

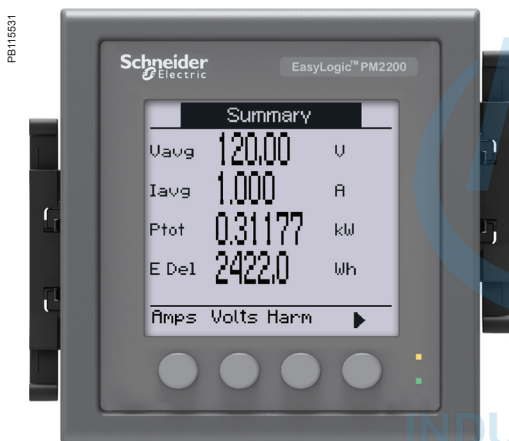
# Power and energy meters

## PM2000 multi-function meters

### Functions and characteristics



PM2000 series LED display meter



PM2000 LCD display

#### Functions and characteristics

Introducing EasyLogic PM2000 series, next generation power meter which offers all the measurement capabilities required to monitor an electrical installation in a single 96 x 96 mm unit. PM2000 meters are available in LED and LCD display variants.

■ **PM2100 series:** LED display type: Intuitive navigation with self-guided, three buttons, bright red colour LEDs of 14.2 mm height. Two columns of LEDs, one on each side of the meter's front panel indicates the parameter name chosen for display

■ **PM2200 series:** LCD display type: Monochrome graphical LCD of 128 x 128 resolution with viewable area of 67 x 62.5 mm lets the users read all three phase measured values simultaneously. The bright anti-glare display features large characters and powerful backlighting for easy reading even in extreme lighting conditions and viewing angles. Intuitive menus, multi-language text, icons and graphics create a friendly environment to learn about your electrical network.

#### Applications

##### Cost management:

- Electrical installation remote monitoring
- Energy accounting and balancing
- Tenant and sub-billing
- Panel instrumentation
- Energy management

##### Network management:

- Power quality analysis: THD and individual harmonics up to 15th and 31st order
- Measurement of True PF and Displacement PF
- Recording Min/Max values of instantaneous parameters with date & timestamp
- Optional IO modules comprising either 2 Digital Inputs and 2 Outputs, or 2 Analogue Inputs and 2 Outputs for comprehensive WAGES monitoring
- Calculates % unbalance for voltage & current

##### Main characteristics:

- Easy to install: Mounts using two clips, no tools are required. Compact meter with 54 mm depth, connectable up to 480 +/-10% AC Volts L-L without voltage transformers for installations compliant with measurement category III, and double insulated.
- Easy to operate: Intuitive navigation with self guided menus and test LED at the front panel used for test and calibration of the meter on site or laboratory. Heart-beat LED indicates normal functioning and communication status if connected to RS-485 network.
- Product standard compliance
  - Active energy Class 1.0 as per IEC 62053-21
  - Active energy Class 0.5S as per IEC 62053-22 (partial compliance for active energy test clause only)
  - Reactive energy Class 1.0 as per IEC 62053-24 (partial compliance for reactive energy test clause only)
- Tested in accordance with IEC 62052-11 standard for
  - 5 A, I-nominal
  - 1 A, I-nominal (field settable).
- Power quality analysis: The PM2000 offers THD measurements and Individual harmonics up to 15th order in PM2x20 variants and up to 31st in PM2x30 variants.
- Load management: Simultaneous display of peak, present, predicted & rising demands of all the four demand parameters (W, VA, VAR, Amps)
- Billing: Tenant billing/utility meter cross check (where local regulations are not applicable).
- Timer: Active load timer, Meter operation timer and Run hours timer. These features help advise maintenance requirements and scheduling.
- Password: Field configurable password for securing set up information and prevent tampering of integrated values.
- Cyber security: Option for disabling RS-485 port through front panel keys against unauthorized access. It helps during installation and trouble shooting of communication network.
- LED display: Auto scaling, 9+3 digits for energy, 4 digits for other parameters.
- LCD display: 5 digits for energy, 5 or 6 digits for other parameters, with auto scaling.
- 12am snap shot: The values from summary page will be stored as snap shot and refreshed by next day 12am.
- Rate counters: 2 configurable counters display values in custom specified units based on energy recorded (e.g., kgCO<sub>2</sub> carbon emission or energy cost).
- Energy preset feature: For retrofit application.

