PowerLogic power-monitoring units

ION8650

Technical data sheet

Schneider Electric™

ION8650
Functions and characteristics

PB107500

PowerLogic ION8650 socket meter

Used to monitor electric energy provider networks, service entrances and substations, PowerLogic ION8650 meters are ideal for independent power producers and cogeneration 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 StruxureWare Power Monitoring (ION Enterprise™) operations software or other energy management and SCADA systems through multiple communication channels and protocols, including Itron MV-90, Modbus, DNP, DLMS, IEC 61850 Ed. 2.

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 totalisation.
Instrument transformer correction.

Main characteristics

ANSI Class 0.2 and IEC 62053-22/23 Class 0,2S metering
For interconnection points on medium, high, and ultra-high voltage networks; twice as accurate as current IEC and ANSI Class 0.2 standards over all conditions and including single wide range current measurement.

Power quality compliance monitoring
Monitor compliance with international quality-of-supply standards (IEC 61000-4-30 Class A/S, EN 50160 Ed. 4, IEC 61000-4-7, IEC 61000-4-15, IEEE 1159, IEEE 519). Also detects disturbance direction.

Digital fault recording
Simultaneous capture of voltage and current channels for sub-cycle disturbance.

Complete communications
Multi-port, multi-protocol ports including serial, infrared, modem and ethernet. Simultaneously supports multiple industry standard protocols including: Itron MV-90, Modbus, Modbus Master, DLMS, DNP 3.0 and IEC 61850 Ed. 2.

Multiple tariffs and time-of-use
Apply tariffs, seasonal rate schedules to measure energy and demand values for time periods with specific billing requirements.

Multiple setpoints for alarm and functions
Use up to 65 setpoints for single/multi-condition alarms and I/O functions with response times down to 1/2 cycle.

Multiple setpoints for alarm and functions
Use up to 65 setpoints.

Instrument transformer correction
Save money and improve accuracy by correcting for less accurate transformers.

Alarm notification via email
High-priority alarms, data logs sent directly to the user's PC. Instant notification of power quality events by email.

Cyber security enhancements
Assign communication admin rights to selected user; prevention measures ensure no loss of security logs; support syslog for external security.

Part numbers

ION8650 meters	
ION8650A	**M8650A**
ION8650B	**M8650B**
ION8650C	**M8650C**

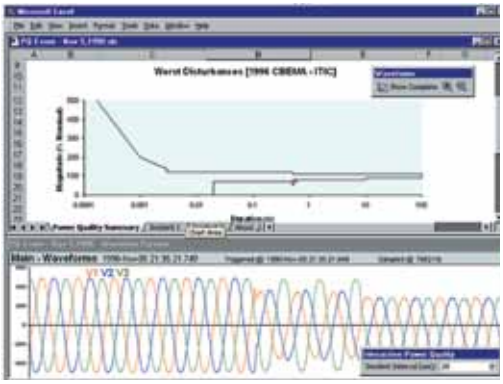
ION8650
Functions and characteristics (cont.)

PE86302-95

PowerLogic ION8650 socket meter.

1 *Terminals*
2 *Optical port*
3 *Main display status bar*
4 *Watt LED*
5 *Navigation, ALT/Enter buttons*
6 *VAR LED*
7 *Nameplate label*
8 *Demand reset switch*

