

# PowerLogic power-monitoring units

## PM800 series power meter

Technical data sheet

# 2010



# PM800 series

## Functions and characteristics

PE68194



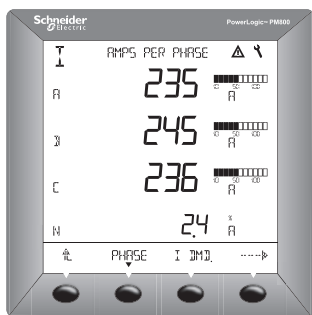
Front view of PowerLogic PM800 series meter with integrated display.

PE101823-50



Rear view of PowerLogic PM800 series meter.

PE66229



PowerLogic PM800 series meter display screen showing bar graphs.

The PowerLogic™ PM800 series meters offers many high-performance capabilities needed to meter and monitor an electrical installation in a compact 96 x 96 mm unit. All models include an easy-to-read display that presents measurements for all three phases and neutral at the same time, an RS-485 Modbus communication port, one digital input, one KY-type digital output, total harmonic distortion (THD) metering, and alarming on critical conditions. Four models offer an incremental choice of custom logging and power quality analysis capabilities. Expand any model with field-installable option modules that offer a choice of additional digital inputs and outputs, analog inputs and outputs, and Ethernet port.

### Applications

- Panel instrumentation
- Sub-billing, cost allocation and energy management
- Remote monitoring of an electrical installation
- Power quality analysis
- Utility bill verification, utility contract optimization and load preservation.

### Characteristics

#### Easy to install

Mounts using two clips, with no tools required. Direct connect the voltage inputs, with no need for potential transformers (PTs) up to 600 VAC.

#### Easy to operate

Intuitive navigation with self-guided, language-selectable menus.

#### System status at a glance

Large, anti-glare display with back-light provides summary screens with multiple values. Bar charts graphically represent system loading and I/O.

#### Custom alarming with time stamping

Over 50 alarm conditions, including over or under conditions, digital input changes, phase unbalance and more. The models PM850 and PM870 offer boolean logic that can be used to combine up to four alarms.

#### Power quality analysis

The PM800 series offers an incremental range of features for troubleshooting and preventing power quality related problems. All models offer THD metering. The PM810 with PM810LOG option and PM820 offer individual current and voltage harmonics readings. The PM850 and PM870 offer waveform capture (PM870 is configurable) and power quality compliance evaluation to the international EN50160 standard. The PM870 offers voltage and current disturbance (sag/swell) detection.

#### Extensive on-board memory

All models offer billing (energy and demand), maintenance, alarm and customizable data logs, all stored in non-volatile memory (PM810 requires PM810LOG option).

#### Active Energy IEC 62053-22 class 0.5S

Accurate energy measurement for sub-billing and cost allocation.

#### IEC61557-12 performance standard

Meets PMD/SD/K70/0.5 and PMD/SS/K70/0.5 requirements for combined Performance Measuring and monitoring Devices (PMD).

#### Trend curves and short-term forecasting

The models PM850 and PM870 offer trend logging and forecasting of energy and demand readings to help compare load characteristics and manage energy costs.

#### Expandable I/O capabilities

Use the on-board or optional digital inputs for pulse counting, status/position monitoring, demand synchronisation or control (gating) of the conditional energy metering. Use the on-board or optional digital outputs for equipment control or interfacing, controllable by internal alarms or externally through digital input status. Use the optional analog inputs and outputs for equipment monitoring or interfacing.

#### Metering of other utilities (WAGES)

All models offer five channels for demand metering of water, air, gas, electricity or steam utilities (WAGES) through the pulse counting capabilities of the digital inputs. Pulses from multiple inputs can be summed through a single channel.

#### Modular and upgradeable

All models offer easy-to-install option modules (memory, I/O and communications) and downloadable firmware for enhanced meter capabilities.

#### Remote display

The optional remote display can be mounted as far as 10 m from the metering unit. The adapter includes an additional 2- or 4-wire RS-485/RS-232 communication port.

# PM800 series

## Functions and characteristics (cont.)

PB101814-36



PowerLogic PM800 series meter without display.

PE86134



PowerLogic PM800 series meter with integrated display.

PB101822-88



PowerLogic PM800 series meter with remote display.

PE86135



Remote display adapter with display and cable.

PB101819-32



Remote display adaptor alone.

### Part Numbers

Description	Schneider Electric	Square D
<b>Meter without display</b>		
Use the base meter unit without display to comply with voltage limitations for local regulations when door mounting is not possible, or when meter voltage exceeds regulations, or when local display is not required. When the meter is used without a display, configuration of the communications port is limited to the default (address 1, 9600 baud, parity even). Requires software to read data.		
<b>PM810 meter</b> unit only, no display, basic instrumentation, THD, alarming, 80 kB logging (with PM810LOG)	<b>PM810UMG</b>	<b>PM810U</b>
<b>PM820 meter</b> unit only, no display, basic instrumentation, THD, alarming, 80 kB logging	<b>PM820UMG</b>	<b>PM820U</b>
<b>PM850 meter</b> unit only, no display, basic instrumentation, THD, alarming, 800 kB logging, waveform capture	<b>PM850UMG</b>	<b>PM850U</b>
<b>PM870 meter</b> unit only, no display, basic instrumentation, THD, alarming, 800 kB logging, configurable waveform capture and disturbance detection.	<b>PM870UMG</b>	<b>PM870U</b>
<b>Meter with integrated display</b>		
Use the meter with integrated display for panel mounting when door space is available and when voltage usage is within the local regulation limits.		
<b>PM810 meter</b> with integrated display,	<b>PM810MG</b>	<b>PM810</b>
<b>PM820 meter</b> with integrated display	<b>PM820MG</b>	<b>PM820</b>
<b>PM850 meter</b> with integrated display	<b>PM850MG</b>	<b>PM850</b>
<b>PM870 meter</b> with integrated display	<b>PM870MG</b>	<b>PM870</b>
<b>Meter with remote display</b>		
Conveniently packaged kit consist of a base meter (810, 820, 850 or 870) with a remote display, remote display adapter, and remote display cable 3 m (9.ft 10 inches).		
<b>PM810 meter</b> with remote display	<b>PM810RDMG</b>	<b>PM810RD</b>
<b>PM820 meter</b> with remote display	<b>PM820RDMG</b>	<b>PM820RD</b>
<b>PM850 meter</b> with remote display	<b>PM850RDMG</b>	<b>PM850RD</b>
<b>PM870 meter</b> with remote display	<b>PM870RDMG</b>	<b>PM870RD</b>
<b>Parts and accessories</b>		
<b>Remote display adapter with remote display and a 3 m (9 ft 10 inch) cable</b>	<b>PM8RDMG</b>	<b>PM8RD</b>
Use this combination of remote display, adapter, and 3 m cable to equip a base meter unit for use with a remote display. In addition, the display can be carried from meter to meter, enabling you to purchase one display for multiple meters. Each base unit meter must be equipped with a remote display adapter (PM8RDA).		
<b>Remote display adapter alone</b>	<b>PM8RDA</b>	<b>PM8RDA</b>
When added to the front of the base unit (PM8xxU), the adapter brings two additional communication ports: one for the remote display and one 4-wire/2-wire RS 485/RS 232.		