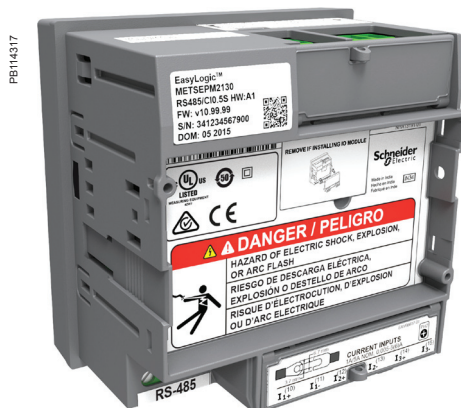
#### Commercial reference numbers

Ref. number	Model
METSEPM2110	PM2110
METSEPM2120	PM2120
METSEPM2130	PM2130
METSEPM2210	PM2210
METSEPM2220	PM2220
METSEPM2230	PM2230
METSEPM2KDGTLIO22	PM2K2DIDO
METSEPM2KANLGIO22	PM2K2AIAO
METSEPM2KANLGIO11	PM2K1AIAO

See your Schneider Electric representative for complete ordering information.

# Power and energy meters PM2000 multi-function meters

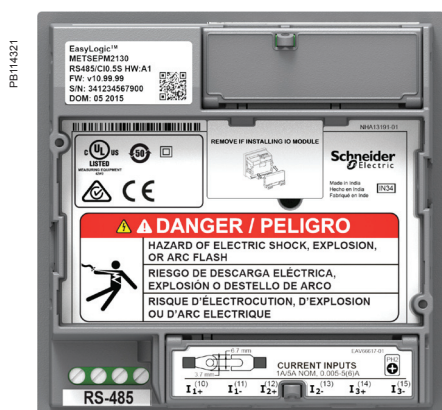
## Functions and characteristics



Rear of PM2000 closed



Rear of PM2000 open



Rear of PM2000 without I/O module

### General

Use on LV and MV systems with onsite programmable PT/CT ratio  
Basic metering with THD, Individual Harmonics, RTC and min/max readings

### Instantaneous rms values

Current	Average line current of 3-phase, per-phase, and calculated neutral current
Voltage	Average voltage of L-L, L-N parameters, and per-phase
Frequency	Any available line
Real, reactive, and apparent power	Total and per-phase value
Displacement power factor	Average and per-phase signed, four quadrant
True Power Factor	Average and per-phase signed, four quadrant
% Unbalance	Among the phase for Amps, V L-N, V L-L

### Energy values stored in non-volatile memory

Four quadrant measurement for Delivered (Forward or Import) and Received (Reverse or Export) energy	Accumulated energy values for Active, Reactive & Apparent Energy parameters, quadrant basis Net & Total (absolute) values
Timer	Accumulated time counters for active load timer, meter operation timer, run hours and power outage counter
Old Registers	Facilitates retrieval of last cleared energy values

### Demand values

Current average	Present, Last, Predicted, Peak, and Peak Date Time
Active power	Present, Last, Predicted, Peak, and Peak Date Time
Reactive power	Present, Last, Predicted, Peak, and Peak Date Time
Apparent power	Present, Last, Predicted, Peak, and Peak Date Time
Demand sync methods	Thermal, Timed, Command Sync, and Clocked Sync
Demand calculation mode	Sliding, fixed and rolling block
Demand intervals	Settable from 1 to 60 minutes, in the step of 1 minute

### Display

PM2100 series	Bright red colour LED display, 7 segment LED, ~ 14.2 mm height, 3 rows with 4 digits per row, Auto range
PM2200 series	Full scape, monochrome graphical LCD of 128 x 128 resolution with viewable area of 67 x 62.5 mm
Visualization mode for signs	IEC or IEEE type in LCD display meter

### Communication

RS-485 serial	Channel connection Industry standard Modbus RTU protocol
Integration with software	SCADA/ DCS/ PMS/ EMS/ BAS/ BMS software
Native Plug and Play support	Schneider Electric energy management system software - StruxureWare Power Monitoring Expert, StruxureWare PowerSCADA Expert along with ION Setup programming support

