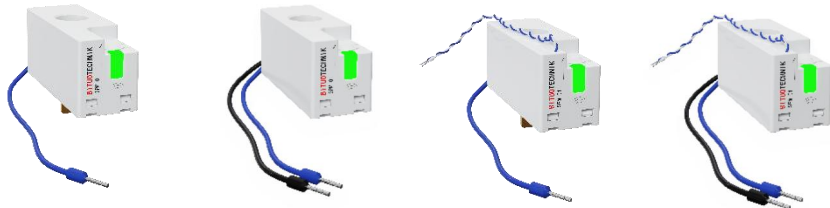


SPM01

Smart Energy Sensor for 1P+N System

User Manual

- ◇ Accurate metering
- ◇ Real-time monitoring
- ◇ Space saving
- ◇ Versatile communication



SPM01 smart energy sensor - also named as miniature energy meter- is an electrical monitoring device with wireless or wired communication. It works like a smart electrical monitoring accessory for protective and control devices, such as circuit breakers and modular contactors.

SPM01 has the following main characteristics

- Flexibly installed above/below protection or control devices requiring no space at Din rails
- Large aperture supporting 16mm² cable through
- Real-time measurement of Voltage, Current, Power and Energy
- Bi-directional energy measurement and forward active energy tolerance within 1%
- Both wireless and wired communication variants available for EMS/ BMS¹⁾ integration

Typical applications for SPM01

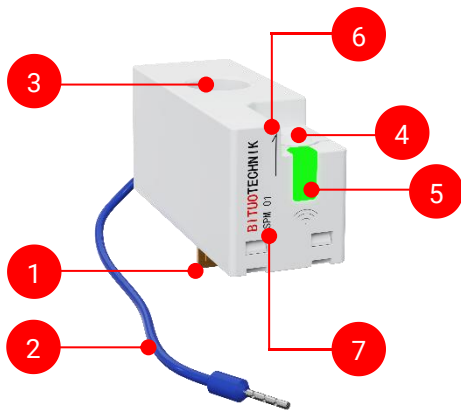
- Home energy monitoring ²⁾
- Café, restaurant and shop energy monitoring
- Office energy monitoring
- Hotel and student dorm energy monitoring / metering³⁾
- Rental property energy monitoring / metering ³⁾
- Energy monitoring for commercial air conditioning system
- Energy monitoring for commercial lighting system
- Factory energy monitoring

1) EMS: Energy Management System; BMS: Building Management System

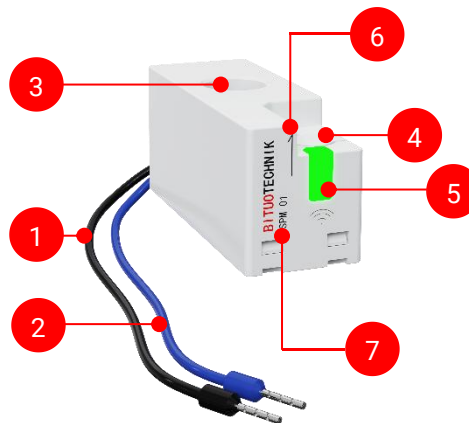
2) In addition to whole-home energy monitoring when being installed at the main circuit (incoming line), the real-time measurement of bi-directional current flow can provide input for dynamic load balancing (DLB) with EV charger and solar power generation optimization

3) Metering certificate for billing purpose can be extended depending on the country/region regulations

