smartcontroller

Electrical Excellence

USER MANUAL

DIN RAIL DUAL SOURCE ENERGY METER SMART - SME 204(CT)

INTRODUCTION

This document provides operating, maintenance and installation instructions . The unit measures and displays the characteristics of single phase two wires(1p2w) , three phase three wires(3p3w,) and three phase four wires(3p4w) supplies, including KWh, kVarh, KW, KVar, KVA, PF, Frequency, Voltage, Current, dmd. THD etc. Energy is measured in terms of kWh, kVArh. Maximum demand current can be measured over preset periods of up to 60minutes. The requisite current input(s) are obtained via current transformers(CT).

This meter can be configured to work with a wide range of CTs,giving the unit a wide range of operation.Built-in interfaces provides pulse and RS485 Modbus RTU outputs.Configuration is password protected.

This unit has 2 Source Powers and can show T1 energy and T2 energy. If you want to shift T1 to T2, as far as there is 230V load between terminal 7 and 8 ,the meter will count up to T2. When T1 is working, you can get Pulse1 output 2 from pin 9 & 10. When T2 is working, you can get Pulse 2 output from pin 11 & 12. Both Pulse 1 output and Pulse 2 output Rate are configurable.

1.1 Unit Characteristics

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
- Reset for demand measurements
- Pulse output duration

Two pulse output indicates real-time energy measurement. An RS485 output allows remote monitoring from another display or a computer.

1.2 Current Transformer Primary Current

The unit can be configured to operate with CT ratio between primary current and secondary current. The secondary CT has two options: 1A/5A

1.3 RS485 Serial Modbus RTU

This 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. Refers to section 4.8

PULSE OUTPUT

This provides two pulse outputs that clock up measured T1 active energy and T2 active energy. The default constant for active energy is 3200imp/kWh. The pulse width for active energy can be set from the set-up menu.

2. Start up screen

	The first screen lights up all display segments and can be used as a display check.
	The second screen indicates the firmware installed in the unit and its build number.
	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

	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 pressing of the U/I button selects a new range:

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

3.2 Frequency and Power factor and Demand

Each successive pressing 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 pressing of the  button select a new range:

	Instantaneous Active Power in kW
	Instantaneous Reactive Power in kVAr

	Instantaneous Volt-amps in KVA
	Total kW, kVArh, kVA

3.4 Energy Measurements

Each successive pressing of the  button selects a new range:

	Total active energy in kWh
	Imported active energy in kWh
	Exported active energy in kWh

	T1 active energy in kWh When T1 working, the symbol“ T1” will be flashing
	T2 active energy in kWh When T2 working, the symbol “ T2” will be flashing
	Total reactive energy in kVArh
	Imported reactive energy in kVArh
	Exported reactive energy in kVArh
	T1 reactive energy in kVArh When T1 working, the symbol “ T1” will be flashing

	T2 reactive energy in kVArh When T2 working, the symbol " T2" will be flashing

Setting 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

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 select the required item from the menu shown in section 4.1. 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

4) Having selected an option from the current layer, press E to confirm your selection. The SET indicator will appear.

5) Having completed a parameter setting, press U/I BSC to return to a higher menu level. The SET indicator will be removed 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 BSC 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:

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. The SET indicator appears after the last digit has been set.

3) After setting the last digit, press U/I BSC to exit the number setting routine. The SET indicator will be removed.

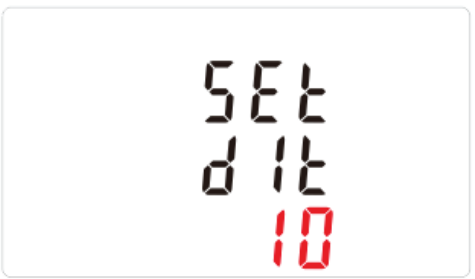
CHANGE PASSWORD

	Use the M and P to choose the change password option
	Press the E to enter the change password routine. The new password screen will appear with the first digit flashing

	Use M and P to set the first digit and press E to confirm your selection. The next digit will flash.
	Repeat the procedure for the remaining three digits
	After setting the last digit, SET will show.
Press U/I to exit the number setting routine and return to the Set-up menu. SET will be removed	

DIT Demand Itegration Time

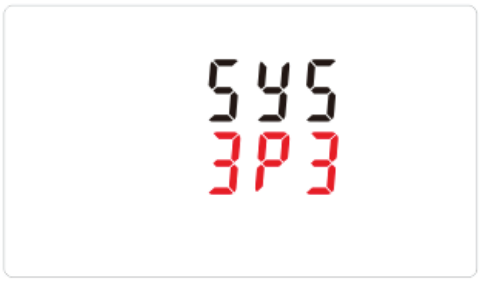
This sets the period in minutes over which the current and power readings are integrated for maximum demand measurement. The options are: off, 5, 10,15 30,60 minutes

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

	Use M and P buttons to select the time required.
	Press E to confirm the selection. SET indicator will appear.
Press U/I to exit the DIT selection routine and return to the menu.	

