group 1, Class A)

Operational specifications

IEC 61107 optical port (COM 1)

- Data rates: 1200 - 19,200 bps
- Protocols: ION, DNP 3.0, Modbus RTU, DLMS
- Isolation: Optical
- Duplex: Half

Serial RS-485 port (COM 2)

- Data rates: 300 – 57,600 bps
- Connectors: captured wire
- Protocols: ION, Modbus RTU, Modbus Master, DNP 3.0, DLMS, GPS, EtherGate, ModemGate
- Isolation: Optical
- Duplex: Half

Serial RS-232/RS-485 port (COM 3)

- Data rates: 300 – 115,200 bps (RS-485 limited to 57,600 bps)
- Connectors: male DB9 (RS-232 DTE) or captured wire (RS-485)
- Protocols: ION, Modbus RTU, Modbus Master, DNP 3.0, DLMS, GPS, EtherGate, ModemGate
- Isolation: Optical
- Duplex: Full (RS-232), Half (RS-485)

Internal PST modem (COM 4)

- Data rate: 300 bps – 56 kbps (V.92, V.90, 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.44, V.42 LAPM, MNP 2-4
- Data compression: V.42 bis/MNP Class 5
- Connectors: RJ11 (Tip & Ring)
- Government approvals: CTR-21 (Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Latvia, Liechtenstein, Lithuania, Luxembourg, Malaysia, Malta, Mexico, Netherlands, New Zealand, Norway, Philippines, Poland, Portugal, Russia, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Kingdom, United States)

Ethernet port

- Interface: IEEE 802.3-1993, ISO/IEC 8802-3:1993 (Ethernet) 10BASE-T or 10BASE-FL (optional)
- Data 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
 - Isolation: Transformer isolated; min isolation voltage 1500 V AC / 2250 V DC
- 10BASE-FL (fiber)
 - Connectors: ST
 - Cabling: Fiber optic cable, 62.5/125 um nominal, wavelength 820 nm Max. length 2000 meters
 - Isolation: Optical

IRIG-B

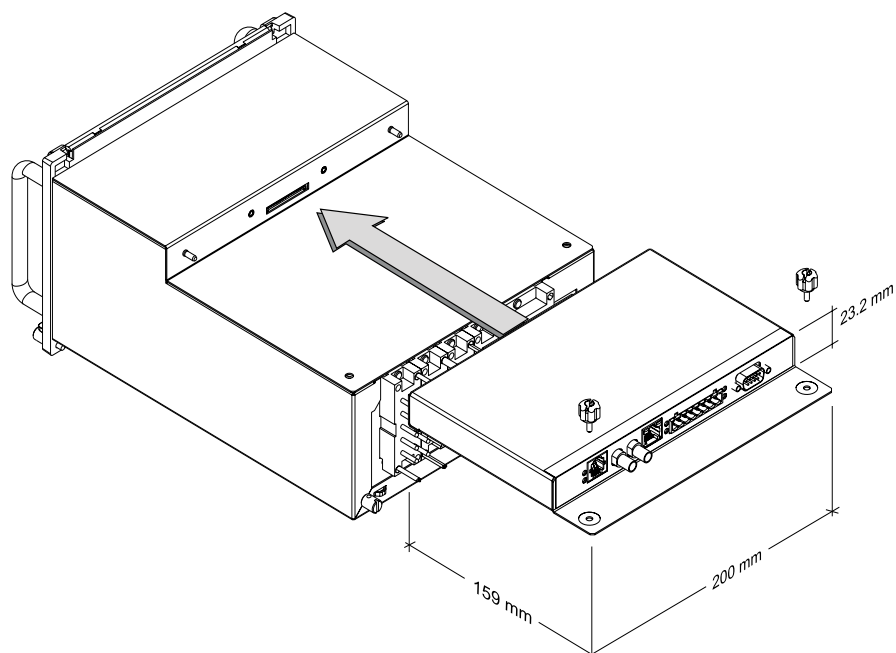
- Accuracy: +/- 1ms.
- Format: IRIG-B00x format (unmodulated IRIG-B time code)
- Nominal voltage: 5 Vdc +/- 10%
- Maximum voltage: 8 Vdc
- Isolation: optical
- Input impedance: 2 M Ω