Parts description (1) - wireless communication version



MCB-mount



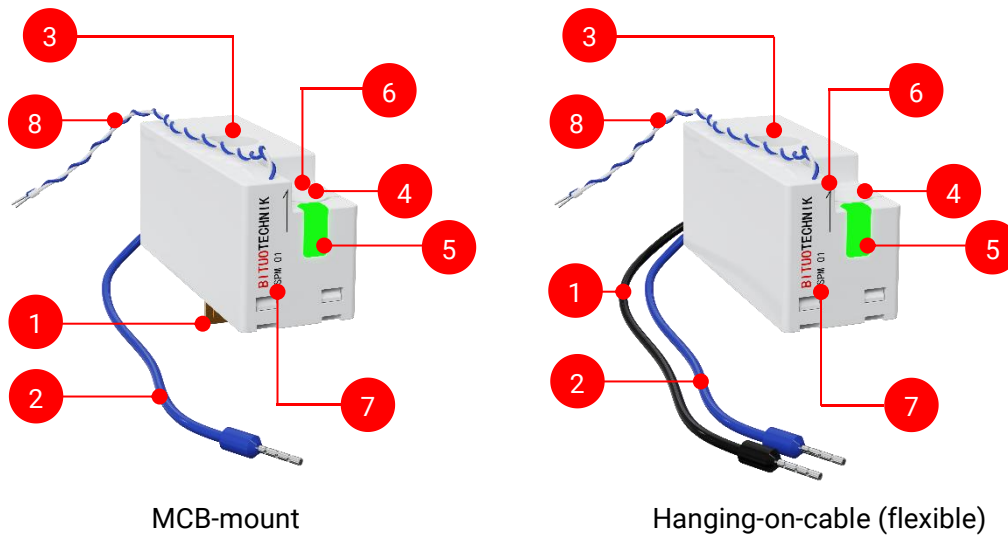
Hanging-on-cable (flexible)

#	Element	Description
(1)	Terminal plate for L Cable for L	Insert to protective device terminal box for power supply from Line ¹⁾ Connect to power supply from Line
(2)	Cable for N	Connect to power supply from Neutral
(3)	Through-hole	Let the measuring cable L going through the through-hole ²⁾ Pay attention for positive current flow aligning with the arrow direction
(4)	Reset button	Reset button Press the button 3~5 seconds to enter the pairing mode
(5)	LED	Status indication <ul style="list-style-type: none"> <input type="checkbox"/> ON, normal using, connect to cloud <input checked="" type="checkbox"/> Flashing with 2Hz, pairing mode <input checked="" type="checkbox"/> Flashing with 0.5Hz, paired, searching for cloud <input checked="" type="checkbox"/> Flashing with 0.25Hz, self-checking failed³⁾ <input checked="" type="checkbox"/> Flashing with 1Hz, wireless communication failed⁴⁾
(6)	Current flow direction	Positive current flow direction for installation
(7)	Product model	Refer to page 5~7 for ordering information

Remark:

- 1) Hanging-on-cable variants are recommended, if users don't know MCB-mount variant compatibility.
- 2) Do not put both the line cable and neutral cable going through the hole
- 3) Irreversible failure due to failed self-checking. Device needs to be replaced.
- 4) Input voltage is too low to ensure communication module inside working properly.

Parts description (2) - wired communication version



#	Element	Description
(1)	Terminal plate for L Cable for L	Insert to protective device terminal box for power supply from Line ¹⁾ Connect to power supply from Line
(2)	Cable for N	Connect to power supply from Neutral
(3)	Through-hole	Let the measuring cable L going through the through-hole ²⁾ Pay attention for positive current flow aligning with the arrow direction
(4)	Reset button	Reset button Press the button above 5 seconds to reset the address as default value 247
(5)	LED	Status indication <input type="checkbox"/> ON, resetting the RS485 address to the default value <input type="checkbox"/> Flashing with 0.25Hz, communication failed <input type="checkbox"/> Flashing with 1Hz, normal using with communication
(6)	Current flow direction	Positive current flow direction for installation
(7)	Product model	Refer to page 5~7 for ordering information
(8)	RS485 communication wire	Connect to the A-B ports of RS485 communication terminals

Remark:

- 1) Hanging-on-cable variants are recommended, if users don't know MCB-mount variant compatibility.
- 2) Do not put both the line cable and neutral cable going through the hole