Suppy System

Use this section to set the type of power supply being monitored.

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

	Press E to confirm the selection. SET indicator will appear.
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	

CT

The CT option sets the secondary current(CT2 1A or 5A) of the current transformer (CT) that wires to the meter.

	From the Set-up menu, use M and P buttons to select the CT option.
	Secondary CT setting Press E to enter the CT secondary current selection routine.:5A/1A
	Set CT Ratio value Press E to enter the CT Ratio setting screen.The range is from 0001 to 9999.
For example,if set the ratio to be 100,it means the primary current equals secondary currentx100	

PT

The PT option sets the secondary voltage (PT2 100 to 500V) of the Voltage transformer (PT) that wires to the meter.

	From the Set-up menu, 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 9999
For example,if set the ratio to be 100,it means the primary voltage equals secondary voltagex100	

Pulse Output

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

(It shows 1 impulse = 10kWh/kVArh)

1		From the Set-up menu, use M and P buttons to select the Pulse Rate option.
2		Press E to enter the selection routine. The current setting will flash. 0.01/0.1/1/10/100/1000kWh/kVArh per pulse
Use M and P buttons to choose pulse rate. On Completion of the entry procedure, press E to confirm the setting and press U/I to return to the main set up menu.		

Pulse Duration

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

(It shows pulse width of 200ms)

	From the Set-up menu, use M and P buttons to select the Pulse width option.

	Press E to enter the selection routine. The current setting will flash.
Use M and P buttons to choose pulse width.On Completion of the entry procedure, press E to confirm the setting and press U/I to return to the main set up menu.	

Communiation

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

RS485 Address

(The range is from 001 to 247)

	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 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.	

	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.	

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

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

CLR

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

	From the Set-up menu, use M and P buttons to select the reset option.
	Press E to enter the selection routine. The MD will flash.
Press E to confirm the setting and press U/I ESC to return to the main set up menu.	

Reverse connected current inputs correction set up

1		use M and P buttons to select page “SET sys cont”

2-1		Press to E enter Phase A , the default is Frd (forward)
2-2		use M and P buttons to Phase B or C setting pages

How to operate if phase A is reversely connected

1		Go to phase A setting page
2		Press E to enter the selection routine. The Frd will flash. Use P button to change Frd to Rev.
Press E to confirm the setting and press U/I to return to the main set up menu.		

SPECIFICATIONS

Measured Parameters

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

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
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

Imported/Exported active energy	0 to 9999999.9 kWh
Imported/Exported 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 four 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 5A or 1A 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)	±2% 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
Total harmonic distortion	1% up to 31st harmonic
Temperature co-efficient	Voltage and current = 0.013%/°C typical
Response time to step input	1s, typical, to >99% of final reading, at 50 Hz.

5.7 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	1 minute
Vibration	10Hz to 50Hz, IEC 60068-2-6, 2g

5.4 Interfaces for External Monitoring

Three interfaces are provided:
- An RS485 communication channel that can be programmed for Modbus RTU protocol
- An pulse output indicating real-time measured energy.(configurable)
- An pulse output 3200imp/kWh (not configurable)
- The Modbus configuration (Baud rate etc.) and the pulse relay output assignments (kW/kVArh,import/export etc.) are configured through the Set-up screens.

5.5.1 Pulse Output

The pulse output can be set to generate pulses to represent kWh.
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
Pulse width 200/100/60 ms.
Relay Rating 230V ac 50mA
Pulse width: 200/100(default)/60ms
Pulse output 2 is non-configurable. It is fixed up with total kWh. The constant is 3200imp/kWh.