Part number list continued on next page.

# PM800 series

## Functions and characteristics (cont.)



PowerLogic PM870 with ECC module (bottom view showing connectors and configuration switches).



ECC module (front view)



ECC module (side view showing LED indicators).



PowerLogic PM8M26 module.



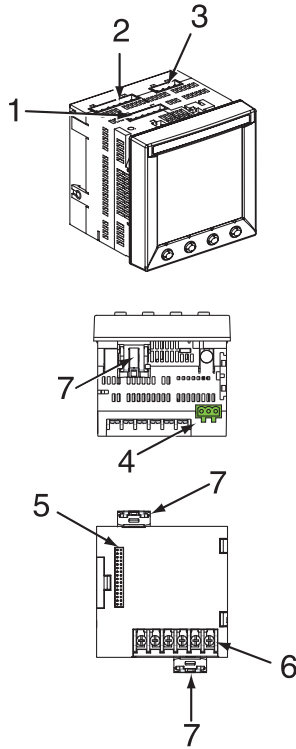
PowerLogic PM800 with PM8M22 and PM8M26 modules.

### Part Numbers - continued

Description		
<b>Optional modules</b>		
Ethernet communication module provides a 10/100BaseTx UTP port, an RS-485 Modbus serial master port, Ethernet-to-serial line gateway functionality, and an embedded web server that is fully compliant with Transparent Ready - Level 1 (TRe1) systems.		<b>PM8ECC</b>
The PM8ECC supports a private host PM8ECC MIB. Use of this MIB allows the reading of Basic Metering Data, Configuration and Status of I/Os and Configuration and Status of Alarms, plus SNMP Trap generation in response to any PM8 on-board alarms.		
2 relay outputs, 2 digital inputs		<b>PM8M22</b>
2 relay outputs, 6 digital inputs		<b>PM8M26</b>
2 relay outputs, 2 digital inputs, 2 analog outputs, 2 analog inputs		<b>PM8M2222</b>
PM810 optional logging module for on-board data recording, uses a non-volatile, battery-backed internal clock		<b>PM810LOG</b>
RJ11 Extender kit to mount RJ11 jack in panel door (for use with PM800, CM3000, and CM4000 series meters)		<b>RJ11EXT</b>
Cable for remote display adapter 1.25 m (4 ft)		<b>CAB4</b>
Cable for remote display adapter 3 m (9 ft 10 inch)		<b>CAB12</b>
Cable for remote display adapter 9.14 m (30 ft)		<b>CAB30</b>

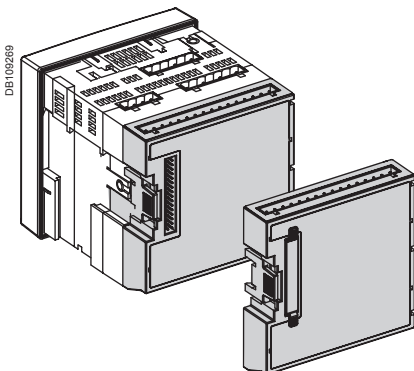
# PM800 series

## Functions and characteristics (cont.)



**PowerLogic PM800 series connectors.**

- 1. Control power.
- 2. Voltage inputs.
- 3. Digital input/output.
- 4. RS 485 port.
- 5. Option module connector.
- 6. Current inputs.
- 7. Mounting clips.



PowerLogic PM800 series meter with I/O module.

