PowerLogic power-monitoring units

ION7550/ION7650

Technical data sheet

Schneider Electric

ION7550 / ION7650
Functions and characteristics

Used at key distribution points and sensitive loads, PowerLogic™ ION7550 and ION7650 meters offer unmatched functionality including advanced power quality analysis coupled with revenue accuracy, multiple communications options, web compatibility, and control capabilities. Customise metering or analysis functions at your work station, without hard wiring. Just link drag-and-drop icons or select default settings. Integrate the meters with StruxureWare Power Monitoring software or share data with SCADA systems via multiple communication channels and protocols.

Applications
Reduce energy costs.
Increase equipment utilisation.
Comply with environmental and regulatory requirements.
Improve power quality and reliability.
Improve customer satisfaction and retention.
Monitor and control equipment.
Integrated utility metering.
Allocate or sub-bill energy costs to departments, processes or tenants.

Main characteristics

Anticipate, diagnose and verify to increase efficiency
Reveal energy inefficiencies or waste and optimise equipment operation to increase efficiency. Isolate reliability risks, diagnose power-related equipment issues and verify reliable operation.

Summarise power quality, set targets, measure and verify results
Consolidate all the power quality characteristics into a single trendable index. Benchmark power quality and reliability and compare against standards, or compare facilities or processes.

Easy to use, multilingual, IEC/IEEE configureable display
Bright LCD display with adjustable contrast. Screen-based menu system to configure meter settings including IEC or IEEE notations. Multilingual support for English, French, Spanish and Russian. 12/24 hour clock support in multiple formats.

Modbus Master functionality
Read information from downstream Modbus devices and view it via the front panel or store in memory until you upload to the system level.

IEC 61850 protocol
Increase interoperability and decrease engineering time using standard protocol.

Gateway functionality
Access through the meter's Ethernet port (EtherGate) or telephone network (ModemGate) to Modbus communicating devices connected to meter serial ports.

Detect and capture transients as short as 20µs at 50Hz (17µs at 60 Hz)
Identify problems due to short disturbances, e.g. switching of capacitors, etc.

Power quality compliance monitoring
Monitor compliance with international quality-of-supply standards (IEC 61000-4-30 class A ed. 2[1], EN50160[1], IEC 61000-4-7[1], IEC 61000-4-15[1], IEEE 519, IEEE 1159, and CBEMA/ITIC). Evaluate flicker based on IEC 61000-4-15[1] and IEEE 1453[1].

Detect waveshape changes
Detection of phase switching phenomena (for example during the transfer of a high-speed static switch) not detected by classical threshold-based alarms.

Record ultra-fast electrical parameters every 100 ms or every cycle
Preventive maintenance: acquisition of a motor startup curve, etc.

Trend curves and short-term forecasting
Rapid trending and forecasting of upcoming values for better decision making.

Disturbance direction detection
Determine disturbance location and direction relative to the meter. Results captured in the event log, along with a timestamp and certainty level.

Alarm setpoint learning
The meter analyses the circuit and recommends alarm setpoints to minimise nuisance or missed alarms.

Notify alarms via email
High-priority alarms sent directly to the user's PC. Instant notification of power quality events by email.[1] *ION7650 only*
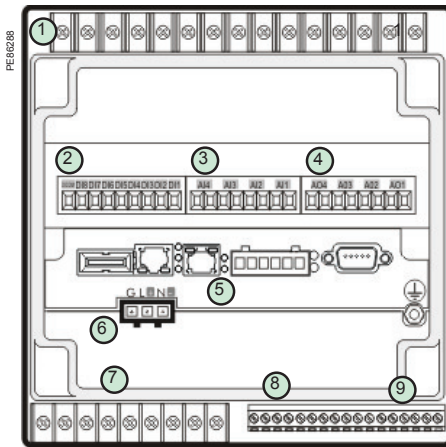
Part numbers

ION7550 / ION7650	
ION7550	**M7550**
ION7650	**M7650**
SE remote display	**M765RD**
SE remote display w/power supply	**M765RDPS**

(1) ION7650 only

ION7550 / ION7650
Functions and characteristics (cont.)

PowerLogic™ ION7550 / ION7650 rear view.

