PowerLogic power-monitoring units

ION8650

Technical data sheet

2011

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 ION Enterprise™ operations software or other energy management and SCADA systems through multiple communication channels and protocols, including Itron MV-90.

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, EN50160, IEC 61000-4-7, IEC 61000-4-15, IEEE 1159, IEEE 519).

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

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, DNP 3.0 and IEC 61850.

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 control functions
A total of 65 setpoints are configurable for 1-second or ½ - cycle operation.

Power quality summary
Consolidation of all the power quality characteristics into a single trendable index.

Integrate with software
Easily integrate with ION Enterprise operations software or other energy management systems; MV90, DNP, Modbus, IEC 61850.

Transformer/line loss compensation
Determine technical system losses in real time.

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.

Part numbers

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

See page 6 for complete part number descriptions.

Options

See page 7.

ION8650

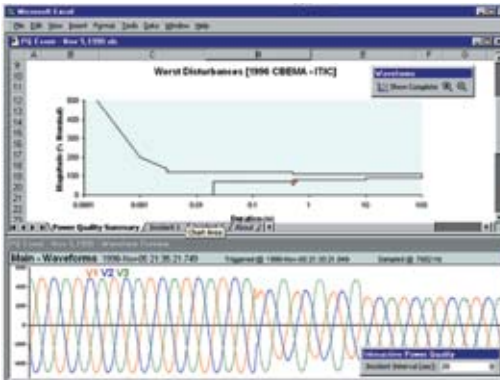
Functions and characteristics (cont.)

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



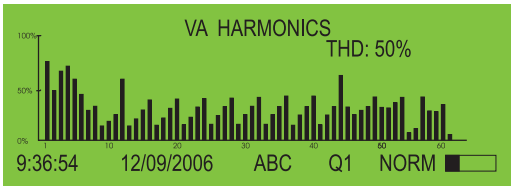
Disturbance waveform capture and power quality report

Selection guide		ION8650 A	ION8650 B	ION8650 C
General				
Use on LV and HV systems		■	■	■
Current accuracy		0.1 % reading	0.1 % reading	0.1 % reading
Voltage accuracy		0.1 % reading	0.1 % reading	0.1 % reading
Power accuracy		0.1 % reading	0.1 % reading	0.1 % reading
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 (autoranging)		0.01 - 20A	0.01 - 20A	0.01 - 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 and 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
Direct connection voltage		277V(2)	277V(2)	277V(2)
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 (WebMeter)		■	■	■
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		■	■	■

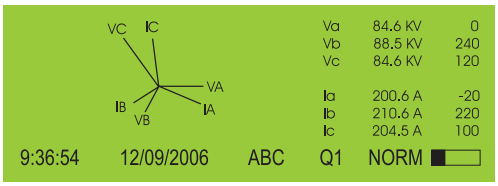
***(1)** With optional I/O Expander.*
***(2)** For 9S, and 36S only. For 35S system up to 480V line-to-line.*
***(3)** Infrared port plus two other communications ports maximum*

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 277VLL rms autoranging (9S) 100V to 480VLL rms autoranging (35S)
	Maximum voltage	347 VLN rms, 600 VLL rms (9S) 600 VLL rms (35S)
	Impedance	5 MΩ /phase (phase-Uref/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 autoranging (standard range)
	Measurement range	0 001 - 24 A
	Permissible overload	500A rms for 1 second, non-recurring (standard)
	Burden per phase	Socket - 0.05VA at 5A (0.002 Ω max) Switchboard - 0.05VA at 1A (0.05 Ω max)
Power supply	Standard power supply, 120-277 VAC	120-277 VLN RMS (-15%/+20%) 47-63 Hz or 120-480 VLL RMS (-15%/+20%) 47-63 Hz (35S)
	Auxiliary power cable assembly, 65-120 VAC	AC: 65-120 (+/- 15%) VLN RMS, 47-63 Hz DC: 80-160 (+/- 20%) VDC
	Auxiliary power cable assembly, 160-277 VAC	AC: 160-277 (+/- 20%) VLN RMS, 47-63 Hz DC: 200-300 (+/- 20%) VDC
	Ride-through time, 120-277 VAC (Standard power supply)	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)
Input/outputs	Digital outputs (Form C)	4 Solid state relays (130 V AC/ 200 V DC) 50 mA AC/DC
	Digital outputs (Form A)	4 Solid state relays (via optional I/O Expander)
	Digital inputs	4 Solid state inputs (via optional I/O Expander)
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		-20°C to +60°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, 50Hz, 1 min
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.