Selection guide	PM810	PM820	PM850	PM870
<b>Performance standard</b>				
ANSI 12.20 (Class 0.2S)	■	■	■	■
IEC 61557-12 PMD/SD/K70/0.5 and PMD/SS/K70/0.5	■	■	■	■
<b>General</b>				
Use on LV and HV systems	■	■	■	■
Current and voltage accuracy	0.5%/0.2%	0.5%/0.2%	0.5%/0.2%	0.5%/0.2%
Active energy accuracy (5% to 200% of load)	0.2%	0.2%	0.2%	0.2%
Number of samples per cycle	128	128	128	128
<b>Instantaneous rms values</b>				
Current, voltage, frequency	■	■	■	■
Active, reactive, Total & per phase apparent power	■	■	■	■
Power factor Total & per phase	■	■	■	■
<b>Energy values</b>				
Active, reactive, apparent energy	■	■	■	■
Configurable accumulation mode	■	■	■	■
<b>Demand values</b>				
Current Present & max.	■	■	■	■
Active, reactive, apparent power Present & max.	■	■	■	■
Predicted active, reactive, apparent power	■	■	■	■
Synchronisation of the measurement window	■	■	■	■
Demand calculation mode Block, sliding, thermal	■	■	■	■
<b>Other measurements</b>				
Hour counter	■	■	■	■
<b>Power quality measurements</b>				
Harmonic distortion Current & voltage	■	■	■	■
Individual harmonics Current & voltage	31 <sup>(1)</sup>	31	63	63
Waveform capture	-	-	■	■ <sup>(2)</sup>
Sag and swell detection	-	-	-	■
<b>Data recording</b>				
Min/max of instantaneous values	■	■	■	■
Data logs	2 <sup>(1)</sup>	2	4	4
Event logs	-	■	■	■
Trending / forecasting	-	-	■	■
GPS synchronization	■ <sup>(1)</sup>	■	■	■
Alarms	■	■	■	■
Time stamping	■ <sup>(1)</sup>	■	■	■
<b>Display and I/O</b>				
White backlit LCD display	■	■	■	■
Multilingual	■	■	■	■
Digital input (standard/optional)	1/12	1/12	1/12	1/12
Digital output (standard/optional)	1 KY/4 RY	1 KY/4 RY	1 KY/4 RY	1 KY/4 RY
Analog inputs (standard/optional)	0/4	0/4	0/4	0/4
Analog outputs (standard/optional)	0/4	0/4	0/4	0/4
Input metering capability (number of channels)	5	5	5	5
<b>Communication</b>				
RS 485 port	2-wire	2-wire	2-wire	2-wire
Modbus protocol	■	■	■	■
RS 232/RS 485, 2- or 4-wire Modbus RTU/ASCII (with addition of PM8RDA module)	■	■	■	■
Ethernet 10/100Base Tx UTP port and RS485 Modbus serial master port with PM8ECC	■	■	■	■

**Option modules selection guide**

The PM800 can be fitted with 2 optional modules, unless otherwise indicated<sup>(3)</sup>

**PM8ECC module**

10/100BaseTx UTP port, RS-485 Modbus serial master port, Ethernet to serial line gateway, embedded web server

Input/Output modules	PM8M22	PM8M26*	PM8M2222
Relay outputs	2	2	2
Digital inputs	2	6	2
Analog outputs 4-20 mA			2
Analog inputs 0-5 Vdc or 4-20 mA			2

\* Includes a 24 Vdc Power Supply that can be used to power the digital inputs

(1) With PM810LOG, battery-backed internal clock and 80 kB memory.

(2) Configurable.

(3) The Series 800 Power Meters supports up to two (2) option modules. When the PM8M2222 and PM8ECC are mounted together with control power over 370 Vac, the temperature rating must be reduced to -25°C to 50 °C. The same is true when using two PM8M2222.

# PM800 series

## Functions and characteristics (cont.)

Electrical characteristics			
Type of measurement	63rd harmonic, 128 samples per cycle		
Measurement accuracy standard IEC 61557-12 compliant			
Current	0.5% from 0.5 A to 10 A		
Voltage L-L	0.2% from 10 V to 277 V		
Power Factor	+/- 0.002 from 0.5 leading to 0.5 lagging		
Active Power	0.2%		
Frequency	+/- 0.01 Hz at 45 to 67 Hz +/- 0.01 Hz at 350 to 450 Hz		
Active Energy	IEC 62053-22 Class 0.5S, ANSI 12.20 Class 0.2S		
Reactive Energy	IEC 62053-23 Class 2		
Data update rate	1 s		
Input-voltage characteristics	Measured voltage	0 to 600 V AC (direct L-L) 0 to 347 V AC (direct L-N) up to 3.2 MV AC (with external VT)	
	Metering over-range	1.5 Un	
	Impedance	5 MΩ	
	Frequency measurement range	45 to 67 Hz and 350 to 450 Hz	
Input-current characteristics	CT ratings	Primary	Adjustable from 5 A to 32767 A
		Secondary	1 A or 5 A
	Measurement input range	5 mA to 10 A AC	
	Permissible overload	15 A continuous 50 A for 10 seconds per hour 500 A for 1 second per hour	
	Impedance	< 0.1 Ω	
Control Power	Load	< 0.15 VA	
	AC	115 to 415 ±10% V AC, 15 VA with options at 45 to 67 Hz or 350 to 450 Hz	
	DC	125 to 250 ±20% V DC, 10 W with options	
Ride-through time	45 ms at 120 V AC or 125 V DC		
Inputs/Outputs			
Standard (meter unit)	1 digital KY pulse output	6 to 220 V AC ± 10% or 3 to 250 V DC ± 10%, 100 mA max. at 25 °C, 1350 V rms isolation	
	1 digital input	24 to 125 V AC/DC ±10%, < 5 mA maximum burden, 1350 Vrms isolation	
PM8M22 option	2 relay outputs <sup>(1)</sup>	6 to 240 V AC or 6 to 30 V DC 2 A rms, 5 A max. for 10 seconds per hour	
	2 digital inputs	19 to 30 V DC, 5 mA max. at 24 V DC	
PM8M26 option	2 relay outputs <sup>(1)</sup>	6 to 240 V AC, 6 to 30 V DC 2 A rms, 5 A max. for 10 seconds per hour	
	6 digital inputs	20 to 150 V AC/DC, 2 mA max.	
	24 V internal supply	20-34 V DC, 10 mA max (feeds 6 digital inputs)	
PM8M2222 option	2 relay outputs <sup>(1)</sup>	6 to 240 V AC, 6 to 30 V DC 2 A rms, 5 A max. for 10 seconds per hour	
	2 digital inputs	20 to 150 V AC/DC, 2 mA max.	
	2 analog outputs	4 to 20 mA dc into 600 ohms maximum	
	2 analog inputs	Adjustable from 0 to 5 V DC or 4-20 mA	
Switching frequency (digital I/O)	PM8M22	Input/output	1 Hz, 50% duty cycle (500 ms ON/OFF)
	PM8M26 and PM8M2222	Input	25 Hz, 50% duty cycle (20 ms ON/OFF)
		Output	1 Hz, 50% duty cycle (500 ms ON/OFF)
Built-in Input/Output	25 Hz, 50% duty cycle (20 ms ON/OFF)		
Mechanical characteristics			
Weight (meter with integrated display)	0.6 kg		
IP degree of protection (IEC 60529)	IP52 or NEMA12 (requires gasket) front display, IP30 meter body		
Dimensions	Without options	96 x 96 x 70 mm (mounting surface)	
	With 1 option	96 x 96 x 90 mm (mounting surface)	
Environmental conditions			
Operating temperature	Meter	-25 °C to +70 °C <sup>(2)</sup>	
	Display	-10 °C to +50 °C	
Storage temp.	Meter + display	-40 °C to +85 °C	
Humidity rating	5 to 95 % RH at 40 °C (non-condensing)		
Pollution degree	2		
Installation category	III, for systems up to 347 V L-N / 600 V AC L-L		
Dielectric withstand	As per EN 61010, UL508		
Altitude	3000 m max.		

