SDM630M-DI

DIN Rail Smart Meter for Single and Three Phase Electrical Systems

- Measures kWh Kvarh, KW, Kvar, KVA, P, F, PF, Hz, dmd, V, A, etc.
- Bi-directional measurement IMP & EXP
- RS485 Modbus
- DI Inputs
- Din rail mounting 35mm
- Better than Class 1 / B accuracy

User Manual V1.0

Introduction

The SDM630M-DI measures and displays the characteristics of single phase two wire (1p2w), single phase three wire (1p3w), three phase three wire (3p3w,) and three phase four wire(3p4w) supplies, including voltage, frequency, current, power ,active and reactive energy, imported or exported. Energy is measured in terms of kWh, kVArh. Maximum demand current can be measured over preset periods of up to 60 minutes. In order to measure energy, the unit requires voltage and current inputs in addition to the supply required to power the product.

SDM630M-DI supports Max. 100A direct connection, saves the cost and avoid the trouble to connect external CTs, giving the unit a cost-effective and easy operation. Built-in interfaces provides DI inputs and RS485 Modbus outputs. Configuration is password protected.

Warning

- During normal operation, voltages hazardous to life may be present at some of the terminals of this unit. Installation and servicing should be performed only by qualified, properly trained personnel abiding by local regulations. Ensure all supplies are de-energized before attempting connection or other procedures.
- Terminals should not be user accessible after installation and external installation provisions must be sufficient to prevent hazards under fault conditions.
- This unit is not intended to function as part of a system providing the sole means of fault protection - good engineering practice dictates that any critical function be protected by at least two independent and diverse means.
- If this equipment is used in a manner not specified by the manufacturer, protection provided by the equipment may be impaired.

Avertissement

- En fonctionnement normal, des tensions mortelles peuvent être présentes sur certaines des bornes de cet appareil. L'installation et la maintenance ne doivent être effectuées que par du personnel qualifié et dûment formé, conformément à la réglementation en vigueur. Assurez-vous que toutes les arrivées sont hors tension avant toute tentative de connexion ou autre manipulation.
- Après l'installation, les équipements ne doivent pas être accessibles à l'utilisateur et les dispositions de protection d'installation externe doivent être suffisantes pour prévenir les risques en cas de défaillance.
- Cet appareil n'est pas conçu pour faire partie d'un système offrant l'unique moyen de protection contre les défaillances. Les bonnes pratiques d'ingénierie exigent que toute fonction critique soit protégée par au moins deux moyens divers et indépendants.
- Si cet équipement est utilisé d'une manière non spécifiée par le fabricant, la protection fournie par l'équipement peut être altérée.

The Unit can measure and display:
- Line voltage and THD% (total harmonic distortion) of all phases
- Line Frequency
- Currents, Current demands and current THD% of all phases
- Power, maximum power demand and power factor
- Active energy imported and exported
- Reactive energy imported and exported

The unit has password-protected set-up screens for:
- Changing password
- Supply system selection 1p2w, 3p3w,3p4w
- Demand Interval Time(DIT)
- Reset for demand measurements
- DI Flitering time setting

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.

Start-up Screens

| 1 | | The first screen lights up all display segments and can be used as a display check. |
| 2 | | The second screen indicates the firmware installed in the unit and its build number.
*The build number(1.302.2019) is for reference only. The actual SW number changes according to product requirements.
* a software code will follow after, which show as CX-XXXX |

3	INSt EESt PASS	The interface performs a self-test and indicates the result if the test passes.
4	Σ 0000 kWh 000.0	After a short delay, the screen will display active energy measurements.

