

PM130E DIRECT CURRENT (DC) ENERGY METER DATASHEET



DC Energy Meter

The PM130E DC is a 96x96mm panel size, multi-function direct current (DC) energy power meter, designed for up to three (3) channel DC metering.

Featuring versatile I/O options, communication ports and protocols it is suitable for integration in utility substation, industrial, data centres, renewable energy systems, SCADA, BMS etc.

DC Measurement

Measurement of PM130E DC system via shunts for single channel input

Measurement of PM130E DC system via Hall Effect Sensors for up to three (3) channel input

HIGHLIGHTS

- ▶ Accuracy: Class 0.5/1.0 per IEC 62053-41
- ▶ Communication:
 - ▶ Built-in port: standard RS-485
 - ▶ Optional ports: Ethernet; 4G Modem; Profibus
 - ▶ Open protocol: Modbus RTU, DNP3.0, IEC 60870-5-101/104
- ▶ Digital and Analog I/O Modules: up to 16 I/O
- ▶ Dual Mounting: suitable for 4-inch round and 92x92mm square cutouts
- ▶ DIN Rail mounting option
- ▶ LED Bar-graph: Displays load as percentage of nominal current

MODULAR VERSATILITY



ACCURACY
CLASS



DIGITAL
IN/OUT

Modbus
101/104
DNP3

OPEN
PROTOCOL



ETHERNET
PORT



CELLULAR
CONNECTIVITY



DC METERING
ENABLED



MODULARITY

FEATURES

DC ENERGY METERING

- ▶ DC Volts
- ▶ DC Amps
- ▶ DC Power
- ▶ DC Energy
- ▶ DC Ampere
- ▶ DC Volt Demand

BILLING/TOU ENERGY METER (PM130E-DCC)

- ▶ Accuracy
 - ▶ Class 0.5/1.0 per IEC 62053-41
 - ▶ Plus Accuracy Shunt or Hall Effect Sensor (HES)
- ▶ Total and per phase energy measurements
- ▶ Time-of-Use, 4 totalisation and tariff energy/demand registers x 8 tariffs, 4 seasons x 4 types of days, 8 tariff changes per day,
- ▶ Easy programmable tariff calendar schedule
- ▶ Automatic daily energy and maximum demand profile log for total energy and tariff registers

PROGRAMMABLE LOGIC CONTROLLER (PLC)

- ▶ Embedded programmable controller
- ▶ 16 control setpoints; programmable thresholds and delays
- ▶ Optional relay output control, alarming (load control)
- ▶ 1-cycle response time (20ms @ 50Hz)

EVENT AND DATA RECORDING

- ▶ non-volatile memory for timestamped event and data recording: 48 days for 2 daily TOU records, half-hourly writing of 4 parameters and recording over 100 events during the entire period

MODELS

PM130E-DCC-RS5 DC SHUNT INPUT*

- ▶ 50 millivolt
- ▶ 60 millivolt
- ▶ 75 millivolt
- ▶ 100 millivolt (maximum)

* DC Current Input shunt dependent

PM130E-DCC-HACS HALL EFFECT SENSOR INPUT

- ▶ HCS100-S 100A Split Core
- ▶ HCS1000 1000A Solid Core
- ▶ HCS2000-S2000A Split Core

VOLTAGE INPUTS

- ▶ DC Voltage Input 0-670V DC
- ▶ Above 670V DC up to 1500V DC with use of SATEC VRM
- ▶ Ranges above 1500V DC on application

- ▶ Event recorder for logging internal diagnostic events and setup changes
- ▶ Two data recorders; programmable data logs on a periodic basis; automatic daily energy log and maximum demand profile

VOLTAGE INPUT OPTIONS

- ▶ Direct Measurement:
 - ▶ 670V DC
 - ▶ Extended range up to 1500V DC is possible via SATEC Voltage Ratio Module (VRM)

CURRENT OPTIONS

- ▶ DC Shunts
- ▶ Hall Effect Sensors

DIGITAL AND ANALOGUE

I/O Available I/O modules:

- ▶ TOD (TOU+4DI): four digital inputs with 1-ms scan time and battery backup for real time clock; automatic recording of last five digital input change events with timestamps (see the PM130 PLUS Modbus Reference Guide)
- ▶ DIOR: 4 digital inputs and 2 relay outputs with 1-cycle update time; unlatched, latched, pulse and KYZ operation; energy pulses, selection of solid state or electromechanical relays
- ▶ 12DIOR: 12 digital inputs, 4 relay outputs (incl. optional Ethernet port or additional RS485 port)