1 Current/voltage inputs
2 Digital inputs
3 Analogue inputs
4 Analogue outputs
5 Communications card
6 Power supply
7 Form C digital outputs
8 Digital inputs
9 Form A digital outputs

Disturbance waveform capture and power quality report

Selection guide		ION7550	ION7650
General			
Use on LV and HV systems		■	■
Current accuracy (1A to 5A)		0.1 % reading	0.1 % reading
Voltage accuracy (57V to 288V)		0.1 % reading	0.1 % reading
Energy accuracy		0.2 %	0.2 %
Nbr of samples/cycle or sample frequency		256	1024
Instantaneous rms values			
Current, voltage, frequency		■	■
Active, reactive, apparent power	Total and per phase	■	■
Power factor	Total and per phase	■	■
Current measurement range (autoranging)		0.01 - 20A	0.01 - 20A
Energy values			
Active, reactive, apparent energy		■	■
Settable accumulation modes		■	■
Demand values			
Current	Present and max. values	■	■
Active, reactive, apparent power	Present and max. values	■	■
Predicted active, reactive, apparent power		■	■
Synchronisation of the measurement window		■	■
Setting of calculation mode	Block, sliding	■	■
Power quality measurements			
Harmonic distortion	Current and voltage	■	■
Individual harmonics	Via front panel	63	63
	Via ION Enterprise	127	511
Waveform capture		■	■
Detection of voltage swells and sags		■	■
Detection and capture of transients		-	20 µs[1]
Flicker		-	■
Fast acquisition of 100 ms or 20 ms data		■	■
EN50160 compliance checking		-	■
Programmable (logic and math functions)		■	■
Data recording			
Min/max of instantaneous values		■	■
Data logs		■	■
Event logs		■	■
Trending/forecasting		■	■
SER (Sequence of event recording)		■	■
Time stamping		■	■
GPS synchronisation (1 ms)		■	■
Memory (in Mbytes)		10	10
Display and I/O			
Front panel display		■	■
Wiring self-test		■	■
Pulse output		1	1
Digital or analogue inputs(max)		20	20
Digital or analogue outputs (max, including pulse output)		12	12
Communication			
RS 485 port		1	1
RS 485 / RS 232 port		1	1
Optical port		1	1
Modbus protocol		■	■
IEC 61850 protocol		■	■
Ethernet port (Modbus/TCP/IP protocol, IEC 61850 [2])		1	1
Ethernet gateway (EtherGate)		1	1
Alarms (optional automatic alarm setting		■	■
Alarm notification via email		■	■
HTML web page server (WebMeter)		■	■
Internal modem		1	1
Modem gateway (ModemGate)		■	■
DNP 3.0 through serial, modem, and I/R ports		■	■

(1) For 50 Hz line frequency; 17µs for 60 Hz line frequency.

ION7550 / ION7650
Functions and characteristics (cont.)

PowerLogic ION7650

Electrical characteristics

Type of measurement		True rms to 1024 samples per cycle (ION7650)
Measurement accuracy	Current and voltage	±0.01% of reading + ±0.025% of full scale
	Power	±0.075% of reading + ±0.025% of full scale
	Frequency	±0.005Hz
	Power factor	±0.002 from 0.5 leading to 0.5 lagging
	Energy:	IEC62053-22 0,2S, 1A and 5A
Data update rate		1/2 cycle or 1 second
Input-voltage characteristics	Measurement range	Autoranging 57V through 347V LN / 600V LL
	Impedance	5 MΩ/phase (phase - Vref)
	Frequency measurement range	42 to 69Hz
Input-current characteristics	Rated nominal current	1A, 2A, 5A, 10A
	Measurement range	0.005 - 20 A autoranging (standard range) 0.001 - 10 A autoranging (optional range)
	Permissible overload	500 A rms for 1 s, non-recurring (5A) 50 A rms for 1s, non-recurring (1A)
	Impedance	0.002 Ω per phase (5A) 0.015 Ω per phase (1A)
	Burden	0.05 VA per phase (5 A) 0.015 VA per phase (1 A)
Power supply	AC	85-240 V AC ±10% (47-63 Hz)
	DC	110-300 V DC ±10%
	DC low voltage (optional)	20-60 V DC ±10%
	Ride-through time	100 ms (6 cycles at 60 Hz) min.
	Burden	Standard: typical 20 VA, max 45 VA Low voltage DC: typical 15 VA, max 20 VA
Input/outputs[1]	Standard	8 digital inputs (120 V DC) 3 relay outputs (250 V AC / 30 V DC) 4 digital outputs (solid state)
	Optional	8 additional digital inputs 4 analogue outputs, and/or 4 analogue inputs