Measurements

The buttons operate as follows:

1	U/I ESC	Selects the Voltage and Current display screens In Set-up Mode, this is the "Left" or "Back" button.
2	M ▲	Select the Frequency and Power factor display screens In Set-up Mode, this is the "Up" button
3	P ▼	Select the Power display screens In Set-up Mode, this is the "Down" button
4	E ▶ ↵	Select the Energy display screens In Set-up mode, this is the "Enter" or "Right" button

Voltage and Current

Each successive pressing of the [U/I ESC] button selects a new range:

1-1	L1 000.0 L2 000.0 V L3 000.0 DI ○○	Phase to neutral voltages(3p4w)

1-2	000.0 L1-2 / 000.0 L2-3 / 000.0 L3-1 V DI ○○	Phase to phase voltages
2	0.000 L1 / 0.000 L2 / 0.000 L3 A DI ○○	Current on each phase
3	00.00 L1 / 00.00 L2 / 00.00 L3 V %THD DI ○○	Phase to neutral voltage THD%(3p4w)
4	00.00 L1 / 00.00 L2 / 00.00 L3 I%THD DI ○○	Current THD% of each phase

Frequency and Power Factor and Demand

Each successive pressing of the [M ▲] button selects a new range:

1	Σ 50.00 Hz 1.000 PF DI ○○	Frequency and Power Factor (total)

2	L1 1.000 L2 1.000 L3 1.000 PF DI ○○	Power Factor of each phase
3	MD L1 0.000 L2 0.000 L3 0.000 A DI ○○	Maximum Current Demand of each phase
4	MD Σ 0.000 kW DI ○○	Maximum Power Demand

Power

Each successive pressing of the [P ▼] button select a new range:

1	L1 0.000 kW L2 0.000 L3 0.000 DI ○○	Instantaneous active power in kW
2	L1 0.000 L2 0.000 kVAr L3 0.000 DI ○○	Instantaneous reactive power in kVAr

3	L1 0.000 L2 0.000 L3 0.000 kVA DI ○○	Instantaneous Volt-amps in KVA
4	Σ 0.000 kW 0.000 kVAr 0.000 kVA DI ○○	Total kW, kVAr, kVA

Energy Measurements

Each successive pressing of the [E ▶←] button selects a new range:

1	Σ 0000 kWh 00.00 DI ○○	Total active energy in kWh
2	Σ 0000 00.00 kVArh DI ○○	Total reactive energy in kVArh
3	0000 kWh Imp 00.00 DI ○○	Import active energy in kWh

4	0000 kWh Exp 00.00 DI ○○	Export active energy in kWh
5	0000 Imp 00.00 kVArh DI ○○	Import reactive energy in kVArh
6	0000 Exp 00.00 kVArh DI ○○	Export reactive energy in kVArh
7	dI - 1 0000 0000 DI ○○	DI 1 Counting
8	dI - 2 0000 0000 DI ○○	DI 2 Counting

Set-up

To enter set-up mode, pressing the [E ▶ ↵] button for 3 seconds, until the password screen appears.

Setting up is password-protected so you must enter the correct password (default '1000') before processing. If an incorrect password is entered, the display will show: PASS Err

PASS

Err
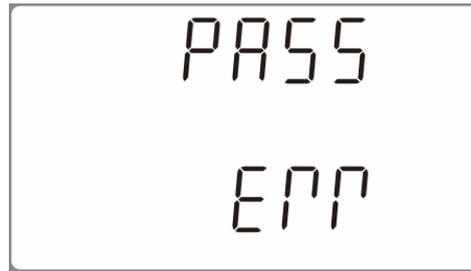
To exit setting-up mode, press [U/I ESC] repeatedly until the measurement screen is shown.

Set-up Entry Methods

Some menu items, such as password, require a four-digit number entry while others, such as supply system, require selection from a number of menu options.

Menu Option Selection

1) Use the [M ▲] and [P ▼] buttons to select the required item from the menu. Selection does not roll over between bottom and top of list.

2) Press [E ▶] to confirm your selection.

3) If an item flashes, then it can be adjusted by the [M ▲] and [P ▼] buttons. If not, there maybe a further layer.

4) Having selected an option from the current layer, press [E ▶] to confirm your selection.

5) Having completed a parameter setting, press [U/I ESC] to return to a higher menu level. You will be able to use the [M ▲] and [P ▼] buttons for further menu selection.

