Power and energy meters
PowerLogic® PM800

Merlin Gerin

Power Meter Series 800
Functions and characteristics

The PowerLogic® Power Meter Series 800 offers all the high-performance measurement capabilities needed to monitor an electrical installation in a compact 96 x 96 mm unit. Its easy-to-read display shows all three phases and neutral at the same time.

Standard features of the Series 800 Power Meters include an RS485 Modbus communication port (ASCII and RTU), digital input and digital output, THD metering, alarming and input metering capability. The PM820 and PM850 also offer custom onboard logging and individual current and voltage harmonic readings. The PM850 includes waveform capture. The PM870 is the first compact meter to offer voltage and current disturbance (sag and swell) detection and configurable waveform capture.

Applications
Panel instrumentation
- Sub-billing, cost allocation and utility bill verification
- Remote monitoring of an electrical installation
- Mid-range power quality analysis and energy management (the PM870 includes sag and swell detection)
- Utility contract optimization and load preservation

Characteristics
Easy to install
Mounts with only two clips. No tools required.

Direct connect voltage inputs
No need for potential transformers (PTs) up to 600 V AC.

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. Boolean logic can be used to combine up to four alarms.

Power quality analysis
The Power Meter Series 800 supports EN 50160 power quality evaluation. The PM850 includes waveform capture. The PM870 features voltage and current disturbance (sag and swells) detection and configurable waveform capture. And both the PM850 and PM870 include current and voltage individual harmonic magnitudes and angles that help troubleshoot and prevent power quality problems.

Extensive on-board memory
Billing (energy and demand), power quality and alarm logs are stored in non-volatile memory.

IEC 62053-22 class 0.5S for real energy
Accurate energy measurement for sub-billing and cost allocation.

Trend curves and short-term forecasting (PM850 and PM870)
Trend and compare energy and demand readings. Forecast upcoming values to anticipate and manage future energy costs.

WAGES capability
Five channels available on all models for input metering of various utilities (WAGES: water, air, gas, electricity, steam).

Modular and upgradeable
Easy-to-install option modules (memory and I/O) 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 RS485/RS232 communication port.

Serial and Ethernet communications
All modules include an RS-485 port supporting Modbus protocol (ASCII and RTU). An optional module provides Ethernet Modbus TCP/IP communications with e-mail on alarm, full function web server and Ethernet-to-serial line gateway functionality.

Remote display adapter with remote display and cable

Power Meter PM800 with ECC module

Part Numbers

Description	
Power Meter with Integrated Display	
PM810 power meter with integrated display, basic instrumentation, THD, alarming	**PM810MG**
PM820 power meter with integrated display, basic instrumentation, THD, alarming, 80 kb logging	**PM820MG**
PM850 power meter with integrated display, basic instrumentation, THD, alarming, 800 kb logging, waveform capture	**PM850MG**
PM870 power meter with integrated display, basic instrumentation, THD, alarming, 800 kb logging, configurable waveform capture and disturbance detection	**PM870MG**
Power Meter Unit (No Display)	
PM810 power meter unit only, no display	**PM810UMG**
PM820 power meter unit only, no display	**PM820UMG**
PM850 power meter unit only, no display	**PM850UMG**
PM870 power meter unit only, no display	**PM870UMG**
Optional modules	
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	**PM8ECC**
2 digital outputs (relays), 2 digital inputs	**PM8M22**
2 digital outputs (relays), 6 digital inputs	**PM8M26**
2 digital outputs (relays), 2 digital inputs, 2 analog outputs, 2 analog inputs	**PM8M2222**
PM810 optional logging module for on-board data recording, uses a nonvolatile, battery-backed internal clock	**PM810LOG**
Parts and accessories	
Remote display and adapter with a 3.55 m (12 ft) cable	**PM8RDMG**
Remote display adapter only	**PM8RDA**
RJ11 Extender kit to mount RJ11 jack in panel door (for use with PM800, CM3000, and CM4000 series meters)	**RJ11EXT**
Cable for remote display adapter 1.25 m (4 ft)	**CAB4**
Cable for remote display adapter 3.65 m (12 ft)	**CAB12**
Cable for remote display adapter 9.14 m (30 ft)	**CAB30**

Display selection guide

| Application	
Meter and integrated display mounted on door	
Use the meter with an integrated display when door space is available and when voltage usage is within the local regulation limits.	**PM810MG**
	PM820MG
	PM850MG
	PM870MG
Meter with no display	
Use the base meter unit without a 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.	**PM810UMG**
	PM820UMG
	PM850UMG
	PM870UMG
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 System Manager™ Software (SMS) to read data.	
Remote display PB101554	
Meter and remote display kit	
Conveniently packaged kit consist of a base meter (810, 820, or 850) with a remote display, remote display adapter, and remote display cable 3.6 m (12 ft).	**PM810RDMG**
	PM820RDMG
	PM850RDMG
	PM870RDMG
	PB101552
Remote display adapter alone	
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 RS485/RS232.	**PM8RDA**
	PB101555
Remote display and cable	
Use this combination of remote display, adapter, and 3.6 m (12 ft) 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).	**PM8RDMG**

