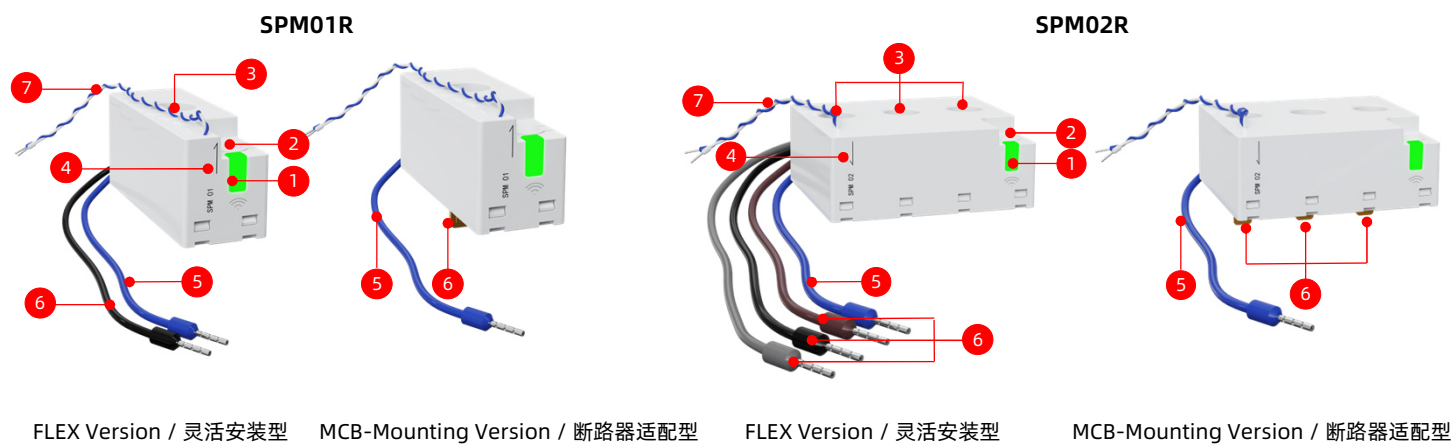


SPM01R/02R

Miniature Energy Meters with Built-in CTs / 内置电流互感器的微型电能传感器

Product Description / 产品描述



1. Indication light 2. Reset button 3. Pass-through hole for L wire 4. Forward energy flow direction 5. Cable for N connection 6. Part for L connection - Cable for L connection (FLEX Version): Brown or Yellow wire - L1/A phase/X; Black or Green wire - L2/B phase/Y; Gray or Red wire - L3/C phase/Z - Terminal plate for L connection (MCBM Version) 7. RS485 communication wire	1. 指示灯 2. 复位按钮 3. L 线穿线孔 4. 正向能量流向 5. N 极连接电线 6. L极连接部分 - L 极连接电线（灵活安装型）：棕色/黄色电线 - L1/A相/X；黑色/绿色电线 - L2/B相/Y；灰色/红色电线 - L3/C相/Z - L 极连接端子（断路器适配型） 7. RS485通讯线
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Technical Data / 技术参数

- Rated voltage U_n: - SPM01R: 220~240 VAC, 50/60 Hz - SPM02R: 220-240(L-N)/380-415 VAC(L-L), 50/60Hz - Max current I_{max}: 63A - Over-voltage category: III - Rated insulating voltage U_i: 250V (SPM01R) / 440 V (SPM02R) - Rated impulse withstand voltage U_{imp}: 4 kV - Pollution degree: 3 - Protection degree: IP20 - Energy measurement accuracy: 1% - Maximum power consumption: ≤ 2 VA - Rated operating temperature: -25~55 °C - Communication type: Modbus RTU	- 额定电压 U_n: - SPM01R: 220~240 VAC, 50/60 Hz - SPM02R: 220-240(L-N)/380-415 VAC(L-L), 50/60Hz - 最大电流 I_{max}: 63A - 过电压类别: III - 额定绝缘电压 U_i: 250V (SPM01R) / 440 V (SPM02R) - 额定冲击耐受电压 U_{imp}: 4 kV - 污染等级: 3 - 防护等级: IP20 - 测量精度: 1% - 最大功耗: ≤ 2 VA - 工作温度范围: -25~55 °C - 通信类型: Modbus RTU
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Indicator Light Description / 指示灯说明

