SDM72CT-M

Three Phase Four Wire Energy Meter

- Measures kWh, kVArh, W, Var, VA, PF, Hz, V, A etc.
- Bi-directional measurement IMP & EXP
- Two pulse outputs
- RS485 Modbus
- Din rail mounting 35mm
- 1/5A CT connection
- Better than Class 1/ B accuracy

User Manual V1.1

2023

Introduction

The SDM72CT-M is digital three phase 4 wire energy meter with a white back-lighted LCD screen for perfect reading. The unit measures and displays the characteristics of three phase four wires(3p4w) supply, including voltage, frequency, current, power ,active and reactive energy, imported or exported. Energy is measured in terms of kWh, kVArh. 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

PART 1 Specification

General Specifications

Voltage AC (Un)	3x230(400)V
Voltage Range	80~120% Un
Base Current (Ib)	5A CT input
Max. Current (Imax)	6A
Mini Current (Imin)	0.05A
Starting current	0.4% of Ib
Power consumption	≤2W/10VA
Frequency	50/60Hz
AC voltage withstand	4KV for 1 minute
Impulse voltage withstand	6KV-1.2uS wavform
Overcurrent withstand	20Imax for 0.5s
Pulse output rate	Configurable (Pulse 1) 1000imp/kWh (Pulse 2)
Display	LCD with backlit
Max. Reading	999999.9kWh
Active energy	Class 1 IEC62053-21

Unit Characteristics

The Unit can measure and display:

- Line voltage of all phases
- Frequency
- Line Currents of all phases
- Power and power factor
- Active energy imported and exported
- Reactive energy imported and exported

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

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

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.

Pulse output

The unit provides two pulse outputs. Both pulse outputs are passive type.

Pulse output 1 is configurable. The pulse output can be set with Modbus protocol:

0.01 kWh / imp

0.1 kWh / imp

1 kWh /imp

10 kWh / imp

100 kWh /imp

1000=1000 kWh/kVArh

Pulse width: 200/100(default)/60ms can set with Modbus protocol.

Pulse output 2 is non-configurable. It is fixed up with total kWh. The constant is 1000imp/kWh.

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 (default)/odd/even

Stop bits 1 or 2

Data bit 8

Max.Bus loading 64pcs

Communication distance 1000M

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.

Environment

Operating temperature	-25℃ to +55℃
Storage and transportation temperature	-40℃ to +70℃
Reference temperature	23℃±2℃
Operating humidity	0 to 95%, non-condensing
Storage humidity	0 to 95%, non-condensing
Altitude	up to 2000m

Warm up time	10s
Installation category	CAT III
Mechanical Environment	M1
Electromagnetic environment	E2
Degree of pollution	2
Electrostatic discharges	8kV contact/ 15kV air gap
Electromagnetic HF fields	IEC 61000-4-3
Electrical fast transients	4kV
Surge	4kV
Radiated & conducted emissions	EN 55022

Mechanics

Din rail dimensions	72x100x66 (WxHxD) DIN 43880
Mounting	DIN rail 35mm
Sealing	IP51 (indoor)
Material	self-extinguishing UL94V-0
Insulating encased meter of protective class	II

PART 2 Operation

Initialization Display

When it is powered on, the meter will initialize and do self-checking.

	Full Screen
	Software Version

	Total active energy(kWh) Total=Import+ Export Max read: 9999999 kWh

Buttons function

There are two buttons on the front panel.

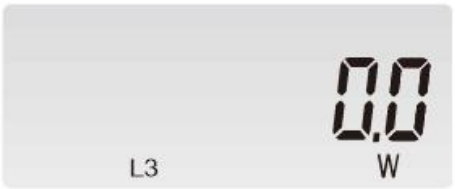
	>Scroll the display for data checking. >Changing option at Set-up mode >Exit the Set-up mode
	>Set-up mode entry >Confirmation

Scroll display

After initialization and self-checking program, the meter display the measured values. The default page is total kWh. If the user wants to check other information, please press the scroll button  on the front panel.