Power Meter Series 800
Functions and characteristics
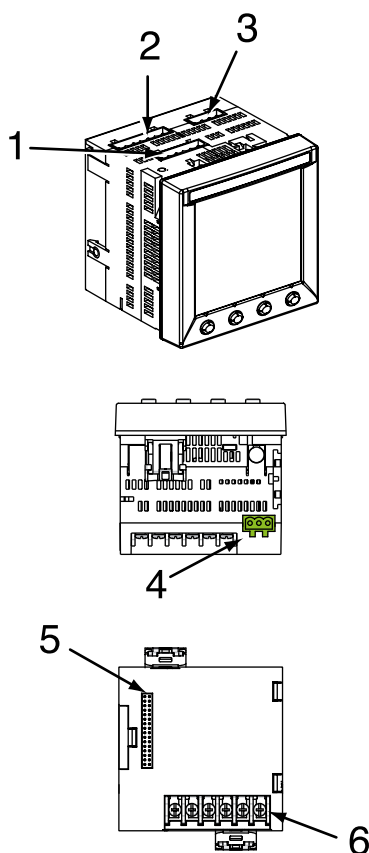
Power Meter Series 800.
1 Control power supply connector.
2 Voltage inputs.
3 Digital input/output.
4 RS485 port.
5 Option module connector.
6 Current inputs.

Selection guide		PM810	PM820	PM850	PM870
General					
Use on LV and HV systems		■	■	■	■
Current and voltage accuracy		0.1 %	0.1 %	0.1 %	0.1 %
Active energy and power accuracy		0.5 %	0.5 %	0.5 %	0.5 %
Number of samples per cycle		128	128	128	128
Instantaneous rms values					
Current, voltage, frequency		■	■	■	■
Active, reactive, apparent power	Total and per phase	■	■	■	■
Power factor	Total and per phase	■	■	■	■
Energy values					
Active, reactive, apparent energy		■	■	■	■
Configurable accumulation mode		■	■	■	■
Demand values					
Current	Present max. values	■	■	■	■
Active, reactive, apparent power	Present max. values	■	■	■	■
Predicted active, reactive, apparent power		■	■	■	■
Synchronisation of the measurement window		■	■	■	■
Demand calculation mode	Block, sliding	■	■	■	■
Other measurements					
Hour counter		■	■	■	■
Power-quality measurements					
Harmonic distortion	Current and voltage	■	■	■	■
Individual harmonics	Current and voltage	31 (1)	31	63	63
Waveform capture		-	-	■	■
Sag and swell detection		-	-	-	■
Data recording					
Min/max of instantaneous values		■	■	■	■
Data logs		-	2	4	4
Event logs		-	■	■	■
Trending / forecasting		-	-	■	■
Alarms		■	■	■	■
Time stamping		■	■	■	■
Display and I/O					
White backlit LCD display		■	■	■	■
Multilingual: English, French, Spanish		■	■	■	■
Digital input		1	1	1	1
Digital output or pulse output		1	1	1	1
Input metering capability (number of channels)		5	5	5	5
Communication					
RS485 port		2-wire	2-wire	2-wire	2-wire
Modbus protocol		■	■	■	■
RS232/RS485, 2- or 4-wire Modbus RTU/ASCII		■	■	■	■
(with addition of PM8RDA module)					
(1) With PM810LOG.					

Optional modules selection guide
The PM800 can be fitted with 2 optional modules, unless otherwise indicated (2)
PM8ECC module
10/100BaseTx UTP port, RS-485 Modbus serial master port, Ethernet to serial line gateway, embedded web server
PM8M22 module
2 digital outputs (relays) for control or alarms
2 digital inputs for position monitoring
PM8M26 module
2 digital outputs (relays) for control or alarms
6 digital inputs for position monitoring or pulse counting
This module includes a 24 V DC power supply that can be used to bias the digital inputs
PM8M2222 module
2 digital outputs (relays) for control or alarms
2 digital inputs for position monitoring or pulse counting
2 analog outputs 4-20 mA
2 analog inputs 0-5 V or 4-20 mA
(2) It is not possible to mount two PM8M22 modules. If the supply voltage of the PM800 is less than 208 V, only one PM8M2222 module can be mounted.
When using two PM8M2222 the temperature should not exceed 25°C

