

User Manual

SDM230 Modbus v2

DIN Rail Smart Energy Meter for Single Phase **Electrical Systems**

1 Introduction

The Multifunction Energy Meter, SDM230 Modbus, is a new generation DIN rail mounted meter, used not only in the electricity transmission and power distribution system but also in power consumption measurement and analysis in high voltage intelligent power grid

This document provides operating, maintenance and installation instructions for the SDM230 Modbus. The unit measures and displays the characteristics of single phase two wire supplies including voltage, frequency, current, power, active and reactive energy, imported or exported. Energy is measured in kWh and kVArh. Maximum demand power can be measured over preset periods of up to 60 minutes.

The SDM230 Modbus features two built-in pulsed outputs and RS485 Modbus RTU comms. Configuration is password protected.

1.1 Unit Characteristics

The SDM230 Modbus can measure and display:

- Voltage
- Frequency
- Current
- Power, Maximum Demand Power and Power Factor
- Imported, Exported & Total Active Energy Imported, Exported & Total Reactive Energy

The unit has a Password-Protected set up menu for:

- Changing the Password
- Demand Interval Time
- Reset for Demand Measurements
- Pulse Output Duration

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

1.2 RS485 Serial – Modbus RTU

This uses an RS485 serial port with Modbus RTU protocol to provide a means of remotely monitoring and controlling the SDM230 Modbus. Set-up screens are provided for setting up the RS485 port. See section 4.3

1.3 Pulse output

This unit has 2 built-in pulsed outputs that record measured active and reactive energy. The constant for reactive energy is 5000imp/ kVArh. The pulse width for active energy can be set from the Set-up

2 Start Up Screens

ΣТ8™РЕХРМD1лл2 8888.8888.8888 PF Hz MkVArh MkWh .πIII % ⓒ ⊏⊒ ∄	The first screen lights all display segments and can be used as a display check		
2P IE - 2. I	The second screen indicates the firmware installed in the unit and its build number.		
Rdd 001	Next the unit will display the set Modbus address.		
bd 9600	Finally the meter will display the configured baud rate.		
*After a short delay, the screen will display the total active			

3.1 Measurements



Instantaneous Active Power (W).

Instantaneous Reactive Power (VAr).

Instantaneous Apparent Power (VA).

W

Π

VAr

VA



To enter set-up mode, press the 🚽 button for 3 seconds, until the password screen appears.		
PR50000	The set-up menu is password- protected so you must enter the correct password (default '1000') before proceeding.	
PR50000	Use the 🚺 button to change the selected number, use the 🚅 button to move right.	
PRS 1000	Once you have inputted the correct password hold the 🚽 button to confirm your selection.	
Err	If the inputted password is correct, access will be granted to the set up menu. If an incorrect password is inputted an error screen will appear and you will be prompted to try again.	

To exit the set-up menu, press & hold 💽 until the measurement screen is restored

4.1 Menu Option Selection

1. Use the 🐼 button to scroll through to the required item in the menu. The menu scrolls through on a loop.

- 2. Once on the desired menu option, press & hold 💶 to confirm your selection.
- 3. If an item flashes, then it can be adjusted by the 🚫 button. If not, there maybe a further layer
- 4. Once you have changed the selection to the desired option, press & hold 🔜 to confirm your selection. Once the option stops flashing it will set.

5. Having completed a parameter setting, press & hold the 🛁 button to exit the set-up menu.

4.2 Number Entry Procedure

When setting up the unit, some screens require the entering of a number. In particular, on entry to the set-up menu, 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 will start flashing and is set using the O button.
- 2. Press 💶 to move right to the next digit.

3. After setting the last digit, press & hold the 💶 button to confirm the change

4.3 Set Modbus Address

This sets the Modbus address of the specific meter so that clients using a Modbus system can differentiate between meters. Available options are 001-241.



screen is restored.

symbols per second transferred.

Warnings



4.3 Set Parity

Available options are none (N), even (E) & odd (O).

Prty N	Use the Obutton to choose the Parity menu option.
Prty <mark>N</mark>	Press & hold the 🚽 button to edit the menu option. The parity option will appear flashing.
Prty <mark>E</mark>	Use the 💟 button to cycle through the available options.
900d	Press & hold the 🚽 button to confirm the change to the option you have selected.

