

DIN-rail Single-circuit Modbus Smart Power Meter



Driving ESG Goals through Smarter Energy Management

Achieving **ESG targets** requires more than reducing energy use—it starts with **clear and measurable power data**. PLANET Smart Power Meter series helps organizations **track energy consumption**, improve operational efficiency and support **sustainability reporting** across commercial, industrial and public infrastructure environments. With greater visibility into power usage, businesses can make more informed decisions and turn **ESG commitments into measurable energy management actions**.

Dedicated Power Monitoring for Critical Electrical Loads

As energy efficiency and sustainability become increasingly important, accurate circuit-level electrical data is essential for understanding the operating conditions of individual loads. PLANET introduces the **SPM-D01 Series DIN-rail smart power meters** for dedicated monitoring of **distribution feeders, motor control panels, industrial machinery and other critical electrical loads**. By providing detailed electrical and energy information for a single circuit, the series helps users identify abnormal conditions, evaluate equipment performance and improve energy-management decisions.

Two Current Sensor Options for Different Applications

The SPM-D01 Series consists of two models designed for different current-sensing requirements. The **SPM-D01-M supports conventional current transformers with a 333mV output** for general electrical panels and low-to-medium-current circuits. The **SPM-D01-R supports Rogowski coils**, whose flexible structure makes them suitable for large conductors, busbars and high-current applications. These two sensing options allow users to select the appropriate installation method without changing the core power-monitoring functions.

Product Type	Circuit Type	Model	Current Sensor Input	Power Supply
DIN-rail Power Meter	Single-circuit	SPM-D01-M	MV 0–333mV	AC 85–264 V / DC 100–300 V
		SPM-D01-R	Rogowski coil 333mV	

Highlights

- SPM-D01-M and SPM-D01-R single-circuit power meter models
- Dedicated monitoring for single-phase and three-phase electrical systems
- Conventional 333mV-output CT support on the SPM-D01-M
- Flexible Rogowski coil support on the SPM-D01-R
- True RMS measurement with 128-point-per-cycle sampling
- 0.2% voltage and current measurement accuracy
- RS-485 Modbus RTU communication
- Built-in 2MB Flash memory for data logging
- Auto Wiring Change and abnormal-event recording

Single-circuit Measurement

- Dedicated monitoring of one single-phase or three-phase electrical circuit
- Suitable for distribution feeders, motor control panels and individual equipment
- Supports balanced and unbalanced load measurement
- Compatible with external potential transformers
- Configurable PT and CT ratios for different electrical systems
- Suitable for general-current and high-current monitoring applications

Electrical Measurement

- Phase voltage and average phase voltage
- Line voltage and average line voltage
- Phase current, average current and neutral current
- Frequency
- Active power
- Reactive power
- Apparent power
- Power factor
- Phase angle
- Active energy
- Reactive energy
- Apparent energy
- Current and power demand
- Maximum and minimum value recording

Power-quality Analysis

- Voltage total harmonic distortion

Two Current Sensor Options for Different Applications

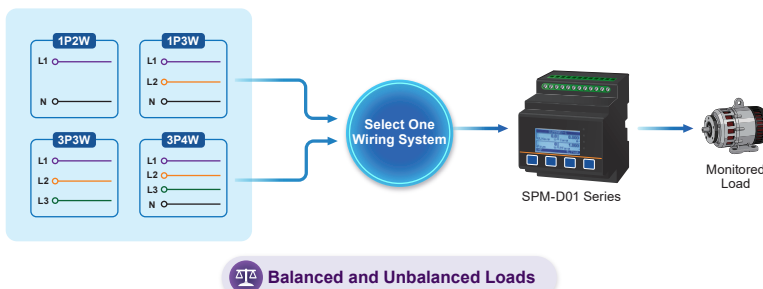


 Same Core Power-monitoring Functions

Flexible Wiring for Various Power Systems

The SPM-D01 Series supports **1P2W, 1P3W, 3P3W and 3P4W** systems with balanced or unbalanced loads. Depending on the selected power system, the meter can operate with **one, two or three current sensors** and with or without external potential transformers. This wiring flexibility enables the same meter platform to be deployed across different single-phase and three-phase electrical environments.

