SDM72CT-M-2T

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 V1.0

2023

Introduction

The SDM72CT-M-2T 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)	120% of Ib AC
Mini Current (Imin)	5% of Ib AC
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	9999999kWh
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

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 2400, 4800, 9600, 19200, 38400bps

Parity none (default)/odd/even

Stop bits 1 or 2

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℃
Relative humidity	0 to 95%, non-condensing
Altitude	up to 2000m
Warm up time	5s
Installation category	CAT III
Mechanical Environment	M1
Electromagnetic environment	E2
Degree of pollution	2

Mechanics

Din rail dimensions	72x100x66 (WxHxD) DIN 43880
Mounting	DIN rail 35mm
Sealing	IP51 (indoor)
Material	self-extinguishing UL94V-0

PART 2 Operation

Initialization Display

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

	Full Screen
 	Software Version (for kind prevail)
	Self Testing Page

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
	Resettable active energy (kWh)
	T1: total kWh
	T2: total kWh
	Resettable total kWh of T1
	Resettable total kWh of T2

	total kVArh of T1
	total kVArh of T1
	Voltage L1
	Voltage L2
	Voltage L3
	Current L1
	Current L2
	Current L3

	Total kW
	L1 kW
	L2 kW
	L3 kW
	Total reactive power (total VAr)
	Reactive power L1
	Reactive power L2
	Reactive power L3

	Total power factor
	L1 Power factor
	L2 Power factor
	L3 Power factor
	Frequency
	Max. Total Current demand
	Max. Total Power demand
	Pulse constant

	Address
	Baud rate
	Parity
	Software

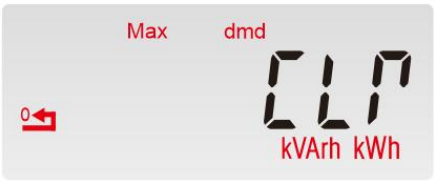
Set-up Mode

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. Use  and  to enter correct password.
		Default password: 1000
		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: 2.4k,4.8k,9.6k (default), 19.2k,38.4k 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.
		Keep pressing for 3 second, the current selection will flash, use and to change the Stop Bit. Options: 1 (default) or 2 Keep press for 3s to confirm the selection.
5		Use to select the CT option. First is to set the CT2 value, Keep pressing for 3 second, the current selection will flash, use and to enter the CT 2. The range is from 1 or 5. For example, if using a 100A/5A current transformer, you shall enter 5. Keep press for 3s to confirm the selection.
5-1		

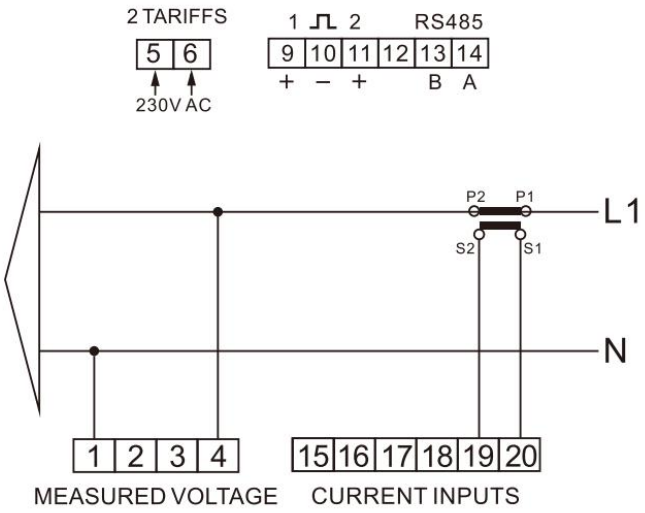
5-2		Second is to set the CT1 value, Keep pressing for 3 second, the current selection will flash, use and to enter the CT 1. The range is from 0005 to 9999 . For example, if using a 100A/5A current transformer, you shall enter 100. Keep press for 3s to confirm the selection.
6		Pulse Output type: Keep pressing for 3 second, the current selection will flash, use to choose the pulse output type. Default: export kWh Keep press for 3s to confirm the selection.
7		Set Pulse constant
7-1		Keep pressing for 3 second, the current selection will flash, use to choose the pulse constant. Default: 1000 imp Keep press for 3s to confirm the selection.
		Demand interval time setting Use to select the backlight set option. Keep pressing for 3 second, the current selection will flash, use and to set the value. Keep press for 3s to confirm the selection. Range: 0-60 mins, default: 60mins

		Keep pressing for 3 second, the current selection will flash, use to choose ON or OFF Default: Off Keep press for 3s to confirm the selection.
		Use to select the backlight set option. Keep pressing for 3 second, the current selection will flash, use and to set the value. Keep press for 3s to confirm the selection. Range: on,5,10,30,60,120, off On=0, means always on OFF=121, means always off Default: 60 mins
		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		
		Use to select the CLEAR option. Keep pressing for 3 second, the current selection will flash, Keep press for 3s to clear all the information.