PE86002

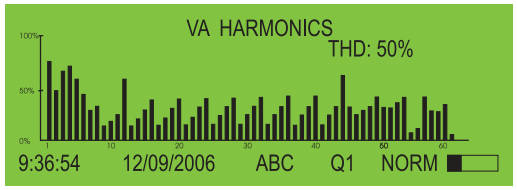


Disturbance waveform capture and power quality report

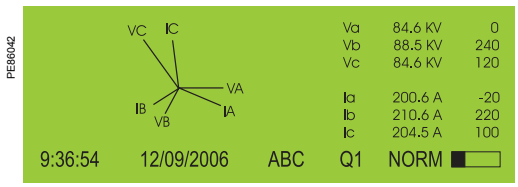
Selection guide		ION8650 A	ION8650 B	ION8650 C
General				
Use on LV, MV and HV systems		■	■	■
Current accuracy		0.1 %	0.1 %	0.1 %
Voltage accuracy		0.1 %	0.1 %	0.1 %
Power accuracy		0.1 %	0.1 %	0.1 %
Samples/cycle		1024	1024	1024
Instantaneous values				
Current, voltage, frequency		■	■	■
Active, reactive, apparent power	Total & per phase	■	■	■
Power factor	Total & per phase	■	■	■
Current measurement range		0 - 20A	0 - 20A	0 - 20A
Energy values				
Active, reactive, apparent energy		■	■	■
Settable accumulation modes		■	■	■
Demand values				
Current	Present & max. values	■	■	■
Active, reactive, apparent power	Present & max. values	■	■	■
Predicted active, reactive, apparent power		■	■	■
Synchronisation of the measurement window		■	■	■
Demand modes: Block (sliding), thermal (exponential)		■	■	■
Power quality measurements				
Harmonic distortion	Current & voltage	■	■	■
Individual harmonics	Via front panel	63	63	31
Waveform / transient capture		■ / ■	- / ■	- / -
Harmonics: magnitude, phase, and interharmonics		50	40	-
Detection of voltage sags and swells		■	■	■
IEC 61000-4-30 class A / S		A	S	-
IEC 61000-4-15 (Flicker)		■	■	-
High speed data recording (down to 10 ms)		■	■	-
EN50160 compliance reporting		■	■	-
Programmable (logic and math functions)		■	■	■
Data recording				
Onboard Memory (in Mbytes)		128	64	32
Revenue logs		■	■	■
Event logs		■	■	■
Historical logs		■	■	■
Harmonics logs		■	■	■
Sag/swell logs		■	■	■
Transient logs		■	-	-
Time stamping to 1 ms		■	■	■
GPS synchronisation (IRIG-B standard)		■	■	■
Display and I/O				
Front panel display		■	■	■
Wiring self-test (requires PowerLogic ION Setup)		■	■	■
Pulse output (front panel LED)		2	2	2
Digital or analogue inputs(1) (max)		11	11	11
Digital or analogue outputs(1) (max, including pulse output)		16	16	16
Communication				
Infrared port		1	1	1
RS 485 / RS 232 port		1	1	1(3)
RS 485 port		1	1	1(3)
Ethernet port (Modbus/TCP/IP protocol) with gateway		1	1	1(3)
Internal modem with gateway (ModemGate)		1	1	1(3)
HTML web page server		■	■	■
IRIG-B port (unmodulated IRIG B00x time format)		1	1	1
Modbus TCP Master / Slave (Ethernet port)		■ / ■	■ / ■	- / ■
Modbus RTU Master / Slave (Serial ports)		■ / ■	■ / ■	- / ■
DNP 3.0 through serial, modem, and I/R ports		■	■	■

(1) *With optional I/O Expander.*
(2) *For 9S, and 36S only. For 35S system up to 480V line-to-line.*
(3) *C model limited to IR + 2 other ports at one time. Ports can be enabled/disabled by user.*

ION8650
Functions and characteristics (cont.)



PowerLogic ION8650 front panel harmonic display.



ION8650 front panel phasor display and table.