<sup>(1)</sup> Mechanical endurance: 15 million operations, Electrical endurance: 25000 commutations at 2 A / 250 V AC  
<sup>(2)</sup> The Series 800 Power Meters supports up to two (2) option modules. When the PM8M2222 and PM8ECC are mounted together with control power over 370 Vac, the temperature rating must be reduced to -25°C to 50 °C. The same is true when using two PM8M2222.

# PM800 series

## Functions and characteristics (cont.)

### Electromagnetic compatibility

Electrostatic discharge	Level III (IEC 61000-4-2)
Immunity to radiated fields	Level III (IEC 61000-4-3)
Immunity to fast transients	Level III (IEC 61000-4-4)
Immunity to impulse waves	Level III (IEC 61000-4-5)
Conducted immunity	Level III (IEC 61000-4-6)
Immunity to magnetic fields	Level III (IEC 61000-4-8)
Immunity to voltage dips	Level III (IEC 61000-4-11)
Conducted and radiated emissions	C $\epsilon$ industrial environment/FCC part 15 class A EN 55011
Harmonics emissions	IEC 61000-3-2
Flicker emissions	IEC 61000-3-3
Surge immunity	IEC 61000-4-12
Surge withstand capability (SWC)	ANSI C37.90.1:2002

### Safety

Europe	C $\epsilon$ , as per IEC 61010-1 $\square$ <sup>(1)</sup>
U.S. and Canada	cULus (UL508 and CAN/CSA C22.2 No. 14-M95, Industrial Control Equipment)

### Onboard communications

RS 485 port	2-wire, up to 38400 baud, Modbus
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### Model-dependent characteristics

Data Logs	PM810 with PM810LOG, PM820, PM850 and PM870: - 1 billing log - 1 customisable log PM850 and PM870 only: 2 additional custom logs
Min./max.	Worst min. and max. with phase indication for Voltages, Currents, Voltage unbalance, and THD. Min. and max. values for power factor (True and Displacement), power (P, Q, S) and frequency
One event log	Time stamping to 1 second
Trend curves (PM850 and PM870 only)	Four trend curves: 1 minute, 1 hour, 1 day and 1 month. Min./max./avg. values recorded for eight parameters: - every second for one minute for the 1-minute curve - every minute for one hour for the 1-hour curve - every hour for one day for the 1-day curve - every day for one month for the 1-month curve
Hour counter	Load running time in days, hours and minutes
Energy per shift	Up to three user-defined intervals per day Available for all models (the PM810 requires the PM810LOG module)
Forecasting (PM850 and PM870 only)	Forecasting of the values for the trended parameters for the next four hours and next four days
PM850 waveform capture	Triggered manually or by alarm, 3-cycle, 128 samples/cycle on 6 user configurable channels
PM870 enhanced waveform capture	From 185 cycles on 1 channel at 16 samples per cycle up to 3 cycles on 6 channels at 128 samples per cycle
Alarms	Adjustable pickup and dropout setpoints and time delays, numerous activation levels possible for a given type of alarm Historical and active alarm screens with time stamping Response time: 1 second Boolean combination of four alarms is possible using the operators NAND, AND, OR, NOR and XOR on PM850 and PM870 Digital alarms: status change of digital inputs
Memory available for logging and waveform capture <sup>(2)</sup>	80 kbytes in PM810 with PM810LOG and PM820 800 kbytes in PM850 and PM870
Firmware update (all models)	Update via the communication ports File download available free from <a href="http://www.powerlogic.com">www.powerlogic.com</a>
Bar graphs (all models)	Graphical representation of system performance

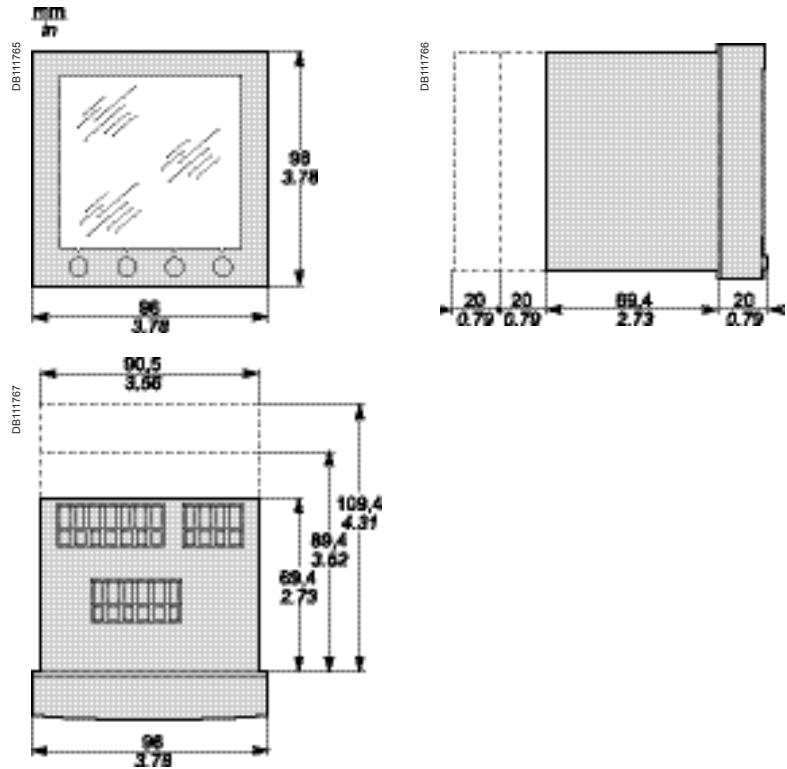
### Display characteristics

Languages	English, French, Spanish, German, Russian, Turkish and Portuguese.	
Display screen	Back-lit white LCD (6 lines total, 4 concurrent values)	
Dimensions	Display screen viewable area	73 x 69 mm
	Integrated display Overall	96 x 96 mm
		Depth meter + display
	Remote display Overall	96 x 96 x 40 mm
Weight	Meter with remote display adapter	0.81 kg
	Remote display	0.23 kg

