SDM120-M

Single-Phase Multi-function DIN Rail Meter

- Measures kWh, kVArh, kW, kVAr, KVA, PF, Hz, dmd, V, A, etc.
- Bi-directional measurement IMP & EXP
- Two pulse outputs
- RS485 Modbus RTU
- Din rail 18mm
- 45A direct connection
- Class C(Class 0.5) / Class B(Class 1)
- EN50470-3:2022

User Manual V1.0

Risk Reduction

Information for Your Own Safety

This manual does not contain all of the safety measures operating the equipment (module, device) for different conditions and requirements. However, it does contain information which you must know for your own safety and to avoid damages. These information are highlighted by a warning triangle indicating the degree of potential danger.

Warning

This means that failure to observe the instruction can result in death, serious injury or considerable material damage.

Caution

This means hazard of electric shock and failure to take the necessary safety precautions will result in death, serious injury or considerable material damage.

Qualified personnel

Operation of the equipment (module, device) described in this manual may only be performed by qualified personnel. Qualified personnel in this manual means person who are authorized to commission, start up, ground and label devices, systems and circuits according to safety and Regulatory standards.

Proper handling

The prerequisites for perfect, reliable operation of the product are proper transport, proper storage, installation and proper operation and maintenance. When operating electrical equipment, parts of this equipment automatically carry dangerous voltages. Improper handling can therefore result in serious injuries or material damage.

- ✧ Use only insulating tools.
- ✧ Do not connect while circuit is live (hot).
- ✧ Do not connect the meter to a 3 phase - 400VAC – network.
- ✧ Place the meter only in dry surroundings.
- ✧ Do not mount the meter in an explosive area or expose the meter to dust, mildew and insects.
- ✧ Make sure the wires are suitable for the maximum current of this meter.
- ✧ Make sure the AC wires are connected correctly before activating the current/voltage to the meter.
- ✧ Do not touch the meter connecting clamps directly with metal, blank wire and your bare hands as you may get electrical shock.
- ✧ Make sure the protection cover is placed after installation.
- ✧ Installation, maintenance and reparation should only be done by qualified personnel.
- ✧ Never break the seals and open the front cover as this might influence the function of the meter, and will cause no warranty.
- ✧ Do not drop, or allow strong physical impact on the meter as the high precisely components inside may be damaged.
- ✧ Designed to be mounted inside of switchboards or cabinet on DIN RAIL

- This device must have a suitable sized Circuit Breaker feeding the Multi Function Energy Meter so it does not exceed the maximum rated current.
- The supply wiring of this device shall be suitable sized cable to match the installed circuit breaker.
- A Disconnection Device (Circuit Breaker) should be installed close to the Multi Function Energy Meter.
- The Disconnection Device shall be marked as the Disconnection Device for the Multi Function Energy Meter

Disclaimer

We have checked the contents of this publication and every effort has been made to ensure that the descriptions are as accurate as possible.

However, deviations from the description cannot be completely ruled out, so that no liability can be accepted for any errors contained in the information given. The data in this manual is checked regularly and the necessary corrections are included in subsequent editions. We are grateful for any improvements that you suggest.

Application

The energy-meters SDM120-M is used to measure single-phase applications like residential, utility and Industrial. The unit measures and displays various important electrical parameters. It equipped with a white back-lighted LCD screen for prefect reading. As well as a RS485 communication port for remote reading and monitoring. Bi-directional energy measurement makes it a good choice for solar PV energy metering. The compact design and din rail installation provides an easy and economical solution for your metering demand.