Digital inputs

- Port Names: DI1 - DI3
- Excitation: External only
- Minimum pulse width: 1 ms
- Maximum pulse rate: 20 Hz
- Timing resolution: 1 ms
- Updated: 1/2 cycle (after timing resolution)
- Isolation: optical
- Rating: Installation category II (local), Pollution degree 2
- Low-voltage inputs:
 - Guaranteed OFF range -75 to 5 V DC / V AC (RMS)
 - Guaranteed ON range 15 to 75 V DC / V AC (RMS)
 - Impedance: 20 k Ω
- High-voltage inputs
 - Guaranteed OFF range -280 to 25 V DC / V AC (RMS)
 - Guaranteed ON range 75 to 280 V DC / V AC (RMS)
 - Impedance: 100 k Ω
- Frequency range for AC detection: 5 - 210 Hz

Digital outputs (Form A)

- Port names: Solid state relay outputs DO5 - DO12
- Excitation: External only
- Maximum switching voltage: 250 V DC or 210 V AC (+/- 300 Vpeak)
- Maximum switching current: 100 mA AC/DC
- Isolation: optical
- Update rate: 0.5 cycle or 1 second (depends on the update rate of the source)
- Rating: Installation category II (local), Pollution degree 2



Rear view of meter with communication module

Digital outputs (Form C)

- Port names: Solid state relay outputs DO1 - DO4
- Excitation: External only
- Contacts: common, NO, NC
- Maximum switching voltage: 250 V DC or 210 V AC (internally limited to 350 V peak)
- Maximum switching current: 100 mA AC/DC
- Isolation: optical
- Update Rate: 0.5 cycle or 1 second (depends on the update rate of the source)
- Rating: Installation category II (local), Pollution degree 2

Mechanical alarm relay

- Port name: Mechanical alarm relay / LED
- Contacts: common, NO, NC
- Maximum switching voltage: 250 V AC / 125 V DC (internally limited to 300 V peak)
- Maximum switching current: 1 A AC / 0.1 A DC
- Operate time (max): 8 ms
- Release time (max): 4 ms
- Minimum operations: 5 000 000
- Update rate: 0.5 cycle or 1 second
- Rating: Installation category II (local), Pollution degree 2

Current inputs (high-current option)

- Accuracy Range: 0.05 A - 10 A autoranging
- Rated nominal: 5 A
- Starting current: 0.005 A RMS
- Maximum current: 10 A
- Fault capture: 14 A peak
- Maximum voltage: 288 V RMS (Cat IV IEC 61010-1)
- Overload: 200 A RMS for 0.5s, non-recurring
- Dielectric withstand: 3250 V AC RMS @ 50 Hz for 60 s
- Burden: 0.25 VA/phase (@ 5 A)
- Impedance: 10 m Ω /phase
- Rating: Measurement category IV

Current inputs (low-current option)

- Accuracy Range: 0.01 A - 6 A autoranging
- Rated nominal: 1 A and 2 A
- Starting current: 0.001 A RMS
- Maximum current: 10 A
- Fault capture: 14 A peak
- Max voltage: 288 V RMS (Cat IV IEC 61010-1)
- Overload: 200 A RMS for 0.5s, non-recurring
- Dielectric withstand: 3250 V AC RMS @ 50 Hz for 60 s
- Burden: 0.01 VA/phase (@ 1 A)
- Impedance: 10 m Ω /phase
- Rating: Measurement category IV

Voltage inputs

- Inputs: U1, U2, U3, Uref
- Accuracy and rating range: 57 - 288 V AC L-N RMS (99 - 500 V AC L-L RMS)
- Fault capture: 1200 V peak (L-N)
- Overload: 1500 V AC RMS continuous
- Dielectric withstand: 3250 V AC RMS @ 50 Hz for 60 s
- Impedance: 5 M Ω /phase (phase - Uref/Ground)
- Rating: Measurement category IV

Environmental conditions (meets & exceeds IEC62052-11)

- Mounting location: Indoor use
- Maximum altitude: 2000 metres above sea level
- Operating range: -25° C to +55° C (no ice formation)
- Display operating range: -10° C to +60° C
- Storage range: -25° C to +70° C
- Relative humidity range: 5 to 95% non-condensing
- Enclosure rating: IP51 (IEC60529)