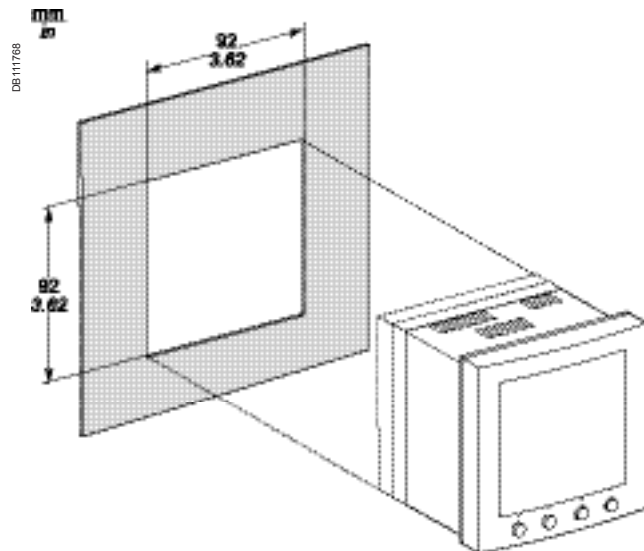
<sup>(1)</sup> Protected throughout by double insulation.

<sup>(2)</sup> Waveform capture with PM850 and PM870 only.

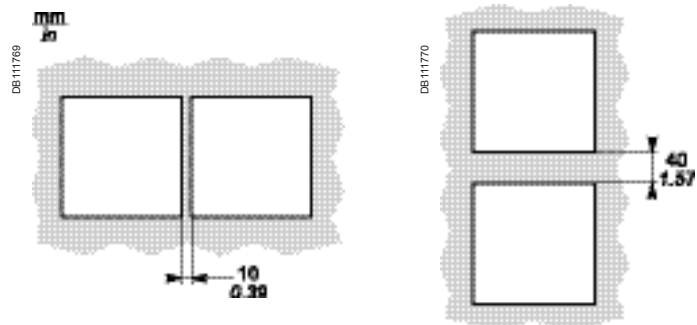
Power meter with integrated display  
Dimensions



Front-panel mounting (meter with integrated display)



Spacing between units

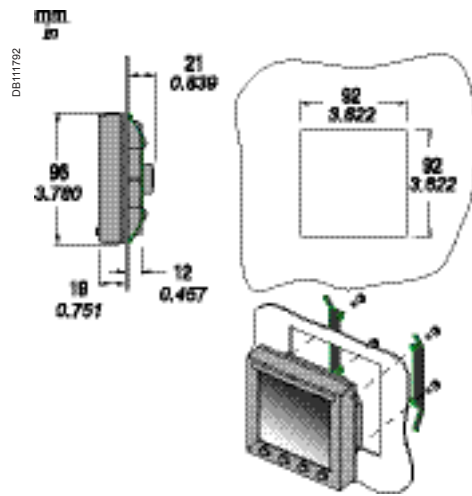


# Power Meter Series 800

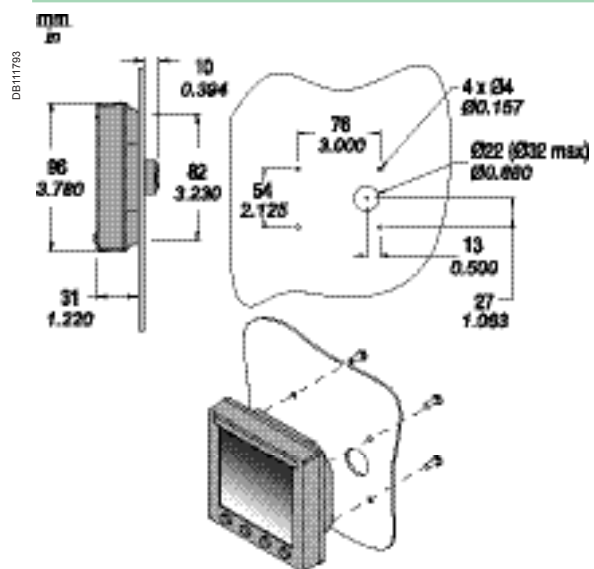
## Installation and connection (cont.)