Mechanical characteristics

Weight		1.9 kg
IP degree of protection (IEC 60529)		Integrated display, front: IP 50; back: IP 30 Transducer unit (no display): IP 30
Dimensions	Standard model	192 x 192 x 159 mm
	TRAN model	235.5 x 216.3 x 133.1 mm

Environmental conditions

Operating temperature	Standard power supply	-20 to +70 ºC
	Low voltage DC supply	-20 to +50 ºC
	Display operating range	-20 to +60 ºC
Storage temperature	Display, TRAN	-40 to +85 ºC
Humidity rating		5 to 95% non-condensing
Installation category		III (2000m above sea level)
Dielectric withstand		As per EN 61010-1, IEC 62051-22A[2]

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 surges	IEC 61000-4-5
Conducted and radiated emissions	CISPR 22

Safety

|	
Europe	IEC 61010-1

Communication

RS 232/485 port [1]	Up to 115,200 bauds (57,600 bauds for RS 485), ION, DNP 3.0, Modbus, GPS, EtherGate, ModemGate, Modbus Master
RS 485 port [1]	Up to 57,600 bauds, ION, DNP 3.0, Modbus, GPS, EtherGate, ModemGate, Modbus Master
Infrared port[1]	ANSI type 2, up to 19,200 bauds, ION, Modbus, DNP 3.0
Ethernet port	10Base-T/100Base-TX, RJ45 connector, 100 m link
Fibre-optic Ethernet link	100 Base FX, SC duplex connector, 1300 nm, FO multimode with gradient index 62.5/125 μm or 50/125 μm, 2000 m link

(1) Consult the ION7550 / ION7650 installation guide for complete specifications.
(2) IEC 62051-22B with serial ports only.
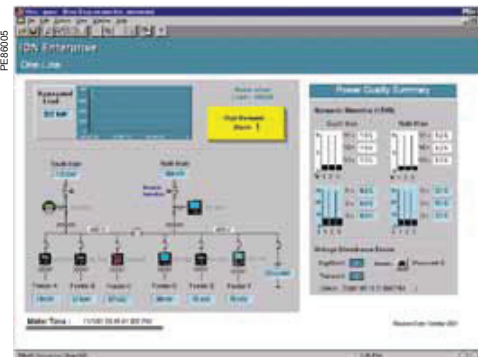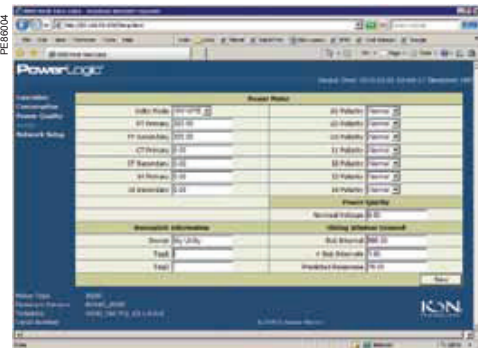
Example showing instantaneous values and alarm.

Communication (cont.)	
Protocol	ION, Modbus, TCP/IP, DNP 3.0, Telnet, IEC 61850[2]
EtherGate	Communicates directly with up to 62 slave devices via available serial ports
ModemGate	Communicates directly with up to 31 slave devices
Ethernet port	10Base-T/100Base-TX, RJ45 connector, 100 m link
WebMeter	5 customisable pages, new page creation capabilities, HTML/XML compatible

| Firmware characteristics	
High-speed data recording	Down to 5ms 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 (511th for ION7650 via ION Enterprise software) for all voltage and current inputs
Sag/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, control
Disturbance direction detection	Determine the location of a disturbance more quickly and accurately by determining the direction of the disturbance relative to the meter. Analysis results are captured in the event log, along with a timestamp and confidence level indicating level of certainty.
Instantaneous	High accuracy (1s) or 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 (800 channels via 50 data recorders) configurable for any measurable parameter, including historical trend recording of energy, demand, voltage, current, power quality, or any measured parameter. Trigger recorders based on time interval, calendar schedule, alarm/event condition, or manually.
Trend curves	Access historical data at the front panel. Display, trend and continuously update historical data with date and timestamps for up to four parameters simultaneously.
Waveform captures	Simultaneous capture of all voltage and current channels - sub-cycle disturbance capture - maximum cycles is 214,000 (16 samples/cycle x 96 cycles, 10Mbytes memory) - 256 samples/cycle (ION7550) - 512 samples/cycle standard, 1024 samples/cycle optional (ION7650) COMTRADE waveform format available direct from the meter (Ethernet port option only)
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 is possible using the operators NAND, OR, NOR and XOR
Advanced security	Up to 16 users with unique access rights. Perform resets, time syncs, or meter configurations on user privileges
Transformer correction	Correct for phase / magnitude inaccuracies in current transformers (CTs), potential transformers (PTs)
Memory	5 to 10 Mbytes (specified at time of order)
Firmware update	Update via the communication ports