Power Meter Series 800
Functions and characteristics

Electrical characteristics

Type of measurement			True rms up to the 63rd harmonic
			On three-phase AC system (3P, 3P + N)
			128 samples per cycle
			On single phase AC system (L-L, L-N, L-L+N)
Measurement accuracy	Current and voltage		±0.075 % of reading + ±0.025 % of full scale
	Power	PM810	±0.5 % of reading + ±0.025 % of full scale
		PM820/PM850	±0.15 % of reading + ±0.025 % of full scale
	Frequency		±0.01 Hz from 45 to 67 Hz
			±0.01 Hz from 350 to 450 Hz
	Active energy		IEC 62053-22 and ANSI C12.20 Class 0.5S
	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)
			0 to 3.2 MV AC (with external VT)
	Metering over-range		1.5 Un
	Impedance		2 MW (L-L) / 1 MW (L-N)
	Frequency measurement range		45 to 67 Hz and 350 to 450 Hz
Input-current characteristics	CT ratings	Primary	Adjustable from 5 A to 32.767 kA
		Secondary	1 A or 5 A
	Measurement input range		0 to 10 A
	Permissible overload		15 A continuous
			50 A for 10 seconds per hour
			500 A for 1 second per hour
	Impedance		< 0.1 W
	Load		< 0.15 VA
Control Power	AC		110 to 415 ±10 % V AC, 11 VA
	DC		125 to 250 ±20 % V DC, 6 W
	Ride-through time		45 ms at 120 V AC
Input/outputs PM800	Static pulse output		Static output (6 to 220 ±10 % V AC or 3 to 250 ± 10 % V DC, 100 mA max. at 25 ℃)
			1350 V rms isolation
	Digital input		24 to 125 V AC/DC (±10 %) 5 mA max. burden

Options

PM8M22	Relay outputs 0 to 240 V AC or 0 to 30 V DC		
			2 A rms, 5 A max. for 10 seconds per hour
	Digital inputs		19 to 30 V DC, 5 mA max. / 24 V DC
PM8M26	Relay outputs 0 to 240 V AC, 0 to 30 V DC		
			2 A rms, 5 A max. for 10 seconds per hour
	Digital inputs		20 to 150 V AC/DC, 2 mA max.
	24 V internal supply		20 - 30 V DC, 10 mA max. (feeds 8 digital inputs)
PM8M2222	Relay outputs 0 to 240 V AC, 0 to 30 V DC		
			2 A rms, 5 A max. for 10 seconds per hour
	Digital inputs		20 to 150 V AC/DC, 2 mA max.
	Analog outputs		4-20 mA, burden 0 to 600 W max.
	Analog inputs Adjustable from 0 to 5 V DC or 4-20 mA		
Switching frequency	PM8M22	Input/output	1 Hz, 50 % duty cycle (500 ms ON/OFF)
	PM8M26 &	Input	25 Hz, 50 % duty cycle (20 ms ON/OFF)
	PM8M2222	Output	1 Hz, 50 % duty cycle (500 ms ON/OFF)
Mechanical endurance (digital outputs)			15 million operations
Electrical endurance (digital outputs)			250000 commutations at 2 A / 250 V AC
Installation category of options			II (1)

Mechanical characteristics

|		
Weight (meter + integrated display)		0.6 kg
IP degree of protection (IEC 60529)		IP52 front display, IP30 meter body
Dimensions	Without options	96 x 96 x 70 mm (behind mounting surface)
	With 1 option	96 x 96 x 90 mm (behind mounting surface)

Environmental conditions

Operating temperature	Meter	-25 ℃ to +70 ℃ (2)
	Display	-10 ℃ to +50 ℃
Storage temperature Meter + display		-40 ℃ to +85 ℃
Humidity rating		5 to 95 % RH at 40 ℃ (non-condensing)
Pollution degree		2
Installation category		III, for distribution systems up to 347 V L-N / 600 V AC L-L
Dielectric withstand		As per EN 61010, UL508

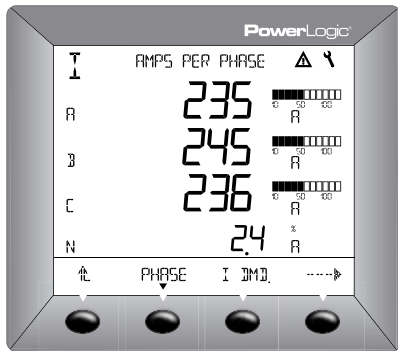(1) Installation category II, for power systems up to 347 V AC / 600 V AC.
(2) 65 ℃ if control power is above 305 V AC.

Power Meter Series 800
Functions and characteristics
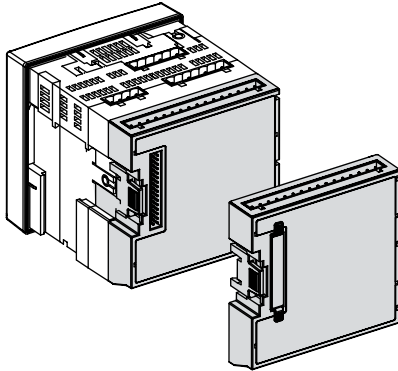
PM800 Series with I/O module.

PM800 Series display screen showing bar graphs.