- ▶ 4AO: four optically isolated analog outputs with an internal power supply; selection of 0-20mA, 4-20mA, 0-1mA, and ± 1 mA output; 1 cycle update time.
- ▶ 8DI: eight digital inputs with 1-ms scan time

COMMUNICATION

- ▶ On-board interface
 - ▶ Standard 2-wire RS-485
- ▶ Optional interfaces
 - ▶ Ethernet (10/100Base T)
 - ▶ 4G Modem
 - ▶ Multipurpose RS-232/422/485
 - ▶ PROFIBUS
- ▶ Client (Modbus/TCP over Ethernet or 4G)
 - ▶ TCP notification client for communicating events or periodic reports to remote server
 - ▶ Expertpower client on subscription basis
- ▶ Communication protocols
 - ▶ Modbus RTU
 - ▶ SATEC ASCII
 - ▶ DNP 3.0 (Level 2)
 - ▶ IEC 60870-5-101 (standard)
 - ▶ IEC 60870-5-104 (requires Ethernet)

DISPLAY

- ▶ Easy to read 3-row (2x4 digits + 1x5 digits) bright LED display
- ▶ Adjustable display brightness and update rate
- ▶ Auto-scroll option with adjustable page; auto-return to a default page
- ▶ LED bar-graph displaying load as percentage of nominal load current (user-definable)

METER SECURITY

- ▶ Password security for protecting meter setups and accumulated data from unauthorised changes

UPGRADEABLE FIRMWARE

- ▶ Device firmware is easily upgraded through the serial or Ethernet port

SOFTWARE SUPPORT

- ▶ SATEC's Power Analysis Software (PAS) for comprehensive configuration and data acquisition is available for download (free). Always make sure to update .exe file with latest version on webpage
- ▶ SATEC's Expertpower web-based energy management platform (subscription). Please visit <https://satec-global.com.au/solutions/expertpower-energy-management-software/>

REAL-TIME CLOCK

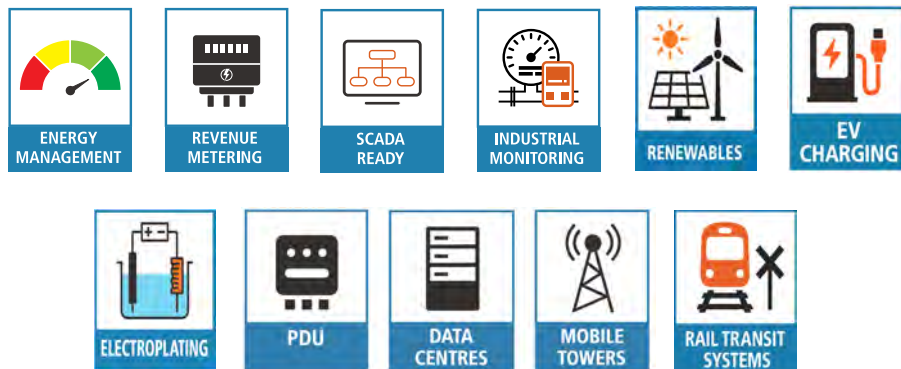
- ▶ Internal clock with 20-second retention time
- ▶ Optional battery backup (TOU+4DI module)

UNIQUE DESIGN

- ▶ Pass through CT connection
- ▶ Built-in auxiliary terminal for loose CT wires.
- ▶ Dual panel mounting:
92×92mm square or 4" round cutout



APPLICATIONS



TECHNICAL SPECIFICATIONS

INPUT RATINGS

* VOLTAGE INPUTS

Nominal voltage (L-N) (1 Voltage Reference Channel)	0-670V DC Use VRM above 670V DC
Over-voltage withstand	1000V AC continuous, 2000V AC for 1 second
Input impedance	1 MΩ
Wire size	up to 12 AWG (up to 3.5mm ²)

CURRENT INPUTS

DC Shunts	
Hall Effects Sensors (HES)	
Wire size	12 AWG (up to 3.5 mm ²)
Galvanic isolation	3500V AC

POWER SUPPLY

120/230V AC-DC Option	» Rated input: 88-290V DC, Burden 9VA, 85-265V AC 50/60/400 Hz Isolation: 1500V DC » Input to ground: 2500V AC
12V DC Option	» Rated input: 9.5-18V DC, Burden 4VA » Isolation: 1500V DC
24/48V DC Option	» Rated input: 18.5-58V DC, Burden 4VA » Isolation: 1500V DC » Wire size: up to 12 AWG (up to 3.5 mm ²)