Waveform (digital fault) recording

- Waveform recording options range from 16 samples/cycle to 1024 samples/cycle (800 Hz to 51 kHz) depending on model and options. Back-to-back waveform recording allows for extended captures.
- Sampling rate: 1024 samples/cycle from 42-69 Hz
- Sub-cycle disturbance capture to 20 μ s
- Dynamic range: up to 1200 V AC, 14 A peak

Display

- Type: FSTN, transreflective, Liquid Crystal Display (LCD)
- Resolution: 240 x 64 pixels
- Backlight: LED

Real-time clock

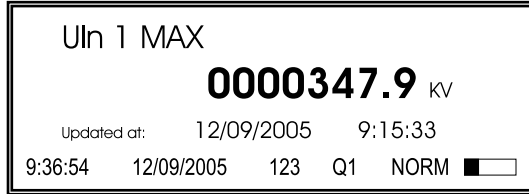
- Operating modes: Synchronize to internal oscillator (default) or external source (e.g. GPS)
- Resolution: year, month, day, hours, minutes, seconds, milliseconds
- Time format: Universal coordinated time (UTC). The clock can display local time based on time-zone settings.
- Daylight Savings Time: Supported based on user programmable 20-year calendar.
- Accuracy Sync to internal crystal: +/- 5 ppm typical 0° C - 40° C, +/-10 ppm max -20° C - +70° C
- Carry through: 3.6 V Lithium battery provides power during outage conditions

Power supply

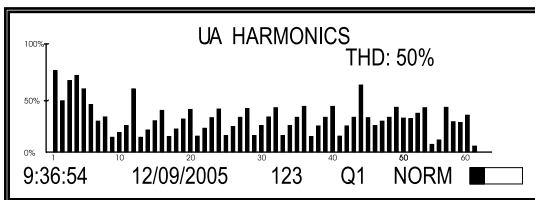
- Single-phase power supply option
 - AC: 85 - 240 V AC (+/- 10%), 47-63 Hz
 - DC: 110 - 270 V DC (+/- 10%)
- Rating: Installation category II (local), Pollution degree 2
- Dielectric Withstand: 2000 V AC @ 50 Hz for 60 s

Front panel display

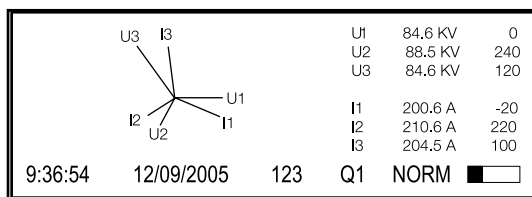
The meter boasts a backlit LCD with multiple programmable screens for numeric values, time-stamped values, frequency spectrum (harmonics), trend logs, and name plate data. The alphanumeric text displays are capable of supporting international labels such as OBIS and VDEW.



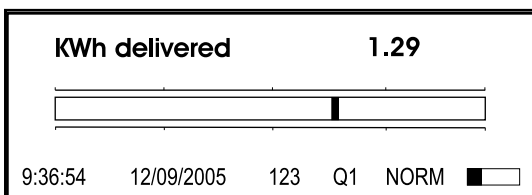
Example numeric display



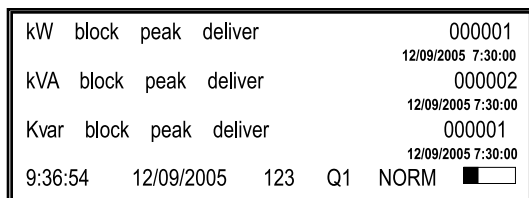
Example histogram display



Example phasor display



Example disk simulator display



Example timestamp display

Metering

Energy

High-accuracy 4-quadrant metering in accordance with IEC 62053-22 class 0,2S for both 3- and 2-element systems:

- Real energy, bidirectional kWh (delivered & received)
- Reactive 4-quadrant energy, kvarh (positive & negative)
- Apparent energy kVAh (delivered & received)
- kWh, kvarh and kVAh net (delivered - received)
- kWh, kvarh and kVAh total (delivered + received)
- Any measured value, instantaneous voltage, current, etc.
- Fully programmable integrating period (1, 5, 10, 15, 30, 60 minutes or other)

Demand

Supports block, rolling block, thermal (exponential), and predicted demand calculations.