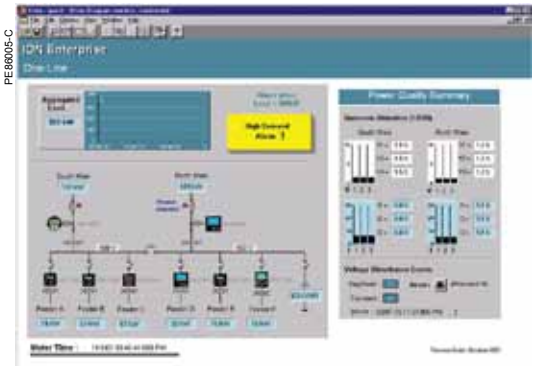
Electrical characteristics		
Type of measurement		True rms 1024 samples per cycle
Measurement accuracy	Current and voltage	0.1 % Reading
	Power	0.1%
	Frequency	±0.001 Hz
	Power factor	0.1%
	Energy	0.1%, twice as accurate as ANSI Class 0.2 and IEC 62053-22/23 (0,2S)
Data update rate		0.5 cycle or 1 second (depending on value)
Input-voltage characteristics (1)	Nominal voltage	57V to 277VLN rms 100V to 480VLL rms (35S)
	Maximum voltage	347 VLN rms, 600 VLL rms (9S)
	Impedance	5 MΩ /phase (phase-Vref/Ground)
	Inputs	V1, V2, V3, VREF
Input-current characteristics	Rated nominal/current class	1A, 2 A, 5 A and/or 10 A (Class 1/2/10/20)
	Accuracy range	0.01 - 20 A (standard range)
	Measurement range	0.001 - 24 A
	Permissible overload	500A rms for 1 second, non-recurring
	Burden per phase	Socket: Typical: 3 W, 8 VA/phase, 3-phase operation; Maximum: 4 W, 11 VA/phase, 3-phase operation Switchboard: 0.05VA at 1A (0.05 Ω max)
Power supply	Standard power supply, blade powered	120-277 VLN RMS (-15%/+20%) 47-63 Hz or 120-480 VLL RMS (-15%/+20%) 47-63 Hz (35S)
	Auxiliary powered low voltage	AC: 65-120 (+/- 15%) VLN RMS, 47-63 Hz DC: 80-160 (+/- 20%) VDC
	Auxiliary powered high voltage	AC: 160-277 (+/- 20%) VLN RMS, 47-63 Hz DC: 200-300 (+/- 20%) VDC
	Ride-through time, (Standard power supply)	Socket: min guaranteed: 6 cycles at nominal frequency (minimun 50 Hz), at 120 V L-N rms (208 V L-L rms) 3-phase operation Switchboard: min guaranteed: 6 cycles at nominal frequency (minimun 50 Hz), at 120 V L-N rms (208 V L-L rms) 3-phase operation
Input/outputs (2)	Digital outputs	4 (Form C) Solid state relays (130 V AC/ 200 V DC) 50 mA AC/DC, 1 (Form A) output
	Digital inputs	upto 3 Self-excited, dry contact sensing inputs
Mechanical characteristics		
Weight		7.0 kg
IP degree of protection	Socket	Front IP65, back IP51
	Switchboard	Front IP50, back IP30
Dimensions	Socket	178 x 237 mm
	Switchboard	285 x 228 x 163 mm
Environmental conditions		
Operating temperature		-40°C to +85°C
Display operating range		-40°C to +70°C
Storage temperature		-40°C to +85°C
Humidity rating		5 to 95 % RH non-condensing
Pollution degree		2
Installation category		Cat III
Dielectric withstand		2.5kV
Electromagnetic compatibility		
Electrostatic discharge		IEC 61000-4-2
Immunity to radiated fields		IEC 61000-4-3
Immunity to fast transients		IEC 61000-4-4
Immunity to surge		IEC 61000-4-5
Immunity conducted		IEC61000-4-6
Damped oscillatory waves immunity		IEC61000-4-12
Conducted and radiated emissions		CISPR 22 (class B)
Safety		
Europe		As per IEC62052-11
North America		As per ANSI C12.1

(1) *Specifications are limited by the operating range of the power supply if a non-aux power supply is used.*

(2) *More input and output selections available via optional I/O expander.*

ION8650
Functions and characteristics (cont.)

Example embedded webserver page (WebMeter) showing realtime values.