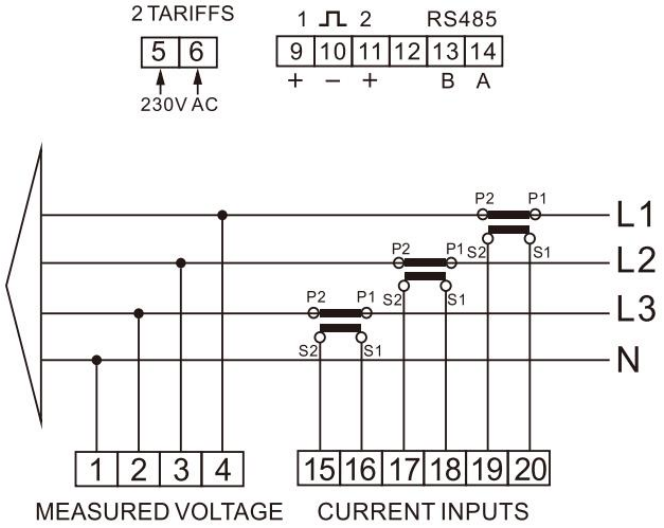
Keep pressing button to exit the set-up mold.

Wiring diagram

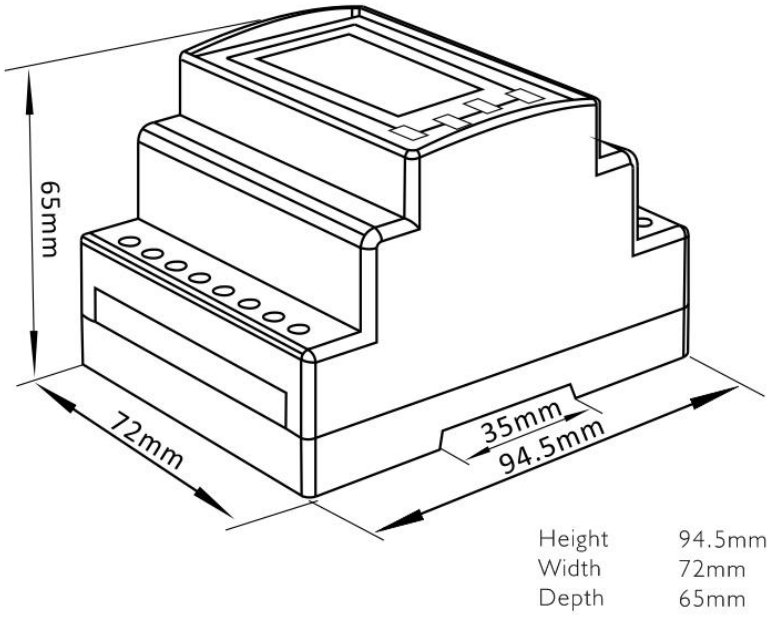
1P2W:



3P4W:



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.

Address (Register)	Input Register Parameter				Modbus Protocol Start Address Hex	
	Description	Length (bytes)	Data Format	Units	Hi Byte	Lo Byte
30001	Phase 1 line to neutral volts.	4	Float	V	00	00
30003	Phase 2 line to neutral volts.	4	Float	V	00	02
30005	Phase 3 line to neutral volts.	4	Float	V	00	04
30007	Phase 1 current.	4	Float	A	00	06
30009	Phase 2 current.	4	Float	A	00	08
30011	Phase 3 current.	4	Float	A	00	0A
30013	Phase 1 active power.	4	Float	W	00	0C
30015	Phase 2 active power.	4	Float	W	00	0E
30017	Phase 3 active power.	4	Float	W	00	10
30019	Phase 1 apparent power.	4	Float	VA	00	12
30021	Phase 2 apparent power.	4	Float	VA	00	14
30023	Phase 3 apparent power.	4	Float	VA	00	16
30025	Phase 1 reactive power.	4	Float	VAr	00	18
30027	Phase 2 reactive power.	4	Float	VAr	00	1A
30029	Phase 3 reactive power.	4	Float	VAr	00	1C
30031	Phase 1 power factor (1).	4	Float	None	00	1E
30033	Phase 2 power factor (1).	4	Float	None	00	20
30035	Phase 3 power factor (1).	4	Float	None	00	22
30043	Average line to neutral volts.	4	Float	V	00	2A
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 active energy	4	Float	kWh	00	48
30075	Export active energy	4	Float	kWh	00	4A
30095	Max.export active power demand of total(T1 + T2)	4	Float	W	00	5E
30201	Line 1 to Line 2 volts.	4	Float	V	00	C8
30203	Line 2 to Line 3 volts.	4	Float	V	00	CA
30205	Line 3 to Line 1 volts.	4	Float	V	00	CC
30207	Average line to line volts.	4	Float	V	00	CE
30225	Neutral current.	4	Float	A	00	E0

