SDM630MCT-RC

3 Phase Meter + Rogowski Coils



4 DIN MODULES MULTI FUNCTION THREE PHASE ENERGY METER WITH ROGOWSKI COILS

User Manual V1.1

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. The SDM630MCT-RC is an innovative instrument for measurement and recording electrical parameters. It is particularly suitable for consumption measurement and analysis with high quality and stability. The meter directly connects with Rogowski coils for current measurement without integrator. It measures and displays the characteristics of single phase two wire(1p2w) and three phase four wire(3p4w) networks. The measuring parameters include voltage(V), frequency(Hz), current(A), power(kW/kVA/kVAr), import, export and total energy(kWh/kVArh).

The unit can also measure Maximum demand current and power, which is measured over preset periods of up to 60 minutes.

SDM630MCT-RC can communicate through the RS485 serial port by MODBUS RTU protocol. Configuration is password protected.

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 Rogowski Coils Primary Current Input

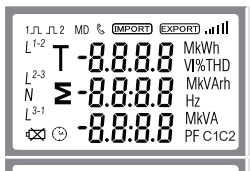
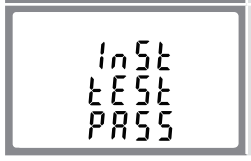
SDM630MCT-RC is operated directly with Rogowski coils without integrator. The ratio of connected Rogowski coils should be standard 85mV/kA.

The primary current ranges from 1A to 5000A with 3 selectable scales. The CT1 setting depends on the current input of Rogowski coils.
If the input of coils is 500A, the CT1 should be set to 0.5kA.
If the input of coils is 1000A, the CT1 should be set to 1kA.
If the input of coils is 5000A, the CT1 should be set to 5kA.
If the input of coils is above 5000A, the CT1 should be set to 20kA.

1.3 RS485 Modbus RTU

SDM630MCT-RC has a RS485 port with Modbus RTU protocol. RS485 provides a means of remotely monitoring and controlling the unit. Set-up screens are provided for setting up the communication port.

2.Start Up Screens

	The first screen lights up all display segments and can be used as a display check.
	Software version information
	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.

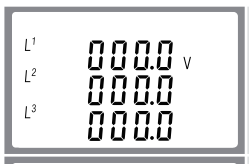
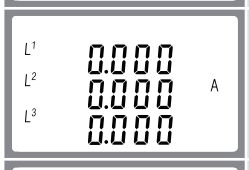
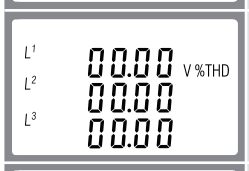
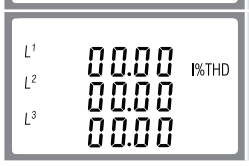
3.Measurements

The buttons operate as follows:

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

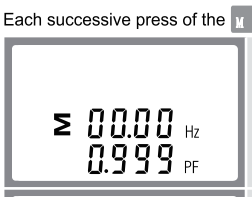
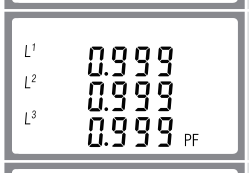
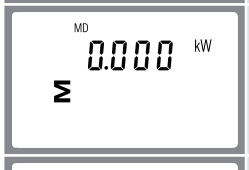
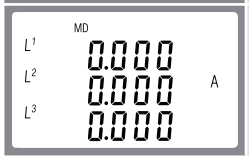
3.1 Voltage and Current

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

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

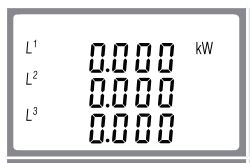
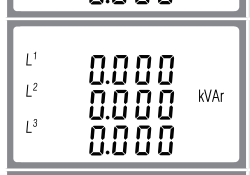
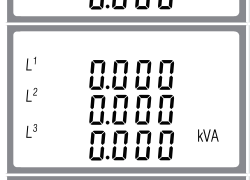
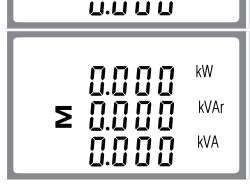
3.2 Frequency and Power Factor and Demand