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	CE industrial environment/FCC part 15 class A EN 55011
Harmonics emissions	IEC 61000-3-2
Flicker emissions	IEC 61000-3-3

Safety

Europe	CE, as per IEC 61010-1 [1]
U.S. and Canada	UL508

Communication

RS 485 port	2-wire, up to 38400 baud, Modbus

Firmware characteristics

Data Logs	PM820, PM850 and PM870: - 1 billing log - 1 customizable 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
Energy per interval	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 Four priority levels Response time: 1 second Boolean combination of four alarms is possible using the operators NAND, OR, NOR and XOR on PM850 and PM870 Digital alarms: status change of digital inputs
Memory available for logging and waveform capture [2]	80 kbytes in PM820 800 kbytes in PM850 and PM870
Firmware update	Update via the communication ports File download available free from powerlogic.com website
Bar graphs	Graphical representation of system performance

Display characteristics

|			
Languages	English, French, Spanish		
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		69.4 mm + 17.8 mm
	Remote display	Overall	96 x 96 x 40 mm
Weight	Meter with remote display adapter		0.81 kg
	Remote display		0.23 kg

(1) Protected throughout by double insulation.
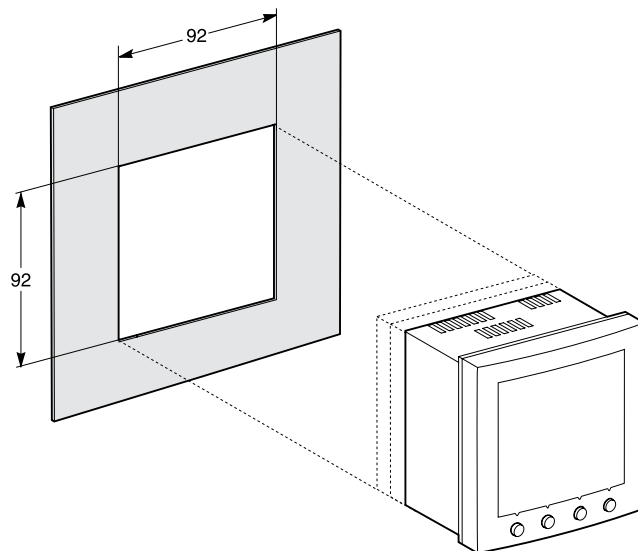(2) Waveform capture with PM850 and PM870 only.

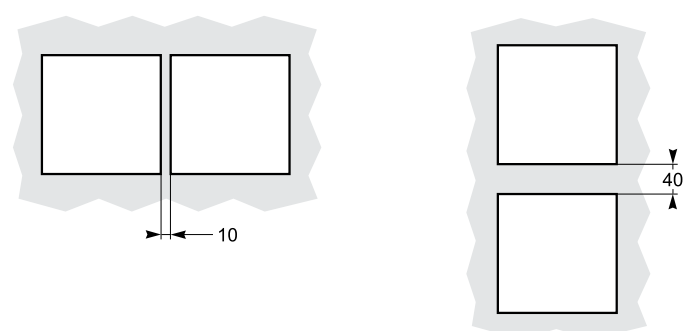# Power Meter Series 800
Installation and connection

Dimensions

96

96

90,5

109,4

89,4

69,4

96

20 20 69,4 20
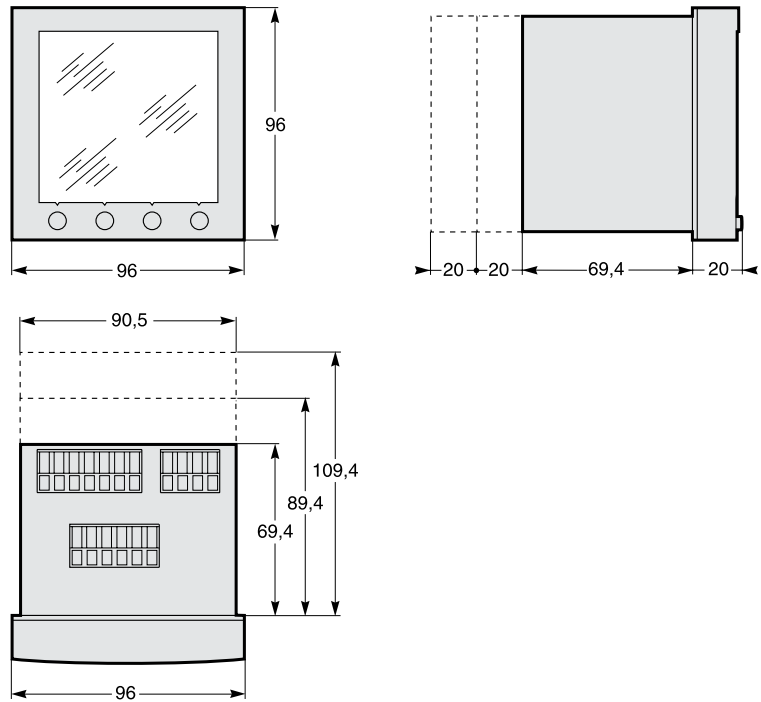
Front-panel mounting (meter with integrated display)

92

92

Spacing between units

10

40

Remote display door mounting

Flush mounting

21
[0.839]

96
[3.780]

92
[3.622]

92
[3.622]

19
[0.751]

12
[0.457]

mm
[in]

Surface mount

10
[0.394]

96
[3.780]

82
[3.230]

31
[1.220]

4 x Ø4
[Ø0.157]

76
[3.000]

Ø22 (Ø32 max)
[Ø0.880]

54
[2.125]

13
[0.500]