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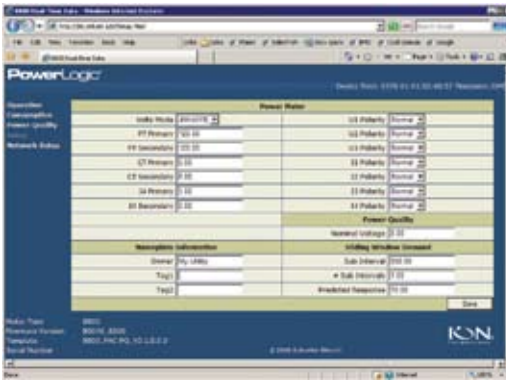
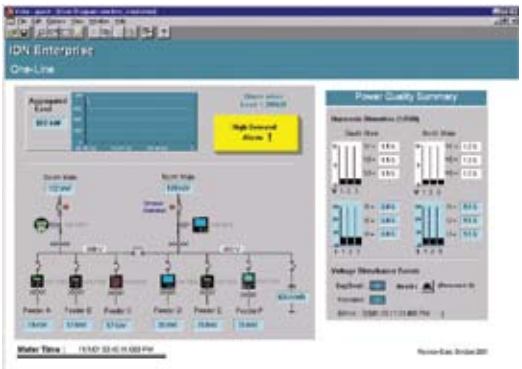
Functions and characteristics (cont.)

PE86004-C



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, DNP 3.0, GPSTRUETIME/DATUM.
Internal modem port (COM2)	300 bps-57,600 bauds (automatic detection supported)
ANSI 12.18 Type II optical port (COM3)	Up to 19200 bauds
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
EtherGate	Up to 31 slave devices via serial ports
ModemGate	Up to 31 slave devices
Embedded web server (WebMeter)	4 standard pages, up to 5 customisable pages
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. Can log data only during critical event to conserve memory
Harmonic distortion	Up to 63rd harmonic for all voltage and current inputs
Dip/swell detection	Analyse severity/potential impact of dips 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 (1s) and high-speed (1/2 cycle) measurements, including true rms per phase / total 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), - 64 channels via 4 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 possible
Advanced security	Up to 16 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	32 Mbytes (C), 64 Mbytes (B), 128 Mbytes (A)
Firmware update	Update via the communication ports
Display characteristics	
Type	FSTN transreflective LCD
Backlight	LED
Languages	English

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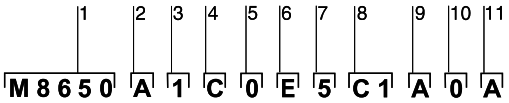
Functions and characteristics (cont.)

PE86043-C



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.*

PowerLogic ION8650 meter with switchboard case

PB107507

Part Numbers

Item	Code	Description
1 Model	M8650	Schneider Electric advanced tariff 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 EN50160 power quality monitoring.
	C	32MB memory, basic tariff/energy metering (4 data recorders, 64 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, low end measurement range limited to 120 V LL.
	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 1	Infrared optical port, Ethernet (10/100 BaseT), 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)
	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)
	E 0	Infrared optical port, Ethernet (10/100 BaseT), RS 232/485 port, RS 485 port (note: in addition to infrared optical port, Feature Set C can use any two ports (configurable)).
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.*

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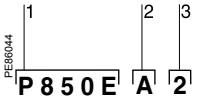
Functions and characteristics (cont.)

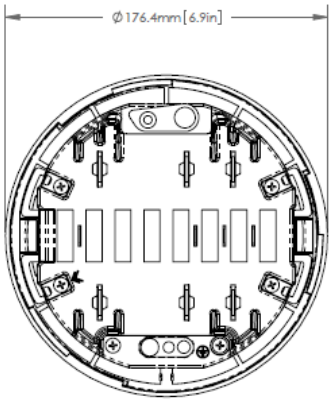


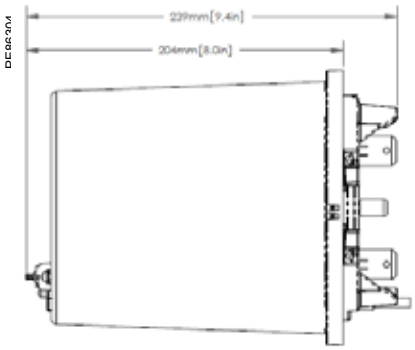
Example order code. Use this group of codes when ordering the I/O Expander.