### Min/Max values

Minimum & Maximum value recording of 3-ph average or total	For 8 parameters, viz., V L-L, V L-N, Amps, PF, Hz, W, VA, VAR with date and time stamp, resettable separately through set up mode
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### Alarms

Alarming with time stamping in PM2x30 meters	A different combination of set point driven alarms and digital alarms with 1s time stamping. The alarms can be programmed and combined to trigger digital outputs, the meter keeps an alarm logs with the active and historical alarms with date and time stamping in 40 registers
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### Diagnostics

Diagnostic page	Indicates LED/LCD status, sl number, diag pages, OS & RS version
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### Lock/ Un-Lock

Page Lock & Unlock (PM2100 series)	Unique feature to ensures that commonly referred page is restored in 4 minutes of inactive time
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### Rate 1 counter<sup>+1</sup>

kgCO <sub>2</sub> emission (example)	Rate counter can be configured to display the CO <sub>2</sub> emission in kgCO <sub>2</sub> format based on the kWh measured either in delivered or received direction.
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### Rate 2 counter<sup>+1</sup>

Tariff counter (example)	Rate counter can also be configured to calculate the electricity cost based on the energy consumption in customized currency format.
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### 12am snap shot

12am snap shot <sup>+1</sup>	Snap shot of Avg Voltage, Avg Current, Total Active Power & Energy delivered as measured by the meter at 12am. The static page will be refreshed with new values by 12am next day
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<sup>+1</sup> In PM2200 (LCD) series meters

# Power and energy meters

## PM2000 multi-function meters

### Functions and characteristics



Rear of PM2000 with I/O module



Rear of PM2000 with I/O module disconnected

#### Electrical characteristics

Type of measurement	True RMS 64 samples per cycle
<b>Measurement accuracy</b>	
Current, average & per-phase	+/- 0.5%
Voltage average & per-phase	+/- 0.5%
Frequency	+/- 0.05%
Power Factor, average & per-phase	+/- 0.01
Power (W-Active, VA- Apparent)	+/- 0.5%
Power (VAR- Reactive)	+/- 1.0%
Real/ Active Energy (Wh)	Class 0.5S as per IEC 62053-22 and Class 1.0 as per IEC 62053-21 for both CT nominal of 5 A and 1 A <sup>2</sup>
Reactive Energy	Class 1.0 as per IEC 62053-24
Apparent Energy	+/- 0.5%
THD% and Individual Harmonics- V & A	+/- 5% FS for THD & Individual harmonics

#### Input-voltage

VT primary	999 kV L-L max, secondary voltage depends on VT ratio
U nominal	277 V L-N/480V L-L
Measured V with full range	20-277 V L-N/35 - 480 V L-L, cat III 20-347 V L-N/35 - 600 V L-L, cat II
Permanent overload	750 V AC L-L
Impedance	=> 5 MΩ
Frequency nominal	50/60 Hz
VA burden	< 0.2 VA at 240 V AC L-N

#### Input-current

CT ratings	Primary adjustable 1 A to 32768 A Secondary 1 A or 5 A I-nominal
Measured Amps with over range & Crest Factor	5 mA to 6 A
Over current withstand	Continuous 12 A, 10s/hr 50 A, 1s/hr 500 A
Impedance	< 0.3 mΩ
Frequency nominal	50/60 Hz
VA Burden	< 0.1 VA at 6 A

#### AC control power

Operating range	44- 277 V AC ±10% (80-277 V AC ±10% with I/O card)
Burden	<8 VA/3.3W at 240V AC L-N
Frequency	45 to 65 Hz
Ride-through time	100 ms typical at 230 V AC and maximum burden 100 ms typical at 277 V AC and maximum burden

#### DC control power

Operating range	44-277 V DC ±10% (100-277 V AC ±10% with I/O card)
Burden	<2 W at 240 V DC
Ride-through time	50 ms typical at 125 V DC and maximum burden

#### Real time clock

RTC with battery backup	3 years (when meter is in Power OFF condition)
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#### Displays update

