Shihlin Electric

2013

DIGITAL POWER METER

FC CE

SHIHLIN ELECTRIC & ENGINEERING

SPM-3

SPM-3 is designed for single and three phase power monitoring and measurement. It provides wide range of measurements including current, voltage, energy, watt, power factor, watt-hour, frequency…etc.
Built in RS485 function can be easily integrated with most third SCADA system.

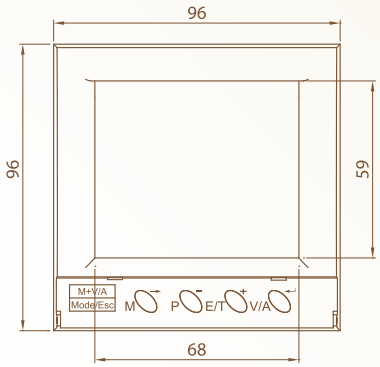
Standard DIN 96×96 enables SPM-3 to be installed easily and its low cost and wide flexibility application also makes SPM-3 a good choice for modern power monitoring.

Features

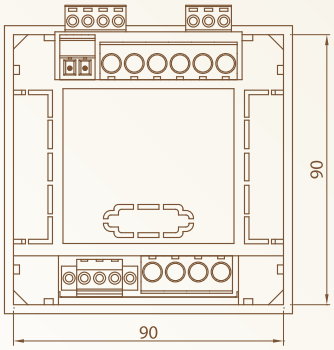
- Compact size, standard DIN 96×96, equipped with four latches to tight the meter on panel
- Accuracy - wh<0.5%(PF=1)
- LCD display
- RS485 communication protocol

Installation

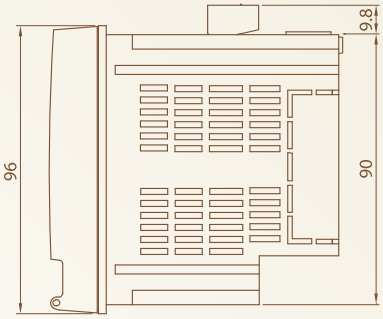
Front View (mm)



Rear View (mm)



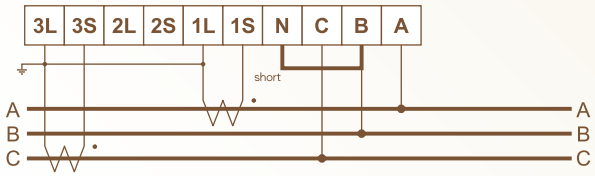
Side View (mm)



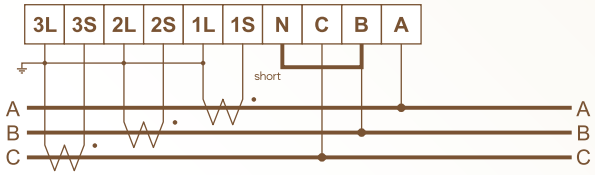
Note. Four support latches must be placed in position after mounting.
Panel cut-out area is 92 × 92mm