PART 1 Specification

General Specifications

Voltage AC (Un)	230V
Voltage Range	85~276V AC
Base Current (Ib)	5A
Max. Current (Imax)	45A
Mini Current (Imin)	0.15A
Starting current	0.4% of Ib
Power consumption	<2W/10VA
Frequency	50/60Hz(±10%)
AC voltage withstand	4KV for 1 minute
Impulse voltage withstand	6KV-1.2uS waveform
Overcurrent withstand	30Imax for 0.01s
Pulse output rate	
-Pulse Output 2	1000imp/kWh (default)
-Pulse Output 1	1000/100/10/1 imp/Exp/kWh/kVArh (configurable)
Display	LCD with white backlit
Max. Reading	99999.9kWh

Accuracy

Voltage	0.5% of range maximum
Current	0.5% of nominal
Frequency	0.2% of mid-frequency
Power factor	1% of Unity
Active power	1% of range maximum
Reactive power	1% of range maximum
Apparent power	1% of range maximum
Active energy	Class C /B EN50470-3:2022
	Class 0.5/1 IEC62053-21
Reactive energy	Class 2 IEC62053-23

Environment

Operating temperature	-40℃ to + 70℃
Storage and transportation temperature	-40℃ to + 80℃
Reference temperature	23℃±2℃
Relative humidity	0 to 95%, non-condensing
Altitude	up to 2000m
Warm up time	3s
Installation category	CAT III
Mechanical Environment	M1
Electromagnetic environment	E2
Degree of pollution	2
Utilization category	UC2

Output

Pulse Output

The meter provides two pulse outputs. Both pulse outputs are passive type.

Pulse output 1 is configurable. The pulse output can be set to generate pulses to represent total / import/export kWh or kVArh.

The pulse constant can be set to generate 1 pulse per: 0.001(default) /0.01/0.1/1kWh/kVArh.

Pulse width: 200/100/60ms

Pulse output 2 is non-configurable. It is fixed to total kWh. The constant is 1000imp/kWh.

RS485 output for Modbus RTU

The meter provides a RS485 port for remote communication. Modbus RTU is the protocol applied. For Modbus RTU, the following RS485 communication parameters can be configured from the set-up menu.

Baud rate: 2400, 4800, 9600,19200,38400 bps. Default: 9600

Parity: NONE/EVEN/ODD

Stop bits: 1 or 2

Modbus Address: 1 to 247 (default 1)

Mechanics

Din rail dimensions	18x118x64 (WxHxD) DIN 43880
Mounting	DIN rail 35mm
Ingress protection	IP51 (indoor)
Material	Self-extinguishing UL94V-0

PART 2 Operation

Initialization Display

When it is powered on, the meter will initialize and do self-checking.

1		Full Screen It will last for 3 seconds.
2		Software version in kind prevail It will last for 3 seconds.
3		Total active energy(kWh)

Scroll Display by Button

There is a button on the front panel of the meter.

After initialization and self-checking program, the meter display the measured values. The default page is total kWh.If the user wants to check other information, he needs to press the scroll button on the front panel.

	Press the button, the LCD display will scroll the measurements.
	Keep pressing the button for 3 seconds, the meter will enter into Set-up mode.

1		Total active energy（kWh） Display format：0000.00→9999.99→10000.0→99999.9→0000.00
1-1		Import active energy（kWh） Display format：0000.00→9999.99→10000.0→99999.9→0000.00

1-2		Export active energy（kwh） Display format：0000.00→9999.99→10000.0→99999.9→0000.00
1-3		Total reactive energy（kVArh） Display format：0000.00→9999.99→10000.0→99999.9→0000.00
2		Voltage (V)
3		Current (A)
4		Active power (W)
5		Frequency (F)
6		Power factor (PF)
7		Modbus address (ID) Default: 001

8		Baud rate Default : 9600bps
9		Parity None/even/odd are optional Default: none
10		Stop bits 1/2 are optional Default: 1
11		Software version in kind prevail

Set-up Mode

To get into Set-up Mode, the user need keep pressing the button for 3 seconds, the meter will enter into the Set-up Mode.

The meter support to set three parameters : Address, Baud Rate, and Parity.

Notice: Under the “SET” mode, If there is no operation, the display will back to the default display.

Modbus Address setting

	Under this menu, long press the button  for 3 seconds enter to the set up mode.
	The rightmost digit will flash, press the button  to increase or decrease number, and then waiting for 4 seconds, the next digits will flash, press the button  again to increase number, and waiting for 4 seconds, repeat above options until all the digits are set
	After the setting of final digit, waiting for 4 seconds, the address information will be stored automatically and the display will returned to the setting mode.