Flexible Wiring for Various Power Systems

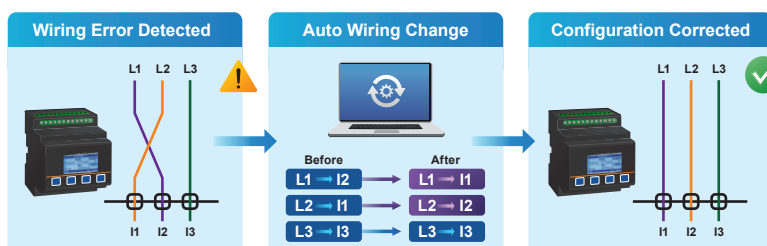


 Balanced and Unbalanced Loads

Software-assisted Auto Wiring Change

The built-in **Auto Wiring Change** function can identify and correct certain voltage and current wiring relationships through software when the required operating conditions are met. This helps reduce the time needed to correct supported wiring errors during installation and commissioning. Wiring information can also be viewed from the front panel to help operators verify the measurement configuration.

Software-assisted Auto Wiring Change



 Helps Reduce Wiring Correction Time during Commissioning

- Current total harmonic distortion
- Three-phase voltage unbalance
- Three-phase current unbalance
- Phase-voltage angle measurement
- Line-voltage angle measurement
- Current phase-angle measurement
- True RMS measurement
- Sampling rate of 128 points per cycle
- Voltage and current measurement accuracy of 0.2%

Flexible Wiring Systems

- Supports 1P2W single-phase two-wire systems
- Supports 1P3W single-phase three-wire systems
- Supports 3P3W three-phase three-wire systems
- Supports 3P4W three-phase four-wire systems
- Supports one, two or three current sensors, depending on the selected power system
- Supports measurement with or without external potential transformers
- Software-assisted Auto Wiring Change for supported wiring configurations
- Front-panel wiring information for installation verification

Communication

- One RS-485 communication interface
- Modbus RTU protocol
- Device address range from 1 to 247
- Communication speeds from 2400bps to 115200bps
- Configurable parity, data bits and stop bits
- Response time of less than 50ms
- Maximum RS-485 transmission distance of 1200 meters
- Supports integration with EMS, BMS, SCADA and industrial control systems

Data Logging and Event Recording

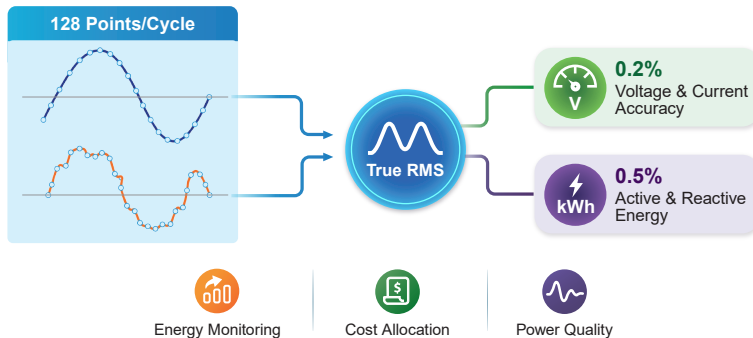
- Built-in 2MB Flash memory
- Configurable data logging intervals
- Records selected measurement parameters
- Date and time recorded with measurement data
- Cyclic recording when storage capacity is reached
- Approximately 40,300 records or 28 days based on the specified recording conditions
- Stores up to 16 abnormal-event records
- Event records include source, status, measured value, date and time

Energy and CO₂ Management

- Import, export, total and net active energy
- Import, export, total and net reactive energy
- Total apparent energy
- Accumulated electricity cost display
- Estimated CO₂ emission calculation

High-accuracy True RMS Measurement

With **True RMS measurement** and a sampling rate of **128 points per cycle**, the SPM-D01 Series provides reliable measurement for different electrical load characteristics. It delivers **0.2% voltage and current accuracy** and **0.5% active, reactive and apparent energy accuracy**, making it suitable for equipment energy monitoring, operating-condition analysis and electricity cost allocation.