	Total active energy(kWh) Total=Import+ Export
	import energy
	export energy

	Total reactive energy (kVArh)
	Imp reactive energy
	Exp reactive energy
	Voltage L1
	Voltage L2
	Voltage L3
	Current L1
	Current L2

	Current L3
	Total active power (W)
	Active power L1
	Active power L2
	Active power L3
	Total reactive power (VAr)
	Reactive power L1
	Reactive power L2

	Reactive power L3
	Total apparent power (VA)
	Apparent power L1
	Apparent power L2
	Apparent power L3
	Total Power Factor
	Power Factor L1
	Power Factor L2

	Power Factor L3
	Frequency
	CT ratio
	Pulse Constant
	Modbus Address
	Baud Rate
	Parity

Set-up Mode

To get into Set-up Mode, the user need press the “Enter” button  for 3 second.

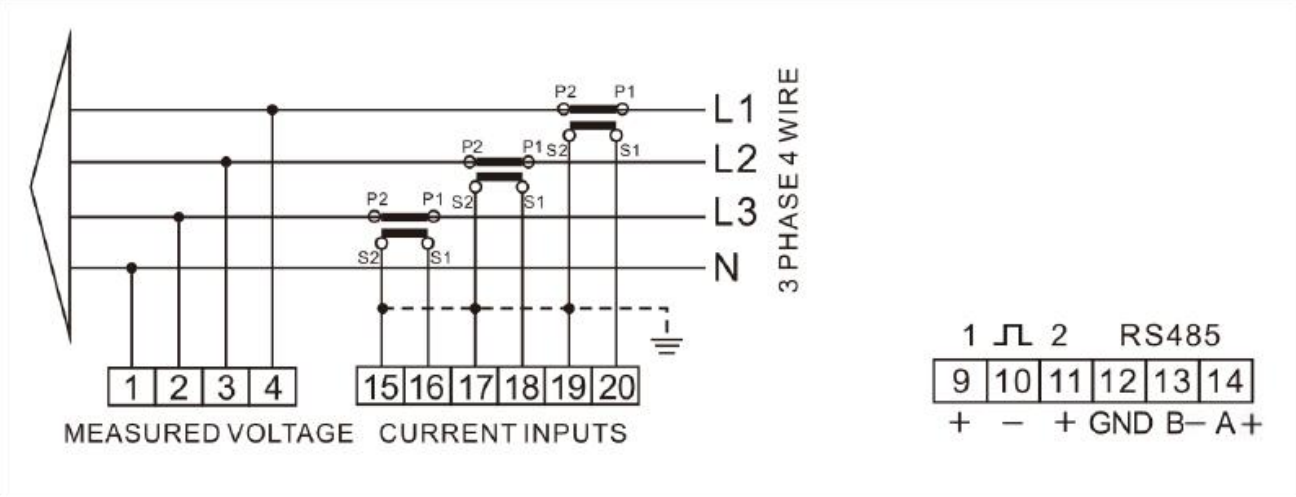
Page	Display	Descriptions

1		**Password** To get into Set-up mode, it asks a password confirmation. Default password: 1000 Use  and  to enter correct password.
		The entering information is wrong. The operation fails.
2		Keep pressing  for 3 second, the current selection will flash, use  and  to change the Modbus address. Options: 1~247 Keep press  for 3s to confirm the selection.
3		Keep pressing  for 3 second, the current selection will flash, use  and  to change the Baud rate. Options: 1.2k, 2.4k,4.8k,9.6k (default) Keep press  for 3s to confirm the selection.
4		Keep pressing  for 3 second, the current selection will flash, use  and  to change the Parity. Options: EVEN,ODD,NONE (default) Keep press  for 3s to confirm the selection.
5		Use  to select the CT ratio option. Keep pressing  for 3 second, the current selection will flash, use  and  to enter the CT Ratio. The range is from 0001 to 2000. For example, if using a 100A/5A current transformer, you shall enter 0020. Keep press  for 3s to confirm the selection.
5-1		