Technical Specification

#	Technical specification	Wireless communication	Wired communication
101	Rated operating voltage U_n	110~240 VAC, 50/60 Hz	110~240 VAC, 50/60 Hz
102	Basic current I_b	10 A	10 A
103	Starting current I_{st}	50 mA	50 mA
104	Max current I_{max}	63 A	63 A
105	Over-voltage category	III	III
106	Rated insulating voltage U_i	250V	250V
107	Rated impulse withstand voltage U_{imp}	4kV	4kV
108	Pollution degree	3	3
109	Protection degree	IP20	IP20
110	Reference standard for measurement tolerance: IEC 61557-12	Voltage: Class 0.5 Current: Class 1 Active power: Class 1 Forward active energy: Class 1	Voltage: Class 0.5 Current: Class 1 Active power: Class 1 Forward active energy: Class 1
111	Power consumption	Normal using: 0.5 Watt Pairing mode: 1 Watt	Normal using: 0.5 Watt Pairing mode: 1 Watt
112	Rated operating temperature	-25~60 °C	-25~60 °C
113	Size: Height x Width x Depth	46.8mm x 17.8mm x 21.3mm	46.8mm x 17.8mm x 21.3mm
114	Reference standard:	IEC 61557-12 IEC 61326-1 ETSI EN 300 328 ETSI EN 301 489-1 ETSI EN 301 489-17	IEC 61557-12 IEC 61326-1 ETSI EN 300 328 ETSI EN 301 489-1 ETSI EN 301 489-17
115	Integrated communication option ¹⁾	Wifi; Zigbee	Modbus RTU

- 1) SPM01 is designed with a modular hardware platform that can be extended for more communication options
- Z-wave, Matter, LoraWan, EEBus, DL645 etc.

Ordering Information

Product part 1 – Integrated WiFi communication

#	Ordering number	Description
1	SPM01-D1TW ¹⁾	MCB mounted ³⁾ (Downstream installation), 18mm, WiFi, 1P+N, Tuya Smart cloud integration
2	SPM01-U1TW ¹⁾	MCB mounted ³⁾ (Upstream installation), 18mm, WiFi, 1P+N, Tuya Smart cloud integration
3	SPM01-D2TW ¹⁾	Hanging on cable (Downstream installation), 18mm, WiFi, 1P+N, Tuya Smart cloud integration
4	SPM01-U2TW ¹⁾	Hanging on cable (Upstream installation), 18mm, WiFi, 1P+N, Tuya Smart cloud integration
5	SPM01-D1EW ²⁾	MCB mounted ³⁾ (Downstream installation), 18mm, WiFi, 1P+N, Customer-specific cloud integration
6	SPM01-U1EW ²⁾	MCB mounted ³⁾ (Upstream installation), 18mm, WiFi, 1P+N, Customer-specific cloud integration
7	SPM01-D2EW ²⁾	Hanging on cable (Downstream installation), 18mm, WiFi, 1P+N, Customer-specific cloud integration
8	SPM01-U2EW ²⁾	Hanging on cable (Upstream installation), 18mm, WiFi, 1P+N, Customer-specific cloud integration

Remark:

1) Tuya CB2S WiFi module is used in the sensor. Smart Life- an APP owned by Tuya Smart- can be used to access the device. Also, Tuya Integration at Home Assistant OS (<https://www.home-assistant.io/integrations/tuya/>) and Tuya Smart API can be used to access the device indirectly via Tuya Smart cloud.

2) ESP32 C2/C3 WiFi module is used in the sensor. For customer-specific direct cloud integration, please contact us by sending an Email (info@bituo-technik.com) .

3) If users are not sure whether the 'MCB mounted' variants fit for the protection/control devices, 'Flexible (Hanging-on-cable)' variants are recommended.

Ordering Information

Product part 2 – Integrated Zigbee communication

#	Ordering number	Description
1	SPM01-D1TZ ¹⁾	MCB mounted ²⁾ (Downstream installation), 18mm, Zigbee, 1P+N, Tuya Smart Zigbee gateway integration
2	SPM01-U1TZ ¹⁾	MCB mounted ²⁾ (Upstream installation), 18mm, Zigbee, 1P+N, Tuya Smart Zigbee gateway integration
3	SPM01-D2TZ ¹⁾	Hanging on cable (Downstream installation), 18mm, Zigbee, 1P+N, Tuya Smart Zigbee gateway integration
4	SPM01-U2TZ ¹⁾	Hanging on cable (Upstream installation), 18mm, Zigbee, 1P+N, Tuya Smart Zigbee gateway integration
3	SPM01-D1TZ-U01 ²⁾	MCB mounted ²⁾ (Downstream installation), 18mm, Zigbee, 1P+N, Universal Zigbee coordinator integration
4	SPM01-U1TZ-U01 ²⁾	MCB mounted ²⁾ (Upstream installation), 18mm, Zigbee, 1P+N, Universal Zigbee coordinator integration
7	SPM01-D2TZ-U01 ²⁾	Hanging on cable (Downstream installation), 18mm, Zigbee, 1P+N, Universal Zigbee coordinator integration
8	SPM01-U2TZ-U01 ²⁾	Hanging on cable (Upstream installation), 18mm, Zigbee, 1P+N, Universal Zigbee coordinator integration