Wiring

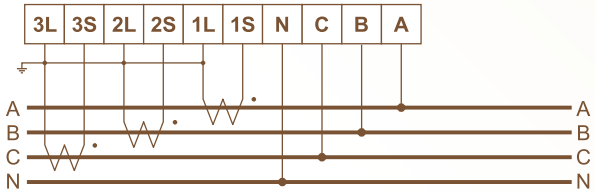
3P3W/2CT



3P3W/3CT

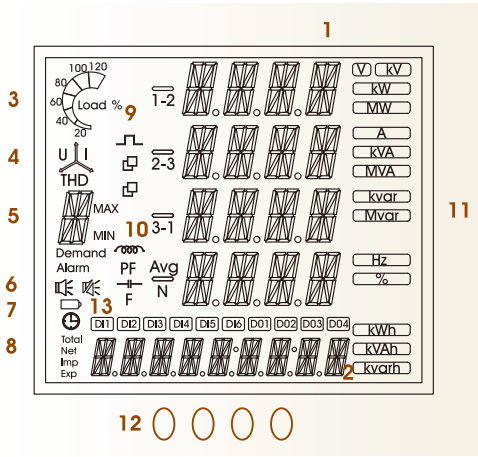


3P4W/3CT



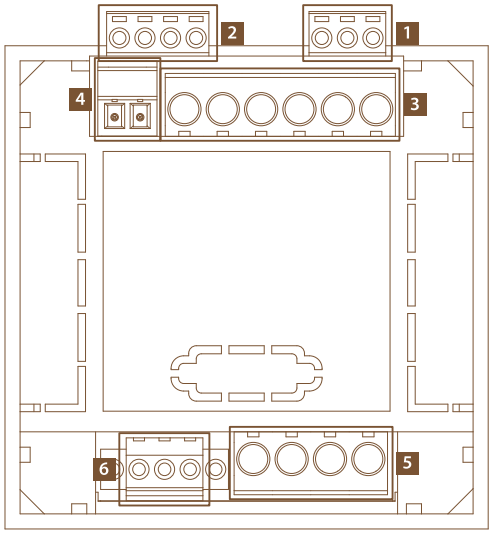
Display

The SPM-3 is equipped with a large back-lit LCD and 4 function buttons. It shows up to five measure errant simultaneously.



Item	Display Reading
1	Values for V, I, kW..... Demand, eligibility rate and unbalance rate
2	Values for energy & time
3	Load percentages
4	Unbalance rate indicator
5	Types of measurement (I, U, E, P….)
6	Alarm on/off
7	Indicator for time display in zone 2
8	Indicator for energy display in zone 2
9	Indicator for pulse output and communication
10	Display for power factor and load characteristics
11	Units for measurements
12	Function Buttons, “M”,“P”, “E/T”, “V/A”
13	DO1, DO2 Status

Connection Port



Item
1. Aux Power (N-, L+)
2. Digital output (Com2 DO2 Com1 DO1)
3. Current Terminal (3L 3S 2L 2S 1L 1S)
4. Lon Port (D-, D+)
5. Voltage Terminal (N, C, B, A)
6. RS485 Port (D-, COM, D+)

Specification

Auxiliary Power	AC80-264V/DC100-300V, Max. 2.3W
Input Voltage	CATII 10V-600V L-L*
Input Current	2 mA-5A
Accuracy	V、I 0.2%, W 0.5% (PF=1.0)
Frequency	45-65Hz
Measures	V, I, kW, kvar, kVA, kWh, kvarh, kVAh, PF, Frequency, Demand, Running hour
Alarms	NONE、OVER V/I、OVER F； UNDER V /I、UNDER F； OVER Dmd； ANY
Power Quality	V/I unbalance、V Eligibility、Min.& Max. parameters
Display	Mono 68×59 LCD
Communication	RS485×1, LonTalk **(option)**
Timer	RTC
Wiring Ports	Aux Power、Voltage、Current、DO×2、RS485、LON
I/O	DO output×2；DO1 Alarm output、DO2 Pulse/ Alarm output
Operation Temperature	-20℃-70℃
Storage Temperature	-25℃-80℃
Humidity	20-90%RH
Dust/Water Proof Rating	Panel：IP52，Case：IP20
Size	96(W) × 96(H) × 97(L) mm
Power consumption	0.45~0.7W (Backlight off) 1.3~1.7W (Max. Backlight) 2.3W (Max. Backlight & Lon module)
Environmental Conditions	Indoor use Altitude up to 2000M Transient overvoltage on the mains supply is 2500V Pollution degree: 2

*CATII-Is for measurement performed on circuits directly connected to the low voltage installation

Certificate

1. LVD : EN61010-1
2. CE :

EN61326 Conducted Emission EN61326 Radiated Emission EN61000-3-2 Harmonic Current Emission

EN61000-3-3 Voltage Fluctuation and Flicker EN61000-4-2 Electrostatic Discharge EN61000-4-3 Radiated Susceptibility

EN61000-4-4 Electrical Fast Transient/Burst EN61000-4-5 Surge EN61000-4-6 Conducted Susceptibility

EN61000-4-8 Power Frequency magnetic Field EN61000-4-11 Voltage Dips and Interruption

3. FCC : Class A and CISPR 22

Ordering Code

SPM-3 ☐

	Communication 0：RS485 1：Lon talk

SPM-8

Integrated ethernet, electric power measurement, power quality analysis and reporting all power reading in one meter.

SPM-8 is a multi-function device which collecting measured data and monitoring the power system. It can replace a variety of meters, relays, communications devices and other meter parts.
SPM-8 is generally applied in factory and building. The design and functions of SPM-8 is qualified for CE & FCC.

