



SDM72DM -multi-function version

Three Phase Four Wire Energy Meter



- Multi-parameter measurement
- Resettable partial energy
- Bi-directional measurement IMP & EXP
- Pulse Output
- RS485 Modbus
- Din rail mounting 35mm
- Direct connection, up to 80A
- Better than Class 1/ B accuracy

User Manual V1.1

2021

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Introduction

The SDM72D-M is digital three phase 4 wire energy meter with a white back-lighted LCD screen for perfect reading. The unit measures and displays voltage, current, frequency, power factor, active power, reactive power, active energy and reactive energy. A resettable partial energy is provided, so the user can easily check the active energy imported and active energy exported during a certain period. SDM72D-M supports max.100A direct connection, saves the cost and avoid the trouble to connect external CTs, giving the unit a cost-effective and east operation. Built-in interfaces provide pulse and RS485 Modbus RTU outputs. Configuration is password protected.

PART 1 Specification

General Specifications

| | |
|---------------------------|--|
| Voltage AC (Un) | 3x230(400)V |
| Voltage Range | 80~120% Un |
| Base Current (Ib) | 10A AC |
| Max. Current (Imax) | 100A AC |
| Mini Current (Imin) | 5% of Ib AC |
| Starting current | 0.4% of Ib |
| Power consumption | ≤ 2W/10VA for the voltage measuring circuit ≤ 4VA for the current measuring circuit |
| Frequency | 50/60Hz (±10%) |
| AC voltage withstand | 4KV for 1 minute |
| Impulse voltage withstand | 6KV-1.2uS waveform |
| Overcurrent withstand | 30 Imax for 0.01s |
| Power supply | self-power supply |
| Display | LCD with backlit |
| Max. Reading | 999999.9kWh |
| Active energy | Class 1 IEC62053-21 Class B EN50470-3 |
| Reactive energy | Class 2 IEC62053-23 |

Unit Characteristics

| Characteristics: | Accuracy: | Resolution: |
|---------------------------------------|-----------|-------------|
| ● Voltage | 0.5% | ≤ 0.1V |
| ● Current | 0.5% | ≤ 0.1A |
| ● Frequency | 0.2% | ≤ 0.2% |
| ● Power factor | 1% | ≤ 0.1 |
| ● Active power | 1% | ≤ 0.1kW |
| ● Reactive Power | 1% | ≤ 0.1 kVAr |
| ● Active energy imported and exported | 1% | ≤ 0.1kWh |
| ● Reactive energy | 2% | ≤ 0.1 kVArh |

RS485 Serial – Modbus RTU

This unit uses an RS485 serial port with Modbus RTU protocol to provide a means of remotely monitoring and controlling the Unit

Set-up screens are provided for setting up the RS485 port.

Pulse output

The unit provides pulse output for active kWh. The Pulse output is passive type.

Pulse constant:

1000imp/kWh

100imp/kWh

10imp/kWh

1 imp/kWh

Pulse width: 60, 100, 200mS

Note: when the pulse constant is set to 1000imp/kWh, the pulse width should be 35ms and cannot be adjusted.

Pulse output type can be set to : total kWh, import kWh, export kWh.

RS485 Output for Modbus RTU

For Modbus RTU, the following RS485 communication parameters can be configured from the Set-up menu:

Baud rate 1200,2400, 4800, 9600, 19200 bps

Parity none (default)/odd/even

Stop bits 1 or 2

RS485 network address *nnn* – 3-digit number, 001 to 247

Modbus™ Word order Hi/Lo byte order is set automatically to normal or reverse. It cannot be configured from set up menu.