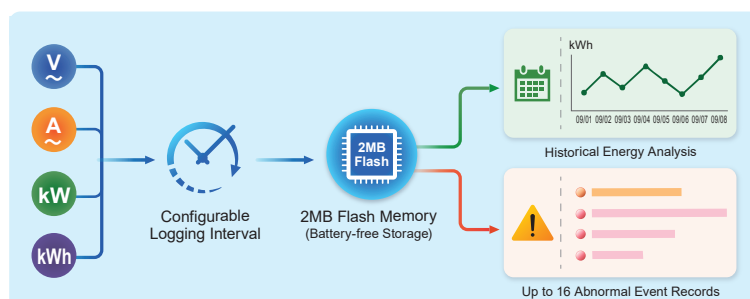
Detailed Electrical and Power-quality Information

The SPM-D01 Series measures **phase and line voltage, current, neutral current, frequency, active power, reactive power, apparent power, power factor, phase angle**, and active, reactive and apparent energy. It also provides voltage and current total harmonic distortion, three-phase **voltage and current unbalance, demand calculation**, and maximum and minimum value recording. These measurements allow users to examine the electrical behavior of a selected load in greater detail.

Historical Data and Abnormal Event Tracking

The built-in **2MB Flash memory** records selected measurement parameters at configurable intervals for historical analysis. The meter can also store **up to 16 abnormal-event records**, including the event source, operating status, measured value, date and time. These records help users review load changes and investigate abnormal electrical conditions without relying only on real-time readings.

Local Data Logging and Abnormal Event Tracking



- Configurable energy display units and CO₂ conversion ratio
- Pulse Output
- One open-collector pulse output
- Maximum output rating of 30V DC and 30mA
- Assignable to imported or exported active energy
- Assignable to imported or exported reactive energy
- Configurable pulse divider
- Configurable pulse width
- Test pulse output for meter verification

Display and Operation

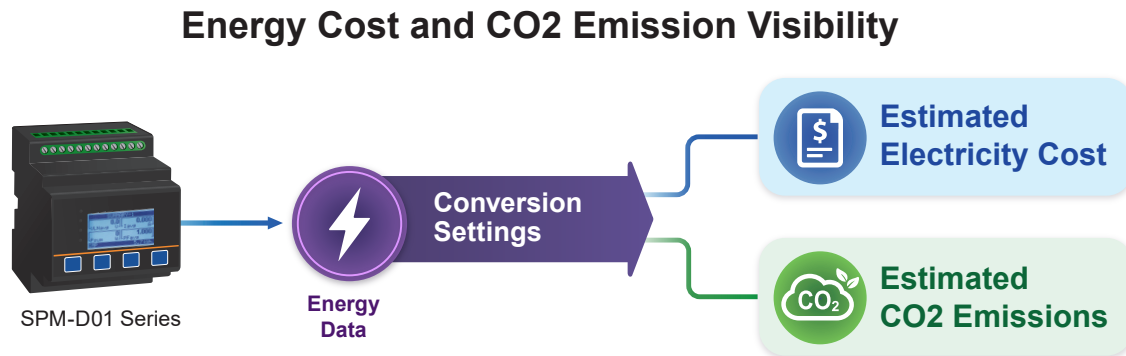
- 128 × 64 dot-matrix LCD
- White LCD backlight
- Four front-panel operating buttons
- Quick access to voltage, current, demand, THD, power and energy information
- Configurable default monitoring screen
- Front-panel communication and pulse output indicators
- Password protection against unauthorized configuration changes
- Built-in date and time display
- Operating-hour and running-hour counters

Installation and Environment

- Compact DIN-rail design
- Dimensions of 72 × 58.7 × 87.5mm
- Flame-retardant black ABS enclosure
- PA66 terminal block compliant with UL 94V-0
- IP20-rated enclosure
- Operating temperature range of 0 to 60°C
- Storage temperature range of -10 to 70°C
- Relative humidity range of 5% to 95%, non-condensing
- Maximum operating altitude of 2000 meters
- AC 85–264V or DC 100–300V power input
- MTBF of more than 60,000 hours
- CE and FCC compliance

Energy Cost and CO₂ Emission Visibility

In addition to electrical measurements, the SPM-D01 Series can display **accumulated electricity cost and estimated CO₂ emissions** based on configurable conversion values. This information allows energy consumption to be presented in operational, financial and environmental terms, supporting equipment-level efficiency evaluation and sustainability reporting.