27
[1.063]

mm
[in]
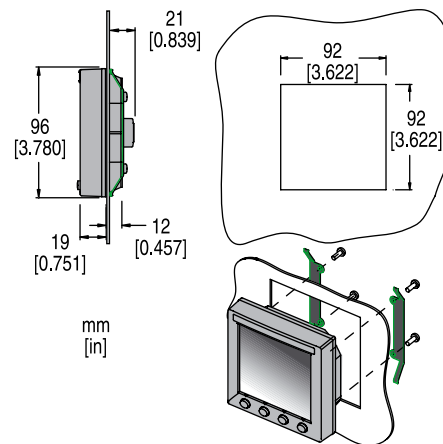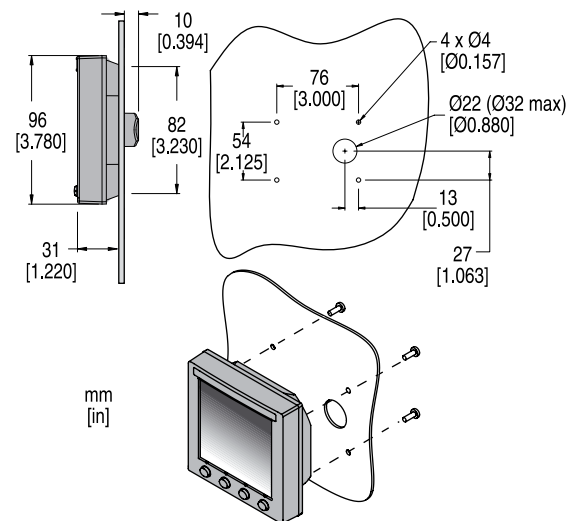
For mounting in a Ø102 cutout
(to replace an analogue device: ammeter, voltmeter, etc.)

21
[0.839]

96
[3.780]

82
[3.230]

19
[0.751]

12
[0.457]

Ø102
[Ø4.000]

4 x Ø4
[Ø0.157]

86
[3.376]

86
[3.376]

A

PM8G

mm
[in]
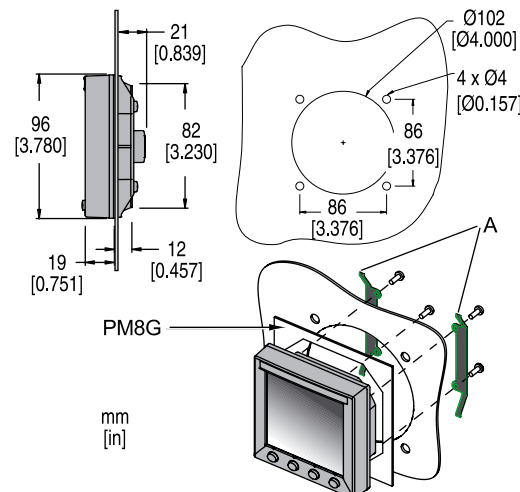
Power Meter Series 800
Installation and connection

4-wire connection with 3 CTs and no PT

110 - 415 V AC
125 - 250 V DC

N L1 L2 L3

PM800

| 1 | 2 | 3 |

Protection

8	V1
9	V2
10	V3
11	VN

Shorting block

12	I1
13	
14	I2
15	
16	I3
17	

S1 S2
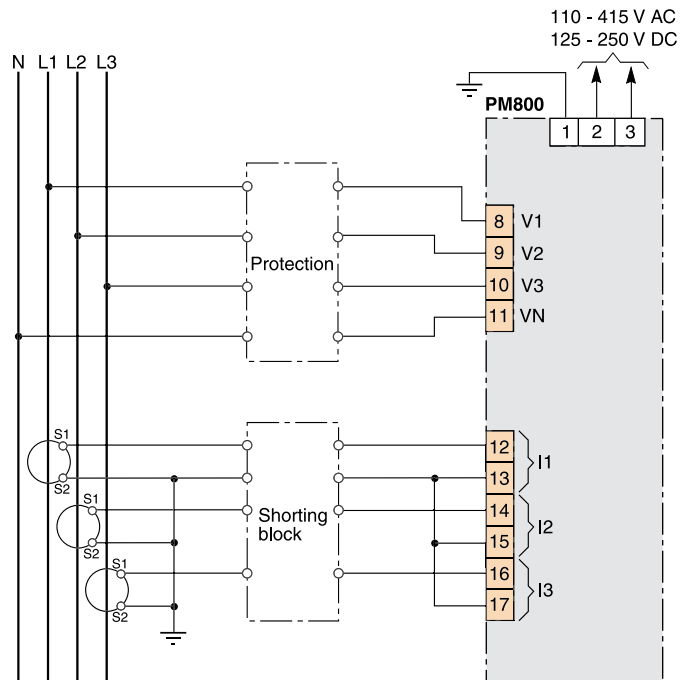
3-wire connection with 2 CTs and 2 PTs