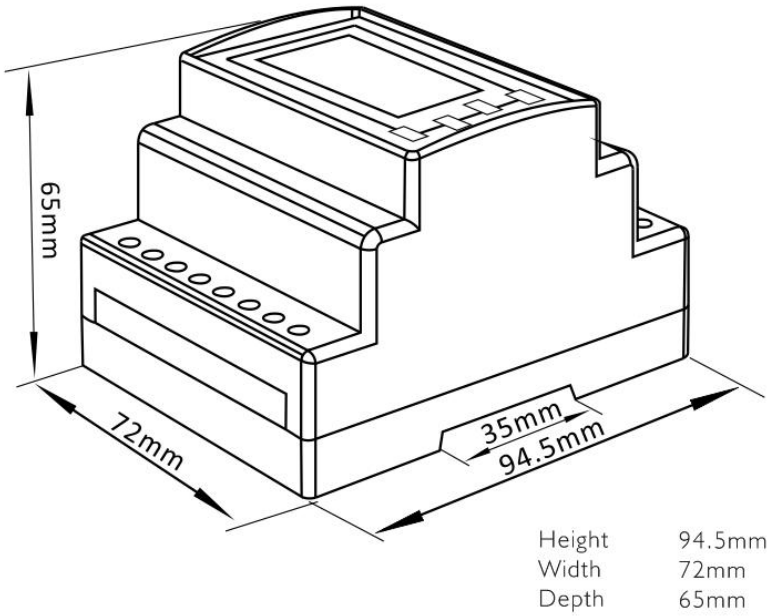
6		Use  to select the Password option. Keep pressing  for 3 second, the current selection will flash, use  and  to enter the new password. The range is from 0001 to 9999. Keep press  for 3s to confirm the selection.
6-1		

Keep pressing button  to exit the set-up mold.

Wiring diagram



Dimensions



PART 3 Modbus Protocol

Input Registers

Input registers are used to indicate the present values of the measured and calculated electrical quantities. Each parameter is held in two consecutive 16 big register. The following table details the 3X register address, and the values of the the address bytes within the message. A (*) in the column indicated the parameter is valid for the particular wiring system, Any parameter with a cross (X) will return the value zero. Each parameter is held in the 3X registers. Modbus Protocol function code 04 is used to access all parameters.

For example, to request: Amps 1 Start address = 0006
No.of registers = 0002
Amps 2 Start address = 0008
No. Of register = 0002

Each request for data must be restricted to 30 parameters or less. Exceeding the 30 parameter limit will cause a Modbus Protocol exception code to be returned.

	Input Register Parameter	Modbus Protocol Start	3 Ø	3 Ø	1 Ø

Address (Register)	Description	Length (bytes)	Data Format	Units	Address Hex				
					Hi Byte	Lo Byte	4 W	3 W	2 W
30001	Phase 1 line to neutral volts.	4	Float	V	00	00	√	X	√
30003	Phase 2 line to neutral volts.	4	Float	V	00	02	√	X	X
30005	Phase 3 line to neutral volts.	4	Float	V	00	04	√	X	X
30007	Phase 1 current.	4	Float	A	00	06	√	√	√
30009	Phase 2 current.	4	Float	A	00	08	√	√	X
30011	Phase 3 current.	4	Float	A	00	0A	√	√	X
30013	Phase 1 active power.	4	Float	W	00	0C	√	X	√
30015	Phase 2 active power.	4	Float	W	00	0E	√	X	X
30017	Phase 3 active power.	4	Float	W	00	10	√	X	X
30019	Phase 1 apparent power.	4	Float	VA	00	12	√	X	√
30021	Phase 2 apparent power.	4	Float	VA	00	14	√	X	X
30023	Phase 3 apparent power.	4	Float	VA	00	16	√	X	X
30025	Phase 1 reactive power.	4	Float	VAr	00	18	√	X	√
30027	Phase 2 reactive power.	4	Float	VAr	00	1A	√	X	X
30029	Phase 3 reactive power.	4	Float	VAr	00	1C	√	X	X
30031	Phase 1 power factor (1).	4	Float	None	00	1E	√	X	√
30033	Phase 2 power factor (1).	4	Float	None	00	20	√	X	X
30035	Phase 3 power factor (1).	4	Float	None	00	22	√	X	X
30043	Average line to neutral volts.	4	Float	V	00	2A	√	X	X
30047	Average line current.	4	Float	A	00	2E	√	√	√
30049	Sum of line currents.	4	Float	A	00	30	√	√	√
30053	Total system power.	4	Float	W	00	34	√	√	√
30057	Total system volt amps.	4	Float	VA	00	38	√	√	√
30061	Total system VAr.	4	Float	VAr	00	3C	√	√	√
30063	Total system power factor (1).	4	Float	None	00	3E	√	√	√
30071	Frequency of supply voltages.	4	Float	Hz	00	46	√	√	√
30073	Import Wh since last reset .	4	Float	kWh	00	48	√	√	√
30075	Export Wh since last reset .	4	Float	kWH	00	4A	√	√	√
30077	Import VArh since last reset .	4	Float	kVArh	00	4C	√	√	√
30079	Export VArh since last reset .	4	Float	kVArh	00	4E	√	√	√
30201	Line 1 to Line 2 volts.	4	Float	V	00	C8	√	√	X
30203	Line 2 to Line 3 volts.	4	Float	V	00	CA	√	√	X
30205	Line 3 to Line 1 volts.	4	Float	V	00	CC	√	√	X
30207	Average line to line volts.	4	Float	V	00	CE	√	√	X
30225	Neutral current.	4	Float	A	00	E0	√	X	X
30343	Total kwh (3)	4	Float	kWh	01	56	√	√	√
30345	Total kvarh (3)	4	Float	kVArh	01	58	√	√	√