Product with RS485 Connectivity / 具有 RS485 通讯功能的产品				
Solid ON / 常亮 Data transmitting/ 数据通讯中	Flashing at 0.5Hz / 0.5 Hz 频闪 Standby (No data exchange) / 待机（无数据通讯）	Flashing at 0.25Hz / 0.25 Hz 频闪 Communication error between MCU and metering chip / MCU和计量芯片通讯异常	Flashing at 1Hz (Only SPM02R) / 1Hz 频闪 (仅 SPM02R) Fault Alarm - Fault detected. Check fault register code for details. / 故障报警 - 检测到故障，请根据故障报警寄存器中的代码排查	Flashing at 5Hz (Only SPM02R) / 5Hz 频闪 (仅 SPM02R) Over-voltage Alarm - Risk of device damage! Check wiring & power immediately. / 过压报警 - 存在设备损坏风险，请立即检查接线与电源。

Please Note / 请注意

Please note before starting Installation - SPM01R/SPM02R devices must only be installed and maintained by qualified professionals. - SPM01R/SPM02R devices should not be installed if, while unpacking, any damage is observed. - SPM01R/SPM02R devices must be installed inside electrical panels or switchboards, behind a door or plate, so that they are inaccessible to unauthorized persons. - The electrical panels must meet the requirements of the applicable standards (IEC 61439-1) and be 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 SPM01R/02R devices. - During the installation of SPM01R/SPM02R devices, a verification of the appropriate mechanical strength and electrical continuity of the connections must be performed by a professional installation engineer. - SPM01R/SPM02R devices' manufacturer is not liable in case the instructions mentioned in this document and other referred documents are not respected.	在安装安装前请注意: - SPM01R/SPM02R设备仅允许由具备资质的专业电工或技术人员进行安装和维护。 - 若在开箱检查过程中发现设备存在任何损坏, 不得进行安装。 - SPM01R/SPM02R设备必须安装在电气控制柜或配电箱内, 并应置于门或挡板之后, 以防止未经授权人员接触。 - 电气控制柜必须符合适用标准 IEC 61439-1 的要求, 并按照现行的安装与安全规范 IEC 61140 进行安装。 - 安装和使用 SPM01R/SPM02R设备过程中, 必须遵守所有相关的地方法规、区域性规定及国家标准。 - 在安装 SPM01R/SPM02R设备时, 必须由专业电气安装工程师对接线的机械强度和电气连续性进行检查和验证。 - 如未遵循本文件及引用文件中的说明, SPM01R/SPM02R设备制造商不承担任何责任。
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HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH / 有触电、爆炸或电弧危险

- SPM01R/02R should be installed, operated, serviced and maintained ONLY by qualified professionals. - Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462, DL/T 320 or local equivalent. - Turn off all power supply sources before installing and during maintenance of this equipment. - Always use a properly rated voltage sensing device to confirm power is off. - Do not use a SPM 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.	- SPM01R/SPM02R 必须仅由具备资质的专业电工或技术人员进行安装、操作、检修和维护。 - 必须佩戴合适的个人防护装备 (PPE), 并遵循安全电气作业规范。参见 NFPA 70E、CSA Z462、DL/T 320 或等效的当地标准。 - 在安装或维护本设备前, 必须切断所有电源。 - 始终使用具有适当额定值的电压检测装置确认电源已断开。 - 严禁使用 SPM 进行电压测试, 应使用专业电压测试仪。 如不遵守上述指示, 可能导致死亡、严重人身伤害或设备损坏。
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FIRE HAZARD / 火灾风险

- SPM01R/SPM02R must be associated with an easily accessible upstream protection and circuit-breaker system. - The ends of voltage take-offs cables must be adjusted to the according equipment and device. Such an adjustment can only be handled by qualified professionals. - For compatibility with circuit breakers, please contact the manufacturers. Failure to follow these instructions can result in death, serious injury, or equipment damage.	- SPM01R/SPM02R 必须配套安装在便于操作的上级保护装置及断路器系统中。 - 电压引出线的线端必须与相应的设备和器件匹配, 并由具备资质的专业人员进行处理。 - 若需确认与断路器的兼容性, 请联系相关制造商。 如不遵循上述指示, 可能导致死亡、严重人身伤害或设备损坏。
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RISK OF DAMAGING / 损坏风险