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

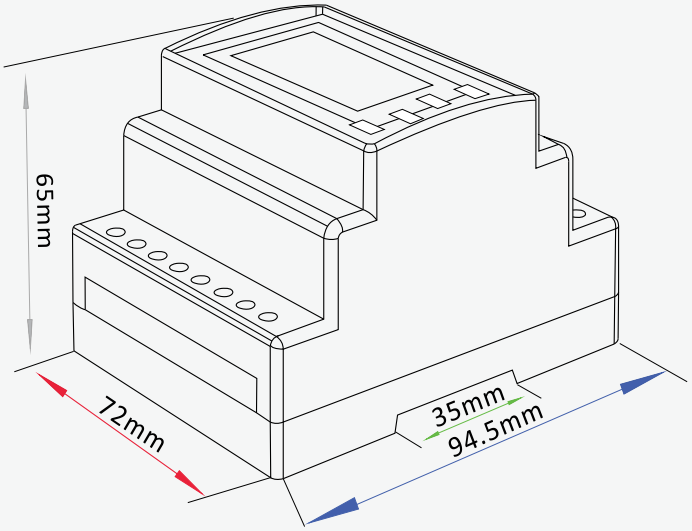
Influence Quantities are variables that affect measurement errors to a minor degree. Accuracy is verified under nominal value (within the specified tolerance) of these conditions.

Ambient temperature	23°C ±1°C
Input waveform	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

5.8 Mechanics

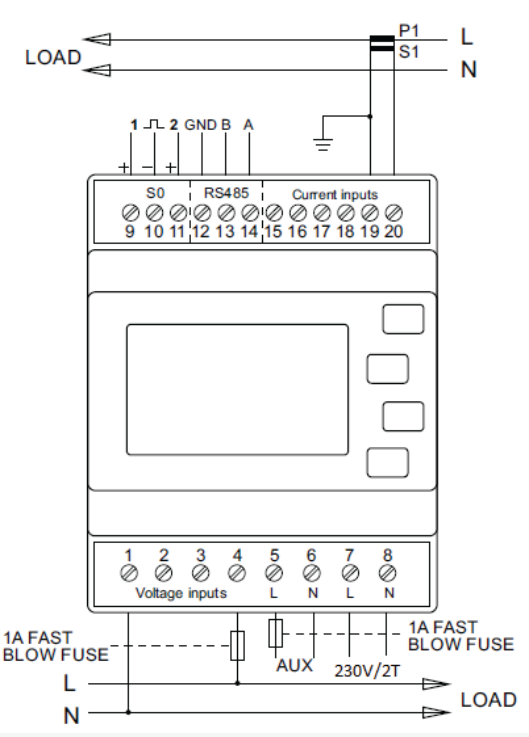
DIN rail dimensions	72 x 94.5 mm (WxH) per DIN 43880
Mounting	DIN rail (DIN 43880)
Sealing	IP20 (minimum)
Material	Self-extinguishing UL 94 V-0

DIMENSIONS

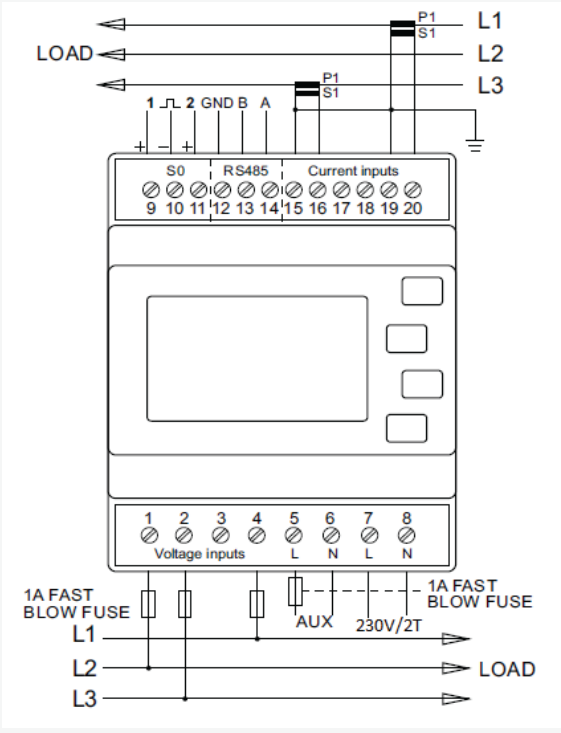


Height	94.5mm
Width	72mm
Depth	65mm

SINGLE PHASE TWO WIRE



THREE PHASE THREE WIRE



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