### Remote display door mounting

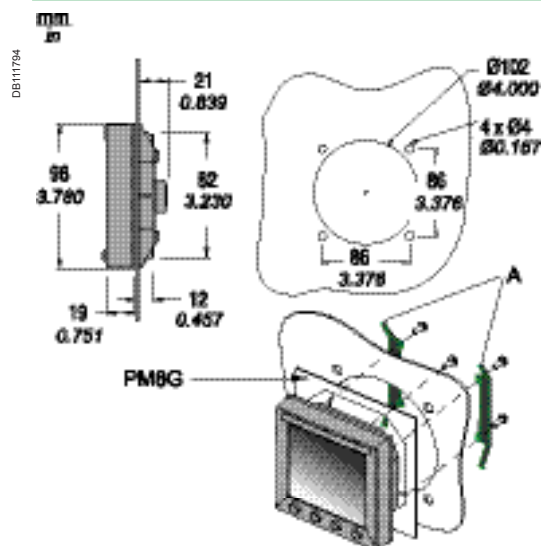
Flush mounting



### Surface mount



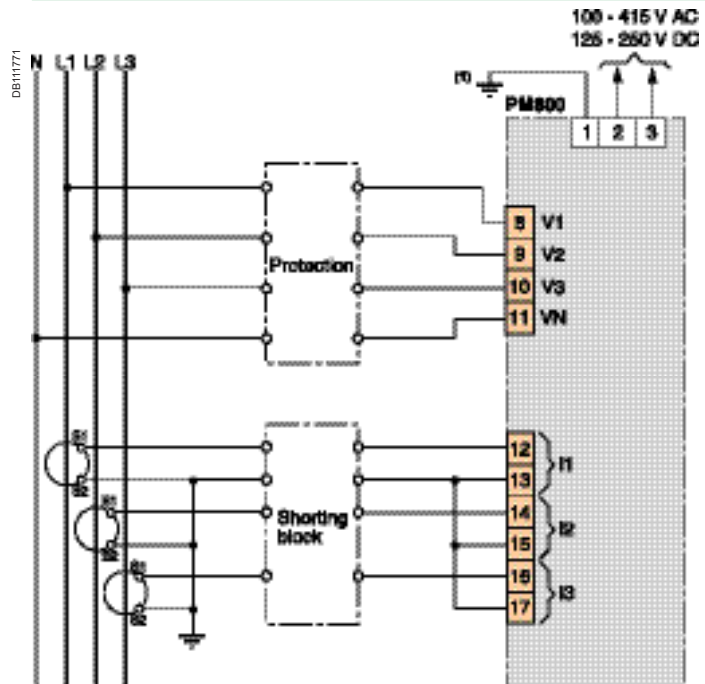
### Mounting in a Ø102 cutout (replace analogue device: ammeter, voltmeter, etc.)



# Power Meter Series 800

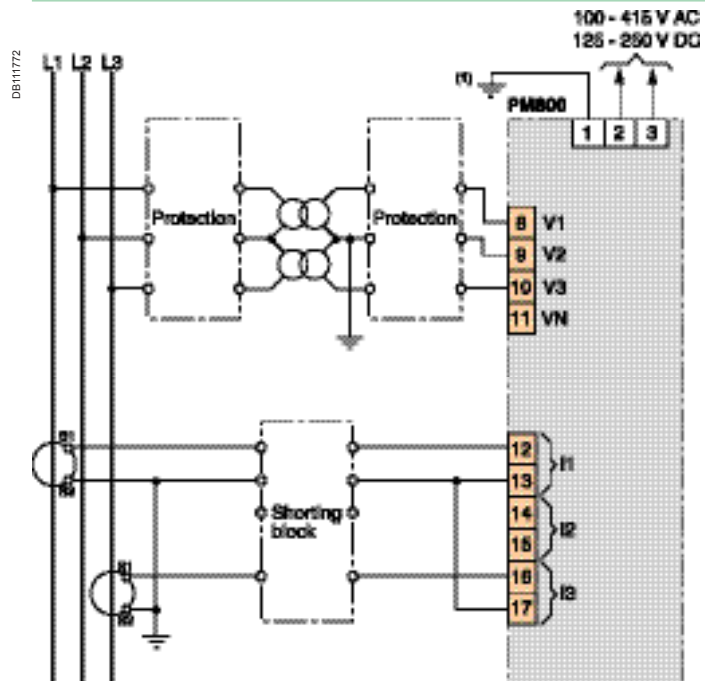
## Installation and connection (cont.)

### 4-wire connection with 3 CTs and no PT



Connection example.

### 3-wire connection with 2 CTs and 2 PTs



Connection example.

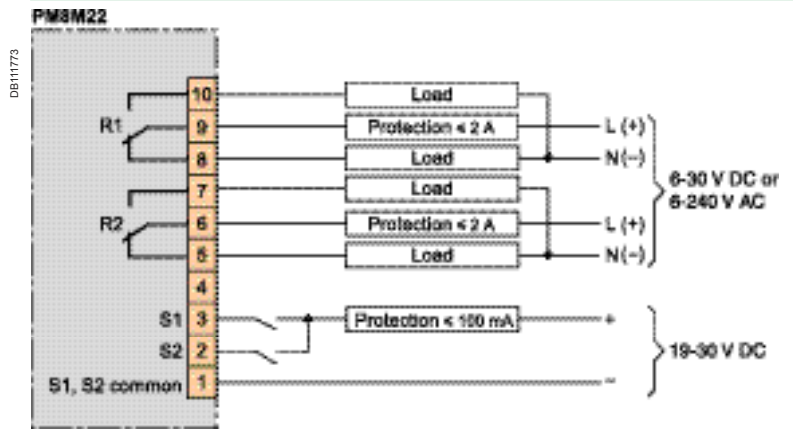
(1) Functional earth terminal.