Instantaneous	1s
Demand	15s
Harmonics	5s

#### Wiring configuration

User programmable	1ph, 2w, L-N 1ph, 2w, L-L 1ph, 3w, L-L with N (2phase) 3ph, 3w, Delta, Ungrounded 3ph, 3w, Delta, Corner Grounded <sup>+3</sup> 3ph, 3w, Wye, Ungrounded <sup>+3</sup> 3ph, 3w, Wye Grounded <sup>+3</sup> 3ph, 3w, Wye, Resistance Grounded <sup>+3</sup> 3ph, 4w, Open Delta, Center-Tapped <sup>+3</sup> 3ph, 4w, Delta, Center-Tapped <sup>+3</sup> 3ph, 4w, Wye, Ungrounded <sup>+3</sup> 3ph, 4w, Wye Grounded 3ph, 4w, Wye, Resistance Grounded <sup>+3</sup>
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<sup>+1</sup> In PM2200 (LCD) series meters

<sup>+2</sup> For 1 A CT nominal, additional error of ±1% from 50 mA to 150 mA, ±2% for current > 10 mA to < 50 mA. Partial standard compliance for Class 0.5S meter type (energy test clause only)

<sup>+3</sup> Through communication in PM2100 series meters



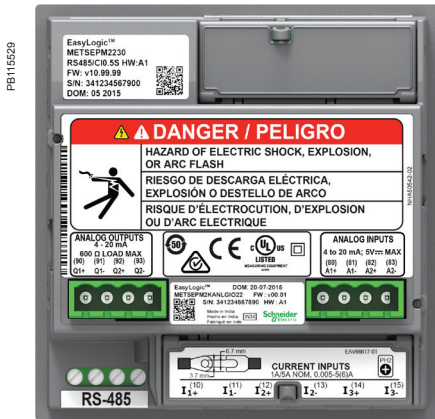
# PM2000 multi-function meters

## Functions and characteristics

Functions and characteristics	
Mechanical characteristics	
Weight	~ 300 gm
IP degree of protection	IP54 front side, IP30 meter body as per IEC 60529
Material	Polycarbonate meets UL 94V-0 flammability rating
Dimensions W x H x D	96 x 96 x 54 mm maximum (depth of the meter from housing mounting flange) and 13 mm (protrusion of meter from housing flange). Meter depth with IO module is 74 mm
Mounting position	Vertical
Panel thickness	5 mm maximum
Environmental characteristics	
Operating temperature	Meter -10 to +60 °C
Storage temperature	Meter -25 to +70 °C
Humidity rating	5 to 95% RH at 50 °C (non-condensing)
Pollution degree	2
Altitude	2000 m Category III
Product life	Minimum 7 years
Electromagnetic compatibility <sup>*4</sup>	
Electrostatic discharge	IEC 61000-4-2
Immunity to radiated field	IEC 61000-4-3
Immunity to fast transients	IEC 61000-4-4
Immunity to impulse waves	IEC 61000-4-5
Conducted immunity	IEC 61000-4-6
Immunity to magnetic fields	IEC 61000-4-8
Immunity to voltage dips	IEC 61000-4-11
Emissions	Emissions FCC Part 15 Class A/CE
Safety	
Europe	CE, as per IEC 61010-1 Ed-3
US and Canada	cULus as per UL61010-1 and CAN/CSA-C22.2 No. 61010-1, for 600V AC
Measurement category (Voltage and Current inputs)	CAT III up to 480 V L-L CAT II up to 600 V L-L
Overvoltage Category (Control power)	CAT III up to 300 V L-N
Dielectric	As per IEC/UL 61010-1 Ed-3
Protective Class	II, Double insulated for user accessible parts
Green premium	EOL, REACH, PEP, RoHS complied
Other certification	RCM (Australia), EAC (Russia)
Communication	
RS-485 port	Modbus RTU: 2-Wires, with ground & shield, 4800, 9600, 19200 or 38400 baud, Parity - Even, Odd, None, 1 stop bit if parity is Odd or Even, 2 stop bits if None DLF3000: Firmware update through communication port
Pulse Output – POP	Max 40 V DC, 20 mA 20 ms ON time Configurable pulse weight from 1 to 9999000 pulses/k_h (kWh, kVAh, or kVARh)
Isolation	2.5 kV RMS, double insulated
Protection features	Password protected for set-up & clearing energy and Min/Max data
Display language	English, Spanish, French, Chinese, German, Portugese, Russian
Technical publication	Printed installation guide (IG) with the meter in multi language (EN,ES,FR,DE,PT, RU,TR,ZH)
Human machine interface	
Display type	LED display: 7 segment LED, ~ 14.2 mm height, 3 rows with 4 digits per row 2 columns of LEDs, one on each side of the LED panel to indicate the parameters under measurement LCD display: Monochrome graphical LCD of 128x128 mm resolution with viewable area of 67 x 62.5 mm
Keypad	PM2100 series: 3 buttons for navigation & combination of 2 buttons for performing set-up, Lock/unlocking of page, Diagnostic page operation PM2200 series: 4 buttons for intuitive navigation of HMI/ UI pages
CAL LED Indicator	Red colour, meter constant is configurable from 1 to 9999000 pulses/k_h (kWh, kVAh, or kVARh)
Comm. activity	Green LED (for indicating RS-485 interface or heart beat pulse)