6) On completion of all set-up, press [U/I ESC] repeatedly until the measurement screen is shown.

Number Entry Procedure

When setting up the unit, some screens require the entering of a number. In particular, on entry to the setting up section, a password must be entered. Digits are set individually from left to right. The procedure is as follows:

1) The current digit to be set flashes and is set using the [M ▲] and [P ▼] buttons.

2) Press [E ▶] to confirm each digit setting.

3) After setting, press [U/I ESC] to exit the setting routine.

Communication

There is a RS485 port can be used for Modbus RTU communication. Modbus RTU parameters can be selected and set from front panel.

RS485 Address

```
SEt
Addr
001
```

(The range is from 001 to 247, default: 001)

1	SEt Addr 101	From the Set-up menu, use M▲ and P▼ buttons to select the Address ID.
2-1	SEt Addr 101	Press E↵ button to enter the selection routine. The current setting will be flashing.
2-2	SEt Addr 001	Use M▲ and P▼ buttons to choose Modbus Address (001 to 247). Press E↵ button to confirm the setting
On completion of the entry procedure, press U/I◄ ESC to return to previous set-up menu.		

Baud Rate

1	SEt bAUd 9.6 k	From the Set-up menu, use [M ▲] and [P ▼] buttons to select the Baud Rate option. Default: 9.6K
2-1	SEt bAUd 9.6 k	Press [E ▶] to enter the selection routine. The current setting will flash.
2-2	SEt bAUd 38.4 k	Use [M ▲] and [P ▼] buttons to choose Baud rate 2.4k. 4.8k, 9.6k, 19.2k, 38.4k Press [E ▶] to confirm the setting
On completion of the entry procedure, press [U/I ◀ ESC] to return to the previous set-up menu.		

Parity

1	SEt PArI nOnE	From the Set-up menu, use [M ▲] and [P ▼] buttons to select the Parity option. Default: None
2-1	SEt PArI nOnE	Press [E ▶] to enter the selection routine. The current setting will flash.

2-2	SEt PArI EVEN	Use [M ▲] and [P ▼] buttons to choose Parity (EVEN / ODD / NONE) Press [E ↵] to confirm the setting
On completion of the entry procedure, press [U/I ESC] to return to the previous set-up menu.		

Stop Bits

1	SEt StOP 1	From the Set-up menu, use [M ▲] and [P ▼] buttons to select the Stop Bit option. Default: 1
2-1	SEt StOP 1	Press [E ↵] to enter the selection routine. The current setting will flash.
2-2	SEt StOP 2	Use [M ▲] and [P ▼] buttons to choose Stop Bit (2 or 1) Press [E ↵] to confirm the setting
On completion of the entry procedure, press [U/I ESC] to return to the previous set up menu.		

Note: **The stop bit can be changed to 2 only when the parity is NONE.**

DIT Demand Integration Time

This sets the period in minutes over which the current and power readings are integrated for maximum demand measurement. The options are: 0, 5, 8, 10, 15, 20, 30, 60 minutes

1	SEt dIt 60	From the set-up menu, use [M ▲] and [P ▼] buttons to select the DIT option.
2-1	SEt dIt **60**	Press [E ▶] to enter the selection routine. The current time interval will flash.
2-2	SEt dIt **20**	Use [M ▲] and [P ▼] buttons to select the time required.
2-3	SEt dIt 20	Press [E ▶] to confirm the selection.

On completion of the entry procedure, press [U/I ◀ ESC] to return to the previous set up menu.

Backlit Set-up

1	SEt LP 60	The backlit lasting time is settable. Default lasting time is 60minutes. For example, if it's set as 10, the backlit will be off in 10 minutes from the last time operation on the meter.

2	SEt LP 60	Press [E] to enter the selection routine. The current time interval will flash Options:0,10,30,60,120 minutes (0 means always on)
3	SEt LP 10	Use [M] and [P] buttons to select the time interval. Press [E] to confirm the set-up.
On completion of the entry procedure, press [U/I ESC] to return to the previous set up menu.	