Remark:

1) Tuya ZS2S Zigbee module (EFR32MG21 SoC) with Tuya’s proprietary Zigbee clusters/attributes is used in the sensor. Those devices can be identified by universal Zigbee coordinators for Zigbee2Mqtt integration (<https://www.zigbee2mqtt.io/devices/SPM01.html>).

2) Tuya ZS2S Zigbee module (EFR32MG21 SoC) with Standard Zigbee clusters/attributes is used in the sensor. Those devices can be identified by universal Zigbee coordinators for ZHA and Zigbee2Mqtt integration.

3) If users are not sure whether the ‘MCB mounted’ variants fit for the protection/control devices, ‘Flexible (Hanging-on-cable)’ variants are recommended.

Ordering Information

Product part 3 – Integrated Modbus communication

#	Ordering number	Description
1	SPM01-D1M1	MCB mounted ¹⁾ (Downstream installation), 18mm, Zigbee, 1P+N, Modbus RTU
2	SPM01-U1M1	MCB mounted ¹⁾ (Upstream installation), 18mm, Zigbee, 1P+N, Modbus RTU
3	SPM01-D2M1	Hanging on cable (Downstream installation), 18mm, Zigbee, 1P+N, Modbus RTU
4	SPM01-U2M1	Hanging on cable (Upstream installation), 18mm, Zigbee, 1P+N, Modbus RTU

Remark:

1) If users are not sure whether the 'MCB mounted' variants fit for the protection/control devices, 'Flexible (Hanging-on-cable)' variants are recommended.

Installation Notice

Please note before starting Installation

- **SPM01 must only be installed and maintained by qualified professionals.** Qualified professionals refer to those who have the skills, license and knowledge related to the manufacture, operation and installation of electrical equipment. They are trained to detect and avoid risks.
- SPM01 should not be installed if, while unpacking, any damage is observed.
- SPM01 must be installed inside electrical panels or switchboards, behind a door or plate, so that they are inaccessible for unauthorized persons. The electric panels must meet the requirements of the applicable standards (IEC 61439-1) and installed in compliance with current installation and safety rules (IEC 61140).
- All relevant local, regional, and national regulations must be respected while installing and using SPM01.
- SPM01 manufacturer declines any responsibility in the event that SPM01 equipment is associated with equipment that is not listed in the latest document of selection guide for product compatibility.
- SPM01 manufacturer is not liable in case the instructions mentioned in this document and other referred documents are not respected.



HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Turn off all power supply sources before installing and during maintenance of this equipment.
- Do not use a SPM01 product for voltage testing purposes. A Voltage Tester must be used instead.

Failure to follow these instructions can result in death, serious injury, or equipment damage.



FIRE HAZARD

- SPM01 must be associated with an easily accessible upstream protection and circuit-breaker system.
- The end of cable for L and N at SPM01 must be adjusted to the according equipment and device. Such an adjustment can only be handled by qualified professionals.

Failure to follow these instructions can result in death, serious injury, or equipment damage.



RISK OF DAMAGING SPM01 Sensor

- Comply with the phase and the neutral position. (Black/Red=Phase, Blue=Neutral)
- Disconnect SPM01 before performing the dielectric withstand test.
- SPM01 can only be installed upstream if associated with contactors, frequency converter or motor starters.
- Limit the insulation measurements up to 500 V DC.