OPTIONAL MODULAR I/O

ELECTROMECHANICAL RELAY

Dry contact	1 contact (SPST Form A)
Rating	5A/250V AC; 5A/30V DC
Galvanic isolation	» Between contacts and coil: 3000V AC @ 1 min » Between open contacts: 750V AC
Operate time	10 ms max
Release time	5 ms max
Update time	1 cycle
Wire size	14 AWG (up to 1.5 mm ²)

SOLID STATE RELAY

Dry contact	1 contact (SPST Form A)
Rating	0.15A/250V AC/DC
Galvanic isolation	3750V AC @ 1 min
Operate time	1 ms max
Release time	0.25 ms max
Update time	1 cycle
Connector type	Removable, 4 pins
Wire size	14 AWG (up to 1.5 mm ²)

* Measuring up to 3000V DC on application

DIGITAL INPUTS

Dry Contacts, internally wetted @ 24V DC or Wet contact @ 250V DC (12DI/4DO only)

Sensitivity	Open @ input resistance >100 kΩ, Closed @ Input resistance < 100 Ω
Galvanic isolation	3750V AC @ 1 min
Internal power supply	24V DC, 4DI/2DO or 12DI/4DO
External power supply	250V DC (12DI/4DO only supply)
Scan time	1 ms
Connector type	Removable, 5 pins
Wire size	14 AWG (up to 1.5 mm ²)

ANALOGUE OUTPUTS

Ranges (upon order)	» ±1 mA, max. load 5 kΩ (100% overload) » 0-20 mA, max. load 510 Ω » 4-20 mA, max. load 510 Ω » 0-1 mA, max. load 5 kΩ (100% overload)
Isolation	2500V AC @ 1 min
Power supply	Internal
Accuracy	0.5% FS
Update time	1 cycle
Connector type	Removable, 5 pins
Wire size	14 AWG (up to 1.5 mm ²)

COMMUNICATION PORTS

COM1 (BUILT IN)

RS-485 optically isolated port

Isolation	3000V AC @ 1 min
Baud rate	up to 115.2 kbps
Supported protocols	Modbus RTU, DNP3, SATEC ASCII, IEC 60870-5-101
Connector type	Removable, 3 pins
Wire size	Up to 14 AWG (up to 1.5 mm ²)

COM2 (OPTIONAL MODULE)

ETHERNET PORT

(as independent module OR add-on to 12DIOR module)

Transformer-isolated 10/100BaseT Ethernet port	
Supported protocols	Modbus/TCP (Port 502), IEC 60870-5-104, DNP3/TCP (Port 20000)
Num. of simultaneous connections	4 (2 Modbus/TCP + 2 DNP3/TCP)
Connector type	RJ45 modular
Isolation	1,500V DC @ 1min

CELLULAR PORT

Supported protocols	Modbus/TCP (Port 502), DNP3/TCP (Port 20000)
Connector type	SMA

PROFIBUS DP (IEC 61158)

RS-485 optically isolated Profibus interface	
Connector type	Removable, 5 pins
Baud rate	9600 bit/s – 12 Mbit/s (auto detection)
32 bytes input, 32 bytes output	
Supported protocols	PROFIBUS DP

RS-232/422-485 PORT

RS-232 or RS-422/485 optically isolated port	
Isolation	3000V AC @ 1 min
Baud rate	Up to 115.2 kbps
Supported protocols	Modbus RTU, DNP3, SATEC ASCII, IEC 60870-5-101
Connector type	Removable, 5 pins for RS-422/485 and DB9 for RS-232
Wire size	Up to 14 AWG (up to 1.5 mm ²)

ADDITIONAL SPECIFICATIONS

REAL TIME CLOCK

Standard Meter Clock	» Non-backed clock » Accuracy—typical error: @ 1 minute per month @ 25°C » Typical clock retention time: 30 seconds
TOU Module Meter Clock	» Battery-backed clock » Accuracy—typical error: 7 seconds per month @ 25°C (±2.5ppm) » Typical clock retention time: 36 months

DISPLAY

High-brightness seven-segment digital LEDs, two 4-digit + one 5 digit windows

3 color LED load bar graph (40-110%)

Keypad 6 push buttons

ENVIRONMENTAL CONDITIONS

Operating temperature -30°C to 60°C (-22°F to 140°F)

Storage temperature -40°C to 85°C (-40°F to 185°F)

Humidity 0 to 95% non-condensing

CONSTRUCTION

Weight 0.70kg (1.54 lb.)