Display characteristics	
Integrated display	Back lit LCD, configurable screens
Languages	English, French, Spanish, Russian
Notations	IEC, IEEE

(1) All the communication ports may be used simultaneously.
(2) Only available with 5MB memory meters.

Example ION7650 product part number.
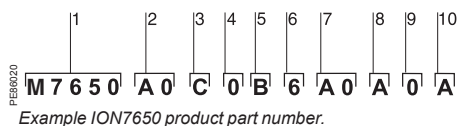
1 Model.
2 Form factor.
3 Current Inputs.
4 Voltage Inputs.
5 Power supply.
6 System frequency.
7 Communications.
8 Inputs/outputs.
9 Security.
10 Special order.

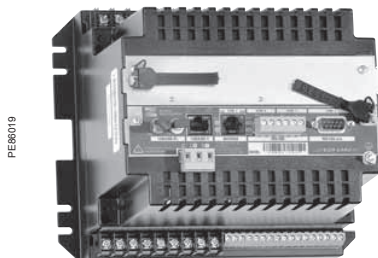| Part numbers		
Item	**Code**	**Description**
1 Model	M7650	Advanced meter with wide-range voltage inputs (57-347V line-neutral or 100-600V line-line), transient detection, data and waveform recording, IEC 61000-4-30 Class A & EN50160. Supports ION, IEC 61850 (only for meters with 5MB memory and Ethernet comm card) Modbus-RTU, and DNP 3.0.
	M7550	Advanced meter with wide-range voltage inputs (57-347V line-neutral or 100-600V line-line), sag/swell detection, data and waveform recording. Supports ION, IEC 61850 (only for meters with 5MB memory and Ethernet comm card) Modbus-RTU, and DNP 3.0.
2 Form Factor	A0	Integrated display with front optical port, 5 MB logging memory, and 512 samples/cycle resolution (ION7650) or 256 samples/cycle (ION7550).
	A1	*ION7650 only.* Integrated display with front optical port, 5 MB logging memory, and 1024 samples/cycle resolution.
	B0	Integrated display with front optical port, 10 MB logging memory, and 512 samples/cycle resolution (ION7650) or 256 samples/cycle (ION7550).
	B1	*ION7650 only.* Integrated display with front optical port, 10 MB logging memory, and 1024 samples/cycle resolution.
	T0	Transducer (no display) version, with 5 MB logging memory, and 512 samples/cycle resolution (ION7650) or 256 samples/cycle (ION7550).
	T1	*ION7650 only.* Transducer (no display) version, with 5 MB logging memory, and 1024 samples/cycle resolution.
	U0	Transducer (no display) version, with 10 MB logging memory, and 512 samples/cycle resolution (ION7650) or 256 samples/cycle (ION7550).
	U1	*ION7650 only.* Transducer (no display) version, with 10 MB logging memory, and 1024 samples/cycle resolution.
3 Current Inputs	C	5 Amp nominal, 20 Amp full scale current input
	E	1 Amp nominal, 10 Amp full scale current input
	F	Current Probe Inputs (for 0-1 VAC current probes; sold separately)
	G	Current Probe Inputs with three Universal Technic 10A clamp on CTs; meets IEC 1036 accuracy
4 Voltage Inputs	0	57 to 347 VAC line-to-neutral / 100 to 600 VAC line-to-line
5 Power Supply	B	Standard power supply (85-240 VAC, ±10%/47-63 Hz / 110-300 VDC, ±10%)
	C	Low voltage DC power supply (20-60 VDC)
6 System Frequency	5	Calibrated for 50 Hz systems
	6	Calibrated for 60 Hz systems
7 Communications	A0	Standard communications (1 RS-232/RS-485 port, 1 RS-485 port). Integrated display models include 1 ANSI Type 2 optical port.
	C1	Standard communications plus 10Base-T/100Base-TX Ethernet (RJ45), 56k universal internal modem (RJ11). Ethernet and modem gateway functions each use a serial communications port.
	D7	Standard communications plus 10Base-T/100Base-TX Ethernet (RJ45) and 100BaseFX Ethernet Fiber, 56k universal internal modem (RJ11). Ethernet/modem gateway uses serial port.
	E0	Standard communications plus 10Base-T/100Base-TX (RJ45). Ethernet gateway function uses a serial communications port.
	F1	Standard communications plus 10Base-T/100Base-TX Ethernet (RJ45) and 100Base-FX (SC male Fiber Optic connection). Ethernet gateway function uses a serial port.
	M1	Standard communications plus 56k universal internal modem (RJ11). Modem gateway function uses a serial port.
8 I/O	A	Standard I/O (8 digital ins, 3 Form C relays, 4 Form A solid-state out)
	E	Standard I/O plus Expansion I/O card (8 additional digital inputs & four 0 to 20 mA analogue inputs)
	K	Standard I/O plus Expansion I/O card (8 additional digital inputs & four 0 to 20 mA analogue outputs)
	N	Standard I/O plus Expansion I/O card (8 additional digital inputs & four 0 to 20 mA analogue inputs and four 0 to 20 mA outputs)
	P	Standard I/O plus Expansion I/O card (8 additional digital inputs & four 0 to 1 analogue inputs and four -1 to 1 mA analogue outputs)
9 Security	0	Password protected, no hardware lock
	1	Password protected, hardware lockable (enabled/disabled via jumper on comm card)
	6	Password protected with security lock enabled, terminal cover and UK OFGEM labels