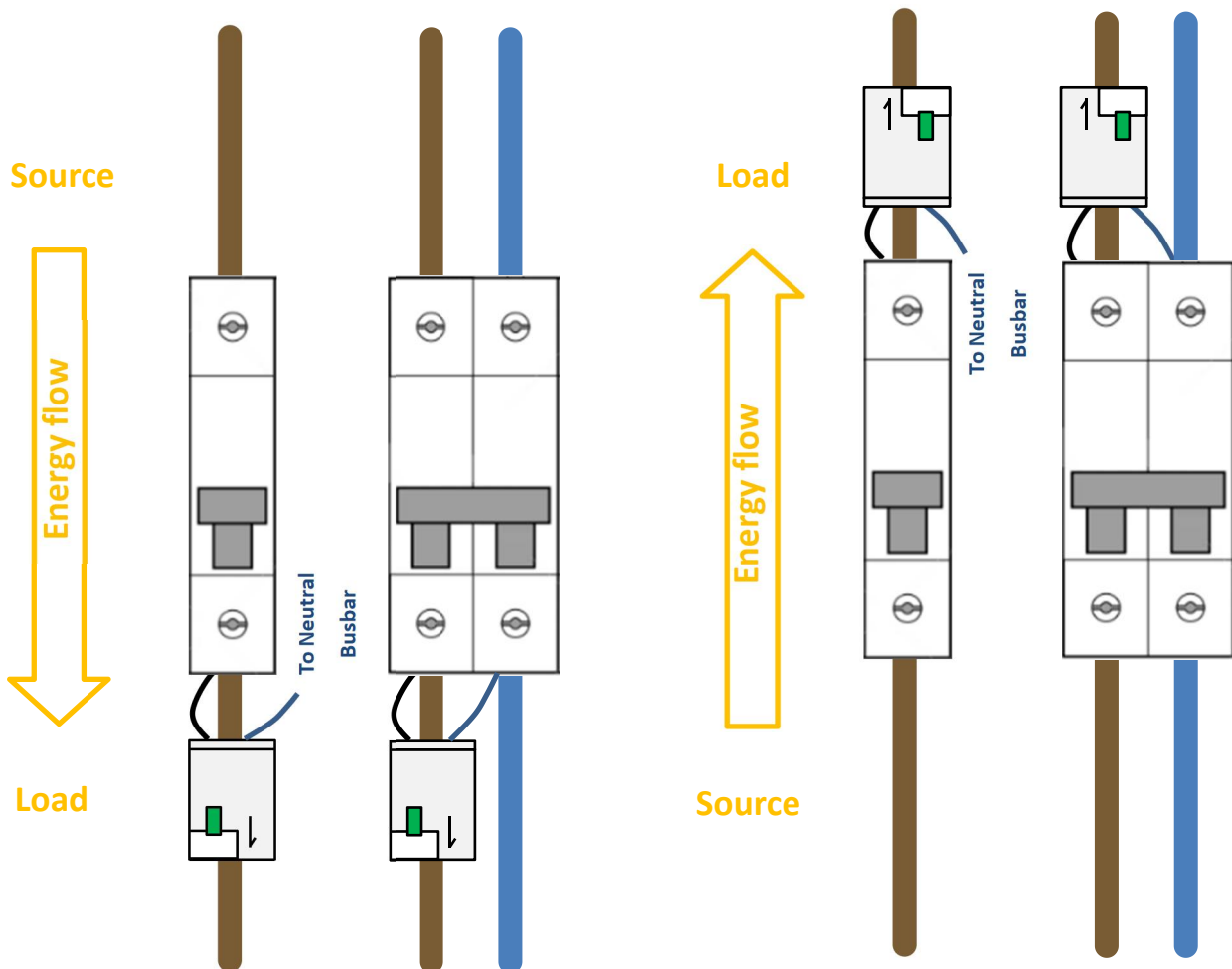
Failure to follow these instructions can result in equipment damage.

Downstream Installation Scheme

WiFi: SPM01-D1TW / SPM01-D2TW / SPM01-D1EW / SPM01-D2EW

Zigbee: SPM01-D1TZ / SPM01-D2TZ

Modbus: SPM01-D1M1/ SPM01-D2M1



Note:

1) SPM01 can be damaged, if it is installed downstream of switching devices – such as a contactor, frequency converter or motor starters.