PE86005-C

Communication	
RS 232 / RS 485 port (COM1)	User-selectable RS 232 or RS 485. 300 - 115,200 bauds (RS485 limited to 57,600 bps); protocols: ION, Modbus/RTU/Mastering, DLMS, DNP 3.0, GPSTRUETIME/DATUM.
Internal modem port (COM2)	300-57,600 bps
ANSI 12.18 Type II optical port (COM3)	Up to 57,600 bps
RS 485 port (COM4)	Up to 57,600 bauds, Modbus, direct connection to a PC or modem
Ethernet port	10/100 BaseT, RJ45 connector, protocols: DNP, ION, Modbus/TCP/Mastering, IEC 61850 Ed. 2 or 100BASE-FX multimode, male ST connectors
EtherGate	Up to 31 slave devices via serial ports
ModemGate	Up to 31 slave devices
Firmware characteristics	
High-speed data recording	Up to 1/2-cycle interval burst recording, stores detailed characteristics of disturbances or outages. Trigger recording by a user-defined setpoint, or from external equipment.
Harmonic distortion	Up to 63rd harmonic for all voltage and current inputs
Dip/swell detection	Analyse severity/potential impact of sags and swells: - magnitude and duration data suitable for plotting on voltage tolerance curves - per phase triggers for waveform recording or control operations
Instantaneous	High accuracy measurements with 1s or 1/2 cycle update rate for: - voltage and current - active power (kW) and reactive power (kVAR) - apparent power (kVA) - power factor and frequency - voltage and current unbalance - phase reversal
Load profiling	Channel assignments are user configurable: - 800 channels via 50 data recorders (feature set A), - 720 channels via 45 data recorders (feature set B), - 80 channels via 5 data recorders (feature set C). Configure for historical trend recording of energy, demand, voltage, current, power quality, other measured parameter. Recorders can trigger on time interval basis, calendar schedule, alarm/event condition, manually.
Waveform captures	Simultaneous capture of all voltage and current channels - sub-cycle disturbance capture (16 to 1024 samples/cycle)
Alarms	Threshold alarms: - adjustable pickup and dropout setpoints and time delays, numerous activation levels possible for a given type of alarm - user-defined priority levels - boolean combination of alarms
Advanced security	Up to 50 users with unique access rights. Perform resets, time syncs, or meter configurations based on user priviledges.
Transformer correction	Correct for phase / magnitude inaccuracies in current transformers (CTs), potential transformers (PTs)
Memory	128 Mbytes (A), 64 Mbytes (B), 32 Mbytes (C)
Firmware update	Update via the communication ports
Display characteristics	
Type	FSTN transreflective LCD
Backlight	LED
Languages	English

ION8650
Functions and characteristics (cont.)

PE86043-C

1	2	3	4	5	6	7	8	9	10	11
M8650	A	1	C	0	E	5	C1	A	0	A

Example product part number.

1 *Model.*
2 *Feature set.*
3 *Form factor.*
4 *Current Inputs.*
5 *Voltage inputs.*
6 *Power supply.*
7 *System frequency.*
8 *Communications.*
9 *Input/output options.*
10 *Security.*
11 *Special order options.*

PB107507

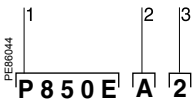
PowerLogic ION8650 meter with switchboard case

Part Numbers

Item		Code	Description
1	Model	M8650	Schneider Electric energy and power quality meter.
2	Feature Set	A	128MB Memory Class A power quality analysis, waveforms and transient capture with 1024 samples/cycle.
		B	64MB memory, energy meter Class S EN 50160 Ed. 4 power quality monitoring.
		C	32MB memory, basic tariff/energy metering (5 data recorders, 80 channels).
3	Form Factor (1)	0	Form 9S/29S/36S Base, 57-277 VLN (autoranging) 3-Element, 4-Wire / 2 1/2-Element, 4-Wire
		1	Form 35S Base - 120-480 VLL (autoranging) 2-Element, 3-Wire
		4	Form 9/29/35/36S FT21 Switchboard (meter + case) with break out panel
		7	Form 9/29/35/36S FT21 Switchboard (meter + case) with break out cable
4	Current Inputs	C	1, 2 or 5 Amp nominal, 20 Amp full scale (24 Amp fault capture, start at 0.001 A)
5	Voltage Inputs	0	Standard (see Form Factor above)
6	Power Supply	E	Form 9/29/35/36S, (socket) and Form 9, 36 (FT21 switchboard): 120-277 VAC. Form 35S (socket) and Form 35 (FT21 switchboard): 120-480 VAC. Powered from the meter's voltage connections.
		H	Auxiliary Power Pigtail: 65-120 VAC or 80-160 VDC (power from external source)
		J	Auxiliary Power Pigtail: 160-277 VAC or 200-300 VDC (power from external source)
7	System Frequency	5	Calibrated for 50 Hz systems.
		6	Calibrated for 60 Hz systems.
8	Communications	A 0	Infrared optical port, RS 232/RS 485 port, RS 485 port
		C 7	Infrared optical port, Ethernet (10/100Base-T), RS 232/485 port, RS 485 port (note: in addition to infrared optical port, Feature Set C can use any two ports (configurable)), 56k universal internal modem (RJ11)
		E 1	Infrared optical port, Ethernet (10/100Base-T), RS 232/485 port, RS 485 port (note: in addition to infrared optical port, Feature Set C can use any two ports (configurable))
		F 1	Infrared Optical port, Ethernet (100BASE-FX multi-mode) with male ST connectors (available on socket meters only, Forms 0 & 1 above. I/O card not available if this option is ordered.) RS-232/485 port, RS-485 port (Note: in addition to Infrared Optical port Feature Set C can use any two ports (configurable))
		M 1	Infrared optical port, RS 232/485 port, RS 485 port (note: in addition to infrared optical port, Feature Set C can use any two ports (configurable)), 56k universal internal modem (RJ11).
		S 0	Infrared optical port, Ethernet (10 BaseT), RS 232/485 port, RS 485 port (note: in addition to infrared optical port, Feature Set C can use any two ports (configurable)), Verizon cell modem.
9	Onboard I/O	A	None.
		B	4 Form C digital outputs, 3 Form A digital inputs.
		C	4 Form C digital outputs, 1 Form A digital output, 1 digital input.
10	Security	0	Password protected, no security lock
		1	Password protected with security lock enabled (requires removal of outer cover to configure billing parameters)
		3	RMICAN (Measurement Canada approved)
		4	RMICAN-SEAL (Measurement Canada approved, and factory sealed)**
11	Special Order	A	None