SPM-8 multi-function power meter is mainly a collection of three-phase power system designed for continuous monitoring, with the rich power measurement functions, including current, voltage, power, watts, power factor, watt-hour, frequency, demand, effective and ineffective power calculation.
Bi-directional energy metering and its harmonic analysis allows SPM-8 can fit in a modern industrial power management, and built-in Ethernet communications and a number of choices to make SPM-8 can easily, and various SCADA (Supervisor Control And Data Acquisitions) system integrated with the application.

Product Features

- a. A Class 0.5 Parameters of two-way power and power measurement accuracy (True RMS).
- ■ b. The electricity daily and monthly reports, including kWh, max Demand, max THD, max / min, V, I, kW, kVA, min PF.
- c. Support the RS485 Modbus.
- d. 12 digital input contacts.
- e. 2 digital outputs, can be used for alarm and kWh pulse output.
- f. Support 4 analog input and output contacts.
- ■ g. Time zone (Block) or moving average type (Rolling) demand measuring.
- ■ h. Measurement of total harmonic and single harmonic of three phase voltage and current. (Max. 31 orders)
- ■ i. Event log with time tag can record alarm and voltage swell / sag.
- ■ j. Support Modbus over TCP / IP for Ethernet.
- ■ k. Voltage swell / sag power quality recording.
- l. Wiring detecting function.
- M. Built-in lithium battery and calender, the time utility meter can still be running when power failure occurs.
- N. Storage function enables the cumulative data reminds when power failure occurs. (Contains kWh, kvarh, day / month reports, event log).

※ **Note : Items marked with ■ refers to features of the advanced type**

Order Information

	□	□	□	□
SPM-8	TYPE 0 : Standard 1 : Advanced	SECONDARY CONNECTION PORT 0 : N/A 1 : Ethernet	ANALOG INPUT 0 : No 1 : Yes	ANALOG OUTPUT 0 : No 1 : Yes

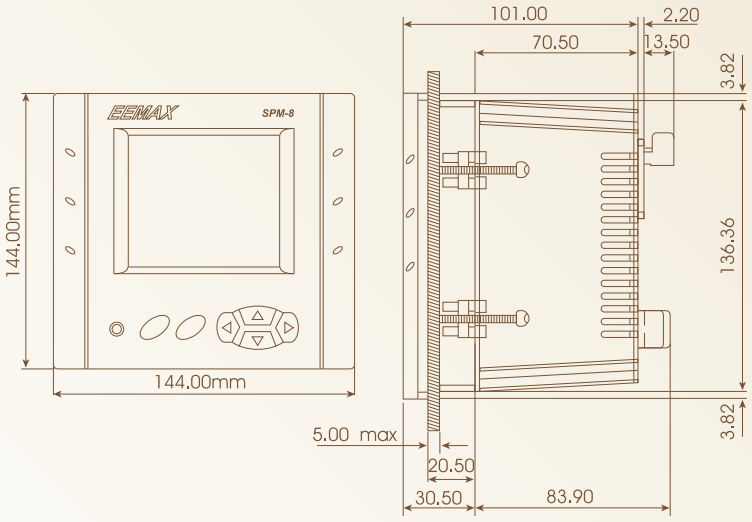
※ **Note: The standard type is unable to select the secondary connection port.**

SPM-8 Main Function

a. Energy reading
b. Power analysis
c. Demand reading
d. Alarm set point
e. Digital / Analog I/O
f. Report logging
g. Event logging
h. Communication port

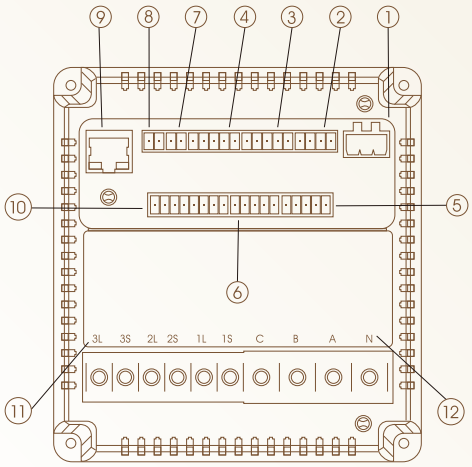
Installation

Four support latches must be placed in position after mounting.
The panel cut off: 138×138mm