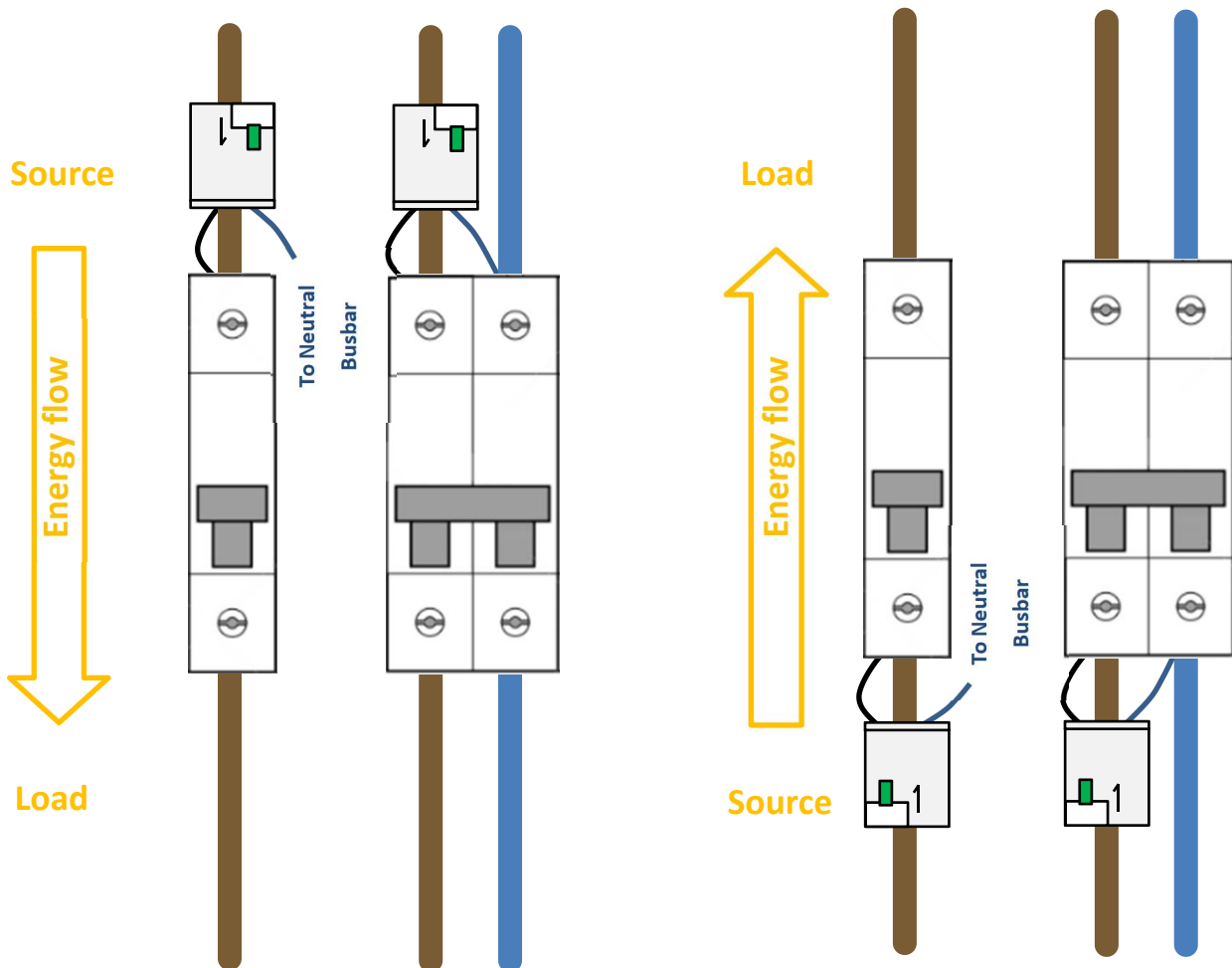
2) SPM01 supports bi-directional energy measurement. The energy flowing at the same direction as the current flow arrow printed on the sensor housing is counted as forward energy.