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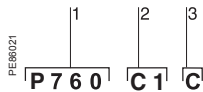
Example order code. Use this group of codes when ordering the PowerLogic™ ION7550/7650 communications or I/O cards.

1 Communications or I/O card.
2 Type
3 Special order.

Part numbers (cont'd)

	Item	Code	Description
10	Other options	A	None
		C	Tropicalisation treatment applied
		E	ION7650 only. EN50160 compliance monitoring, IEC61000-4-30 Class A measurements
		F	ION7650 only. EN50160 compliance monitoring, with tropicalisation treatment, IEC61000-4-30 Class A measurements

Communications Card [1]

	Item	Code	Description
1	Comm card	P765C	ION7550 / ION7650 communication card for field retrofit installations
2	Type	A0	Standard communications (1 RS-232/RS-485 port, 1 RS-485 port). Front optical port support for meters with integrated display.
		C1	Standard communications plus 10Base-T/100Base-TX Ethernet (RJ45), 56k universal internal modem (RJ11; the modem port is shared with the front optical port). Ethernet and modem gateway functions each use a serial communications port. IEC 61850 protocol (depending on firmware version).
		D7	Standard communications plus 10Base-T/100Base-TX Ethernet, 100BaseFX Ethernet Fiber, 56k universal internal modem (RJ11; the modem port is shared with the front optical port). Ethernet and modem gateway functions each use a serial communications port.IEC 61850 protocol (depending on firmware version).
		E0	Standard communications plus 10Base-T/100Base-TX Ethernet. Ethernet gateway function uses a serial communications port. IEC 61850 protocol (depending on firmware version).
		F1	Standard communications plus 10Base-T/100Base-TX Ethernet, 100BaseFX Ethernet Fiber (SC male Fiber Optic connection). Ethernet gateway function uses a serial communications port. IEC 61850 protocol (depending on firmware version).
		M1	Standard communications plus 56k universal internal modem (RJ11; the modem port is shared with the front optical port). Modem gateway function uses a serial communications port.
3	Special order	A	None
		C	Tropicalization treatment applied

Input/Output expansion card

Item	Code	Description
I/O card	P760A	Expansion I/O for field retrofit installations.
Type	D	Expansion I/O card with eight digital inputs, four 0 to 1 mA analogue inputs
	E	Expansion I/O card with eight digital inputs, four 0 to 20 mA analogue inputs
	H	Expansion I/O card with eight digital inputs, four -1 to 1 mA analogue outputs
	K	Expansion I/O card with eight digital inputs, four 0 to 20 mA analogue outputs
	N	Expansion I/O card with eight digital inputs, four 0 to 20 mA analogue inputs & four 0 to 20 mA outputs
	P	Expansion I/O card with eight digital inputs, four 0 to 1 analogue inputs and four -1 to 1 mA analogue outputs
Special Order	A	None
	C	Tropicalization treatment applied