110 - 415 V AC
125 - 250 V DC

L1 L2 L3

PM800

| 1 | 2 | 3 |

Protection   Protection

8	V1
9	V2
10	V3
11	VN

Shorting block

12	I1
13	
14	I2
15	
16	I3
17	

S1 S2
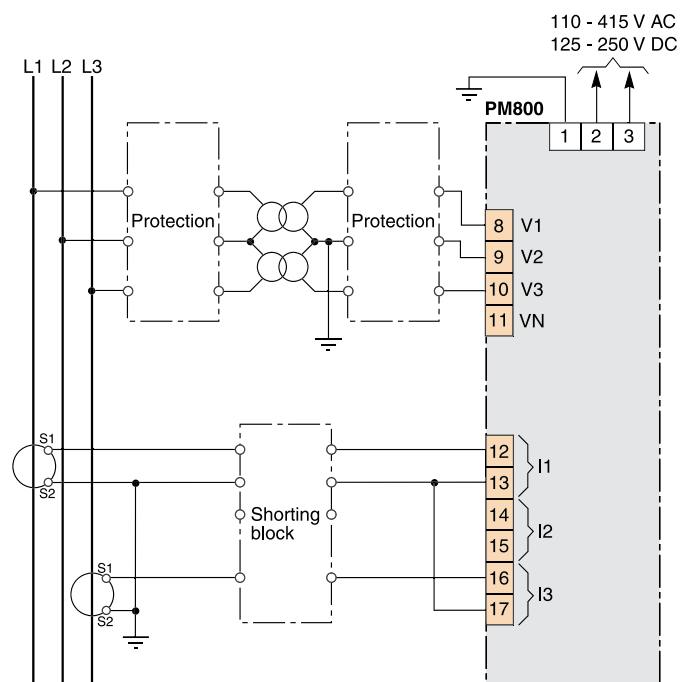
Note: Other types of connection are possible. See product documentation.
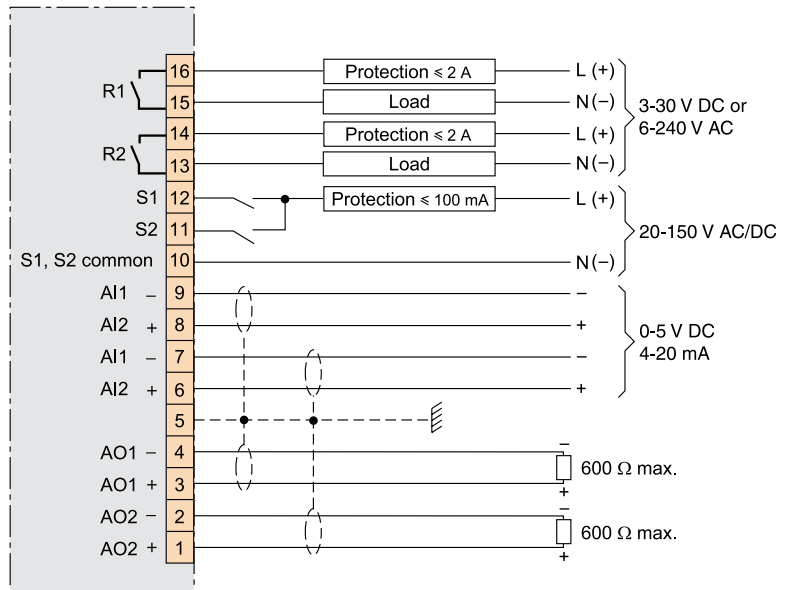
Power Meter Series 800
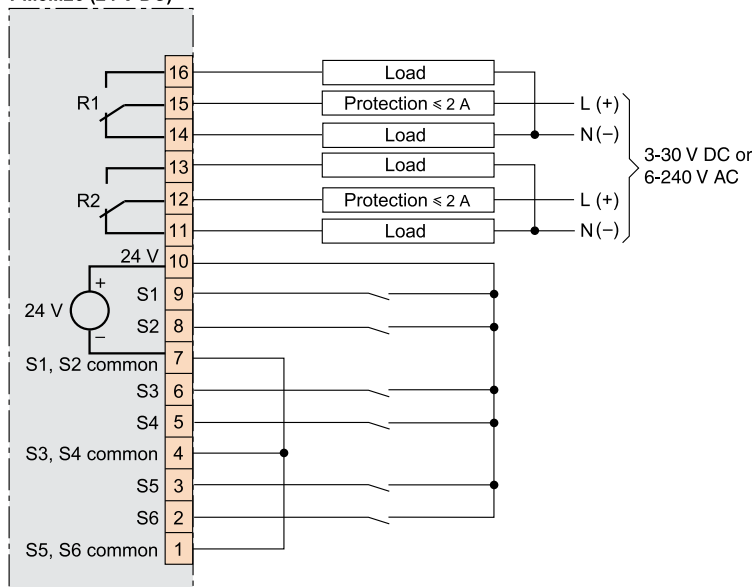## Installation and connection

PM8M22 module

PM8M22

10	Load
R1 9	Protection ≤ 2 A — L (+)
8	Load — N (−)
7	Load
R2 6	Protection ≤ 2 A — L (+)
5	Load — N (−)
4	
S1 3	Protection ≤ 100 mA — +
S2 2	
S1, S2 common 1	−