Environment

| | |
|--|--------------------------|
| Operating temperature | -25°C to +55°C |
| Storage and transportation temperature | -40°C to +70°C |
| Reference temperature | 23°C ± 2°C |
| Relative humidity | 0 to 95%, non-condensing |
| Altitude | up to 3000m |
| Warm up time | 10s |
| Installation category | CAT III |
| Mechanical Environment | M1 |
| Electromagnetic environment | E2 |
| Degree of pollution | 2 |

Mechanics

| | |
|--|-----------------------------|
| Din rail dimensions | 72x100x66 (WxHxD) DIN 43880 |
| Mounting | DIN rail 35mm |
| Protection against penetration of dust and water | IP51 (indoor) |
| Material | self-extinguishing UL94V-0 |
| Wiring | |

PART 2 Operation



Initialization Display

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


| | |
|--|--|
| | <p>Full Screen</p> |
| | <p>Software Version</p> |
| | <p>Pulse constant</p> |
| | <p>Total active energy(kWh) Total=Import+ Export 5+2 -> 6+1 Max read: 999999.9 kWh</p> |





Buttons function

There are two buttons on the front panel.

| | |
|---|--|
|  | >Scroll the display for data checking. >Changing option at Set-up mode >Exit the Set-up mode |
|  | >Set-up mode entry >Confirmation |



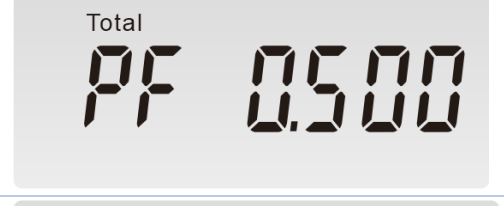
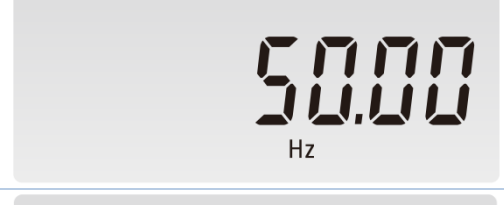
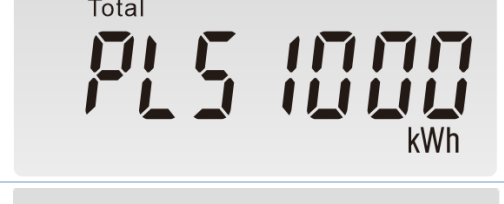



Scroll display

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, please press the scroll button  on the front panel.

| | |
|---|--|
|  | Total active energy(kWh) Total=Import+ Export |
|  | Resettable partial kWh |
|  | import energy |
|  | export energy |


| | |
|---|------------------------------|
| <p>Total</p> <p>00028.67</p> <p>kVArh</p> | <p>Total reactive energy</p> |
| <p>L1</p> <p>230.0</p> <p>V</p> | <p>Voltage L1-N</p> |
| <p>L2</p> <p>230.1</p> <p>V</p> | <p>Voltage L2-N</p> |
| <p>L3</p> <p>230.2</p> <p>V</p> | <p>Voltage L3-N</p> |
| <p>L1</p> <p>60.023</p> <p>A</p> | <p>L1 current</p> |
| <p>L2</p> <p>60.023</p> <p>A</p> | <p>L2 current</p> |
| <p>L3</p> <p>60.023</p> <p>A</p> | <p>L3 current</p> |
| <p>L1</p> <p>3.670</p> <p>kW</p> | <p>L1 active power</p> |










| | |
|---------------------------------------|-----------------------------|
| <p>L2</p> <p>3.6 7.0</p> <p>kW</p> | <p>L2 active power</p> |
| <p>L3</p> <p>3.6 7.0</p> <p>kW</p> | <p>L3 active power</p> |
| <p>Total</p> <p>3.6 7.0</p> <p>kW</p> | <p>Total active power</p> |
| <p>L1</p> <p>3.6.8</p> <p>kVAr</p> | <p>L1 reactive power</p> |
| <p>L2</p> <p>3.6.8</p> <p>kVAr</p> | <p>L2 reactive power</p> |
| <p>L3</p> <p>3.6.8</p> <p>kVAr</p> | <p>L3 reactive power</p> |
| <p>Total</p> <p>6.2.8</p> <p>kVAr</p> | <p>Total reactive power</p> |
| <p>L1</p> <p>PF 0.500</p> | <p>L1 Power factor</p> |