Dimensions [H×W×D] 114×114×109mm (4.5×4.5×4.3")

MATERIALS

Case enclosure plastic PC/ABS blend

Front panel plastic PC

PCB FR4 (UL94-V0)

Terminals PBT (UL94-V0)

Connectors-Plug-in type Polyamide PA6.6 (UL94-V0)

Packaging case Carton and Stratocell® (Polyethylene Foam) brackets

Labels Polyester film (UL94-V0)

STANDARDS COMPLIANCE

ACCURACY

- ▶ Complies with IEC62053-41, class 0.5/1.0
- ▶ *Accuracy subject to DC Shunt or Hall Effect Sensor input
- ▶ Meets ANSI C12.20 –1998, class 10 0.5%
- ▶ Complies with IEC 61557-12 (PMD):
 - ▶ *Total DC Power 0.5
 - ▶ *Total DC Energy 0.5
 - ▶ *DC Current 0.05
 - ▶ *DC Voltage 0.05

ELECTROMAGNETIC IMMUNITY

Complies with IEC 61000-6-2:

- ▶ IEC 61000-4-2 level 3: Electrostatic Discharge
- ▶ IEC 61000-4-3 level 3: Radiated Electromagnetic RF Fields
- ▶ IEC 61000-4-4 level 3: Electric Fast Transient
- ▶ IEC 61000-4-5 level 3: Surge

- ▶ IEC 61000-4-6 level 3: Conducted Radio Frequency
- ▶ IEC 61000-4-8: Power Frequency Magnetic Field
- ▶ Meets ANSI/IEEE C37.90.1: Fast Transient SWC

ELECTROMAGNETIC EMISSION

- ▶ Complies with IEC 61000-6-4: Radiated/Conducted class A
- ▶ Complies with IEC CISPR 22: Radiated/Conducted class A

SAFETY/CONSTRUCTION

- ▶ UL File no. E236895
- ▶ Meets IEC 61010-1: 2006

AC AND IMPULSE INSULATION

- ▶ Complies with IEC 62052-11: 2500V AC during 1 minute
- ▶ 6KV/500Ω @ 1.2/50 μs impulse

ORDER STRING

MODELS

DC Energy Power Version	PM130E-DCC
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OPTIONS

CURRENT INPUTS

DC Shunt	RS5
Hall Effect Sensors	HACS

DISPLAY RESOLUTION

Low Resolution 1A, 1V	-
High Resolution 0.01A, 0.1V	H

POWER SUPPLY

85-265V AC and 85-290V DC	ACDC
9.5-18V DC	1DC
18.5-58V DC (24V DC, 48V DC)	23DC

COMMUNICATION PROTOCOL

Modbus and DNP 3.0	-
Modbus and IEC 60870-5-101/104^	870

MOUNTING

Panel Mount (standard)	-
DIN Rail Mounting	DIN

TESTING AND CERTIFICATE

Full functional test, calibration at various work loads & detailed test report	-
All of the above plus ISO 17025 and ILAC certified calibration certificate	CC

NOTES

^ -104 requires Ethernet does NOT work over cellular network

EXPANSION MODULE *

ANALOGUE OUTPUTS

4 Analogue Outputs: $\pm 1\text{mA}$	AO1
4 Analogue Outputs: 0-20mA	AO2
4 Analogue Outputs: 0-1mA	AO3
4 Analogue Outputs: 4-20mA	AO4
4 Analogue Outputs: 0-3mA	AO5
4 Analogue Outputs: $\pm 3\text{mA}$	AO6
4 Analogue Outputs: 0-5mA	AO7
4 Analogue Outputs: $\pm 5\text{mA}$	AO8

ADDITIONAL COMMUNICATION PORTS

Communication: Ethernet (TCP/IP)	ETH
Communication: PROFIBUS	PRO
Communication: RS232/422/485	RS232
Communication: 4G Modem ** x: G=Europe; V=Verizon (US); A=AT&T (US); T=Telstra (AUS)	T4x

DIGITAL INPUTS

4 Digital Inputs (Dry Contact) / 2 Relay Outputs 250V / 5A AC	DIOR
4 Digital Inputs (Dry Contact) / 2 SSR Outputs 250V / 0.1A AC	DIOS
4 Digital Inputs (Dry Contact) / TOU / RTC Battery	TOD
8 Digital Inputs (Dry Contact)	8DI

12 DI 4 RO MODULE

12 Digital Inputs / 4 Relay Outputs 250V/5A AC	12DIOR
Digital Inputs Rating - Dry Contact (DRC), 48V, 125V or 250V	DRC or 48V or 125V or 250V
12 DIOR module communication port:	
None	-
RS-485	485
Ethernet	ETH



NOTES

* Max. 1 module per instrument. Can be ordered separately.

** Does not support 870 protocol. Supplied with bendable antenna.



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