(1) *Specifications are limited by the operating range of the power supply if a non-aux power supply is used.*

ION8650
Functions and characteristics (cont.)



Example order code. Use this group of codes when ordering the I/O Expander.

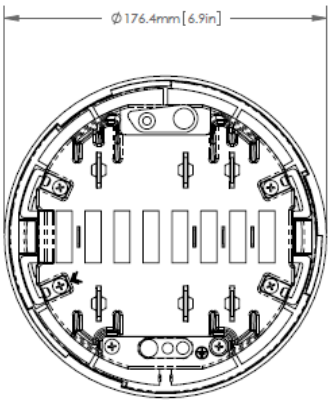
1 *Digital / Analogue I/O.*
2 *I/O option.*
3 *Cable option.*

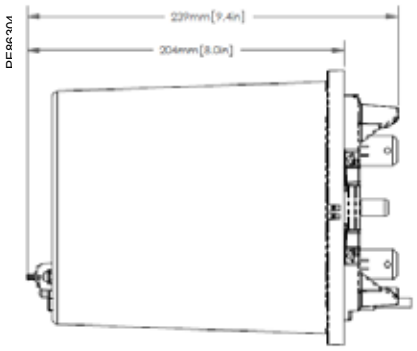
Part numbers (cont.)

I/O Expander		
Digital/Analogue I/O	**P850E**	Schneider Electric I/O Expander for ION8600 meters: Inputs and Outputs for energy pulsing, control, energy counting, status monitoring, and analogue interface to SCADA.
I/O option	**A**	External I/O box with 8 digital inputs and 8 digital outputs (4 Form A, 4 Form C)
	B	External I/O box with 8 digital inputs and 4 digital outputs (4 Form C) and 4 analogue outputs (0 to 20mA)
	C	External I/O box with 8 digital inputs and 4 digital outputs (4 Form C) and 4 analogue outputs (-1mA to 1mA)
	D	External I/O box with 8 digital inputs and 4 digital outputs (4 Form C) and 4 analogue outputs (two -1 to 1 mA, and two 0 to 20 mA outputs)
Cable option	**0**	No cable - cables for the I/O box are no ordered as a separate part number. Refer to part numbers: CBL-8X00IOE5FT, CBL-8X00IOE15FT and CBL-8XX0-BOP-IOBOX under Connector cables, below.
A-base adapters		
A-BASE-ADAPTER-9		Form 9S to Form 9A adapter
A-BASE-ADAPTER-35		Form 35S to Form 35A adapter
Optical communication interface		
OPTICAL-PROBE		Optical communication interface
Connector cables		
CBL-8X00BRKOUT		5' extension cable, mates with 24-pin male Molex connector from the meter to the 24-pin Molex connector on the I/O expander box (not for use with breakout panel E8, F8 & G8 form factors)
CBL-8X00IOE5FT		15' extension cable, mates with 24-pin male Molex connector from the meter to the 24-pin Molex connector on the I/O expander box (not for use with breakout panel E8, F8 & G8 form factors)
CBL-8X00IOE15FT		15' extension cable, mates with 24-pin male Molex connector from the meter to the 24-pin female Molex connector on the I/O Expander box (not for use with breakout panel E8, F8 & G8 form factors)
CBL-8XX0-BOP-IOBOX		6' connector cable, 24-pin male to 14-pin male Molex connector for connecting an ION8000Series meter with breakout panel to an I/O Expander Box