30343	Total kwh (3)	4	Float	kWh	01	56
30345	Total kvarh (3)	4	Float	kVArh	01	58
30385	resettable total active energy	4	Float	kWh	01	80
30397	Net kWh (Import - Export)	4	Float	kWh	01	8C
32629	Max. L1 current demand	4	Float	A	0A	44
32631	Max. L2 current demand	4	Float	A	0A	46
32633	Max. L3 current demand	4	Float	A	0A	48
32763	Max. current demand(total)	4	Float	A	0A	CA
34877	T1 total active energy	4	Float	kWh	13	0C
34879	T2 total active energy	4	Float	kWh	13	0E
34901	T1 total reactive energy	4	Float	kWh	13	24
34903	T2 total reactive energy	4	Float	kWh	13	26
35529	Max. import active power demand of T1	4	Float	kWh	15	98
35533	Max. import active power demand of T2	4	Float	kWh	15	9C
36145	Current resettable total active energy	4	Float	kWh	18	00
36157	Current resettable Tarrif-1 active energy	4	Float	kWh	18	0c
36159	Current resettable Tarrif-2 active energy	4	Float	kWh	18	0e
310017	Total apparent energy.	8	Int64	VAh	27	20
310021	Total active Energy	8	Int64	Wh	27	24
310025	Total reactive Energy	8	Int64	VArh	27	28
310101	T1 Total active energy	8	Int64	Wh	27	74
310105	T2 Total active energy	8	Int64	Wh	27	78
310117	T1 Import active energy	8	Int64	Wh	27	84
310121	T2 Import active energy	8	Int64	Wh	27	88
310133	T1 Export active energy	8	Int64	Wh	27	94
310137	T2 Export active energy	8	Int64	Wh	27	98

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	Modbus Protocol Start Address Hex		Valid range	Mode
		High Byte	Low Byte		
40001	Demand Time	00	00	Read minutes into first demand calculation. When the Demand Time reaches the Demand Period then the demand values are valid. **Length : 4 byte** **Data Format : Float**	ro
40003	Demand Period	00	02	Default 15,min. Range 0~60. Setting the period to 0 will cause the demand to show the current parameter value, and demand max to show the maximum parameter value since last demand reset. **Length : 4 byte** **Data Format : Float**	r/w
40005	Sliding time	00	04	Default 1,min. Range 0~(Demand Period - 1) **Length : 4 byte** **Data Format : Float**	r/w
40013	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	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	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	r/w

				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**	
40021	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	Pulse 1 Rate	00	16	Write pulse rate index: n = 1 to 5 1--0.01kwh/imp(default) 2--0.1kwh/imp 3--1kwh/imp 4-10kwh/imp 5-100kwh/imp **Length : 4 byte** **Data Format : Float**	r/w
40025	Password	00	18	Read：get password Write：change password **Length : 4 byte** **Data Format : Float**	r/w
40029	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). 3 = 19200 baud 4 = 38400baud **Length : 4 byte** **Data Format : Float**	r/w
40033	CT 1	00	20	CT 1 (Range: 0005—9999) **Default: 5** **Length : 4 byte** **Data Format : Float** (KPPA is asked)	r/w
40059	Time for scrolling display	00	3A	Default: 0, Unit: s **Range: 0~255 (** 0 means close scrolling) **Length : 4 byte** **Data Format : Float**	r/w
40061	Time of back light	00	3C	Default: 60. Unit: min Range 0~121， 0 means backlit always on ， 121 means backlit always off	r/w

				Length : 4byte **Data Format : Float**	
40087	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** **Data Format : Float**	r/w
461457	Reset historical data	F0	10	**00 00 = reset the Maximum demand** **00 03 = reset energy info** **Length : 2 byte** **Data Format: Hex**	wo
464513	Serial number	FC	00	Serial number **Length : 4 byte** **Data Format : unsigned int32** **Note: Only read**	ro
464515	Meter code	FC	02	Meter code SDM72CTM-2T = 01 00 **Length : 2 byte** **Data Format : Hex** **Note: Only read**	ro