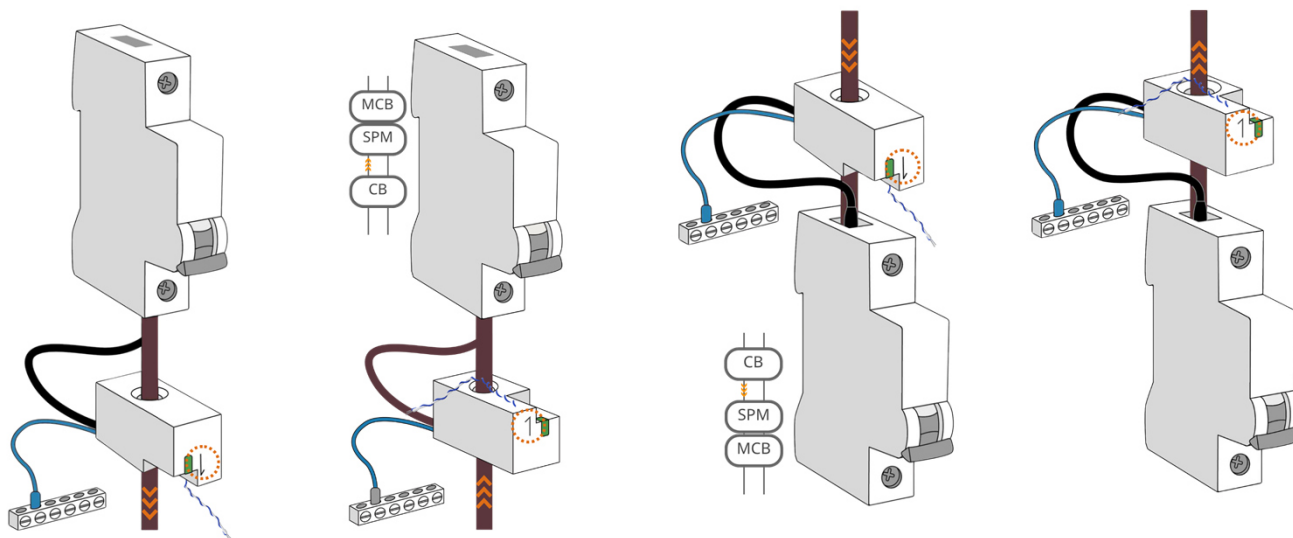
- Comply with the phase and the neutral position. Connect the N pole of the voltage measurement connector to phase voltage is strictly forbidden. - Disconnect the voltage take-offs of SPM01R/SPM02R devices before performing the dielectric withstand test or insulation measurements. - Limit the insulation measurements up to 500 VDC. - When used to monitor circuits with contactors, frequency converters, or motor starters, the SPM01R/SPM02R device must be installed upstream of these units. Failure to follow these instructions can result in equipment damage.	- 必须严格遵守相线与中性线的接线位置。严禁将电压测量端子的 N 极接至相电压。 - 在进行耐压试验或绝缘测试之前, 必须断开 SPM01R/SPM02R 设备的电压引出线。 - 绝缘测试电压不得超过 500 VDC。 - SPM01R/SPM02R 设备用于监测带有接触器、变频器或电动机起动器的回路时, 需要安装在这些设备的上游。 如不遵循上述指示, 可能导致设备损坏。
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Installation Scheme - FLEX Version / 安装示意图 - 灵活安装型