Terminal Connection

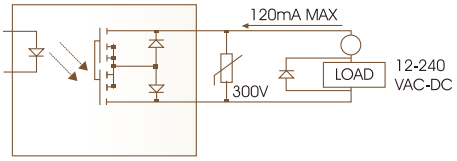
① Auxiliary Power (N-L 86 ~ 242VAC or 100 ~ 300VDC)
② Digital Output (Com1-DO1, Com2-DO2)
③ Analog Output (Com1-AO4-AO3-AO2-AO1)
④ Digital Input (Com1 -DI4 -DI3 -DI2 -DI1)
⑤ Digital Input (Com2 -DI8 -DI7 -DI6 -DI5)
⑥ Digital Input (Com3 -DI12 -DI11 -DI10 -DI9)
⑦ RS485 Port (D-D +)
⑧ Lon Talks port (D-D +)
⑨ Ethernet Port
⑩ Analog Input (AI1+ AI1-AI2+ AI2-AI3+ AI3-AI4+ AI4-)
⑪ Current input Terminal (3L 3S 2L 2S 1L 1S)
⑫ Voltage Input Terminal (C.B.A.N)



Input / Output

Digital Input : 12 group input.
Digital Output : 2 relay output, can be used for alarm and kWh pulse output.
Analog Output : 4 group 4-20mA output can be set to V, I, kW, kVA, kVAR.
Analog Input : 4 group 4-20mA input.
Voltage Input : up to 600V.
Current Input: 0~5A

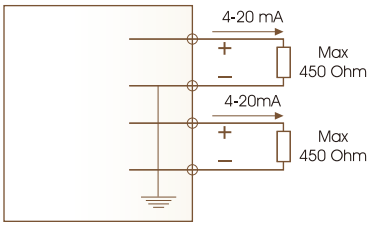
Digital Output



Digital output : 4 pin 2 channel.
12-240VAC-DC / 120mA max.
Digital output port-1 function selection : voltage / current unbalance alarm, over voltage / current alarm, voltage / current loss alarm, THD alarm, under voltage alarm, maximum demand alarm.
Digital output port-2 function selection : as pulse output

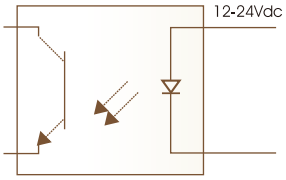
Analog Output

Analog output : 5 pins, 4 channel.
4-20mA output.
Analog output options : phase, voltage, current and power



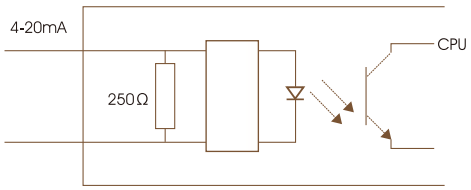
Digital Input

Digital input : 3 groups, 15 pins, 12 channels.
12-24Vdc.

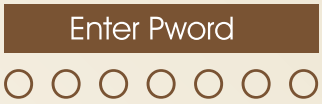


Analog Input

Analog input : 8 pins, 4 channels.
4-20mA input



Setting Function with Password



The 7 digits password is required for entering the setting mode.
Factory default password "0000000"

Electric Parameter Measurement

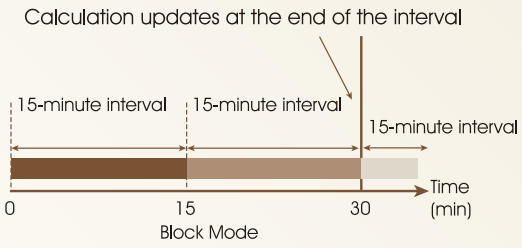
Current: 3 phase, neutral line current, accuracy 0.1%.
Voltage: 3 phase, phase -phase, phase -neutral voltage, accuracy 0.1%.
Frequency: 50/60 Hz
Total power: effective, ineffective, apparent power, accuracy 0.5%.
Each phase power: effective, ineffective, apparent power, accuracy 0.5%.
Power factor: Total and phase

Demand Model

Block: Fixed
Rolling: Moving average type

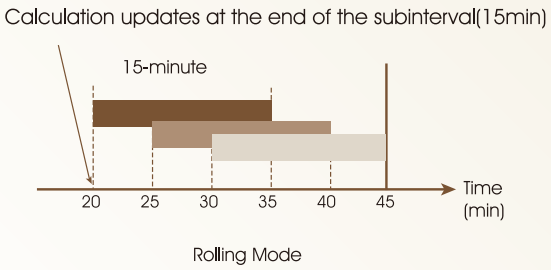
Block

In the fixed interval, select the range of 1 to 60 minutes, SPM-8 can calculate at the end of each interval and update the demand.