Upstream Installation Scheme

WiFi: SPM01-U1TW / SPM01-U2TW / SPM01-U1EW / SPM01-U2EW

Zigbee: SPM01-U1TZ / SPM01-U2TZ

Modbus: SPM01-U1M1/ SPM01-U2M1

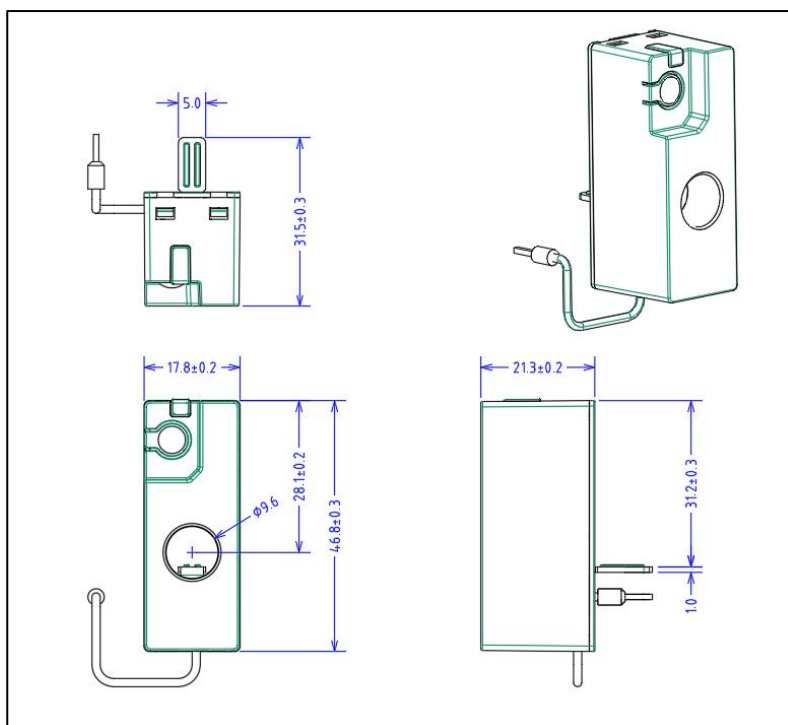
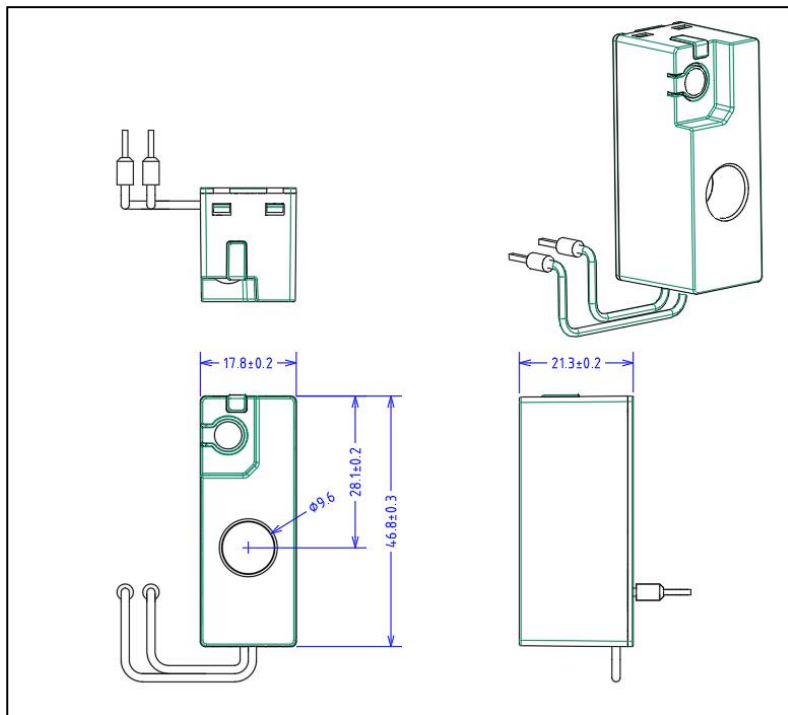


Note:

1) SPM01 supports bi-directional energy measurement. The energy flowing at the same direction as the current flow arrow printed on the sensor housing is counted as forward energy.

Mechanical outline*

Unit: mm



* Both wireless communication version and wired communication version have the same mechanical outline except for the RS485 A/B wires.

Disclaimer:

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