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

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

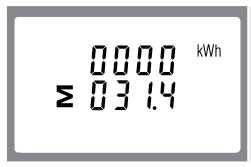
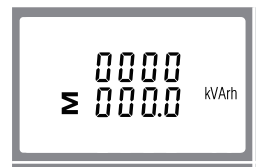
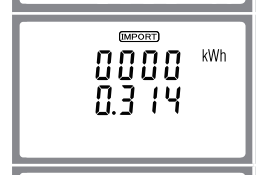
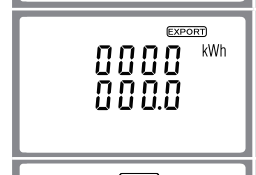
3.3 Power

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

	Instantaneous Active Power in kW.
	Instantaneous Reactive Power in kVAr.
	Instantaneous Volt-Amps in kVA.
	Total kW, kVAr, kVA.

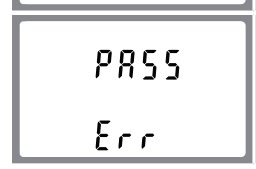
3.4 Energy Measurements

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

	Total active energy in kWh.
	Total reactive energy in kVArh.
	Import active energy in kWh.
	Export active energy in kWh.
	Import reactive energy in kVArh.
	Export reactive energy in kVArh.

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 so you must 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

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

4.1.2 Number Entry Procedure

When setting, some screens require entering password. 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 the last digit, press U/I to exit the number setting routine.

4.2 Communocation

There is a RS485 port that can be used for communication using Modbus RTU protocol. For Modbus RTU, parameters are selected from front panel.

4.2.1 RS485 Address



(The range is from 001 to 247)

	From the set-up menu, M and P buttons to select the address ID.
	Press E button to enter the selection routine. The current setting will be flashing.
	Use M and P buttons to choose Modbus address (001 to 247).

On completion of the entry procedure, press E button to confirm the setting and press U/I button to return the main set-up menu.

4.2.2 Baud Rate

	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

On completion of the entry procedure, 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)).

On completion of the entry procedure, 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.

On completion of the entry procedure, 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 rogowski coil that wires to the meter. There are 3 selectable current scales: 500A/1000A/5000A.

	From the set-up menu, use M and P buttons to select the CT option.
	Secondary CT setting Press E to enter the CT primary current selection routine.: 0.5kA/1kA/ 5kA
	Press E to confirm the selection.

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 ratios value Press E to enter the PT ratio screen. The range is from 0001 to 2000.

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

4.5 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.

SEt dIt 10	From the set-up menu, use M and P buttons to select the DIT option. The screen will show the currently selected integration time.
SEt dIt 10	Press E to enter the selection routine. The current time interval will flash.
SEt dIt	Use M and P buttons to select the time required.
SEt dIt 20	Press E to confirm the selection.

Press U/I to exit the DIT selection routine and return to the menu.

4.6 Backlit Set-up

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

0 means the backlit always on.

SEt LP 60	Default:60 If it's setted as 5,the backlit will be off in 5minutes.
SEt LP 60	Use M and P buttons to choose the time

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

4.7 Supply System

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

SYS 3P3	From the set-up menu, use M and P buttons to select the system option. The screen will show the currently selected power supply.
SYS 3P3	Press E to enter the selection routine. The current selection will flash.
SYS 1P2	Use M and P buttons to select the required system option: 1P2(W),3P3(W) ,3P4(W).
SYS 3P4	Press E to confirm the selection.

Press U/I to exit the system selection routine and return to the menu. SET will disappear and you will be returned to the main set-up menu.

4.8 CLR

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

CLr	From the set-up menu, use M and P buttons to select the reset option.
CLr dIt	Press E to enter the selection routine. The dIt will flash.