Baud rate setting

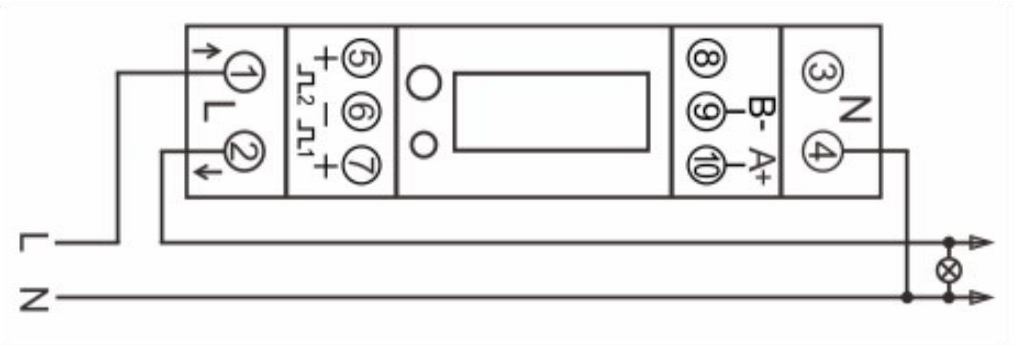
	Under this menu, long press the button  for 3 seconds enter to the set-up mode.
	The digits will flash, press the button  to choose baud rate options (from 1200 to 38400 bps), then waiting for 4 seconds
	the baud rate setting will be stored automatically after 4 seconds and the screen will return to the setting display.

Parity setting

	Under this menu, long press the button  for 3 seconds enter to the set-up mode.
	The digits will flash, press the button  to choose parity options (None/Even/Odd), then waiting for 4 seconds Notice: n=None, e=Even, o= Odd
	the parity setting will be stored automatically after 4 seconds and the screen will return to the setting display.

The user can program the meter parameters by sending correct command via RS485 port.
The protocol is Modbus RTU. For the details. Please look at the ***"Modbus resgiter Map"***.

Wiring Diagram

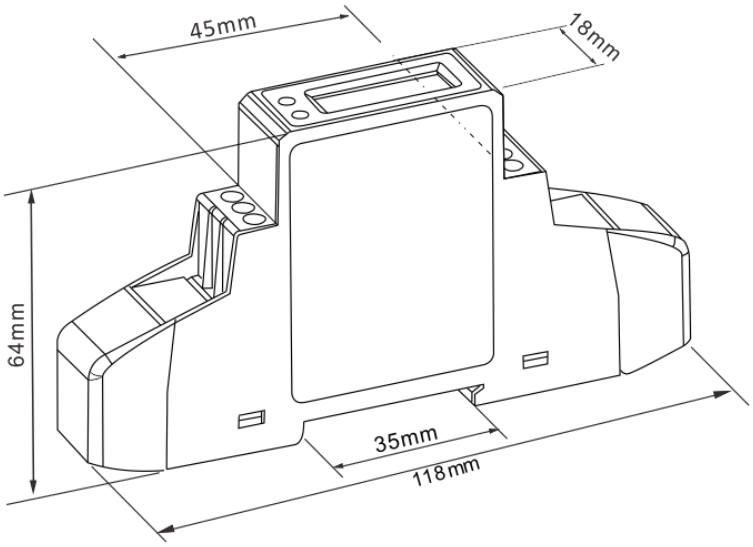


1 / 2: L-in/ L-out
3 / 4: N
5 / 6 / 7: Pulse Output 2 + / COM / Pulse Output 1 -
9 / 10： RS485 B-/ RS485 A+