<sup>\*4</sup>as per IEC 61326-1 standard (Class A Emission)

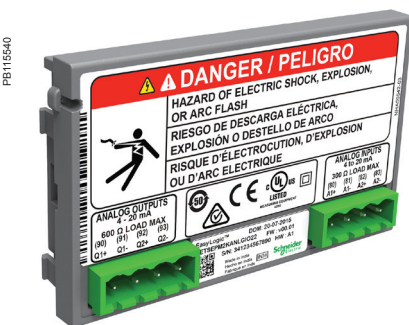
# Power and energy meters CÔNG TY CỔ PHẦN HOPLONGTECH PM2000 multi-function meters Functions and characteristics



Rear of PM2200 with I/O module



Digital I/O module



Analogue I/O module

## Electrical characteristics of IO modules

### Status Inputs (Digital Inputs)

Voltage ratings	18.5 to 36 V DC, OFF 0 to 4 V DC
Input resistance	110 kΩ
Max Frequency	2 Hz (T ON min = T OFF min = 250 ms)
Detect Time	20 ms
Update time	1 s
Isolation	2.5 kV RMS
Application	Integration of Breaker status or other non-electrical devices like steam, water, gas meter through pulse inputs
Display support	Available on PM2230 (LCD type). In PM2130 meter, data is available through communication only.
Set up and configuration	Through set-up software

### Digital Outputs

Voltage ratings	40 V DC max, 20mA max
On Resistance	50 Ω max
Meter constant	Configurable from 1 to 9999000 k_h (kWh, kVARh, kVAh)
Pulse width	20 ms
Pulse frequency	25 Hz
Leakage current	1 micro Amps
Isolation	2.5 kV RMS
Alarm conditions	14 set point driven alarms, 4 Unary alarms, 2 Digital inputs status
Application	Pulse output: configurable for energies upper / lower limit: configurable for 9 parameters with 14 set point: V L-L, V L-N, Amps, F, V-THD, W-tot, VA-tot, VAR-tot, PF-avg
Display support	Available on PM2230 (LCD type). In PM2130 meter, data is available through communication only
Set up and Configuration	Through set-up software

### Analogue inputs

Measurement scale	4-20 mA
Input impedance	=<300 Ω
Max source impedance	>500 Ω
Update rate	1 s
Accuracy	1% of Full scale at ambient temp 0.1%/K for de-rating
Voltage ratings	Typical 12 V (max 30 V)
Power Consumption	<1.5 Watts
Isolation	2.5 kV RMS
Application	Configurable for inputs from flow rates, RPM, fluid level, oil pressure, temperature measurement devices or transducers with option of 81 different Uni code selection. Configuration via set up software
Display	Available on PM2230 (LCD type). In PM2130 meter, data is available through communication only
Set up and configuration	Through set up software

### Analogue outputs

Scale	4-20 mA
Load impedance	=<600 Ω
Update rate	1s
Accuracy	1% of Full scale at ambient temp
Voltage ratings	Typical 12 V (max 30 V)
Power Consumption	<1.5 Watts
Isolation	2.5 kV RMS
Application	Analogue outputs can be associated to 40 different instantaneous parameters
Display	Available on PM2230 (LCD type). In PM2130 meter, data is available through communication only
Set-up & configuration	Through set-up software

