

SDM630 MCT 40mA

Three Phase Multifunction Energy Meter



DIN RAIL SMART METER FOR SINGLE AND THREE PHASE ELECTRICAL SYSTEMS

User Manual v1.0

Warnings

Important Safety Information is contained in the Maintenance section. Familiarize yourself with this information before attempting installation or other procedures. Symbols used in this document:

- Risk of Danger: These instructions contain important safety information. Read them before starting installation or servicing of the equipment.
- Caution: Risk of Electric Shock

1. Introduction

This document provides operating, maintenance and installation instructions. This unit measures and displays the characteristics of single phase two wire(1p2w), three phase three wire(3p3w) and three phase four wire(3p4w) networks. The measuring parameters include voltage(V), frequency(Hz), current(A), power(kW/kVA/kVAh), import, export and total Energy(kWh/kVAh). The unit can also measure Maximum demand of current and power. This is measured over preset periods of up to 60 minutes.

This unit is 40mA current transformer operated and can be configured to work with a wide range of CTs. Built-in pulse and Modbus outputs. Configuration is password protected.

This unit can be powered by a separate auxiliary (AC or DC) supply. Alternatively it can be powered from the monitored supply by linking the voltage reference and neutral reference to terminals 5 and 6 (Please refer to wiring diagram).

1.1 Unit Characteristics

The Unit can measure and display:

- Voltage and THD% (total harmonic distortion) of all phases
- Line frequency
- Currents, current demand and current THD% of all phases
- Power, maximum power demand and power factor
- Active energy imported and exported
- Reactive energy imported and exported

1.2 RS485 Modbus RTU

The unit has RS485 port with Modbus RTU protocol. Settings can be done via both display and communication. Refers to section 4.2

1.3 Current Transformer Primary Current

The unit is CT operated. you will need to set the correct CT value. Refers to section 4.3.

1.4 Pulse Output

Two pulse outputs that pulse measured active and reactive energy. The Pulse 2 constant for active energy is fixed at 3200imp/kWh. The pulse output 1 is configurable. Refers to section 4.5

2. Start Up Screens

	The first screen lights up all display segments and can be used as a display check.
	Software version information (This information is for reference only, in kind prevail.)
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	The interface performs a self-test and indicates the result if the test passes.

*After a short delay, the screen will display active energy measurements.

3. Measurements

The buttons operate as follows:

	Selects the Voltage and Current display screens. In Set-up Mode, this is the "Left" or "Back" button.
	Select the Frequency and Power factor display screens. In Set-up Mode, this is the "Up" button.
	Select the Power display screens. In Set-up Mode, this is the "Down" button.
	Select the Energy display screens. In Set-up mode, this is the "Enter" or "Right" button.

3.1 Voltage and Current

Each successive press of the U/I button selects a new parameter:

	Phase to neutral voltages.
	Phase to phase voltages.
	Current on each phase.
	Neutral Current
	Phase to neutral voltage THD%.
	Current THD% for each phase.

3.2 Frequency and Power Factor and Demand

Each successive press of the M button selects a new range:

	Frequency and Power Factor (total).
	Power Factor of each phase.
	Maximum Current Demand.
	Maximum Power Demand.

3.3 Power

Each successive press of the P button selects a new range:

	Instantaneous Active Power in kW.
	Instantaneous Reactive Power in kVA.
	Instantaneous Volt-Amps in kVA.
	Total W, VA, VAR.

3.4 Energy Measurements

Each successive press of the E button selects a new range:

	Total Active Energy in kWh.
	Total Reactive Energy in kVAh.
	Import Active Energy in kWh.

	Export Active Energy in kWh.
	Import Reactive Energy in kVAh.
	Export Reactive Energy in kVAh.

4. Set Up

To enter set-up mode, press the E button for 3 seconds until the password screen appears.

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

To exit setting-up mode, press U/I repeatedly until the measurement screen is restored.

4.1 Set-up Entry Methods

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

4.1.1 Menu Option Selection

- Use the U/I and P buttons to scroll through the different options of the set up menu.
- Press E to confirm your selection
- If an item flashes, then it can be adjusted by the M and P buttons.
- Having selected an option from the current layer, press E to confirm your selection.
- Having completed a parameter setting, press U/I to return to a higher menu level. You will be able to use the M and P buttons for further menu selection.
- On completion of all setting-up, press U/I repeatedly until the measurement screen is restored.