ION7550 / ION7650 related items

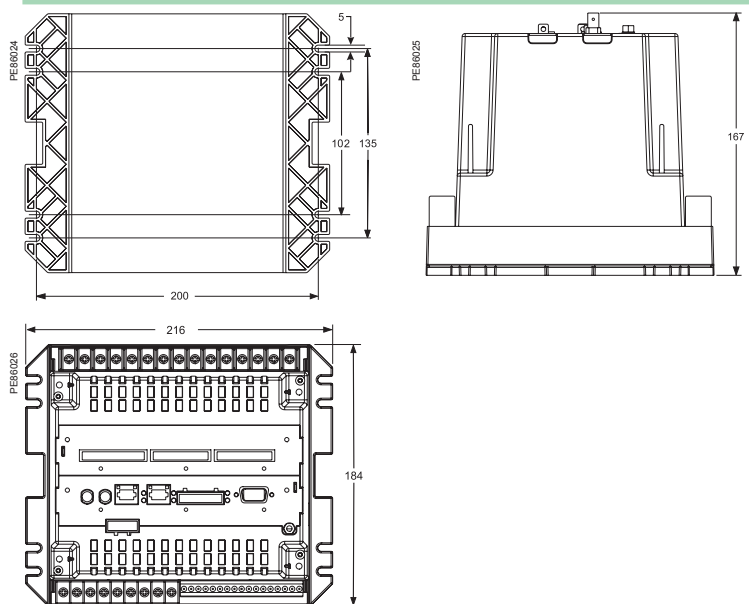| Code	Description
ADPT-37XX-7500	Adapter plate to fit meter into a 3710 or 3720 ACM panel cutout
TERMCVR-7500	Terminal strip cover for the ION7550 or ION7650
M1UB10A1V-10A	10 A / 1 VAC Universal Technic Clamp On Current Probe
P32UEP813-1000A	1000 A / 1 VAC Universal Technic Clamp On Current Probe
P32UEP815-3000A	3000 A / 1 VAC Universal Technic Clamp On Current Probe
SCT0750-005-5A	5 A / 0.333 VAC Magnelabs Split Core Current Probe
SCT1250-300-300A	300 A / 0.333 VAC Magnelabs Split Core Current Probe

(1) Firmware version 350 or higher required.

PowerLogic™ ION7550 TRAN

ION7550 / ION7650
Dimensions and connection

ION7550/ION7650 dimensions

PE86022

192

192

PE86023

184

159

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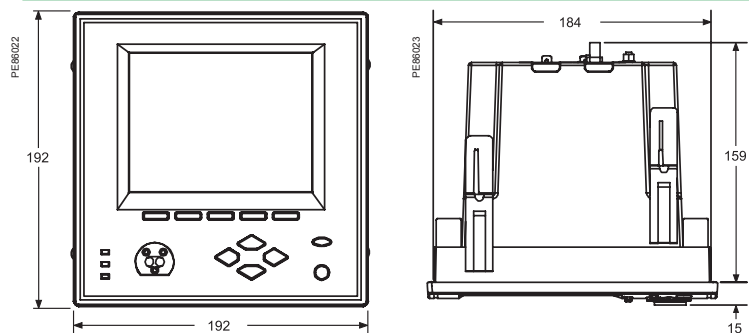
ION7550 / ION7650 TRAN dimensions

PE86024

5

102 135

200

PE86025

167

PE86026

216

184

Front-panel mounting
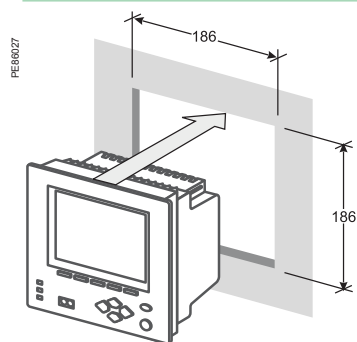
ION7550 and ION7650 meter can have integrated or remote display. The meter with integrated display is designed to fit DIN standard 192 cutout (186 mm by 186 mm) . The remote display is intalled through a circular cutout (22.5 mm diameter) at the panel door and it has a front and a back module that is connected to the meter mounted in a DIN rail at the back.

PE86027

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As standards, specifications and designs develop from time to time, please ask for confirmation of the information given in this document.

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