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

4.9 Change Password

SEt PASS 1000	Use the M and P to choose the change password option.
SEt PASS 1000	Press the E to enter the change password routine. The new password screen will appear with the first digit flashing.
SEt PASS 1000	Use M and P to set the first digit and press E to confirm your selection. The next digit will flash.
SEt PASS 1100	Repeat the procedure for the remaining three digits.
SEt PASS 1100	After setting the last digit. Press E to confirm the selection.

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

4.10 CT Reversal

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

SEt SYS Cont	Use the M and P buttons to select the menu option. Hold the E button to view the sub-menu.
SEt 1A Frd	This screen will display, you can change Forward to Reverse on each individual CT connection.
SEt 1A rEU	Hold the E button to confirm your adjustment. You can then move on to IB or IC using the M and P buttons.

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 289V 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
- Instantaneous power:
- Power 0 to 3600 MW
- Reactive power 0 to 3600 MVAr
- Volt-amps 0 to 3600 MVA
- Maximum demanded power since last Demand reset Power factor
- Maximum neutral demand current, since the last Demand 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 standard wire capacity. single phase two wire(1p2w), three phase four wire(3p4w) unbalanced.

Three current inputs (six physical terminals) with 2.5mm² standard wire capacity for connection of external Rogowski coils. Nominal rated input current 85mV/kA 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)	±0.5% 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
• Reactive energy (VArh)	±2% of range maximum
• Response time to step input	1s, typical, to >99% of final reading, at 50 Hz.

5.4 Auxiliary Supply

Two-way fixed connector with 2.5mm² standard wire capacity.
85 to 275V a.c. 50/60Hz ±10% or 120V to 380V d.c. ±20%.
Consumption < 2W/10 VA.

5.5 Interfaces for External Monitoring

RS485 communication channel that can be programmed for Modbus RTU protocol

The Modbus configuration in (baud rate etc.) is configured through the set-up screens.

5.5.1 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 ±1°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

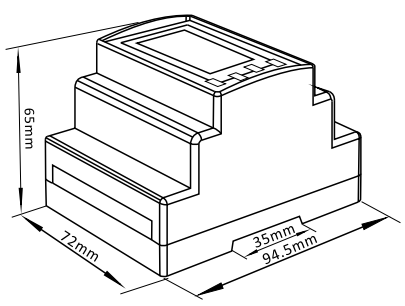
• Operating temperature	−25°C to +55°C
• Storage temperature	−40°C to +70°C
• Relative humidity	0 to 95%, non-condensing
• Altitude	Up to 2000m
• Warm up time	5s
• Vibration	10Hz to 50Hz, IEC 60068-2-6, 2g
• Shock	30g in 3 planes

*** 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 (DIN 43880)
• Ingress protection	IP51 (indoor)
• Material	Self-extinguishing UL94 V-0

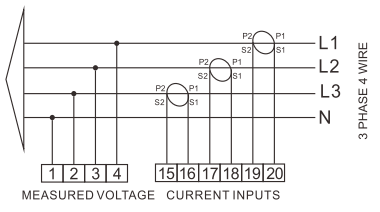
6.Dimensions

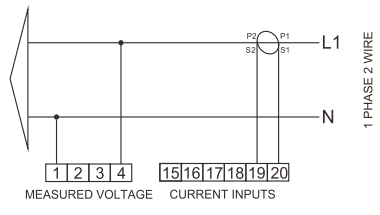


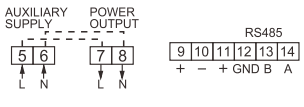
7.Installation

For the wiring diagram of SDM630MCT-RC, different networks have different diagrams. Below are wire diagrams for 3 phase 4 wires and 1 phase 2 wires.

Current and Voltage inputs







Terminals Capacity	RS485: 0.5~2.5mm²
	Load: 1.5~2.5mm²
Screw Torque	RS485: 0.4Nm
	Load: 0.4Nm

8.Rogowski Coil



Manual of Rogowski Coil

Coil code	Reference Rated Current	Class	Window Size (mm)	Coil Length (mm)
ESCT-RC60	500A	0.5	50	200
ESCT-RC100	1000A	0.5	100	395
ESCT-RC150	5000A	0.5	150	525

9.Download

Operation Manual

MODBUS Protocol

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