4.1.2 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:

- The current digit to be set flashes and is set using the M and P buttons.
- Press E to confirm each digit setting.
- After setting the last digit, press U/I to exit the number setting routine.

4.2 Communication

4.2.1 RS485 Address



(The range is from 001 to 247 for Modbus)

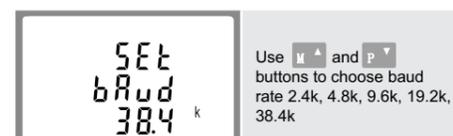
	From the set-up menu, use M and P buttons to select the address ID.
	Press E button to enter the selection routine. The current setting will flash
	Use M and P buttons to choose Modbus address

Press E button to confirm the setting and press U/I button to return the main set-up menu.

4.2.2 Baud Rate

Baud rate range for Modbus RTU: 2.4k, 4.8k, 9.6k, 19.2k, 38.4k.

	From the set-up menu, use M and P buttons to select the baud rate option.
	Press E to enter the selection routine. The current setting will flash.



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 and press U/I to return to the main set-up menu.

4.2.3 Parity

	From the set-up menu, use M and P buttons to select the parity option.
	Press E to enter the selection routine. The current setting will flash.
	Use M and P buttons to choose parity (EVEN / ODD / NONE (default)).

Press E to confirm the setting and press U/I to return to the main set-up menu.

4.2.4 Stop Bits

	From the set-up menu, use M and P buttons to select the stop bit option.
	Press E to enter the selection routine. The current setting will flash.
	Use M and P buttons to choose stop bit (2 or 1). Note: Default is 1, and only when the parity is NONE that the stop bit can be changed to 2.

Press E to confirm the setting and press U/I to return to the main set-up menu.

4.3 CT

The CT option sets the primary current (CT1) of the current transformer (CT) that wires to the meter. CT2 is fixed to 40mA.

	From the set-up menu, use M and P buttons to select the CT option.
	Set CT1 value Press E to enter the CT1 setting screen. The range is from 0001 to 9999.

For example, if using a 100/40mA current transformer, the CT1 should be set to 0100.

* Please note for the MID approved version device, you will only have one opportunity to set the CT1.

4.4 PT

The PT option sets the secondary voltage (PT2 100 to 500V) of the voltage transformer (PT) that may be connected to the meter.

	Use M and P buttons to select the PT option. The screen will show the voltage PT secondary voltage value. The default value is 400V.
	Secondary PT setting Press E to enter the PT secondary voltage selection routine. The range is from 100 to 500V.
	Set PT rate value Press E to enter the PT rate screen. The range is from 0001 to 2000.

For example, if set the rate to 100, it means the primary voltage equals secondary voltage x100.

4.5 Pulse Output

The option allows you to configure the pulse output 1. The output can be set to provide a pulse for a defined amount of energy active or reactive. Use this section to set up the pulse output—Units: kWh, kVAh

	From the set-up menu, use M and P buttons to select the Pulse output option.
	Press E to enter the selection routine. The unit symbol will flash.



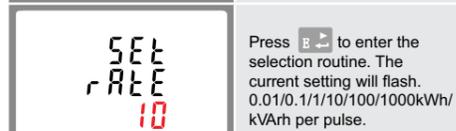
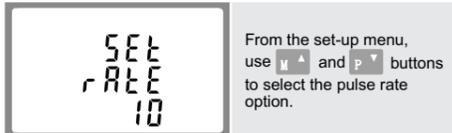
Press **E** to confirm the setting and press **U/I** to return to the main set up menu.

4.5.1 Pulse Rate

Use this to set the energy represented by each pulse. Rate can be set to 1 pulse per 0.01/0.1/1/10/100/1000kWh/kVArh.



(It shows 1 impulse = 10kWh/kVArh)



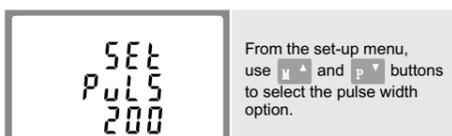
Use **M** and **P** buttons to choose pulse rate. Press **E** to confirm the setting and press **U/I** to return to the main set up menu.