Supply System

Use this section to set the type of electrical system.

1	SYS 3P4	From the Set-up menu, use [M] and [P] buttons to select the System option.
2-1	SYS 3P4	Press [E] to enter the selection routine. The current selection will flash
2-2	SYS 1P2	Use [M] and [P] buttons to select the required system option: 1P2(W), 3P3(W) ,3P4(W) *If 1P3W requires, pls keep the SYS setting as 3P4 and connect the meter with L1, L2 and N terminal.

2-3	SYS IP2	Press [E] to confirm the selection.
On completion of the entry procedure, press [U/I ESC] to return to the previous set up menu.		

CLR

The meter provides a function to reset the maximum demand value of current/power and DI countings.

1	CLR	From the Set-up menu, use [M] and [P] buttons to select the reset option.
2	MD CLR	Press [E] to enter the selection routine. The MD will flash. Press [E] again to confirm the reset.
3-1	CLR dI Cnt	Press [E] to enter the selection routine. Then press [P] to enter the DI counting reset page. The current DI CNT will flash.
3-2	CLR dI Cnt	Press [E] to confirm the reset.
On completion of the entry procedure, press [U/I ESC] to return to the previous set up menu.		

Change Password

1	SEt PASS 1000	Use the [M ▲] and [P ▼] to choose the password changing option.
2-1	SEE PASS *1*000	Press the [E ▶] to enter the password change routine. The first digit flashing.
2-2	SEE PASS *1*000	Use [M ▲] and [P ▼] to set the first digit and press [E ▶] to confirm your selection. Meanwhile, the next digit will flash.
2-3	SEE PASS 1100	Repeat the procedure for the remaining three digits.
2-4	SEE PASS 1100	After setting the last digit, Press [E ▶] to confirm the reset.
On completion of the entry procedure, press [U/I ◀ ESC] to return to the previous set up menu.		

DI Filtering Time

1	SEt dI	From the Set-up menu, use [M ▲] and [P ▼] buttons to select the filtering time setting.
2-1	dI FLtr 100	Press the [E ▶] to enter the filtering time setting routine. The first digit flashing.
2-2	dI FLtr 100	Use [M ▲] and [P ▼] to set the first digit and press [E ▶] to confirm your selection. Meanwhile, the next digit will flash.
2-3	dI FLtr 100	Repeat the procedure for the remaining digit. After setting the last digit, Press [E ▶] to confirm the reset.
On completion of the entry procedure, press [U/I ◀ ESC] to return to the previous set up menu.		

Specifications

Measured Parameters

The unit can monitor and display the following parameters of a single phase two wire(1p2w), single phase three wire (1p3w) three phase three wire(3p3w) or four phase four wire(3p4w) supply.

Note: If the meter will be used on 1P3W, Please set the meter system type to 3P4(W), and wiring L1, L2 and N terminals, Leave L3 blank.

Voltage and Current

Phase to neutral voltages 85 to 276V a.c. (not for 3p3w supplies)

Voltages between phases 176 to 480V a.c. (3p supplies only)

Percentage total voltage harmonic distortion (THD%) for each phase to N (not for 3p3w supplies)

Percentage voltage THD% between phases (three phase supplies only)

Current of each phase

Neutral current

Current THD% for each phase

Power Factor and Frequency and Max. Demand

Frequency in Hz

Instantaneous power:

Power 0 to 99999 W

Reactive Power 0 to 99999 VAr

Volt-amps 0 to 99999 VA

Maximum power demand since last reset.

Maximum current demand since last reset. (for 3p4w supply only)

Energy Measurements

- Import active energy   0 to 999999.99 kWh
- Export active energy   0 to 999999.99 kWh
- Import reactive energy   0 to 999999.99 kVArh
- Export reactive energy   0 to 999999.99 kVArh
- Total active energy   0 to 999999.99 kWh
- Total reactive energy   0 to 999999.99 kVArh

Measured Inputs

Voltage inputs through 4-way fixed connector with 25mm² stranded wire capacity. single phase two wire(1p2w), single phase three wire (1p3w), three phase three wire(3p3w) or four phase four wire(3p4w) unbalanced. Line frequency measured from L1 voltage or L3 voltage.