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

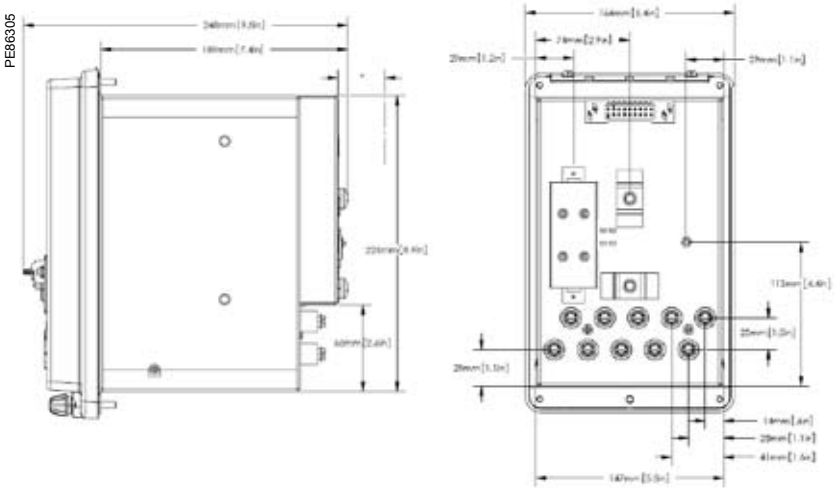
Part numbers (cont.)		
I/O Expander		
Digital/Analog I/O	**P850E**	Schneider Electric I/O Expander for ION8600 meters: Inputs and Outputs for energy pulsing, control, energy counting, status monitoring, and analog interface to SCADA.
I/O option	**A**	External I/O box with 8 digital inputs and 8 digital 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 analog outputs (0 to 20mA)
	C	External I/O box with 8 digital inputs and 4 digital outputs (4 Form C) and 4 analog outputs (-1mA to 1mA)
	D	External I/O box with 8 digital inputs and 4 digital outputs (4 Form C) and 4 analog 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		5ft Breakout Cable: 24-pin female Molex connector to one DB9 female connector for RS 232, and 2 sets of twisted pair wires for two RS 485 port connections
CBL-8X00IOE5FT		5ft 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-8X00IOE15FT		15ft 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		6ft connector cable, 24-pin male to 14-pin male Molex connector for connecting an ION8650 meter with breakout panel to an I/O Expander Box

ION8650 socket dimensions

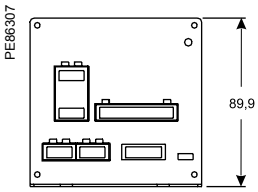


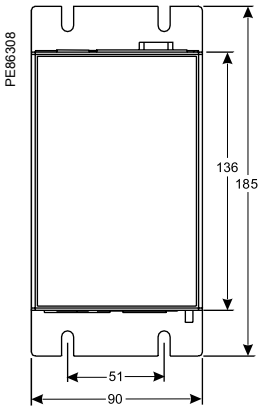


ION8650 switchboard dimensions



I/O Expander dimensions





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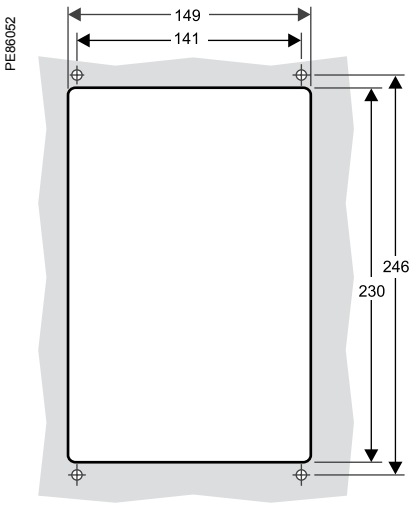
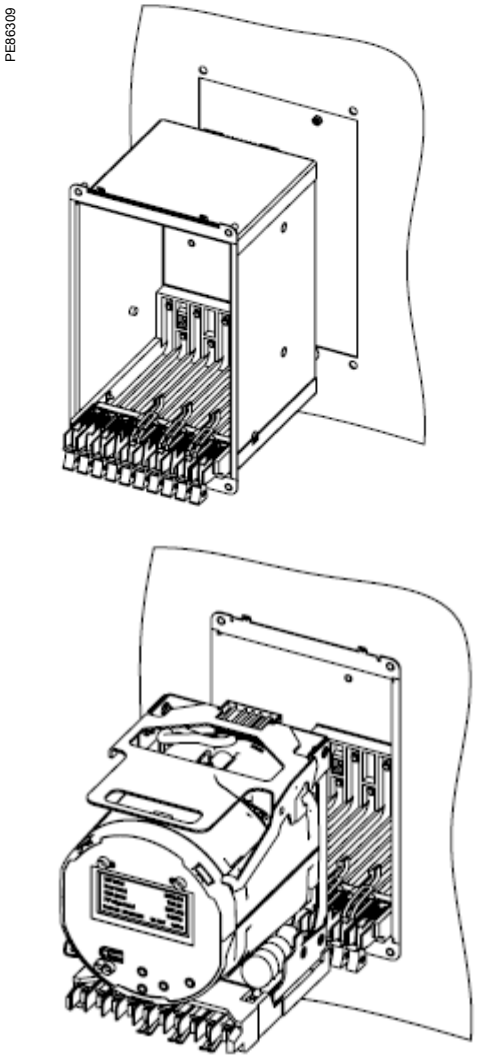
Installation and connections (cont.)