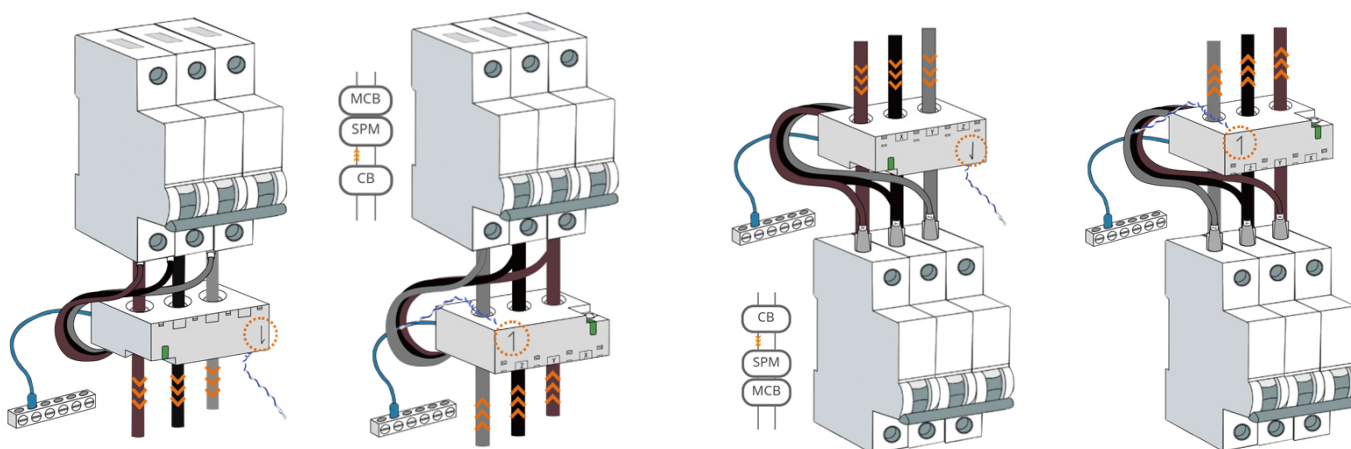


SPM01R/SPM02R should be installed, operated, serviced and maintained **ONLY** by qualified professionals.
SPM01R/SPM02R 必须仅由具备资质的专业电工或技术人员进行安装、操作、检修和维护。

Flexible Installation / 灵活安装型 (SPM01-D2M1)



Flexible Installation / 灵活安装型 (SPM02-D2M1)



Remark/备注:

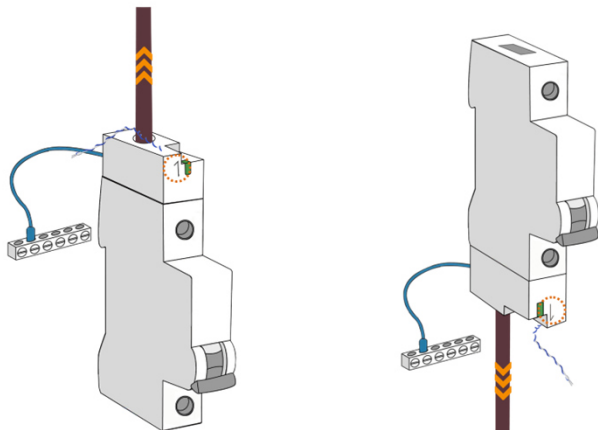
1. The energy flowing  in the same direction as the energy flow arrow printed on the sensor housing  is counted as forward energy. / 同传感器外壳上箭头一致方向的电流动，被计为正向电能。

Installation Scheme - MCB-Mounting Version / 安装示意图 - 断路器适配型

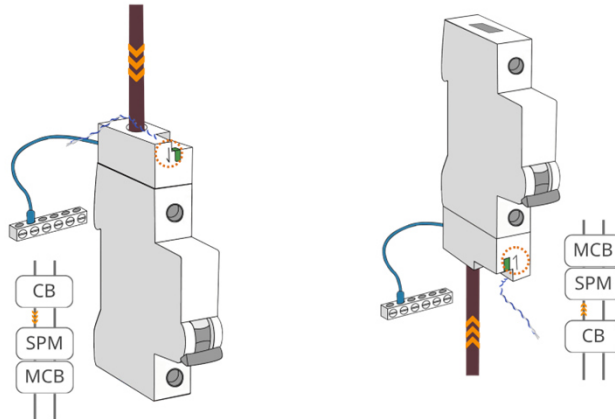


SPM should be installed, operated, serviced and maintained **ONLY** by qualified professionals.
SPM 必须仅由具备资质的专业电工或技术人员进行安装、操作、检修和维护。

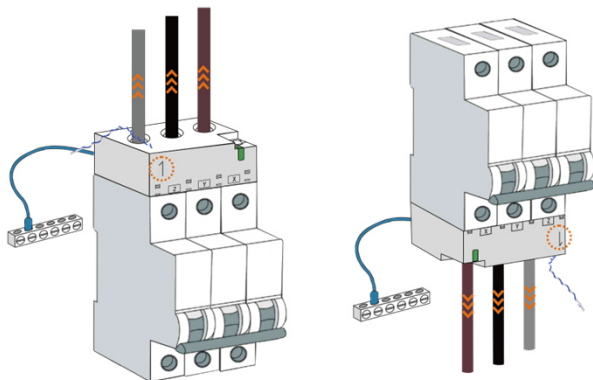
**Downstream Installation
(SPM01-D1M1)**