Rolling

In the moving average type, select the number of sub-interval and sub-interval length.
The end of each sub-interval and update the demand will be calculated.

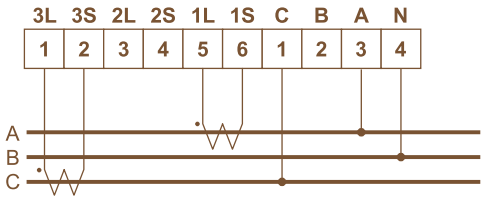


Specification

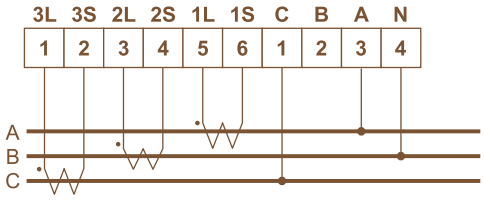
Power parameters measurement	Current: 3 phase, neutral, accuracy 0.1%
	Voltage: 3 phase phase-phase, phase-neutral, accuracy 0.1%
	Frequency: 50/60 Hz
	Total power: Active, reactive, apparent power, accuracy 0.5%
	Power per phase: Active, reactive, apparent power, accuracy 0.5%
	Power factor: Total, per phase
Energy measurement	Energy: Active, reactive, apparent energy, accuracy 0.5%
	Bi-directional energy: Deliver and receive kWh, kVARh, kVAh
Display and input/output	Panel display: Mono 128×128 TFT-LCD
	Digital input: 12 channels dry contact inputs
	Digital output: 2 channels relay for alarm or kWh pulse output
	Analog output: 4 channels 4~20mA for V, I, kW, kVA, kVAR
	Analog input: 4 channels 4~20mA input
	Voltage connection: 0~600V
	Current connection: 0~5A
	Power supply: 86~242 Vac or 100~125Vdc
Environmental & physical	Operation temperature: -10℃ to 55℃
	Storage temperature: -25℃ to 60℃
	Humidity: 20 to 80%RH (non-condensing)
	Dimensions: 144mm(L) × 144mm(W) × 94mm(H)
Communication	Primary port: RS485 Modbus
	Second port: ETHERNET, 10/100Mbps, Modbus over TCP/IP

Wiring

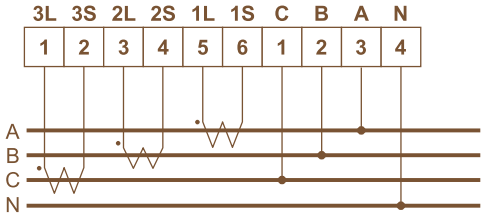
3P3W/2CT



3P3W/3CT



3P4W/3CT



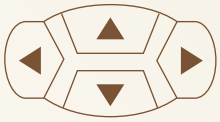
Operation Display

The reading on display on real time measuring value during the general use. The display items can be mode by setting and adjustment. The display items are stated in the table below:

NO.	Item	Display
1	Average / ∑ Result	Vavg、Iavg、∑LW、∑LVAR
2	Line Voltage L-L	L12 、L23 、L31 V, kV, MV
3	Phase Voltage L-N	L1 、L2 、L3 V, kV, MV
4	Line Current	L1 、L2 、L3、N A, kA, MA
5	Active Power	L1、L2、L3、∑L W, kW, MW
6	Apparent Power	L1、L2、L3、∑L VA, kVA, MVA
7	Reactive Power	L1、L2、L3、∑L VAr, kVAr, MVAr
8	Power Factor	L1、L2、L3、∑L
9	Total Energy	kWh del、rec、total
10	Total Energy	kVARh ＋(lagging)、－(leading)、total
※11	Demand	kW、Time
12	Frequency / Status	Freq: Hz
		Digital Output 1~2 ON/OFF
		Digital Input 1~12 ON/OFF

※Features only for the advanced type

Auto Scroll



The display reading page will change automatically during the general use. The time can be set from 1 ~ 6 sec.