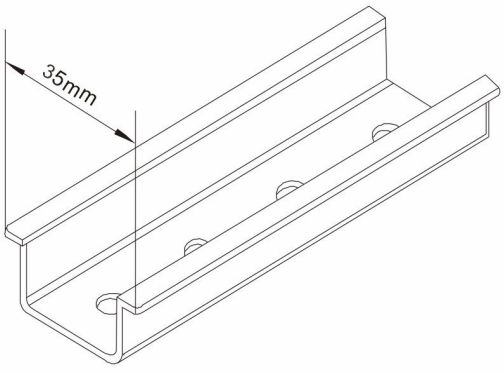
Wiring Guide

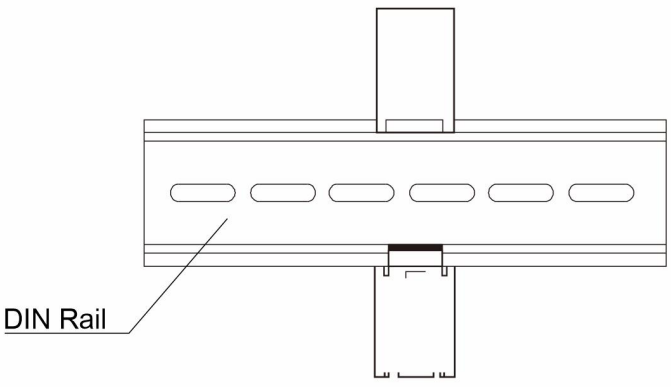
Terminal ①②③④	Measurement Connection	Screw Connection	Diameter 4.0mm*PH2 
	Strip Length	8-9mm	
	Screw	M4	
	Rigid/supple	2.5-10mm²	
	Tightening torque	1.5Nm	
	Model	PZ2	
Terminal ⑤⑥⑦⑨⑩	Measurement Connection	Screw Connection	Diameter 2.5mm*PH1 
	Strip Length	4.5-5mm	
	Screw	M2.5	
	Fixed/flexible(Wire Range)	0.5-1.5mm²(22~14 AWG)	
	Tightening torque	0.2Nm	
	Model	PZ0	

Dimensions



Installation





Modbus register Map

Function code	
04	to read input parameters

Address (Register)	Input Register Parameter			Modbus Protocol Start Address Hex	
	Parameters	Unit	Format	Hi byte	Low Byte
30001	Voltage	Volts	Float	00	00
30007	Current	Amps	Float	00	06
30013	Active power	Watts	Float	00	0C
30019	Apparent power	VA	Float	00	12
30025	Reactive power	VAr	Float	00	18
30031	Power factor	None	Float	00	1E
30071	Frequency	Hz	Float	00	46
30073	Import active energy	kWh	Float	00	48
30075	Export active energy	kWh	Float	00	4A
30077	Import reactive energy	kVArh	Float	00	4C
30079	Export reactive energy	kVArh	Float	00	4E
30081	VAh	kVAh	Float	00	50
30083	Ah	Ah	Float	00	52
30085	Total system power demand	W	Float	00	54
30087	Maximum total system power demand	W	Float	00	56
30089	Import system power demand	W	Float	00	58
30091	Maximum Import system power demand	W	Float	00	5A
30093	Export system power demand	W	Float	00	5C
30095	Maximum Export system power demand	W	Float	00	5E
30259	current demand.	Amps	Float	01	02
30265	Maximum current demand.	Amps	Float	01	08
30343	Total active energy	kWh	Float	01	56
30345	Total reactive energy	kVArh	Float	01	58
320131	CO2	Kg	Float	4E	A2
310001	Total import active energy	Wh	Int64	27	10
310005	Total export active energy	Wh	Int64	27	14
310009	Total import reactive energy	VArh	Int64	27	18
310013	Total export reactive energy	VArh	Int64	27	1C
310017	Total apparent energy	VAh	Int64	27	20
310021	Total active Energy	Wh	Int64	27	24
310025	Total reactive Energy	VArh	Int64	27	28

310251	Phase 1 line to neutral volts	0.1V	Int32	28	0A
310257	Phase 1 current	0.001A	Int32	28	10
310263	Phase 1 active power	0.1W	Int32	28	16
310269	Phase 1 apparent power	0.1VA	Int32	28	1C
310275	Phase 1 reactive power	0.1VAr	Int32	28	22
310281	Phase 1 power factor	0.01	Int32	28	28
310309	Frequency	0.01Hz	Int32	28	44
310311	CO2	0.001Kg	Int64	28	46