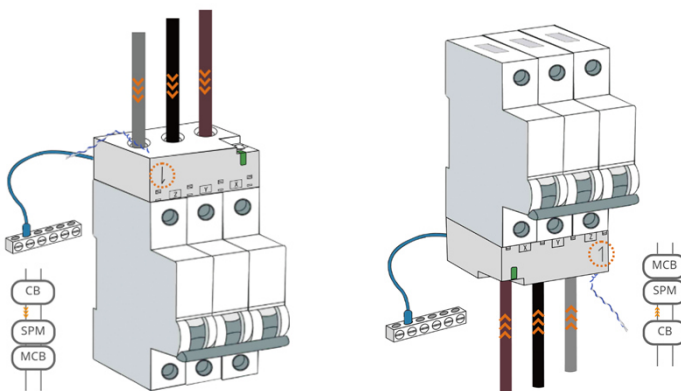
**Upstream Installation
(SPM01-U1M1)**



**Downstream Installation
(SPM02-D1M1)**



**Upstream Installation
(SPM02-U1M1)**



Remark/备注:

1. The energy flowing  in the same direction as the energy flow arrow printed on the sensor housing  is counted as forward energy. / 同传感器外壳上箭头一致方向的电能流动，被计为正向电能。
2. The manufacturer has only verified the compatibility of the SPM01 MCBM with Siemens 5SY/5SL/5SN series. For compatibility with other circuit breaker brands, please contact us directly. / 制造商仅验证了 SPM01 MCBM 与 西门子 5SY/5SL/5SN 系列断路器的兼容性。如需确认与其他品牌断路器的兼容性，请直接与我们联系。

Modbus Register List - 1 / Modbus寄存器地址表 (1)

1. Default Communication Parameters / 默认通讯参数

- **Baud Rate (波特率):** 9600 bps
- **Data Format (数据格式):** 8 Data bits, None Parity, 1 Stop bit (N, 8, 1)
- **Default Address (默认地址):** 247
- **Byte Order (字节序):** FLOAT32 follows Big-Endian (ABCD)
- **Supported Function Codes (支持功能码):** 0x03 (Read Holding), 0x04 (Read Input), 0x06 (Write Single), 0x10 (Write Multiple)

2. Basic Metering Data / 基本监测数据

Note: All Float32 values occupy 2 Modbus Registers (4 Bytes) / 所有 Float32 数据占用 2 个寄存器 (4 字节)。