Accuracy

- Voltage   0.5% of range maximum
- Current   0.5% of nominal
- Frequency   0.2% of mid-frequency
- Power factor   1% of unity (0.01)
- Active power (W)   ±1% of range maximum
- Reactive power (VAr)   ±1% of range maximum
- Apparent power (VA)   ±1% of range maximum

- Active energy (Wh)   Class 1 IEC 62053-21 / Class B EN50470-1/3
- Reactive energy (VArh)   Class 2 IEC 62053-23
- Response time to step input   100ms, typical, to >99% of final reading, at 50 Hz.

Interfaces for External Monitoring

Three interfaces are provided:
- RS485 communication channel that via protocol remotely.
- DI Inputs (24V DC @0.1W)

The Modbus configuration (Baud rate etc.) and the DI inputs are configured through the Set-up screens.

RS485 Output for Modbus RTU

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

Baud rate 2400, 4800, 9600(default), 19200, 38400 bps

Parity none (default)/odd/even

Stop bits 1(default) 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 the set-up menu.

Reference Conditions of Influence Quantities

Influence Quantities are variables that affect measurement errors to a minor degree. Accuracy is verified under nominal value (within the specified tolerance) of these conditions.

- Ambient temperature   23°C ±1°C
- Input frequency   50Hz (MID)
                                             45-65Hz (non-MID)
- Input waveform   Sinusoidal (distortion factor < 0·005)
- Magnetic field of external origin   Terrestrial flux

Environment

- Operating temperature   -25°C to +55°C*
- Storage temperature   -40°C to +70°C*
- Relative humidity   0 to 90%, non-condensing
- Altitude   Up to 2000m
- Warm up time   5S
- Vibration   10Hz to 50Hz, IEC 60068-2-6, 2g
- Shock   30g in 3 planes

* Maximum operating and storage temperatures are in the context of typical daily and seasonal variation.