**Note:** other types of connection are possible. See product documentation.

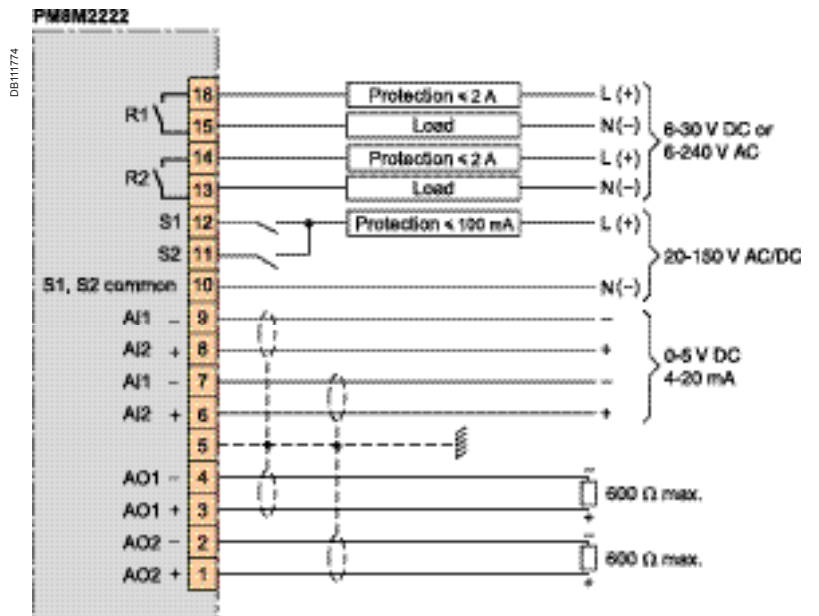
# Power Meter Series 800

## Installation and connection (cont.)

### PM8M22 module



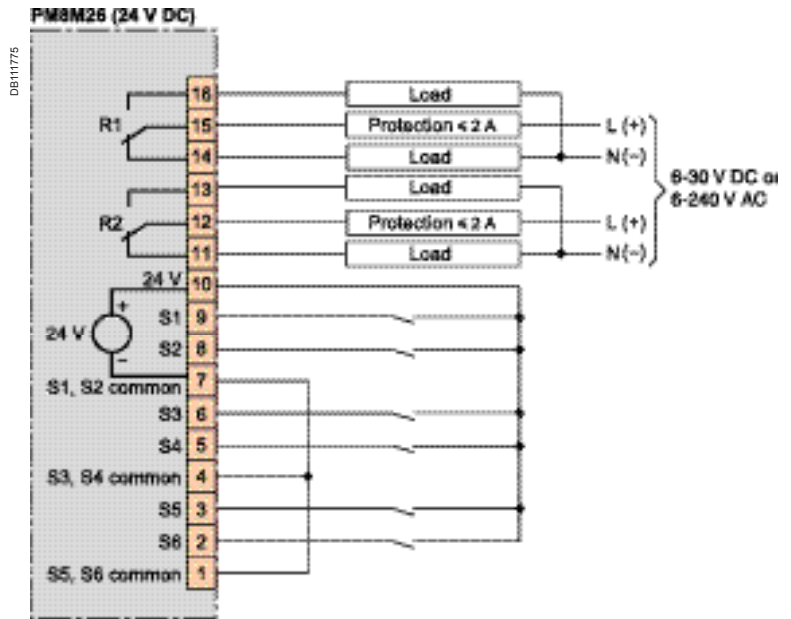
### PM8M2222 module



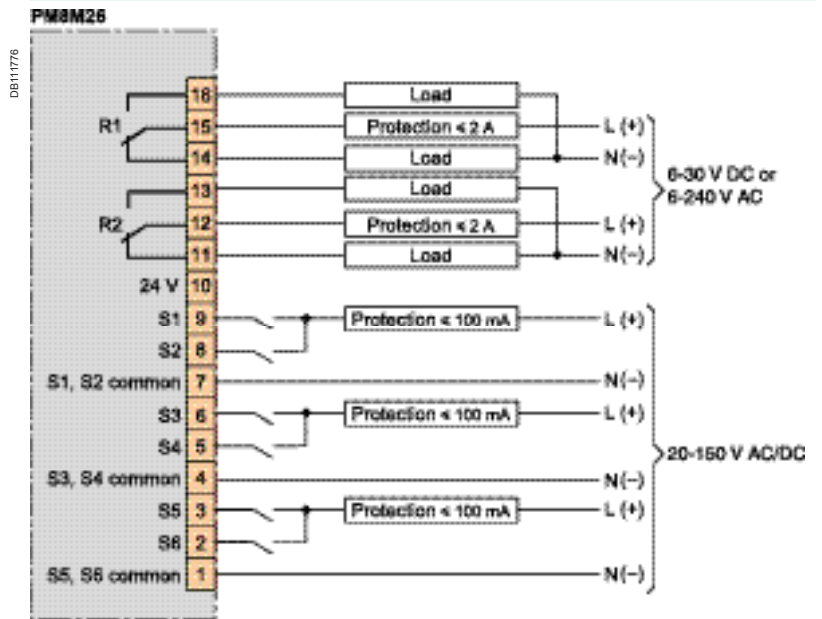
# Power Meter Series 800

## Installation and connection (cont.)

### PM8M26 module internal 24 V DC power supply



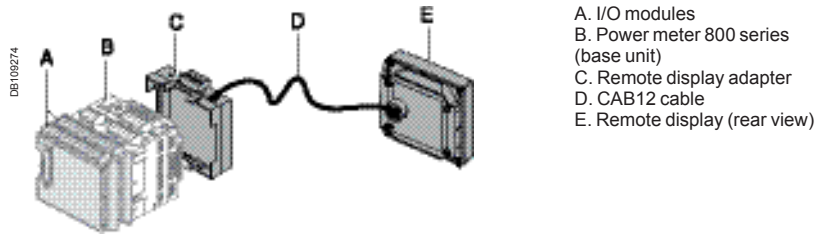
### PM8M26 module external power supply



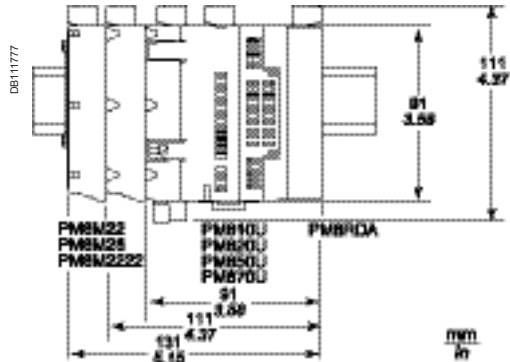
# Power Meter Series 800

## Installation and connection (cont.)

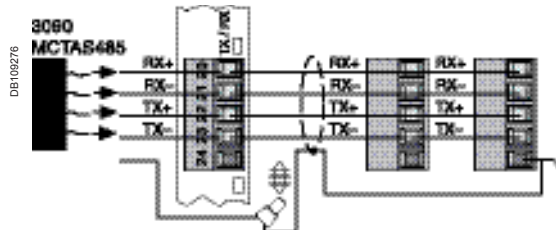
### Remote display kit



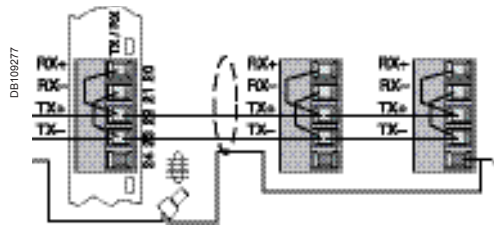
### Dimension (meter with I/O and remote display adapter)