Function code	
10	to set holding parameter
03	to read holding parameter

Address Register	**Holding Register Parameter**		**Modbus Protocol Start Address Hex**		**Description**
	Parameters	Format	Hi byte	Low byte	
40003	Demand Period	Float	00	02	Write demand period Range from: 0~60 minutes, default 60. Setting the period to 0 will cause the demand to show the current parameter value, and demand max to show the maximum parameter value since last demand reset. **Length : 4 byte** **Data Format : Float**
40013	Pulse 1 Width	Float	00	0C	Write Pulse 1 Width in milliseconds: 60, 100 or 200, default 60ms. **Length : 4 byte** **Data Format : Float**
40019	Network Parity Stop	Float	00	12	Write the network port parity/stop bits for Modbus Protocol.where: 0 = One stop bit and none parity, 1 = One stop bit and even parity. (default) 2 = One stop bit and odd parity. 3 = Two stop bits and none parity. Requires a restart to become effective. **Length : 4 byte** **Data Format : Float**

40021	Meter ID	Float	00	14	Ranges from:1 to 247, Default ID is 1. **Length : 4 byte** **Data Format : Float**
40023	Pulse 1 Rate	Float	00	16	Write pulse rate index: N = 0 to 6 0-- 0.001 kwh/imp 1--0.01kwh/imp 2--0.1kwh/imp 3--1kwh/imp **Length : 4 byte** **Data Format : Float**
40029	Baud rate	Float	00	1C	Write baud rate for Modbus Protocol, where: 0 = 2400 baud 1 = 4800 baud 2 = 9600 baud (default) 3=19200 baud 4=38400 baud **Length : 4 byte** **Data Format : Float**
40059	Time of scroll display	Float	00	3A	Time of scroll display Default 0:does not display in turns， units:s Range from 0~255, **Length : 4 byte** **Data Format : Float**
40071	CO_2 RATE	hex	00	46	Carbon emissions per kWh of electricity 00.0000~60.0000 kg Example:0x01 = 0.0001 Default:0.5703(0X00001647) **Length : 4 byte** **Data Format : hex**
40087	Pulse 1 output mode	Float	00	56	Write Modbus Protocol input parameter for pulse out 1: 0001: Import active energy, 0002: Total active energy (Imp + exp) 0004: Export active energy (default). 0005: Import reactive energy 0006:Total reactive energy (Imp+ exp) 0008: Export reactive energy **Length : 4 byte** **Data Format : Float**

461457	Reset historical data	Hex	F0	10	00 00: reset demand info **Length : 2 byte** **Data Format : Hex**
463745	Time of scroll display	BCD	F9	00	Time of scroll display Default 0:does not display in turns Range from:0-30s **Length : 2 byte** **Data Format : BCD**
463761	Pulse 1 output	Hex	F9	10	0000:0.001kWh/imp(default) 0001:0.01kWh/imp 0002:0.1kWh/imp 0003:1kWh/imp **Length : 2 byte** **Data Format : HEX**
463777	Measurement mode	Hex	F9	20	Measurement mode 0001:mode 1 (total = import) 0002:mode 2 (total = import + export）(default) 0003:mode 3 (total = import - export) **Length : 2 byte** **Data Format : HEX**
464513	Serial number	Unsigned int32	FC	00	Serial Number **Length : 4 byte** **Data Format: Unsigned int32**
464515	Meter code	Hex	FC	02	Meter code = 00 20 **Length: 2 bytes** **Data Format: Hex** Note: read only
464645	Software version	Hex	FC	84	Software version:XX.YY First byte=XX,Second byte=YY **Length : 2 byte** **Data Format : Hex** Note: read only

If you have any question, please feel free to contact our sales team.

Zhejiang Eastron Electronic Co., Ltd.
No. 52, Dongjin Road, Nanhu, Jiaxing, Zhejiang, China
Tel: +86-573-83698881 Fax: +86-573-83698883
Email: sales@eastrongroup.com
www.eastrongroup.com