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

Multiple tariffs & time-of-use (TOU)

- Active, reactive, and apparent energy and demand
- Automatic recording of maximum (peak) demand during each tariff period
- Automatic clock synchronization over communications channel or GPS
- 20-year calendar with automatic leap-year and seasonal time adjustments
- Time switch for tariff control per IEC 62056 and other international standards
- automatic mid-season rate change support
- TOU: Four seasons, five daily profiles per season, and four tariff periods per daily profile

Operational measurements

High-accuracy (1-second) and high-speed (1/2-cycle) true RMS 3-phase measurements for each phase and all phases:

- Voltage and current
- Active, reactive and apparent power
- Power factor and frequency
- Voltage / current unbalance / phase reversal
- Additional calculated and derived values

User programmable log capacity

Example configurations:

	ION8800			
Events	500	500	500	500
Data ^A	1.5 years	3.1 years	1.3 years	2.9 years
Waveforms	180 ^B	180 ^B	360 ^C	360 ^C

A 16 parameters recorded every 15 minutes

B 30 waveforms on 6 channels at the maximum sampling rate

C 30 waveforms on 12 channels with any selectable format (for example, 6 channels are 512 samples per cycle for 4 cycles, and 6 channels are 32 samples per cycle for 54 cycles)

The PowerLogic ION8800 meter is available in three different base models: the ION8800A, the ION8800B, and the ION8800C.

Feature	ION8800A	ION8800B	ION8800C
Power Quality			
Sag/Swell Monitoring	■	■	■
Symmetrical Components: zero, positive, negative	■	■	■
Harmonics: individual, even, odd, total (up to 63rd)	■	■	■
Harmonics: magnitude, phase and interharmonics	■	■	
EN50160 compliance monitoring	■	■	
Flicker (Standard harmonics, IEC 61000-4-7/4-15)	■	■	
Configurable for IEEE519-1992, IEEE1159-1995	■		
Transient detection, waveform capture	■		
Communications & Logging/Recording			
Modbus Master RTU on serial ports	■	■	
Historical logs, maximum # of channels	800	640	32
Waveform logs, maximum # of cycles per log	96		
Consecutive waveform cycles captured per MB	900		

Feature	All models
Revenue Metering & Standards	
IEC 62053-22 class 0,2S compliant	■
Time-of-Use	■
Transformer/line loss compensation	■
MV-90 on serial, modem & Ethernet ports (if present)	■
Communications and I/O	
IEC1107 optical port (COM1) Standard on front of meter	1
RS-485 port (COM2) Selectable on Essalec connector or communication module	1
RS-232/485 port (COM3) Optional on communication module	1
Internal PSTN Modem (COM4) Optional on communication module	1
Ethernet port - Optional on communication module	1
DLMS, DNP 3.0 & Modbus RTU Slave via serial, modem & optical ports	■
Modbus TCP through Ethernet port	■
EtherGate, WebMeter, ModemGate, MeterM@il	■
Active/Reactive energy pulser, visible LED and IEC1107 style port	■
Digital pulse outputs (solid state Form A) (Optional)	8
Digital pulse outputs (solid state Form C)	4
Alarm relay output (Form C)	1
Digital inputs (Optional)	3
Setpoints, Alarming, & Control	
Setpoints, number / minimum response time	65 / ½ cycle
Math, logic, trig, log, linearization formulas	■
Call-out on single & multi-condition alarms	■
Logging and Recording	
Memory capacity, standard / optional	5MB/10MB
Max data points per MB (channels x depth per recorder)	165,000
Timestamp resolution in seconds	0.001
Min/max logging for any parameter	■
GPS time synch (standard on serial; optional on IRIG-B)	■
Power Line Time Synchronization	■

Schneider Electric
<http://www.schneider-electric.com>
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<http://www.PowerLogic.com>

As standards, specifications and designs develop from time, always ask for confirmation of the information given in this publication



Publication: Schneider Electric

Software integration

PowerLogic® ION Enterprise® software
 ION Setup software
 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.

PowerLogic®

ION®