### 4-wire connection (RS 485) of remote display adapter



### 2-wire connection (RS 485) of remote display adapter



### RS-485 wiring color codes

#### 2-wire connections

##### Belden 9841 cable:

- (+) blue, white stripe
- (-) white, blue stripe
- (shield)

#### 4-wire connections

##### Belden 9843 cable:

- (TX+) blue, white stripe
- (TX-) white, blue stripe
- (RX+) orange, white stripe
- (RX-) white, orange stripe
- (SG) green, white stripe
- (unused) white, green stripe
- (shield)

##### Belden 9842 cable:

- (TX+) blue, white stripe
- (TX-) white, blue stripe
- (RX+) orange, white stripe
- (RX-) white, orange stripe
- (shield)

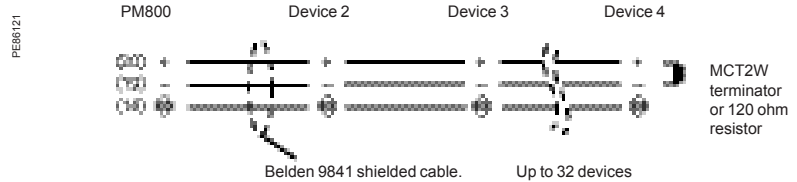
##### Belden 8723 cable:

- (TX+) green
- (TX-) white
- (RX+) red
- (RX-) black
- (shield)

### Surge protection

For surge protection, it is recommend that the PM8ECC signal ground wire be connected directly to an external earth ground at a single point.

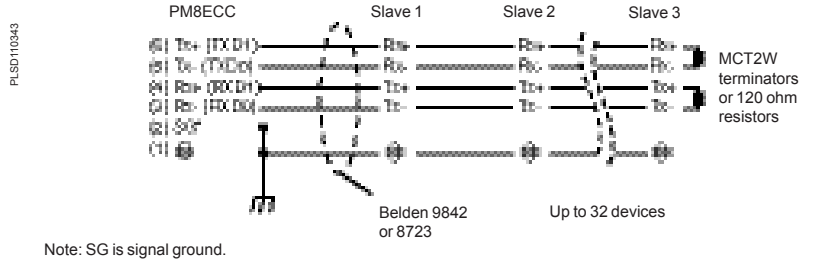
### PM800 meter unit RS-485 port 2-wire daisy-chain connection



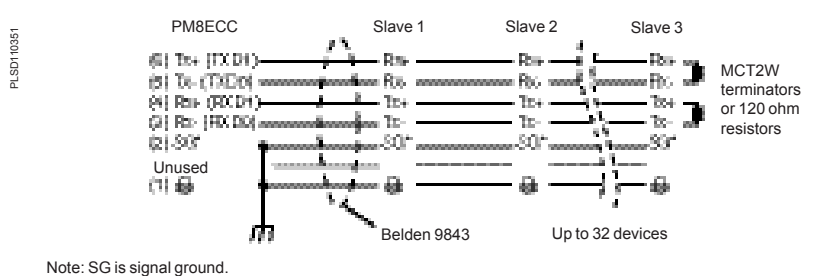
# Power Meter Series 800

## Installation and connection (cont.)

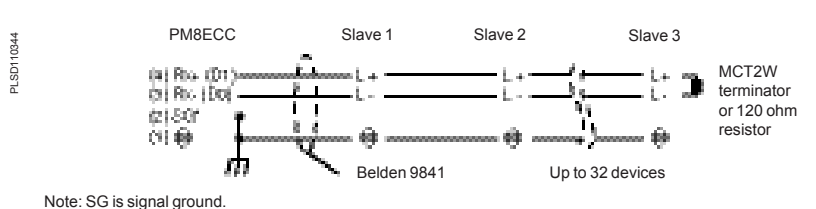
### PM8ECC module RS-485 port connections for 4-wire devices that do not support separate signal ground and shield wire



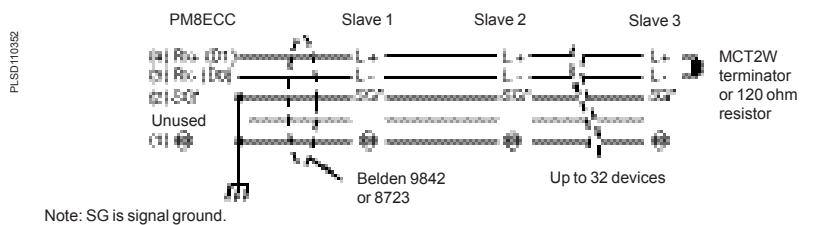
### PM8ECC module RS-485 port connections for 4-wire devices that support separate signal ground and shield wire



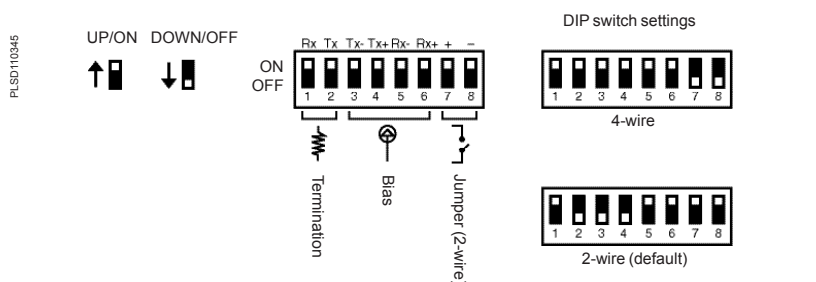
### PM8ECC module RS-485 port connections for 2-wire devices that do not support separate signal ground and shield wire



### PM8ECC module RS-485 port connections for 2-wire devices that support separate signal ground and shield wire



### PM8ECC module RS-485 port biasing and termination



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