RS-485 Communication and Energy Pulse Output

Both models are equipped with an **RS-485 interface supporting Modbus RTU** for integration with EMS, BMS, SCADA and industrial control systems. Communication rates of **up to 115200bps** and transmission distances of **up to 1200 meters** enable flexible field deployment. An **open-collector pulse output** can be assigned to imported or exported active and reactive energy for connection to external counters or monitoring equipment.

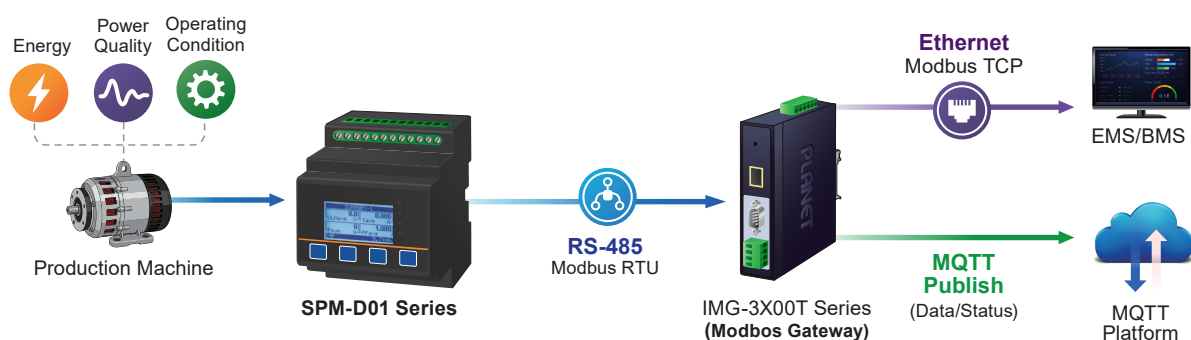
Space-saving DIN-rail Installation

With a compact **72 × 58.7 × 87.5mm enclosure**, the SPM-D01 Series can be installed in distribution panels where available space is limited. The **128 × 64 dot-matrix LCD**, four operating buttons and front-panel indicators provide convenient on-site measurement viewing, wiring verification and parameter configuration.

Applications

Machine-level Energy and Operating-condition Analysis

Installed on the power feed of an individual motor, pump, compressor or production machine, the single-circuit power meter continuously measures its voltage, current, power, power factor, energy consumption and power-quality conditions. When paired with a PLANET **IMG-3X00T Series Modbus Gateway**, the meter data can be converted from Modbus RTU to Modbus TCP or published to an MQTT platform for equipment-level visualization and analysis. Changes in current demand, power factor or energy-use patterns can help operators identify abnormal loading, inefficient operation and possible maintenance requirements before they affect production.



HaLow-enabled Equipment and Cabinet Monitoring

The single-circuit power meter can be connected to the PLANET **HLB-1150 IIoT Remote I/O Controller** through RS-485 Modbus RTU to monitor the energy consumption and operating condition of an individual machine or electrical feeder. The HLB-1150 can simultaneously collect cabinet-door, smoke, water-leakage, cooling-system and equipment-alarm signals through its digital inputs, while its digital outputs can activate warning devices or external relays. With long-range **Wi-Fi HaLow connectivity**, power data and equipment status can be transmitted from hard-to-wire machine areas or remote electrical cabinets to a centralized monitoring platform. This integrated solution is suitable for production equipment, utility rooms, outdoor cabinets and other locations requiring combined **energy monitoring, alarm detection and basic remote control**.