To exit the set-up menu, press & hold 🐼 until the measurement screen is restored

4.6 Set Pulsed Output

The SDM230 Modbus comes with 2 built-in pulsed outputs. One of the pulsed outputs is settable by the user, the other pulsed output is fixed. Available options for editable pulsed outputs are kWh, kVArh, Import kWh, Export kWh, Import kVArh & Export kVArh.

Please note there are limitations that need to be factored in when setting the pulsed output. This is based upon the relay output only being able to pulse 2 times in one second.



To exit the set-up menu, press & hold 💽 until the measurement screen is restored.

4.7 Set Pulse Constant

100 & 200mS.

The Pulse Constant is the menu setting that allows you to set how many times the meter will pulse to produce 1 pulsed output. Available options are 1, 10, 100 & 1000. For example, if you have set the Pulsed Output (see 4.4) to kWh, and the Pulse Constant is set to 10, the meter will pulse 10 times per kWh pulsed output.





To exit the set-up menu, press & hold 🕥 until the measurement screen is restored.

4.9 DIT - Demand Integration Time This sets the period in minutes over which the power readings are integrated for maximum demand measurement. The options are: off, 5, 10,15 30,60 minutes.



To exit the set-up menu, press & hold 💽 until the measurement screen is restored.

4.10 Automatic Scroll Time Interval Use this section to set the time interval for the meter to scroll through the different parameters.



To exit the set-up menu, press & hold 🕥 until the measurement screen is restored.

4.11 LP - Light Period

This sets the period in minutes over which the backlight on the meter stays on for. The options are: off, 5, 10,15 30,60 minutes. The option OFF means that the backlight stays on continuously.

Power (W), you can reset the Partial Active Energy (Σ kWh) and the Partial Reactive Energy (Σ kVArh).



To exit the set-up menu, press & hold 🕥 until the measurement screen is restored.



To exit the set-up menu, press & hold 🕥 until the measurement screen is restored

5 Specifications The SDM230 Modbus can monitor and display the following parameters of a single phase supply:

5.1.1 Voltage and Current

 Phase to neutral voltage 176 to 276V AC. Phase current

- 5.1.2 Power factor and Frequency and Max. Demand
- Frequency in Hz
- Instantaneous Power Power 0 to 999MW
- Reactive Power 0 to 999MVAr
- Volt-amps 0 to 999 MVA Maximum demanded power since last Demand reset Power factor

5.1.3 Energy Measurements

 Imported active energy 0 to 99999.9 kWh Exported active energy 0 to 99999.9 kWh 0 to 99999.9 kVArh Imported reactive energy Exported reactive energy 0 to 99999.9 kVArh Total active energy 0 to 99999.9 kWh 0 to 99999.9 kVArh Total reactive energy

 Relay output indicating real-time measured energy. (configurable) Pulse output 5000imp/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

Opto-coupler with potential free SPST-NO Contact (Contact rating 5-27V DC / Max current input: Imin 2mA and Imax 27mA DC). The pulse relay output can be set to generate pulses to represent kWh or kVArh

Rate can be set to generate 1 pulse per: 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 1200, 2400, 4800, 9600,

Parity none / odd / even

RS485 network address 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 Input waveform Input waveform Magnetic field of external origin

50 or 60Hz ±2% Sinusoidal (distortion factor < 0.005) Terrestrial flux

23°C ±1°C

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
Shock	30g in 3 planes

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

6 Meter

6.1 Dimensions



6.2 Appearance



7 Wiring Diagram



8 Notes



To exit the set-up menu, press & hold 🕥 until the measurement screen is restored

4.12 Reset (Clr) Within this menu option, you can clear the Maximum Demand

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5.2 Accuracy

Voltage

Current

Frequency

Power factor

Active power (W)

Reactive power (VAr)

Apparent power (VA)

Active energy (Wh)

0.5% of range maximum 0.5% of nominal 0.2% of mid-frequency 1% of unity (0.01) ±1% of range maximum ±2% of range maximum ±1% of range maximum 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 = 0.018%/°C, typical

> 1s, typical, to >99% of final reading, at 50 Hz.

- Active energy
- Response time to step input
- 5.3 Interfaces for External Monitoring

Three interfaces are provided:

 RS485 communication channel that can be programmed for Modbus RTU protocol