| | |
|---|--|
|  <p>PF 0.500 L2</p> | <p>L2 power factor</p> |
|  <p>PF 0.500 L3</p> | <p>L3 power factor</p> |
|  <p>Total PF 0.500</p> | <p>Total Power factor</p> |
|  <p>50.00 Hz</p> | <p>Frequency</p> |
|  <p>Total PLS 1000 kWh</p> | <p>Pulse output type: Default: kWh Pulse constant: 1000imp</p> |
|  <p>C 1000</p> | <p>Pulse constant</p> |
|  <p>Add 001</p> | <p>Modbus Address</p> |
|  <p>bd 9600</p> | <p>Baud Rate</p> |

| | |
|---|------------------|
|  | Parity |
|  | Software version |

Set-up Mode

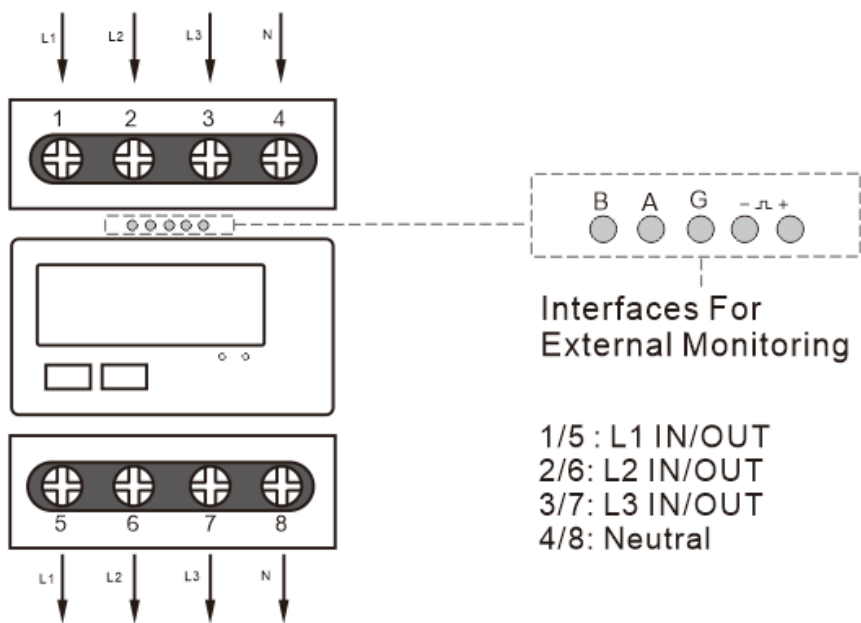
To get into Set-up Mode, the user need press the “Enter” button  for 3 seconds.

| Setting interface | Setting statu | Option: |
|---|--|--|
|  | | Password Default: 1000 |
|  |  | Modbus address Rane: 001~247 default: 001 |
|  |  | Buad rate Option: 1200, 2400, 4800, 9600, 19200 bps default: 9600 bps |
|  |  | Parity: Option: NONE, EVEN, ODD default: NONE |
|  |  | Stop bit Option: 1, 2 default: 1 |

| | | |
|--|--|---|
| | | Pulse output type Option: Total kWh, Imp kWh, Exp kWh Default: Total kWh |
| | | Pulse constant: Option: 1000, 100, 10, 1 imp/kWh The default pulse output is related to the CT1 value. |
| | | Pulse width Option: 60, 100, 200, unit:ms Note: If pulse constant is 1000imp/kWh, pulse width will be fixed at 35ms. |
| | | Automatic Scroll display set Range: 0~60, unit: second default: 0, means do not scroll |
| | | Backlit time setting Option: on,5,10,20,30,60,120,off unit: minute default: 60 minute |
| | | System: Option: 3P4W,1P2W, default: 3P4W. |
| | | Password: default: 1000 |
| | | Resettable partial energy |

Keep pressing button to exit the set-up mold.