Notes:

1. The power factor has its sign adjusted to indicate the direction of the current. Positive refers to forward current, negative refers to reverse current.
2. The power sum demand calculation is for import – export.
3. Total kWh / kVarh equals to Import + export.

Holding Registers

Holding register are used to store and display instrument configuration settings. All holding registers not listed in the table below should be considered as reserved for manufacturer use and no attempt should be made to modify their values.

The holding register parameters may be viewed or changed using the Modbus Protocol. Each parameter is held in two consecutive 4X registers. Modbus Protocol Function Code 03 is used to read the parameter and Function code 10 is used to write. Write only to one parameter per massage.

Address Register	Parameter Number	Parameter	Modbus Protocol Start Address Hex		Valid range	Mode
			High Byte	Low Byte		
40013	7	Pulse 1 Width	00	OC	Write pulse on period in milliseconds: 60, 100 or 200, default 200. **Length : 4 byte** **Data Format : Float**	r/w
40015	8	Access authority (write password to get the access and read the status of the access) (KPPA)	00	0E	Read: to get status of the current access. 0: failed to get the access 1 : already got the access Write: write correct password to get the access **Length : 4 byte** **Data Format : Float**	r/w
40019	10	Parity / Stop	00	12	Write the network port parity/stop bits for MODBUS Protocol, where: 0 = One stop bit and no parity, default. 1 = One stop bit and even parity. 2 = One stop bit and odd parity.3 = Two stop bits and no parity. **Length : 4 byte** **Data Format : Float**	r/w
40021	11	Modbus Address	00	14	Write the network port node address: 1 to 247 for MODBUS Protocol, default 1. **Length : 4 byte** **Data Format : Float**	r/w
40023	12		00	16	Write pulse rate index: n	r/w

		Pulse 1 Rate			= 1 to 5 1--0.01kwh/imp 2--0.1kwh/imp 3--1kwh/imp 4-10kwh/imp 5-100kwh/imp **Length : 4 byte** **Data Format : Float**	
40025	13	Password	00	18	Read：get password Write：change password **Length : 4 byte** **Data Format : Float**	r/w
40029	15	Network Baud Rate	00	1C	Write the network port baud rate for MODBUS Protocol, where: 0 = 2400 baud. 1 = 4800 baud. 2 = 9600 baud (default). 5 = 1200 band **Length : 4 byte** **Data Format : Float**	r/w
40033	17	CT ratio	00	20	CT ratio (Range: 0001－2000) **Default: 1** **Length : 4 byte** **Data Format : Float** (KPPA is asked)	r/w
40059	30	Time for scrolling display	00	3A	Default: 0, Unit: s **Range: 0~30, (** 0 means close scrolling) **Length : 4 byte** **Data Format : Float**	r/w
40061	31	Time of back light	00	3C	Default: 0. Unit: min Rang :0~120. (0 means the back light will work all the time) **Length : 4byte** **Data Format : Float**	r/w
40087	44	Pulse 1 Energy Type	00	56	Write MODBUS Protocol input parameter for pulse output 1： 1: import active energy 2: total active energy 4: export active energy, default 5: import reactive energy 6: total reactive energy 8: export reactive energy **Length : 4 byte**	r/w

					Data Format : Float	
464513	32257	Serial Number	FC	00	Serial number **Length : 4 byte** **Data Format : unsigned int32** **Note: Only read**	ro