

SNG96C

Multifunction Power Meter

-Modbus-RTU

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1. Overview

This user manual is the operation instruction for SNG96C multifunction power meter with Modbus-RTU protocol, which is used to help third party to operate and develop this meter.

2. Communication

2.1 Physical layer

Communication interface should be connected by shielded twisted-pair. Thirty-two meters are supposed to be connected to the same busbar at most. Terminal resistance should be connected to both ends of busbar. Communication speed is 1200 ~ 9600bps which can be set. Defaulted communication speed is 9600bps. Byte transmission format is composed of one start bit, eight data bits, no check bit or one odd bit or one even check bit, one or two stop bits.

2.2 Communication protocol

Message format

Address field	Function code field	Data field	Check field
one byte	one byte	N bytes	two bytes

◆ Address code

Address code is slave address with range of 1-247. Other addresses are reserved.

◆ Function code field

Function code field indicates the executive function of addressed terminal. Meaning and function of function codes supported by meter is shown in the following list.

Code	Meaning
0x03/0x04	Read data register value
0x10	Write Multiple Registers

◆ **Data code**

Data code includes the data which is needed by a terminal device when it performs a function or the data collected from a terminal device when it responds to an inquiry. These data may be numbers, referenced address or setting value. For example, when the function code tells a terminal device to read a register, the data field should indicate the terminal device that which register it should begin from and how much data it should read. The data code sent back from a terminal device includes data length and corresponding data. Data adopts Big Endian mode which means low byte is after high byte.

◆ **Check code**

Cyclical Redundancy Check (CRC16) field occupies two bytes including a 16-bit binary value. CRC value will be calculated by transmission equipment and be added to a data frame. When the receiving equipment receives the data, it will calculate CRC value again, and then it compares the two CRC values. If the two values are not equal to each other, an error will be detected.

2.3 Modbus-RTU communication protocol format

2.3.1 Read data register value (FC 0x03/0x04)

Request					
Frame structure	address code	function code	data		CRC
			Start address	number of register	
Byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes
data range	1~247	0x03/ 0x04		Max. 100	CRC16
message example	<u>0x01</u>	<u>0x03</u>	<u>0x00 0x06</u>	<u>0x00 0x06</u>	<u>0Xe4 0x36</u>
Response					
frame structure	address code	function code	data		CRC
			byte of register	register value	
byte	1 byte	1 byte	1 byte	12 bytes	2 bytes
message example	<u>0x01</u>	<u>0x03</u>	<u>0x0C</u>	<u>12-byte data</u>	<u>CRC16</u>

Remark: The initial register address in host inquiry is the initial address of the data collected from primary or secondary power grid. The number of register indicates the length of the data. In the upper list the register address “0x00 0x00” indicates the initial address of phase voltage float data of three phases, and the number of register “0x00 0x06” indicates the length of the data is 6 (three float data occupies six registers).

2.3.2 Write Multiple Registers (FC 0x10)

Request							
frame structure	address code	function code	data code				CRC
			initial relay address	relay length	relay byte	written value	
byte	1 byte	1 byte	2 bytes	2 bytes	1 byte	2N bytes	2 byte
data range	1~247	0x10	0x080A	0x0001	N		CRC16
message example	<u>0x01</u>	<u>0x10</u>	<u>0x08 0x0A</u>	<u>0x00</u> <u>0x01</u>	<u>0x02</u>	<u>0x0064</u>	<u>0x2ED1</u>
Request							
frame structure	address code	function code	data code		CRC		
			initial relay address	relay length			
byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes		
message example	<u>0x01</u>	<u>0x10</u>	<u>0x08 0x0A</u>	<u>0x00 0x01</u>	<u>0x2ED1</u>		

Remark: Please strictly follow the Meter setting information address list in appendix when writing setting register. Do not change the reserved data. Written data should not exceed set range. Wrong operation may cause meter damaged.

2.4 Data format

2.4.1 32-bit float format

32-bit float type data follows IEEE-754 format. Byte sequence of data adopts big-endian mode which means low byte is after high byte.

Float type data of three phase voltages are shown in the following list.

Address(Hex)	Data(Hex)	Description
0006-0007	435C-8000	V1 = 0x435C8000 = 220.5V
0008-0009	4360-4CCD	V2 = 0x43604CCD = 224.3V
000A-000B	435E-B333	V3 = 0x435EB333 = 222.7V

2.4.2 16-bit integer format

16-bit integer type data adopts two's complement storage mode. Byte sequence of data adopts big-endian mode which means low byte is after high byte.

Int data of three phase voltages harmonic are shown in the following list.

Address(Hex)	Data(Hex)	Description
0812	000F	Demand period = 0x000F=15min

2.4.3 32-bit long integer format

32-bit integer type data adopts two's complement storage mode. Byte sequence of data adopts big-endian mode which means low byte is after high byte.

Long data of energy accumulation time are shown in the following list.

Address(Hex)	Data(Hex)	Description
080E-080F	0000 0258	CT primary = 0x0000 0258=600A

3. Communication address information list

3.1 Basic parameters

Address	Format	Description1	Description2	R/W
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0006-0007	Float	V1	V	R
0008-0009	Float	V2	V	R
000A-000B	Float	V3	V	R
000C-000D	Float	V12	V	R
000E-000F	Float	V23	V	R
0010-0011	Float	V31	V	R
0012-0013	Float	I1	A	R
0014-0015	Float	I2	A	R
0016-0017	Float	I3	A	R
0018-0019	--	--		
001A-001B	Float	P1	kW	R
001C-001D	Float	P2	kW	R
001E-001F	Float	P3	kW	R
0020-0021	Float	P	kW	R
0022-0023	Float	Q1	kvar	R
0024-0025	Float	Q2	kvar	R
0026-0027	Float	Q3	kvar	R
0028-0029	Float	Q	kvar	R
002A-002B	Float	S1	kVA	R
002C-002D	Float	S2	kVA	R
002E-002F	Float	S3	kVA	R
0030-0031	Float	S	kVA	R
0032-0033	Float	PF1		R
0034-0035	Float	PF2		R
0036-0037	Float	PF3		R
0038-0039	Float	PF		R
003A-003B	Float	F	Hz	R
003C-0041	--	--		

0042-0043	Float	Import Active Energy	kWh	R
0044-0045	Float	Export Active Energy	kWh	R
0046-0047	Float	Import Reactive Energy	kvarh	R
0048-0049	Float	Export Reactive Energy	kvarh	R
004A-004B	Float	Present demand value -I1	A	R
004C-004D	Float	Present demand value -I2	A	R
004E-004F	Float	Present demand value -I3	A	R
0050-0051	Float	Previous demand value -I1	A	R
0052-0053	Float	Previous demand value -I2	A	R
0054-0055	Float	Previous demand value -I3	A	R
0056-0057	Float	Max. demand value -I1	A	R
0058-0059	Float	Max. demand value -I2	A	R
005A-005B	Float	Max. demand value -I3	A	R

3.2 Setup Parameters

Address	Format	Description1	Description2	R/W
803	Int	High byte	Back light delay time:0-255s 0:usually ON	R/W
0804	Int	High byte	Address: 1-247	R/W
		Low byte	Baud rate 0: 1200bps 1: 2400bps 2: 4800bps 3: 9600bps	
0805	Int	High byte	Parity 0: N,8,1 1: O,8,1 2: E,8,1	R/W

			3: N,8,2	
0808-080D	--	--	--	
080E-080F	Long	CT primary	1~9999A	R/W
0810	--	--	--	
0811	Int	CT secondary	5A	R
0812	Int	Demand period	1-30 min	R/W