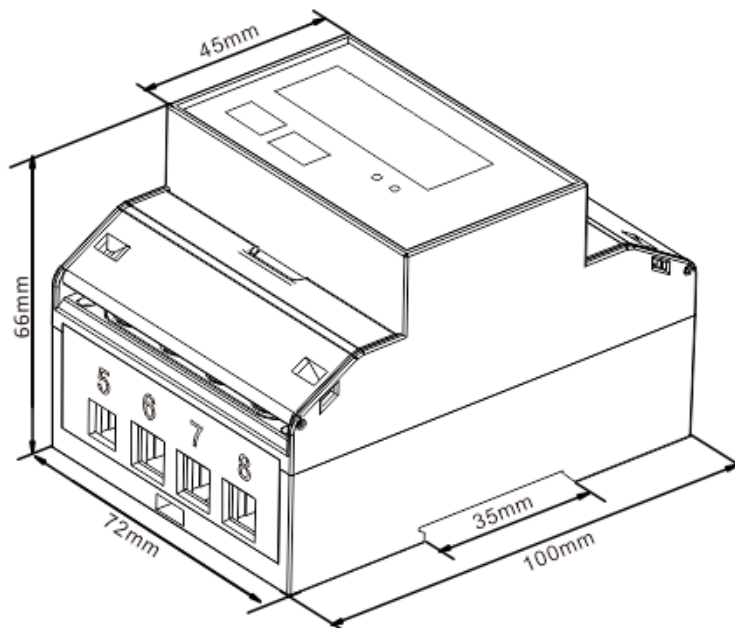
Wiring diagram



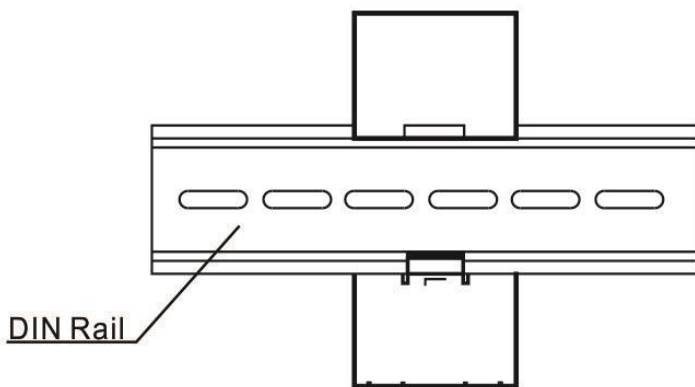
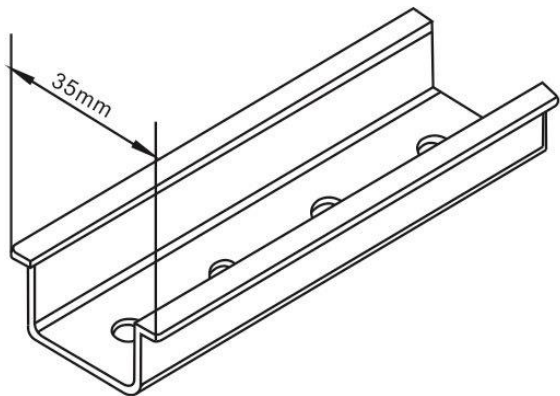
NOTE:

Maximum Wire Size for Mainload: 25mm²

Dimensions



Installation



PART 3 Modbus Protocol

Input Registers

Input registers are used to indicate the present values of the measured and calculated electrical quantities. Each parameter is held in two consecutive 16 bit registers. The following table details the 3X register address, and the values of the address bytes within the message. A (*) in the column indicated the parameter is valid for the particular wiring system, Any parameter with a cross (X) will return the value zero. Each parameter is held in the 3X registers. Modbus Protocol function code **04** is used to access all parameters.