DEC	HEX	Description / 描述	Func	R/W	Type	Range	Unit	SPM01R	SPM02R
1000	03E8	Voltage A-N / A相电压	03, 04	R	FLOAT32	0 - 1000	V	√	√
1002	03EA	Voltage B-N / B相电压	03, 04	R	FLOAT32	0 - 1000	V		√
1004	03EC	Voltage C-N / C相电压	03, 04	R	FLOAT32	0 - 1000	V		√
1006	03EE	Current A / A相电流	03, 04	R	FLOAT32	0 - 1000	A	√	√
1008	03F0	Current B / B相电流	03, 04	R	FLOAT32	0 - 1000	A		√
1010	03F2	Current C / C相电流	03, 04	R	FLOAT32	0 - 1000	A		√
1012	03F4	Active Power A / A相有功功率	03, 04	R	FLOAT32	-1000 - 1000	kW	√	√
1014	03F6	Active Power B / B相有功功率	03, 04	R	FLOAT32	-1000 - 1000	kW		√
1016	03F8	Active Power C / C相有功功率	03, 04	R	FLOAT32	-1000 - 1000	kW		√
1018	03FA	Reactive Power A / A相无功功率	03, 04	R	FLOAT32	-1000 - 1000	kVAR		√
1020	03FC	Reactive Power B / B相无功功率	03, 04	R	FLOAT32	-1000 - 1000	kVAR		√
1022	03FE	Reactive Power C / C相无功功率	03, 04	R	FLOAT32	-1000 - 1000	kVAR		√
1024	0400	Apparent Power A / A相视在功率	03, 04	R	FLOAT32	-1000 - 1000	kVA	√	√
1026	0402	Apparent Power B / B相视在功率	03, 04	R	FLOAT32	-1000 - 1000	kVA		√
1028	0404	Apparent Power C / C相视在功率	03, 04	R	FLOAT32	-1000 - 1000	kVA		√
1030	0406	Power Factor A / A相功率因数	03, 04	R	FLOAT32	-1.0 - 1.0	-	√	√
1032	0408	Power Factor B / B相功率因数	03, 04	R	FLOAT32	-1.0 - 1.0	-		√
1034	040A	Power Factor C / C相功率因数	03, 04	R	FLOAT32	-1.0 - 1.0	-		√
1036	040C	Avg Voltage L-N / 平均相电压	03, 04	R	FLOAT32	0 - 1000	V		√
1038	040E	Avg Line Current / 平均线电流	03, 04	R	FLOAT32	0 - 1000	A		√
1040	0410	Unbalance Currents / 电流不平衡度	03, 04	R	FLOAT32	-300 - 300	%		√
1042	0412	Total Line Currents / 总线电流	03, 04	R	FLOAT32	0 - 3000	A		√
1044	0414	Total Active Power / 总有功功率	03, 04	R	FLOAT32	-3000 - 3000	kW		√
1046	0416	Total Reactive Power / 总无功功率	03, 04	R	FLOAT32	-3000 - 3000	kVAR		√
1048	0418	Total Apparent Power / 总视在功率	03, 04	R	FLOAT32	-3000 - 3000	kVA		√
1050	041A	Total Power Factor / 总功率因数	03, 04	R	FLOAT32	-1.0 - 1.0	-		√
1052	041C	Frequency / 频率	03, 04	R	FLOAT32	0 - 1000	Hz	√	√
1054	041E	Total Import Active Energy / 总正向有功电能	03, 04	R	FLOAT32	±1,999,999,999	kWh	√	√
1056	0420	Total Export Active Energy / 总反向有功电能	03, 04	R	FLOAT32	±1,999,999,999	kWh	√	√
1058	0422	Total Import & Export Active Energy / 绝对有功总电能	03, 04	R	FLOAT32	±1,999,999,999	kWh	√	√
1060	0424	Phase A Import Active Energy / A相正向有功电能	03, 04	R	FLOAT32	±1,999,999,999	kWh		√
1062	0426	Phase A Export Active Energy / A相正向有功电能	03, 04	R	FLOAT32	±1,999,999,999	kWh		√
1064	0428	Phase A Import & Export Active Energy / A相绝对有功电能	03, 04	R	FLOAT32	±1,999,999,999	kWh		√
1066	042A	Phase B Import Active Energy / B相正向有功电能	03, 04	R	FLOAT32	±1,999,999,999	kWh		√
1068	042C	Phase B Export Active Energy / B相反向有功电能	03, 04	R	FLOAT32	±1,999,999,999	kWh		√
1070	042E	Phase B Import & Export Active Energy / B相绝对有功电能	03, 04	R	FLOAT32	±1,999,999,999	kWh		√
1072	0430	Phase C Import Active Energy / C相正向有功电能	03, 04	R	FLOAT32	±1,999,999,999	kWh		√
1074	0432	Phase C Export Active Energy / C相反向有功电能	03, 04	R	FLOAT32	±1,999,999,999	kWh		√
1076	0434	Phase C Import & Export Active Energy / C相绝对有功电能	03, 04	R	FLOAT32	±1,999,999,999	kWh		√

3. Single Frame Data Set (SPM01R Only) / 单帧数据集 (仅限 SPM01R)

Note: This section allows reading all critical data in a single Modbus request to optimize bus bandwidth. / 备注：此连续地址段允许通过单条 Modbus 指令一次性读出所有关键数据，以优化总线带宽。