Use ◀ ▶ to change the page, press ▶ to the next page, press ◀ the back page.

Monitor

Display panel : single color 128 × 128 STN-LCD.

Communication

Main communication port: RS485, Modbus protocol support.
Secondary connection ports: Ethernet, 10/100 Mbps, Modbus protocol support.

Electric Energy Measurement

Energy: Effective, ineffective, apparent power, accuracy 0.5%
Two-way power: input-output effective, ineffective, apparent power.

Demand Measurement

Two-way time zone (Block) and moving average type (Rolling) Demand

Power Quality

Voltage swell / sag: Setting the voltage swell / sag detection point
Harmonic: V, I THD, and a single harmonic (available to 31-order harmonic analysis)

Event Log Report

Report: daily report, monthly report, regular report
Event Log: Voltage swell / sag, alarm record (which can record up to 20 recent events)

Operating Environment

Ambient operating temperature: -20℃~ 60℃.
Storage temperature: -25℃~ 80℃.
Humidity: 20 ~ 90% RH (no condensation).
Dimensions: 144mm (length) × 144mm (width) × 114mm (depth).
Protection class: Panel IP54, Case IP20.

Specification

Item	Functions	SPM-80000 (Standard type)	SPM-3
Communication	Ethernet: 10/100Mbps, Modbus over TCP/IP	SPM-81100 above (advanced type)	
	RS-485 Modbus	●	●
Measurement	50Hz/60Hz	●	●
	Wiring detecting function	●	●
	Voltage: 3 phase, phase-phase, phase-neutral	●	●
	voltage measurement	●	●
	Current: 3 phase, neutral line current measurement	●	●
	Active power (kW)	●	●
	Apparent power (kVA)	●	●
	Reactive power (kVAR)	●	●
	Power factor (Single-phase、Total)	●	●
	Deliver and receive (kWH)	●	●
	Deliver and receive (kVARH)	●	●
	CT、PT: Primary and secondary setting	●	●
Security Setup	Password protection	7 digits	4 digits
Alarm Setup	THD(Total Harmonic Distortion) Alarm	●	
	Voltage sag	●	
	Voltage swell	●	
	Voltage Unbalance Alarm	●	●
	Current Unbalance Alarm	●	●
	Over-current Alarm (3 phase, neutral line)	●	●
	Current phase loss alarm	●	
	Voltage phase loss alarm	●	
Clock Setup	Date & time setup	●	●
Digital Output Setup	2 relay output (can be used for alarm and kWh) pulse output	●	2 DO: DO1 Alarm Output、DO2 Pulse / Alarm output
Digital Input Setup	12 groups input	●	
Analog Output	4 group 4-20mA output can be set to V, I, kW, kVA, kVAR.	Optional	
Analog Input	4 group 4-20mA input.	Optional	
Power Demand	Demand measurement model: Block & Rolling	SPM-81000 type above (advanced type)	●
Display	Auto Scroll Display Setup	●	●
	Backlight Timeout Display Setup	●	●
	Runtime Auto Scroll setup (Each display item except Average/ΣResult can be disable/ enable individually)	●	●
	Language (Chinese / English)	●	English

Specification

Item	Functions	SPM-80000 (Standard type)	SPM-3
Report	Daily and monthly reports, including kWh, max Demand, max THD, max / min, V, I, kW, kVA, min PF.	SPM-81000 type above (advanced type)	
	Event logging	SPM-81000 type above (advanced type)	
	Harmonics analysis	SPM-81000 type above (advanced type)	
Event Logging	Voltage sag	SPM-81000 type above (advanced type)	
	Voltage swell	SPM-81000 type above (advanced type)	
	Alarm	SPM-81000 type above (advanced type)	
Harmonic Analysis	Harmonics analysis	THD (SPM-80000)	THD
	The total three-phase harmonic Voltage and Current measurements and single-phase harmonic measurements (31 steps harmonics analysis)	SPM-81000 type above (advanced type)	
Monitor	Language: English & Chinese	●	English
	LCD panel	●	●
	Screen saver	●	●
Aux. Power	85~242VAC / 100~300VDC	●	●
Production Class	Panel: IP 54 Case: IP 20	●	Panel: IP 52 Case: IP 20
Accuracy	**Current:** 3 phase, neutral line current, accuracy 0.1%. **Voltage:** 3 phase, phase-phase, phase-neutral voltage, accuracy 0.1%.	●	●
	Total power: effective, ineffective, apparent power, accuracy 0.5%. Each phase power: effective, ineffective, apparent power, accuracy 0.5%.	●	●
Certification	CE, FCC	●	●
Operation Temp.	-10℃~60℃	●	●
Storage Temp.	-25℃~80℃	●	●
Dimension	144mm(L)×144mm(W)×114mm(D)	●	96mm(L) × 96mm(W) ×97mm(D)