### Mechanical characteristics

Mechanical dimension	90.5 mm W x 53 mm H x 14.67 mm D (without connector)
Weight	50 g

\* as per IEC 61326-1

# Power and energy meters

## CÔNG TY CỔ PHẦN ÔNG NGUYỄN HỒ LONG

### PM2000 multi-function meters

#### Functions and characteristics

Feature set summary	PM2110	PM2120	PM2130	PM2210	PM2220	PM2230
Accuracy Class for Wh	1.0		0.5S	1.0		0.5S
Accuracy Class for VARh			1.0			
Accuracy for VAh			+/- 0.5%			
Amps, per-phase, average and calculated neutral current			■			
Voltage, V L-N, V L-L, per-phase and average			■			
Power Factor	True PF	True PF Displacement PF <sup>+3</sup>		True PF	True PF Displacement PF	
Frequency, any available phase			■			
Power: W, VA, VAR: per-http://69.195.124.174/~pilatfa7/temp/			■			
3-phase unbalance %	Current	Current Voltage <sup>+3</sup>	Current	Current Voltage		
Demand parameters (Present, Last, Predicted and Peak for W, VA, VAR, Amps)	■	■	■	■		
Date and Time stamp for peak demand	(no timestamp)		(no timestamp)			
Energy: Wh, VAh, VARh (4 quadrant) Delivered (Import or Forward), Received (Export or Reverse)	Delivered, Received	Delivered, Received Total <sup>+3</sup> , Net <sup>+3</sup> , Last cleared <sup>+3</sup>	Delivered, Received, Total, Net	Delivered, Received Total, Net, Last cleared <sup>+3</sup>		
Active load timer, meter operating timer, run hours and power outage counter		Through com			■	
THD: Voltage L-N or L-L, Amps per phase			■			
Individual harmonics for Voltage, Current, per-phase		Up to 15th <sup>+3</sup>	Up to 31st <sup>+3</sup>		Up to 15th	Up to 31st
Min/ Max with real time clock For avg or total of V L-L, V L-N, Amps, PF, Hz, W, VA, VAR parameters with date and time stamp of occurrence		Through com			■	
RTC/battery <sup>+6</sup>	NA	■	■	NA	■	■
Communication	Pulse Output	RS-485		Pulse Output	RS-485	
Expandable Analogue IO modules (2 inputs & 2 outputs) <sup>+5</sup>		■				■
Expandable Digital IO modules (2 inputs & 2 outputs) <sup>+5</sup>		■				■
Customizable data logging up to 2 parameters. Option to select Power (W,VA,VAR) Bi-directional energy (+/-Wh, +/- VAh, +/- VARh), Demand (W, VA,VAR) with configurable interval and duration (e.g. 2 parameters for 60 days at 15 minutes interval)		■				■
Alarms: 14 set point driven alarms from 9 parameters (V L-L, V L-N, Amps, F, V-THD, W-tot, VA-tot, VAR-tot, PF-avg), 4 Unary alarms (meter power up, meter reset, meter diagnostic, phase reversal) and 2 digital inputs status (with DI/DO card only)		■				■
12 am snap shot of Avg Voltage, Avg Current, Total active power & Energy delivered as measured every day at 12am				■		
Rate counters: 2 configurable counters to display values in customer specified units base on energy measured (e.g., kgCO <sub>2</sub> emission or energy cost)				■		