DEC	HEX	Description / 描述	Func	R/W	Type	Range	Unit	SPM01R	SPM02R
20000	4E20	Voltage A-N / A相电压	03, 04	R	FLOAT32	0 - 1000	V	√	
20002	4E22	Current A / A相电流	03, 04	R	FLOAT32	0 - 1000	A	√	
20004	4E24	Active power A / A相有功功率	03, 04	R	FLOAT32	-1000 - 1000	kW	√	
20006	4E26	Power factor A / A相功率因数	03, 04	R	FLOAT32	-1.0 - 1.0	-	√	
20008	4E28	Frequency / 频率	03, 04	R	FLOAT32	0 - 1000	Hz	√	
20010	4E2A	Import active energy / 正向有功电能	03, 04	R	FLOAT32	±1,999,999,999	kWh	√	
20012	4E2C	Export active energy / 反向有功电能	03, 04	R	FLOAT32	±1,999,999,999	kWh	√	
20014	4E2E	Total active energy / 绝对有功总电能	03, 04	R	FLOAT32	±1,999,999,999	kWh	√	
20016	4E30	Non-resettable Import energy / 不可复位正向电能	03, 04	R	FLOAT32	±1,999,999,999	kWh	√	
20018	4E32	Non-resettable Export energy / 不可复位反向电能	03, 04	R	FLOAT32	±1,999,999,999	kWh	√	
20020	4E34	Non-resettable Total energy / 不可复位总电能	03, 04	R	FLOAT32	±1,999,999,999	kWh	√	
20022	4E36	Apparent power A / A相视在功率	03, 04	R	FLOAT32	-1000 - 1000	kVA	√	

Modbus Register List - 2 / Modbus寄存器地址表 (2)

4. Product Identification / 产品标识

DEC	HEX	Description / 描述	Func	R/W	Type	Value / Range
100	0064	Meter Type / 仪表类型	03, 04	R	UTF8 (20)	"SPM01" or "SPM02"
110	006E	Manufacturer / 制造商	03, 04	R	UTF8 (20)	"Energy Sensor"
120	0078	Product ID / 产品ID	03, 04	R	UTF8 (10)	"SPM01X001" / "SPM02X001"
125	007D	Serial Number / 序列号	03, 04	R	UTF8 (10)	"SXYWWZZZZZ"
130	0082	HW Version / 硬件版本	03, 04	R	UTF8 (10)	"xxx.xx.xx"
135	0087	FW Version / 固件版本	03, 04	R	UTF8 (10)	"xxx.xx.xx"

5. Modbus Parameter Settings / Modbus 通讯参数设置

DEC	HEX	Description / 描述	Func	R/W	Type	Value Mapping / 设值映射
6000	1770	Modbus Address / 通讯地址	03, 04, 06, 10	R/W	UINT16	1 - 247 (Default: 247)
6001	1771	Baud Rate / 波特率	03, 04, 06, 10	R/W	UINT16	0=9600, 1=2400, 2=4800, 3=9600 (Default), 4=19200, 5=38400
6002	1772	Parity & Stop / 校验与停止位	03, 04, 06, 10	R/W	UINT16	0=N81 (Default), 1=E81, 2=O81, 3=N82

6. Control & Broadcast Commands / 控制与广播命令

DEC	HEX	Description / 描述	Func	R/W	Type	Write Value / 写入值
10000	2710	Device Locating / 寻呼设备 (LED频闪)	06	W	UINT16	写 0x5055 (20565) 触发
10001	2711	Reset Energy / 电能清零	06	W	UINT16	写 0x51AA (20906) 触发
30000	7530	Broadcast Address Assign / 广播分配地址	10	W	UINT16	0x55AA + [新地址 1-246]

Notes / 备注:

1. Device Locating via LED / 设备寻呼功能

When multiple meters are installed in a dense electrical panel, send 0x5055 to a specific device's Slave ID. The target meter's LED will blink rapidly for 15 seconds, allowing field engineers to visually identify the physical device corresponding to that IP/Slave ID. / 当配电箱中密集安装了多个传感器时，向特定设备的从机地址发送 0x5055。目标传感器的 LED 将快速闪烁 15 秒，使现场工程师能够直观地识别与该从机地址对应的物理设备。

2. How to use Broadcast Address Assignment / 如何使用广播地址分配

This feature allows quick commissioning without needing to wire devices one by one.

1. The Host PLC sends a broadcast write command (Slave ID = 0) to register 30000. 2. The payload must be 2 words (4 bytes): 0x55AA followed by the [New Address] (e.g., 0x0005). 3. Action: Only the meter that currently has its physical reset button pressed will accept this command and update its address. All other meters on the bus will ignore it. / 此功能允许快速调试，无需逐个接线。1. 主机 PLC 向寄存器 30000 发送广播写命令（从机地址 = 0）。2. 负载必须是 2 个字（4 字节）：0x55AA 后跟 [新地址]（例如 0x0005）。3. 动作：只有当前按下了物理复位按钮的传感器才会接受此命令并更新其地址。总线上的所有其他传感器都将忽略该命令。）