For example, to request: Amps 1 Start address = 0006
 No. of registers = 0002
 Amps 2 Start address = 0008
 No. Of register = 0002

Each request for data must be restricted to 30 parameters or less. Exceeding the 30 parameter limit will cause a Modbus Protocol exception code to be returned.

| Address (Register) | Input Register Parameter | | | | Modbus Protocol Start Address Hex | |
|-----------------------|--------------------------------|----------------|-------------|-----------------|-----------------------------------|---------|
| | Description | Length (bytes) | Data Format | Units | Hi Byte | Lo Byte |
| 30001 | Phase 1 line to neutral volts. | 4 | Float | V | 00 | 00 |
| 30003 | Phase 2 line to neutral volts. | 4 | Float | V | 00 | 02 |
| 30005 | Phase 3 line to neutral volts. | 4 | Float | V | 00 | 04 |
| 30007 | Phase 1 current. | 4 | Float | A | 00 | 06 |
| 30009 | Phase 2 current. | 4 | Float | A | 00 | 08 |
| 30011 | Phase 3 current. | 4 | Float | A | 00 | 0A |
| 30013 | Phase 1 active power. | 4 | Float | W | 00 | 0C |
| 30015 | Phase 2 active power. | 4 | Float | W | 00 | 0E |
| 30017 | Phase 3 active power. | 4 | Float | W | 00 | 10 |
| 30019 | Phase 1 apparent power. | 4 | Float | VA | 00 | 12 |
| 30021 | Phase 2 apparent power. | 4 | Float | VA | 00 | 14 |
| 30023 | Phase 3 apparent power. | 4 | Float | VA | 00 | 16 |
| 30025 | Phase 1 reactive power. | 4 | Float | VA _r | 00 | 18 |
| 30027 | Phase 2 reactive power. | 4 | Float | VA _r | 00 | 1A |
| 30029 | Phase 3 reactive power. | 4 | Float | VA _r | 00 | 1C |

| | | | | | | |
|-------|---------------------------------|---|-------|------|----|----|
| 30031 | Phase 1 power factor (1). | 4 | Float | None | 00 | 1E |
| 30033 | Phase 2 power factor (1). | 4 | Float | None | 00 | 20 |
| 30035 | Phase 3 power factor (1). | 4 | Float | None | 00 | 22 |
| 30043 | Average line to neutral volts. | 4 | Float | V | 00 | 2A |
| 30047 | Average line current. | 4 | Float | A | 00 | 2E |
| 30049 | Sum of line currents. | 4 | Float | A | 00 | 30 |
| 30053 | Total system power. | 4 | Float | W | 00 | 34 |
| 30057 | Total system volt amps. | 4 | Float | VA | 00 | 38 |
| 30061 | Total system VAR. | 4 | Float | VAR | 00 | 3C |
| 30063 | Total system power factor (1). | 4 | Float | None | 00 | 3E |
| 30071 | Frequency of supply voltages. | 4 | Float | Hz | 00 | 46 |
| 30073 | Import active energy | 4 | Float | kWh | 00 | 48 |
| 30075 | Export active energy | 4 | Float | kWh | 00 | 4A |
| 30201 | Line 1 to Line 2 volts. | 4 | Float | V | 00 | C8 |
| 30203 | Line 2 to Line 3 volts. | 4 | Float | V | 00 | CA |
| 30205 | Line 3 to Line 1 volts. | 4 | Float | V | 00 | CC |
| 30207 | Average line to line volts. | 4 | Float | V | 00 | CE |
| 30225 | Neutral current. | 4 | Float | A | 00 | E0 |
| 30343 | Total active Energy (2) | 4 | Float | kWh | 01 | 56 |
| 30345 | Total reactive energy | 4 | Float | kVAh | 01 | 58 |
| 30385 | resettable total active energy | 4 | Float | kWh | 01 | 80 |
| 30389 | resettable import active energy | 4 | Float | kWh | 01 | 84 |
| 30391 | resettable export active energy | 4 | Float | kWh | 01 | 86 |
| 30397 | Net kWh (Import - Export) | 4 | Float | kWh | 01 | 8C |
| 31281 | Total import active power | 4 | Float | W | 05 | 00 |
| 31283 | Total export active power | 4 | Float | W | 05 | 02 |

Instruction:

(1) : The power factor has its sign adjusted to indicate the direction of the current. Positive refers to forward current, negative refers to reverse current.

(2) : Total active energy equals to import + export.