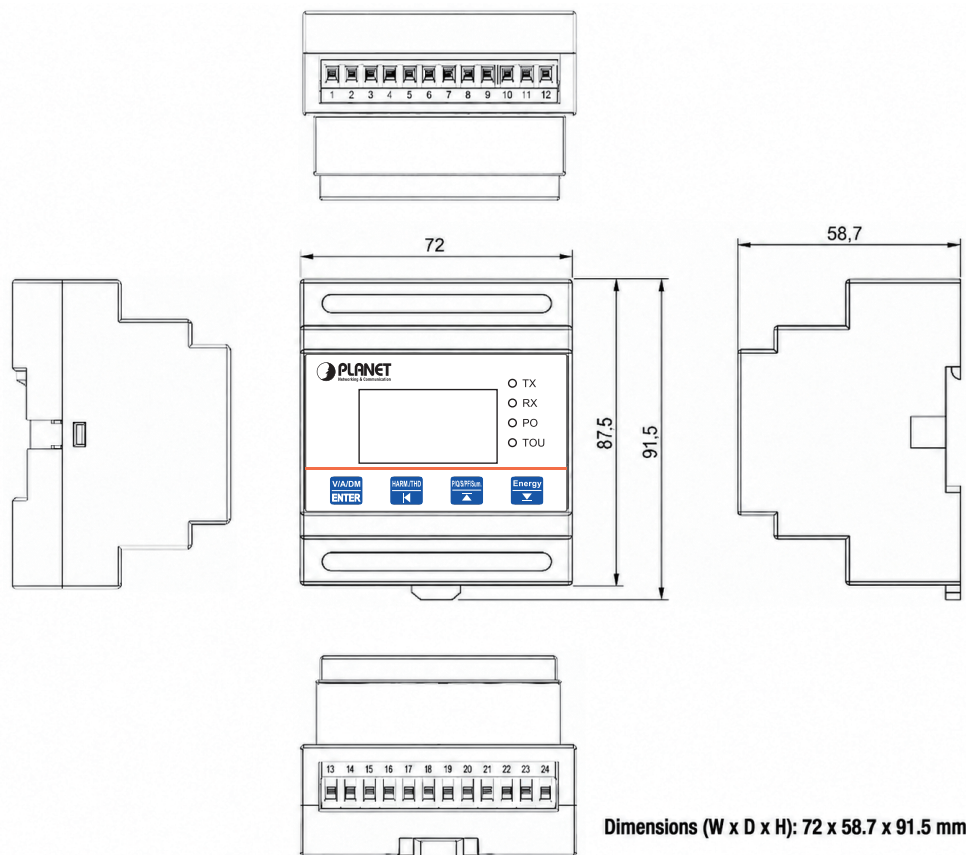
Specifications

Model	SPM-D01-M		SPM-D01-R
Hardware Specifications			
Circuit Configuration	Single circuits		
Current Sensor Type	Conventional voltage-output CT	Rogowski coil	
Current Sensor Input	MV, 0–333mV	RC, 333mV	
LED Indicators	TX, RX, PO and TOU		
Display Panel	128 × 64 dot-matrix LCD with white backlight		
Display Refresh Rate	0.5 second		
Installation	35mm DIN-rail mounting (EN50022)		
Date and Time	Perpetual calendar with year, month, day, hour, minute and second		
Power Requirements	85–264V AC, 50/60Hz or 100–300V DC		
Power Consumption	AC: 5VA maximum DC: 2W maximum		
Dimensions (WxDxH)	72 × 87.5 × 58.7mm		
Weight	195g		
Enclosure	Black flame-retardant ABS		
Metering Specifications			
Measurement	True RMS measurement		
Sample Rate	128 points per cycle		
Power System	1P2W, 1P3W, 3P3W or 3P4W		
Load System	Balanced or unbalanced load		
Voltage Input Range	20–400V AC, L-N 35–600V AC, L-L		
Frequency Range	45–65Hz		
Main Circuit Current Input	333mV CT input	333mV Rogowski coil input	
CT Primary Ratio	1–9999A		
CT Secondary Ratio	333mV		
PT Primary Ratio	100–1200000V		
PT Secondary Ratio	50–500V		
Overload Capacity	Voltage: 2 times rated voltage continuously; 2500V for 1 second Current: 2 times rated current continuously; 20 times rated current for 1 second		
Input Burden	Voltage: <0.2VA; Current: <0.1VA		
Auto Wiring Change	Supported under specified wiring and phase-angle conditions		
Power Quality			
Total Harmonic Distortion	THD of voltage and current		
Unbalance	Three-phase voltage and current unbalance		
Phase Angle	Voltage and current phase-angle measurement		