SPM-8 Series Selection Table

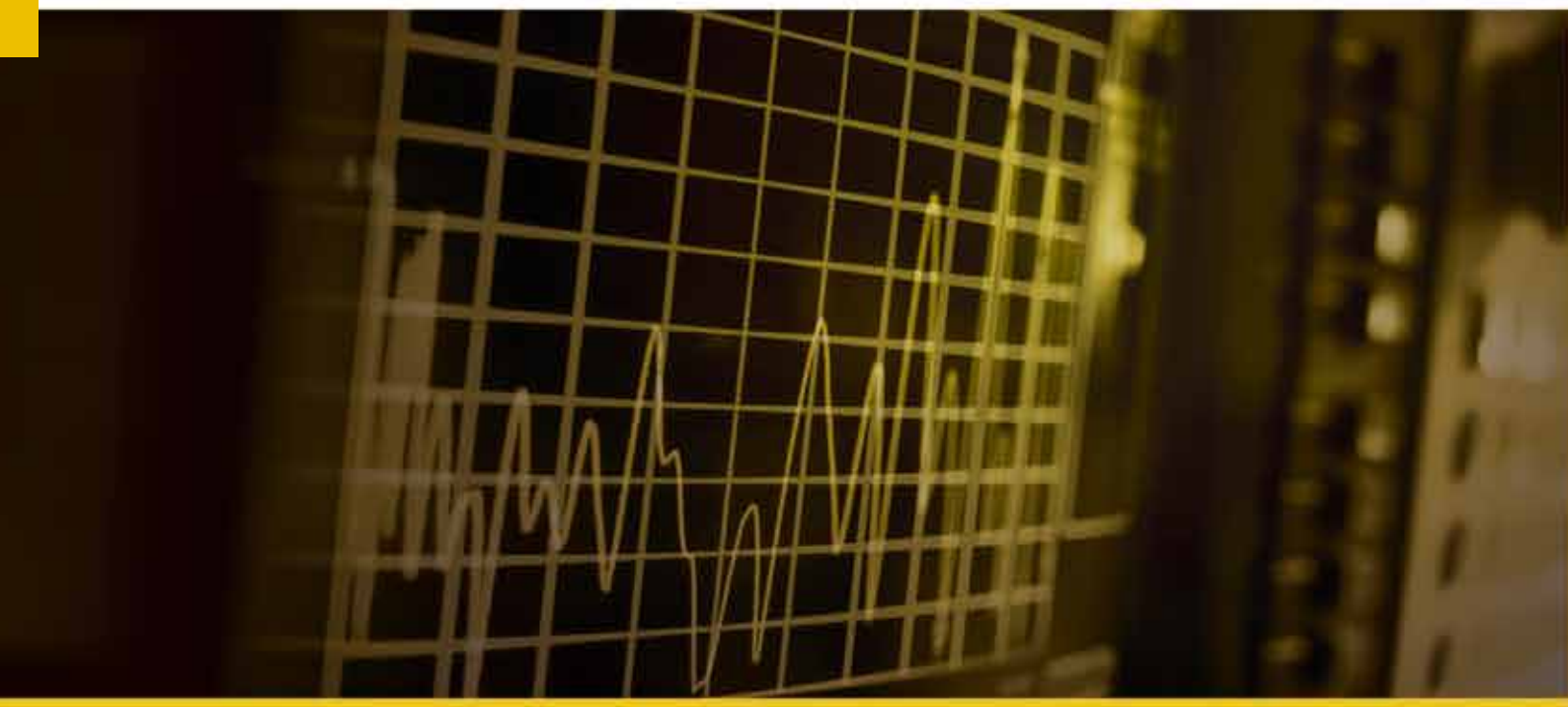
Item	Functions	Standard type		Advanced type		
		SPM-80000	SPM-80011	SPM-81000	SPM-81100	SPM-81111
Communication	Ethernet: 10/100Mbps, Modbus over TCP/IP				●	●
	RS-485 Modbus	●	●	●	●	●
Measurement	50Hz/60Hz	●	●	●	●	●
	Wiring detecting function	●	●	●	●	●
	Voltage: 3 phase, phase-phase, phase-neutral	●	●	●	●	●
	voltage measurement	●	●	●	●	●
	Current: 3 phase, neutral line current measurement	●	●	●	●	●
	Active power (kW)	●	●	●	●	●
	Apparent power (kVA)	●	●	●	●	●
	Reactive power (kVAR)	●	●	●	●	●
	Power factor (Single-phase、Total)	●	●	●	●	●
	Deliver and receive (kWH)	●	●	●	●	●
	Deliver and receive (kVARH)	●	●	●	●	●
	CT、 PT: Primary and secondary setting	●	●	●	●	●
Security Setup	7 digits password protection	●	●	●	●	●
Alarm Setup	THD(Total Harmonic Distortion) Alarm			●	●	●
	Voltage sag	●	●	●	●	●
	Voltage swell	●	●	●	●	●
	Voltage Unbalance Alarm	●	●	●	●	●
	Current Unbalance Alarm	●	●	●	●	●
	Over-current Alarm (3 phase, neutral line)	●	●	●	●	●
	Current phase loss alarm	●	●	●	●	●
	Voltage phase loss alarm	●	●	●	●	●
Clock Setup	Date & time setup	●	●	●	●	●
Digital Output Setup	2 relay output (can be used for alarm and kWh) pulse output	●	●	●	●	●
Digital Input Setup	12 groups input	●	●	●	●	●
Analog Output	4 group 4-20mA output can be set to V, I, kW, kVA, kVAR.		●			●
Analog Input	4 group 4-20mA input.		●			●
Power Demand	Demand measurement model: Block & Rolling			●	●	●
Display	Auto Scroll Display Setup	●	●	●	●	●
	Backlight Timeout Display Setup	●	●	●	●	●
	Runtime Auto Scroll setup (Each display item except Average/ Σ Result can be disable/ enable individually)	●	●	●	●	●
	Language (Chinese / English)	●	●	●	●	●