<sup>+3</sup> Through communication only

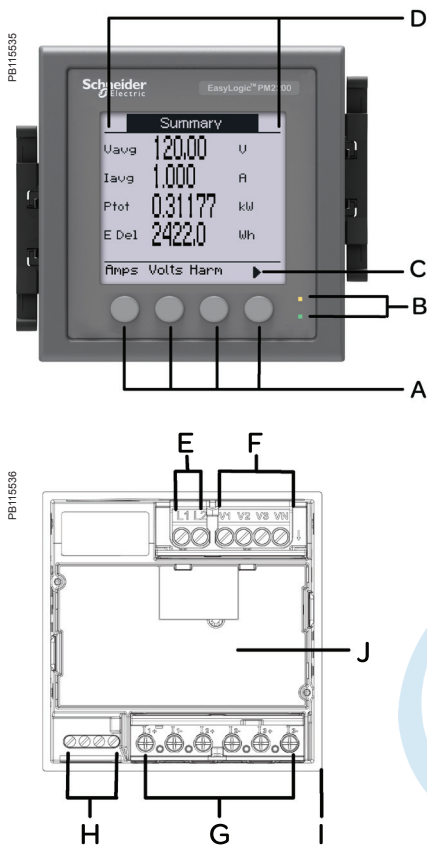
<sup>+5</sup> Any one IO module can be used at a time with PM2130 or PM2230 meter. The control power range with IO module shall be 72 to 304 V AC L-N or 90 to 304 V DC.

<sup>+6</sup> Battery backup duration 3 years when meter is in Power OFF condition.

# PM2000 multi-function meters

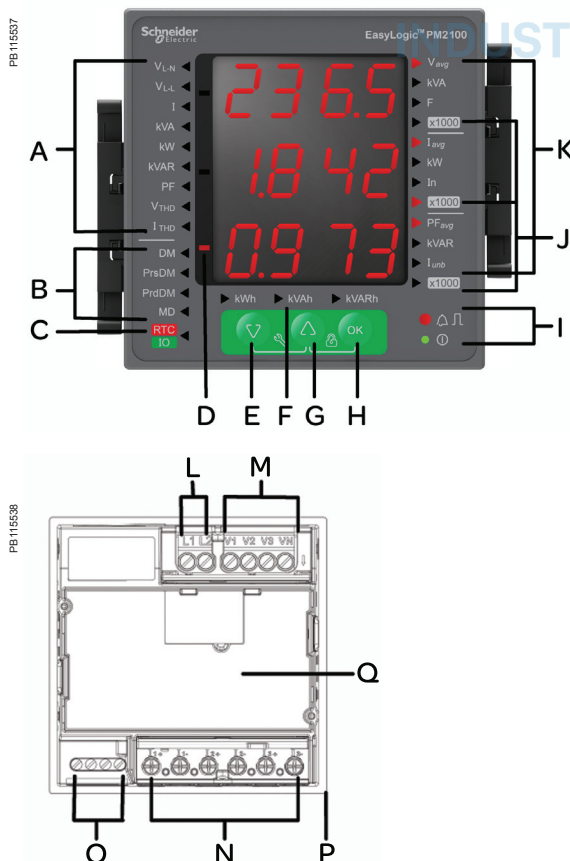
## Functions and characteristics

### PM2000 LCD display legend description



- A Menu selection buttons
- B LED indicators
- C Navigation or menu selections:
  - ▲ Exit screen and go up one level
  - ▲ Move cursor up list of options
  - ▼ Move cursor down, display more options
  - ◀ Move cursor one character to the left
  - ▶ Scroll right and display more menu items
  - + Show next item in list or increase the highlighted value
  - Show previous item in list
- D Maintenance & alarm notification area
- E Control power
- F Voltage inputs
- G Current inputs
- H RS-485 / POP
- I Gasket
- J I/O slot (for PM2x30 only)

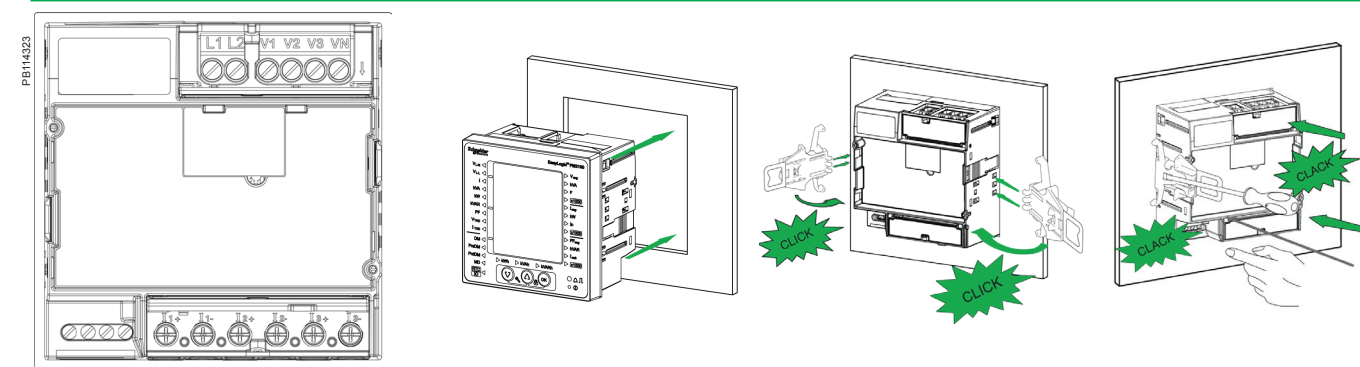
### PM2000 LED display legend description