Dimensions
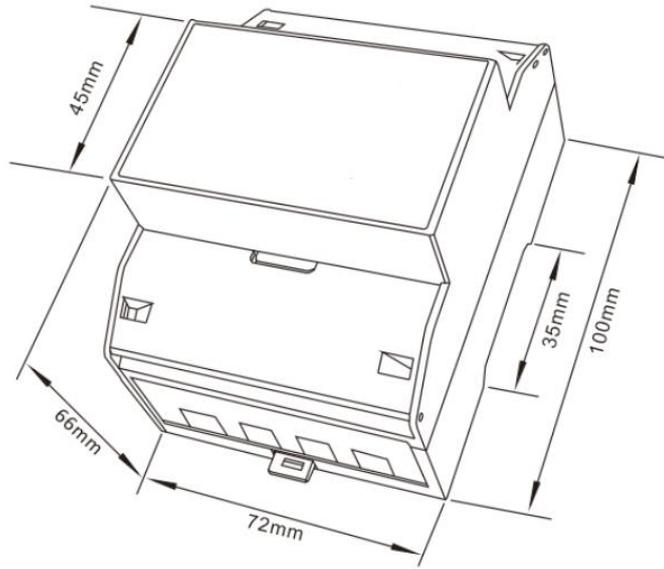
Wiring diagram

● Three Phase Four Wire：
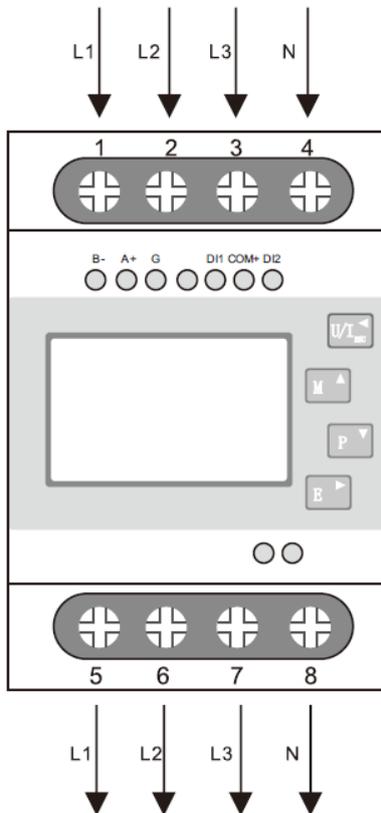
- Three Phase Three Wire：
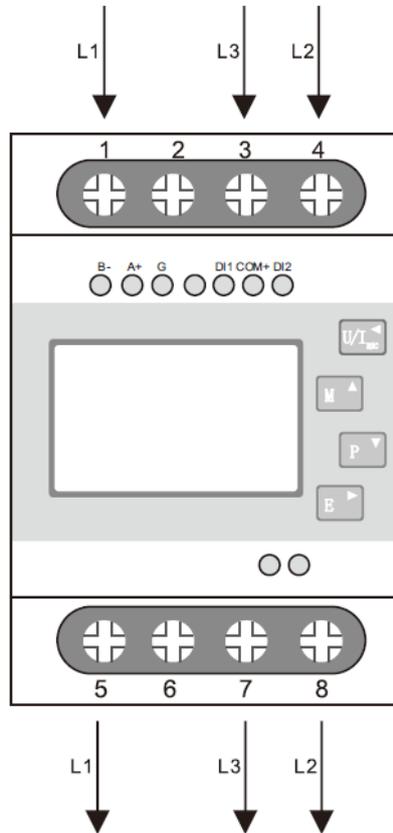
- Single Phase three Wire：
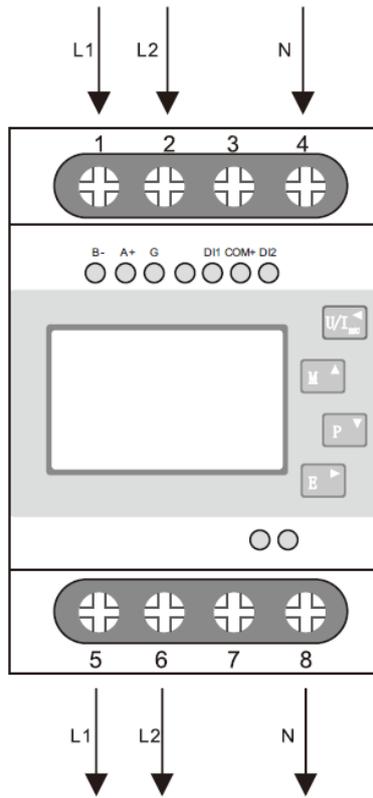
- Single Phase two Wire：
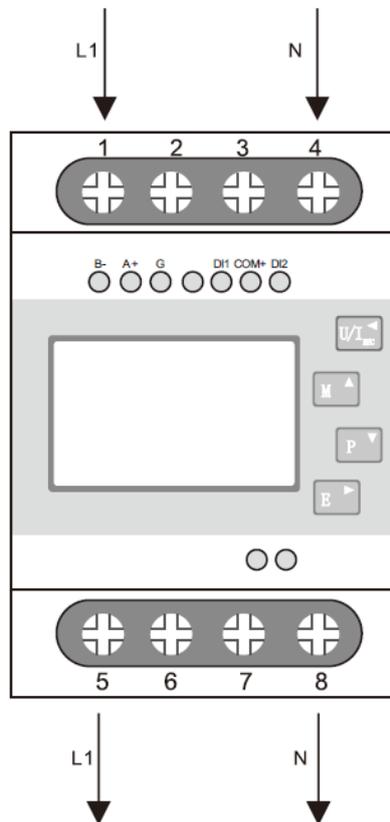
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