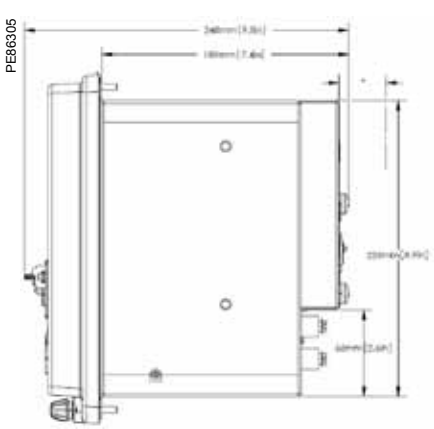
ION8650
Dimensions and connections

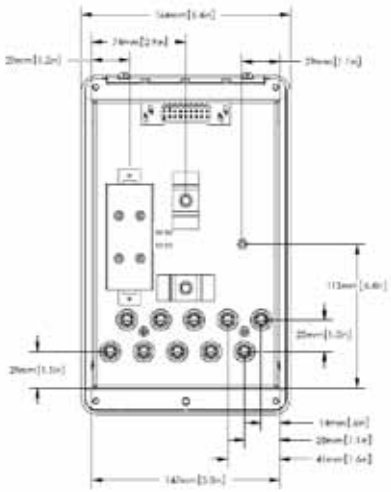
ION8650 socket dimensions



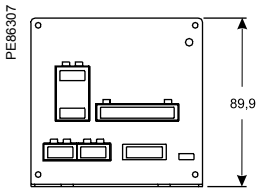


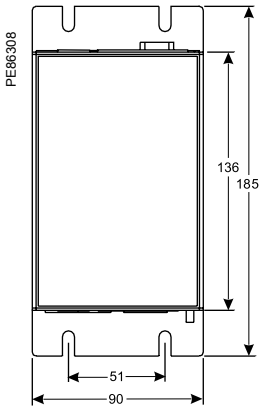
ION8650 switchboard dimensions





I/O Expander dimensions

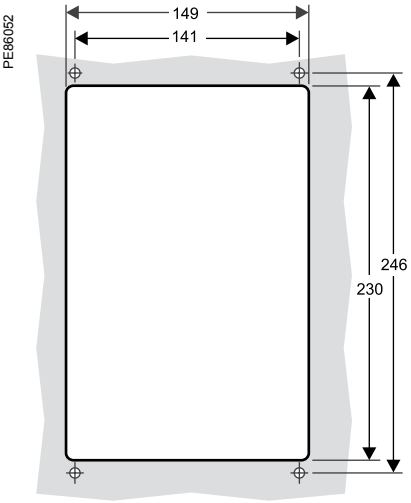




ION8650
Dimensions and connections (cont.)

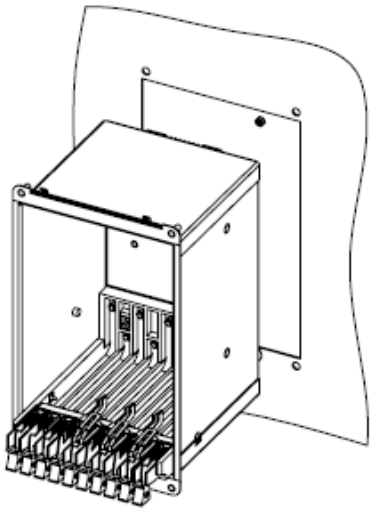
ION8650 suggested switchboard mounting dimensions

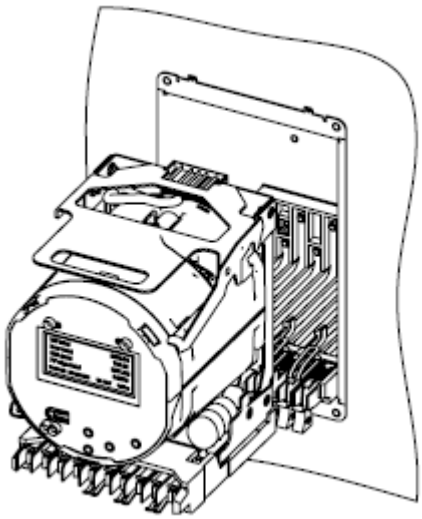
PE86052



ION8650 switchboard mounting

PE86309





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