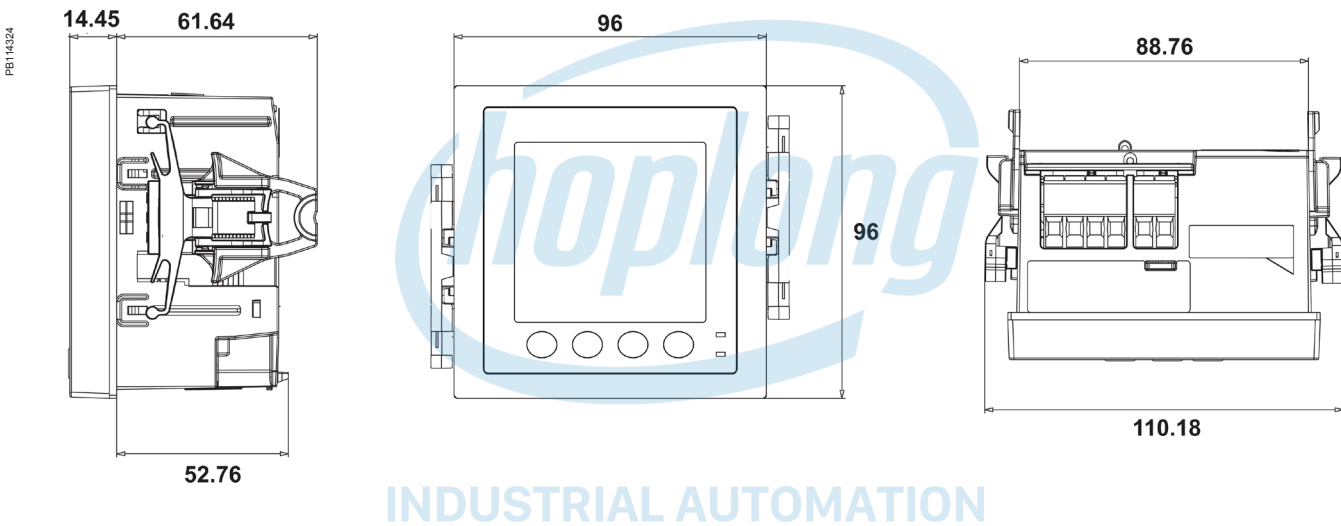
- A Phase measurements (VL-N, VL-L, I, kVA, kW, kVAR, PF, VTHD%, ITHD%)
- B Demand measurements (DM, PrsDM, Prd, DM, MD)
- C RTC Date & time
- D Negative indicator
- E Navigation key to navigate down
- F Energy readings Apparent energy, Active energy, Reactive energy
- G Navigation key to navigate up
- H OK Enter key
- I Energy pulsing LED (red) Heartbeat / communications LED (green)
- J x 1000 indicator
- K System measurements Vavg, kVA, F, Iavg, kW, In, PFavg, kVAR, Iunb
- L Control power L1, L2
- M Input voltage terminals V1, V2, V3, VN
- N Input current terminals I1+, I1-, I2+, I2-, I3+, I3-
- O RS-485 communications / POP terminals
- P Gasket
- Q I/O card slot (for PM2130 only)

PM2000 meter rear view

LED meter installation



PM2000 multi-function meter mechanical dimensions



PM2000 I/O module mechanical dimensions