SPM-8 Series Selection Table

Item	Functions	Standard type		Advanced type		
		SPM-80000	SPM-80011	SPM-81000	SPM-81100	SPM-81111
Report	Daily and monthly reports, including kWh, max Demand, max THD, max / min, V, I, kW, kVA, min PF.			●	●	●
	Event logging			●	●	●
	Harmonics analysis			●	●	●
Event Logging	Voltage sag			●	●	●
	Voltage swell			●	●	●
	Alarm			●	●	●
Harmonic Analysis	Harmonics analysis			●	●	●
	The total three-phase harmonic Voltage and Current measurements and single-phase harmonic measurements (31 steps harmonics analysis)			●	●	●
Monitor	Language: English & Chinese	●	●	●	●	●
	LCD panel	●	●	●	●	●
	Screen saver	●	●	●	●	●
Aux. Power	85~242VAC / 100~300VDC	●	●	●	●	●
Production Class	Panel: IP 54 Case: IP 20	●	●	●	●	●
Accuracy	**Current:** 3 phase, neutral line current, accuracy 0.1%. **Voltage:** 3 phase, phase-phase, phase-neutral voltage, accuracy 0.1%.	●	●	●	●	●
	Total power: effective, ineffective, apparent power, accuracy 0.5%. Each phase power: effective, ineffective, apparent power, accuracy 0.5%.	●	●	●	●	●
Certification	CE, FCC	●	●	●	●	●
Operation Temp.	-10℃~60℃	●	●	●	●	●
Storage Temp.	-25℃~80℃	●	●	●	●	●
Diamention	144mm(L)×144mm(W)×114mm(D)	●	●	●	●	●

SHIHLIN ELECTRIC & ENGINEERING

MOTOR CONTROL (CONTACTOR/ MS/ MMS), CIRCUIT BREAKER (MCCB/ ELCB/ EMCCB/ MCB), AIR CIRCUIT BREAKER, AUTOMATIC TRANSFER SWITCHES (Panel Board Type/ Residential Unit Use), SURGE PROTECTIVE DEVICE, LOW VOLTAGE POWER CAPACITORS, SMART METER, INVERTER



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