3-30 V DC or 6-240 V AC

19-30 V DC
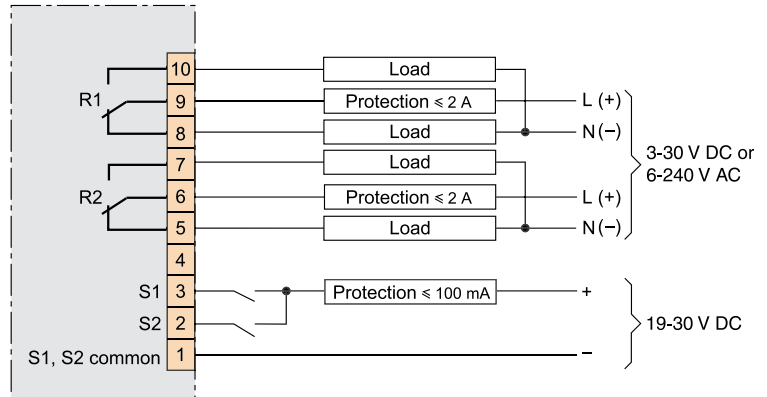
PM8M2222 module

PM8M2222

16	Protection ≤ 2 A — L (+)
R1 15	Load — N (−)
14	Protection ≤ 2 A — L (+)
R2 13	Load — N (−)
S1 12	Protection ≤ 100 mA — L (+)
S2 11	
S1, S2 common 10	N (−)
AI1 − 9	−
AI2 + 8	+
AI1 − 7	−
AI2 + 6	+
5	
AO1 − 4	
AO1 + 3	600 Ω max.
AO2 − 2	
AO2 + 1	600 Ω max.

3-30 V DC or 6-240 V AC

20-150 V AC/DC

0-5 V DC
4-20 mA

Power Meter Series 800
Installation and connection

PM8M26 module internal 24 V DC power supply

PM8M26 (24 V DC)

Terminal	Connection
16	Load
R1 — 15	Protection ≤ 2 A — L (+)
14	Load — N (−)
13	Load
R2 — 12	Protection ≤ 2 A — L (+)
11	Load — N (−)

3-30 V DC or 6-240 V AC

Terminal	
24 V — 10	
S1 — 9	
24 V + / −	S2 — 8
S1, S2 common — 7	
S3 — 6	
S4 — 5	
S3, S4 common — 4	
S5 — 3	
S6 — 2	
S5, S6 common — 1	

PM8M26 module external power supply

PM8M26

Terminal	Connection
16	Load
R1 — 15	Protection ≤ 2 A — L (+)
14	Load — N (−)
13	Load
R2 — 12	Protection ≤ 2 A — L (+)
11	Load — N (−)

3-30 V DC or 6-240 V AC

Terminal	Connection
24 V — 10	
S1 — 9	Protection ≤ 100 mA — L (+)
S2 — 8	
S1, S2 common — 7	N (−)
S3 — 6	Protection ≤ 100 mA — L (+)
S4 — 5	
S3, S4 common — 4	N (−)
S5 — 3	Protection ≤ 100 mA — L (+)
S6 — 2	
S5, S6 common — 1	N (−)

20-150 V AC/DC
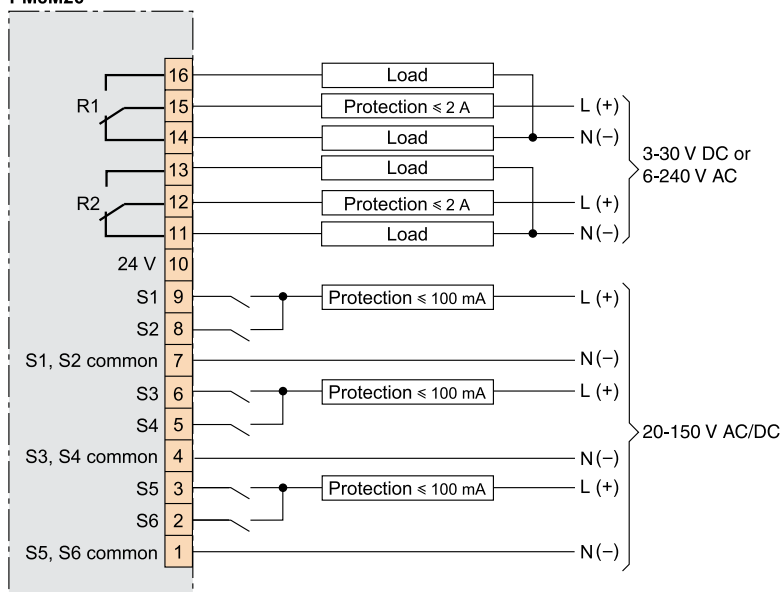
Power Meter Series 800
Installation and connection