Holding Registers

Holding register are used to store and display instrument configuration settings. All holding registers not listed in the table below should be considered as reserved for manufacturer use and no attempt should be made to modify their values.

The holding register parameters may be viewed or changed using the Modbus Protocol. Each parameter is held in two consecutive 4X registers. Modbus Protocol Function Code **03** is used to read the parameter and Function

code 10 is used to write. Write only to one parameter per message.

| Address Register | Parameter | Modbus Protocol | | Valid range | Mode |
|------------------|--|-------------------|-----------|--|------|
| | | Start Address Hex | | | |
| | | High Byte | High Byte | | |
| 40011 | System Type | 00 | 0A | Write system type: 1 = 1P2W; 3 = 3P4W,(default); Length : 4 byte Data Format : Float (KPPA is asked) | r/w |
| 40013 | Pulse width | 00 | 0C | Range: 60, 100, 200, unit: ms, default 100. Note: If pulse output =1000imp/kWh, then pulse width is fixed at 35ms, and cannot be adjusted. Length : 4 byte Data Format : Float | r/w |
| 40015 | Key Parameter Programming Authorization (KPPA) | 00 | 0E | Read: to get the status of the KPPA 0 = not authorized; 1 = authorized Write the correct password to get KPPA, enable to program key parameters. Length : 4 byte Data Format : Float | r/w |
| 40019 | Parity and stop bit | 00 | 12 | Write the network port parity/stop bits for MODBUS Protocol, where: 0 = One stop bit and no parity, default. 1 = One stop bit and even parity. 2 = One stop bit and odd parity. 3 = Two stop bits and no parity. Length : 4 byte Data Format : Float | r/w |
| 40021 | Modbus address | 00 | 14 | Write the network port node Address: 1 to 247 for MODBUS Protocol, default 1. Length : 4 byte Data Format : Float | r/w |
| 40023 | Pulse constant | 00 | 16 | Option: 0~3, 默认0 0 : 1000 imp/kWh 1 : 100 imp/kWh 2: 10 imp/kWh 3 : 1 imp/kWh Note: If pulse output =1000imp/kWh, then pulse width is fixed at 35ms, and cannot be adjusted. Length : 4 byte Data Format : Float | r/w |
| 40025 | Password | 00 | 18 | Read: to get the password of the meter Write: to program the new password of the meter Default 1000 | r/w |

| | | | | | |
|--------|-------------------------------|----|----|--|-----|
| | | | | <p>Length : 4 byte Data Format : Float</p> | |
| 40029 | Network Baud Rate | 00 | 1C | <p>Write the network port baud rate for MODBUS Protocol, where: 0 = 2400 baud. 1 = 4800 baud. 2 = 9600 baud, default. 3 = 19200 baud 5 = 1200 band</p> <p>Length : 4 byte Data Format : Float</p> | r/w |
| 40059 | Automatic Scroll Display Time | 00 | 3A | <p>Default 0, second Range 0~60</p> <p>Length : 4 byte Data Format : Float</p> | r/w |
| 40061 | Backlit time | 00 | 3C | <p>Default 60, min Range 0~121, 0 means backlit always on , 121 means backlit always off</p> <p>Length : 4byte Data Format : Float</p> | r/w |
| 40087 | Pulse 1 Energy Type | 00 | 56 | <p>Pulse 1 Energy Type: 1: import active energy 2: total active energy 4: export active energy, (default)</p> <p>Length : 4 byte Data Format : Float</p> | r/w |
| 461457 | Reset historical data | F0 | 10 | <p>00 03 = reset energy info</p> <p>Length : 2 byte Data Format: Hex</p> | wo |
| 464513 | Serial number | FC | 00 | <p>Serial number</p> <p>Length : 4 byte Data Format : unsigned int32</p> <p>Note: Only read</p> | ro |
| 464515 | Meter code | FC | 02 | <p>Meter code SDM72D-M = 00 89</p> <p>Length : 2 byte Data Format : Hex</p> <p>Note: Only read</p> | ro |