Demand	
Calculation Method	Fixed block or sliding block
Period	1–60 minutes
Demand Parameters	Current, active power, reactive power and apparent power demand
Demand Record	Maximum demand value and time stamp
Max./Min. Values	Maximum and minimum parameter values with time stamps
Communication	
RS-485 Interface	1
Protocol	Modbus RTU
Device Address	1–247
Baud Rate	Up to 115200bps
Response Time	Less than 50ms between completion of command reception and start of data transmission
Data Bits	8 bits
Parity	None, Even or Odd
Stop Bits	1 or 2
Distance	1200m
Maximum Connected Devices	32
Data Logging	
Memory Storage	2MB Flash ROM without battery-life limitations
Log Setting	Selected measurement parameters can be recorded at configurable intervals
Interval Time	1–32767 seconds, minutes, hours or days
Date and Time	Year, month, day, hour, minute and second
Storage Method	Cyclic recording when storage capacity is reached
Recording Capacity	Approximately 40,300 records or 28 days when recording ten 4-byte data points every minute
Data Access	Data logs are configured and read through communication
Event Recording	Up to 16 abnormal-event records
Event Information	Event source, status, measured value, date and time
CO ₂ Emission	Total CO ₂ weight calculated from energy consumption
Pulse Output	
Output Capacity	Open collector, 30V DC and 30mA maximum
Corresponding Item	Import/export active energy or import/export reactive energy
Output Frequency	1000Hz maximum
Test Pulse Output	1600 pulses/kWh, 50% duty cycle
Pulse Divider	1–9999
Pulse Width	0–5000ms; 0 represents a 50% duty cycle
Environment Specifications	
Operating Temperature	0–60 degrees C
Storage Temperature	-10–70 degrees C
Humidity Rating	5–95%, non-condensing
Temperature Coefficient	100ppm/degree C or less
Operating Altitude (Maximum)	2,000m above sea level
Protection Rating	IP20
Standards Conformance	
Isolation	2kV AC, 50/60Hz for 1 minute between power, input, output and enclosure
Insulation Resistance	≥100MΩ at 500V DC
EMC	EN IEC 61326-1:2021
	EN 55011:2016/A2:2021
	EN IEC 61000-3-2:2019+A1:2021
	EN 61000-3-3:2013+A2:2021
	IEC 61000-4-2:2008
	IEC 61000-4-3:2020
	IEC 61000-4-4:2012
	IEC 61000-4-5:2014/A1:2017
	IEC 61000-4-6:2013/COR1:2015
Safety (LVD)	IEC 61000-4-8:2009
	IEC 61000-4-11:2020/COR1:2020
	EN 61010-1:2010/A1:2019/AC:2019-04
FCC	FCC 47 CFR Part 15, Subpart B, Class A

Dimensions

■ SPM-D01-M & SPM-D01-R



Dimensions (W x D x H): 72 x 58.7 x 91.5 mm

Ordering Information

SPM-D01-R	DIN-rail Single-circuit Modbus Smart Power Meter with Rogowski Coil Input
SPM-D01-M	DIN-rail Single-circuit Modbus Smart Power Meter with 333mV CT Input

Related Products

SPM-D05	DIN-rail 5-circuit Modbus Smart Power Meter
SPM-D05E	DIN-rail 5-circuit Modbus RTU/TCP Smart Power Meter
SPM-D10	DIN-rail 10-circuit Modbus Smart Power Meter
SPM-D10E	DIN-rail 10-circuit Modbus RTU/TCP Smart Power Meter
CT-60A-16	60A Split-Core Current Transformer with 333mV Output
CT-100A-16	100A Split-Core Current Transformer with 333mV Output
CT-200A-24	200A Split-Core Current Transformer with 333mV Output
CT-400A-35	400A Split-Core Current Transformer with 333mV Output
CT-600A-35	600A Split-Core Current Transformer with 333mV Output
RC-300A-395	300A Rogowski Coil Current Sensor with 333mV Output
RC-500A-395	500A Rogowski Coil Current Sensor with 333mV Output
RC-800A-525	800A Rogowski Coil Current Sensor with 333mV Output
RC-1000A-525	1000A Rogowski Coil Current Sensor with 333mV Output
RC-1500A-525	1500A Rogowski Coil Current Sensor with 333mV Output
RC-2000A-525	2000A Rogowski Coil Current Sensor with 333mV Output
RC-3000A-525	3000A Rogowski Coil Current Sensor with 333mV Output
RC-3000A-525	3000A Rogowski Coil Current Sensor with 333mV Output

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SPM-D01 series