ION8650 suggested switchboard mounting dimensions



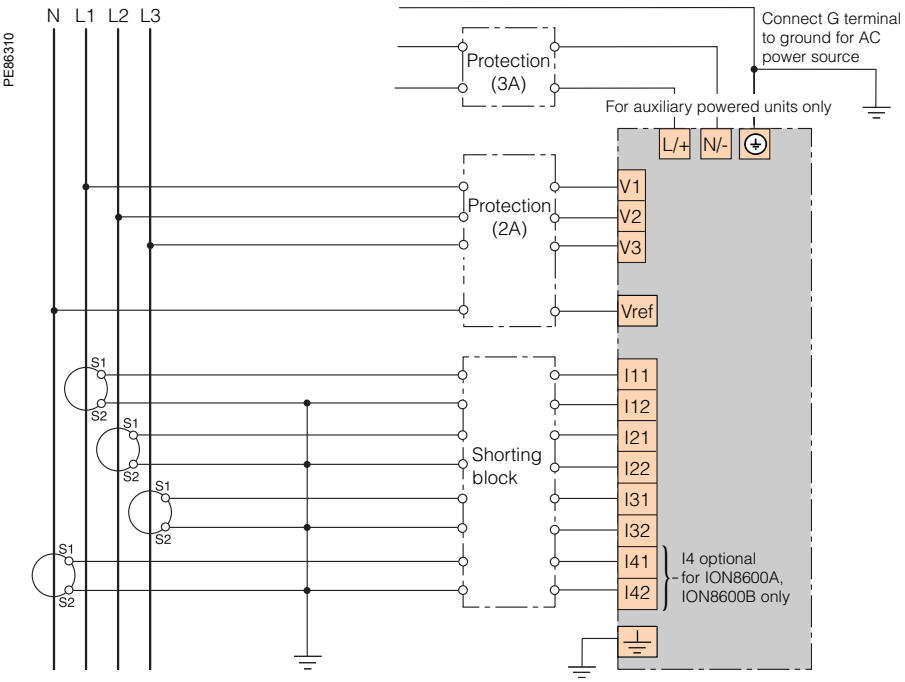
ION8650 switchboard mounting



ION8650

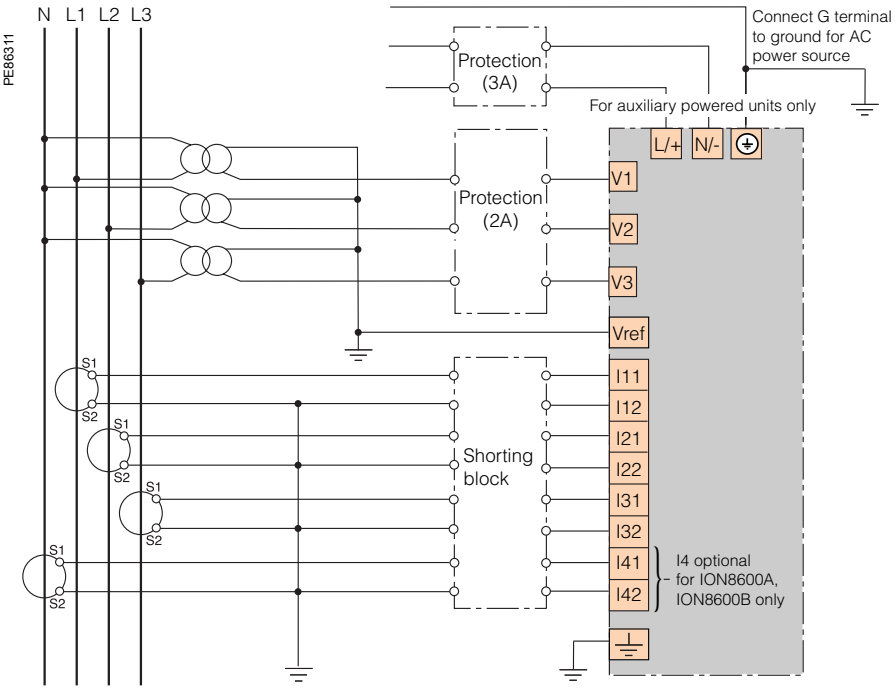
Installation and connection (cont.)

4-Wire 3 element direct connection



Connection representation only. Other types of connection are possible. See product installation guide for complete wiring and communication connection details.

4-Wire 3 element, 3 PT connection



Connection representation only. Other types of connection are possible. See product installation guide for complete wiring and communication connection details.

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