Remote display kit
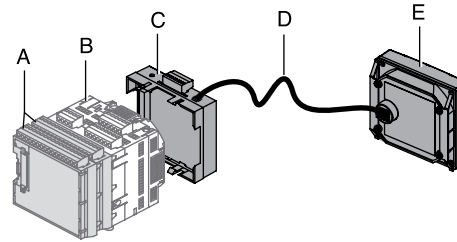
A. Optional modules
B. Power meter 800 series (base unit)
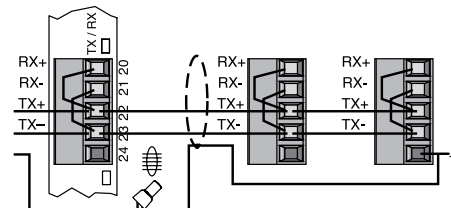C. Remote display adapter
D. CAB12 cable
E. Remote display (rear view)
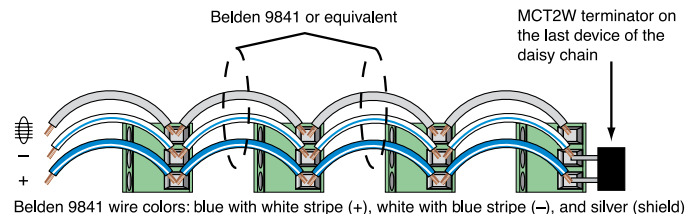
Dimension (meter with I/O and remote display adapter)
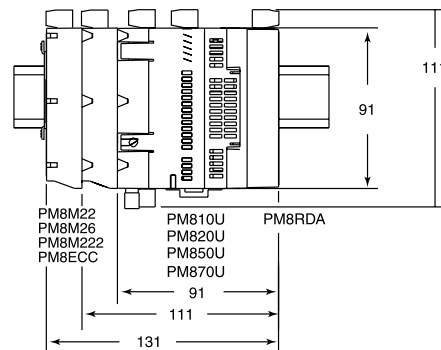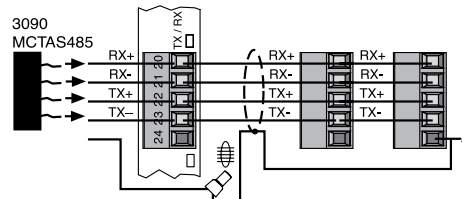
PM8M22
PM8M26
PM8M222
PM8ECC

PM810U
PM820U
PM850U
PM870U

PM8RDA

111
91
91
111
131

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

3090
MCTAS485

TX / RX

RX+
RX-
TX+
TX-

24 13 12 21 20

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

TX / RX

RX+
RX-
TX+
TX-

24 23 22 21 20

2-wire daisy-chain connection of devices (RS 485)

Belden 9841 or equivalent

MCT2W terminator on the last device of the daisy chain

Belden 9841 wire colors: blue with white stripe (+), white with blue stripe (–), and silver (shield)

4-wire daisy-chain connection of devices, connected to 2-wire Modbus or Jbus connection of devices (RS 485)

Belden 8723 or equivalent
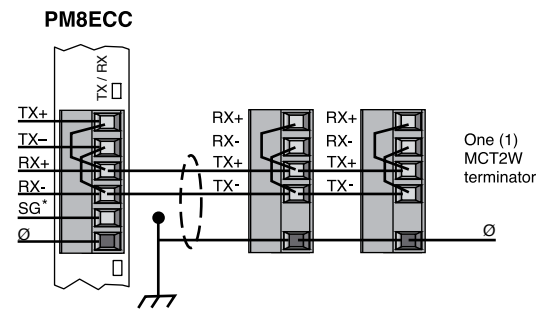Jumpers
Belden 9841 or equivalent

From Master (Host) Device

20 RX+
21 RX-
22 TX+
23 TX-
24 SHLD

18
19 –
20 +

MCT2W terminator

PM800

CM3000, CM400 or PM600
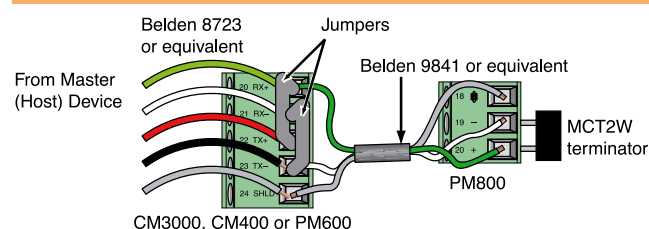
4-wire connection (RS 485) of PM8ECC
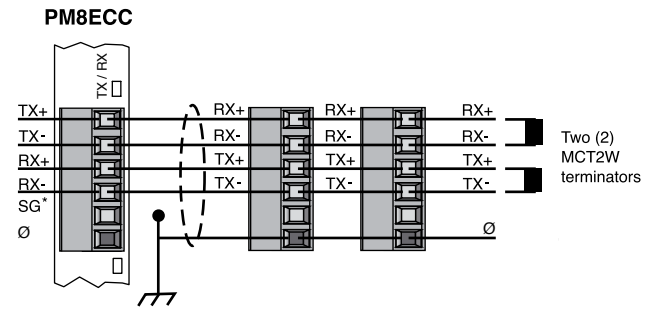
PM8ECC

* **Note:** SG = Signal Strength

2-wire connection (RS 485) of PM8ECC

PM8ECC

* **Note:** SG = Signal Strength

This information is supplied by theTBIS Integrator highlighted below...

Transparent Buildings Systems Integrator Alliance

The T-BIS Systems Integrator alliance is an approved network of experienced systems integrators who have been chosen to deliver the very best in intelligent building integration solutions. The alliance programme has been developed to bring together the very best System Integrators in the marketplace .

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