4.5.2 Pulse Duration

The energy monitored can be active or reactive and the pulse width can be set as 200, 100 or 60ms.



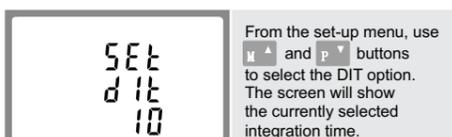
(It shows pulse width of 200ms)



Use **M** and **P** buttons to choose pulse width. Press **E** to confirm the setting and press **U/I** to return to the main set-up menu.

4.6 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.

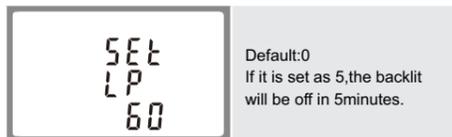


Use **M** and **P** buttons to choose the selection. Press **E** to confirm the setting and press **U/I** to return to the main set-up menu.

4.7 Backlit Set-up

The meter provides a function to set the backlit lasting time(0/5/10/30/60/120 minutes).

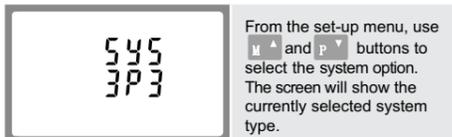
Option 0 means the backlit always on here.



Press **E** to confirm the setting and press **U/I** to return to the main set-up menu.

4.8 Supply System

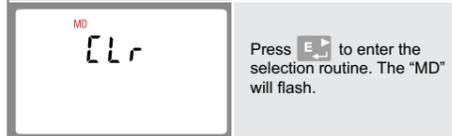
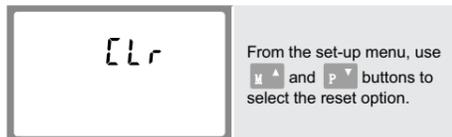
The unit has a default setting of 3Phase 4wire (3P4). Use this section to set the type of electrical system.



Press **E** to confirm the selection. Press **U/I** to exit the system selection routine and return to the main set-up menu.

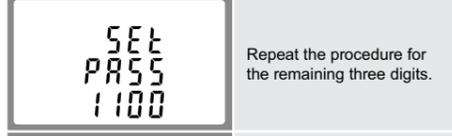
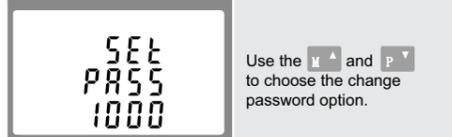
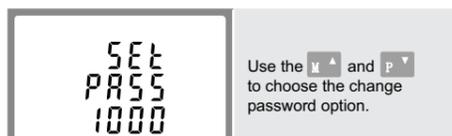
4.9 CLR

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



Press **E** to confirm the reset and press **U/I** to return to the main set-up menu.

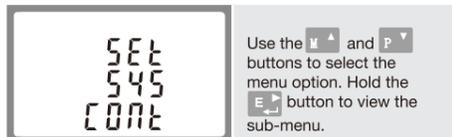
4.10 Change Password



Press **U/I** to exit the number setting routine and return to the Set-up menu.

4.11 CT Reversal

If the CT connections are incorrectly wired, they can be reversed through the set-up menu:



Hold the **U/I** button for 3 seconds to exit the set up menu.

5. Specifications

5.1 Measured Parameters

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

5.1.1 Voltage and Current

- Phase to neutral voltages 100 to 276V a.c. (not for 3p3w supplies).
- Voltages between phases 173 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 THD% for each phase

5.1.2 Power Factor and Frequency and Max. Demand

- Frequency in Hz
- Power factor
- Instantaneous power:
- Power 0 to 3600 MW
- Reactive power 0 to 3600 MVar
- Volt-amps 0 to 3600 MVA
- Maximum demanded power since last reset
- Maximum neutral current demand, since the last reset (for three phase supplies only)

5.1.3 Energy Measurements

- Import/Export active energy 0 to 9999999.9 kWh
- Import/Export reactive energy 0 to 9999999.9 kVArh
- Total active energy 0 to 9999999.9 kWh
- Total reactive energy 0 to 9999999.9 kVArh

5.2 Measured Inputs

Voltage inputs through 4-way fixed connector with 2.5mm² stranded wire capacity. single phase two wire(1p2w), three phase three wire(3p3w) or three phase four wire(3p4w) unbalanced. Line frequency measured from L1 voltage or L3 voltage.

Three current inputs (six physical terminals) with 2.5mm² stranded wire capacity for connection of external CTs. Nominal rated input current 40mA a.c. RMS.

5.3 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 2 IEC 62053-23
- Reactive energy (VArh) 1% up to 31st harmonic
- Total harmonic distortion 1s, typical, to >99% of final reading, at 50 Hz.
- Response time to step input

5.4 Auxiliary Supply

Two-way fixed connector with 2.5mm² stranded wire capacity. 85 to 275V a.c. 50/60Hz ±10% or 120V to 380V d.c. ±20%. Consumption < 10W.

5.5 Interfaces for External Monitoring

Three interfaces are provided:

- RS485 communication channel that can be programmed via protocol remotely.
- Pulse output(Pulse 1) indicating real-time measured energy (configurable)
- Pulse output(Pulse 2) 3200imp/kWh (non-configurable)

The Modbus configuration (baud rate etc.) and the pulse output assignments (kWh/kVArh) are configured through the set-up screens.

5.5.1 Pulse Output

The pulse output can be set to generate pulses to represent kWh or kVArh.

Rate can be set to generate 1 pulse per:

- 0.01 = 10 Wh/VArh
- 0.1 = 100 Wh/VArh
- 1 = 1 kWh/kVArh
- 10 = 10 kWh/kVArh
- 100 = 100 kWh/kVArh
- 1000 = 1000 kWh/kVArh

Pulse width 200/100/60 ms.

5.5.2 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, 19200, 38400
- Parity none (default) / odd / even
- Stop bits 1 or 2
- RS485 network address nnn – 3-digit number, 1 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.

5.6 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 ±2°C
- Input frequency 50 or 60Hz ±2%
- Input waveform Sinusoidal (distortion factor < 0.005)
- Auxiliary supply voltage Nominal ±1%
- Auxiliary supply frequency Nominal ±1%
- Auxiliary supply waveform (if AC) Sinusoidal (distortion factor < 0.05)
- Magnetic field of external origin Terrestrial flux

5.7 Environment

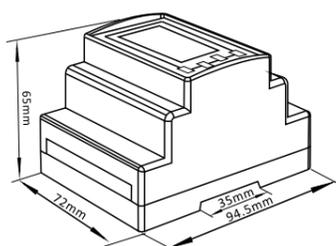
- Operating temperature -25°C to +55°C*
- Storage temperature -40°C to +70°C*
- Relative humidity 0 to 95%, non-condensing
- Altitude Up to 2000m
- Warm-up time 5s
- Vibration 10Hz to 50Hz, IEC 60068-2-6, 2g
- Shock 30g in 3 planes

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

5.8 Mechanics

- DIN rail dimensions 72 x 94.5 mm (WxH) per DIN 43880
- Mounting DIN rail 35mm
- Ingress protection IP51 (indoor)
- Material Self-extinguishing UL94 V-0

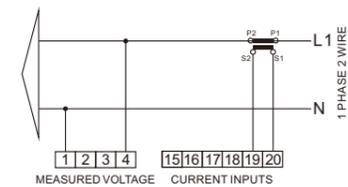
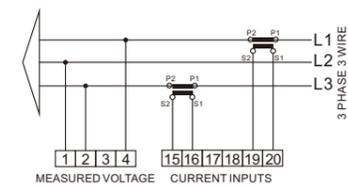
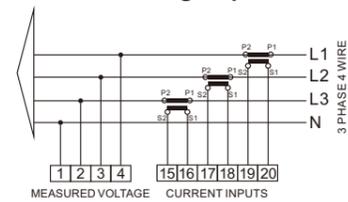
6. Dimensions



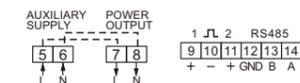
7. Installation

This manual does not contain all of the safety measures for operation of the equipment (module, device), because special operating conditions, and local code requirements or regulations may necessitate further measures.

Current and Voltage Inputs



Definitions of Other Terminals



Terminals Capacity	RS485 / Pulse	0.5~2.5mm ²
	Load	1.5~2.5mm ²
Screw Torque	RS485 / Pulse	0.4Nm
	Load	0.4Nm

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