ZH-40062A

6 Channel perforated AC current collector Operation Instructions

Keywords:AC current detection, current perforation input,RS485 communication,MODBUS protocol, DC RMS measurement, 6-channel AC acquisition

1.Product Overview

This product is a 6-channel AC current collector with perforated high current input, which can save one transformer on site; Adopting high-precision 24 bit dedicated AD chip, with a dynamic range ratio of up to 1000:1; True effective value measurement, high measurement accuracy, fast speed, good stability, and high communication speed. Fully isolated processing technology with strong anti-interference ability. The measurement of electrical parameters is remotely transmitted through RS485 digital interface output, and the product's MODBUS protocol is fully compatible with various configuration software or MODBUS (RTU) protocol in PLC devices. Has the following characteristics:

- ✧ The measurement has seven speed settings: 20ms, 40ms, 60ms, 80ms, 100ms, 400ms, and 1000ms.
- ✧ Available with wide power supply options: DC: 10-30V or 10-55V or AC/DC: 85-265V
- ✧ Multiple communication formats such as odd parity, even parity, no parity, and 2-stop bits can be freely set.
- ✧ The communication speed and address have two modes:software or hardware settings, making it easy to use
- ✧ Equipped with a frequency measurement function
- ✧ Equipped with multiple working operation indicator lights, the red light indicates normal operation of the product (measuring speed and flashing time), and the green light indicates product communication
- ✧ Strong anti-interference ability, with input, output, and power ports capable of withstanding surge voltages of up to 2KV or more
- ✧ Can combine any voltage and current input, with a total of 6 channels
- ✧ The power supply, communication, and input are isolated from each other, and the communication uses a dedicated 485 isolation chip,high reliability

2.Product Model

ZH-40062A-19N1/*A(6-channel current acquisition,85V-265V AC/DC power supply)；
ZH-40062A-14N1 /*A(6-channel current acquisition, 10V-30VDC power supply)；

If the power supply needs to be customized for 48V power supply, the product model suffix should be "-15N1", and the "* A" in the model represents the current range parameter of the module;

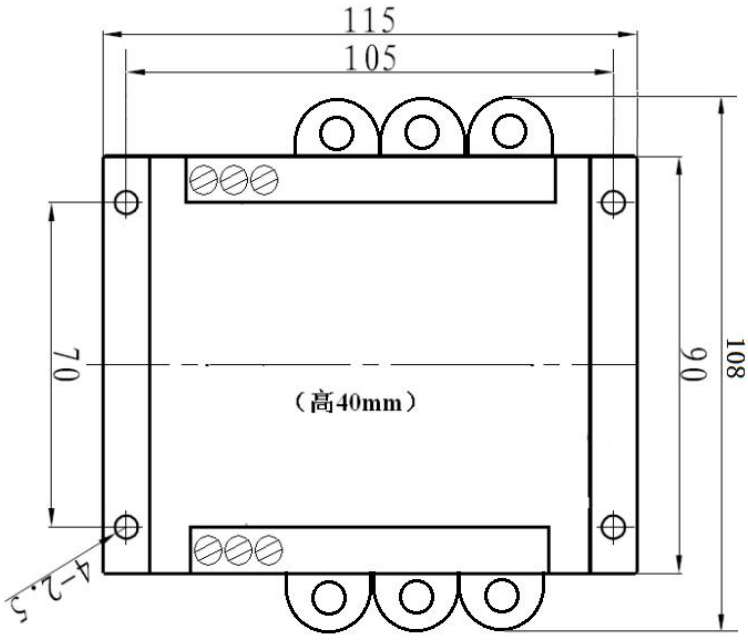
3.Performance index

- Accuracy level: 0.2% FS
- Current range: 100mA, 500mA, 1A, 5A, 10A, 20A, 30AAC (others can be customized)
- Current perforation aperture: 6mm
- Frequency response: 30Hz-1KHz
- Working temperature: -20 ℃~+60 ℃
- Temperature drift: ≤ 100ppm/℃
- Data update time: 20ms, 40ms, 60ms, 80ms, 100ms (default), 400ms,1000ms
- Isolation voltage withstand:> 2500V DC
- Auxiliary power supply:+ 10V~+30VDC or+10V~+55VDC or 85~265VAC
- Rated power consumption:< 1W
- Output interface: RS485 (standard Modbus RTU communication protocol)
- Data output: The effective values of 6 AC sampling data channels and 1 frequency data channel
- Communication baud rates: 4800, 9600, 19200, 38400, 57600, 115200bps
- Data format: no parity/odd parity/even parity, 8 data bits, 1 stop bit;
  Or special method: no checksum, 9 digits (the 9th digit can be set to 1 or 0)

Note: The default factory parameters for this product are: Address 1, baud rate 9600, no checksum, 8 data bits, and 1 stop bit

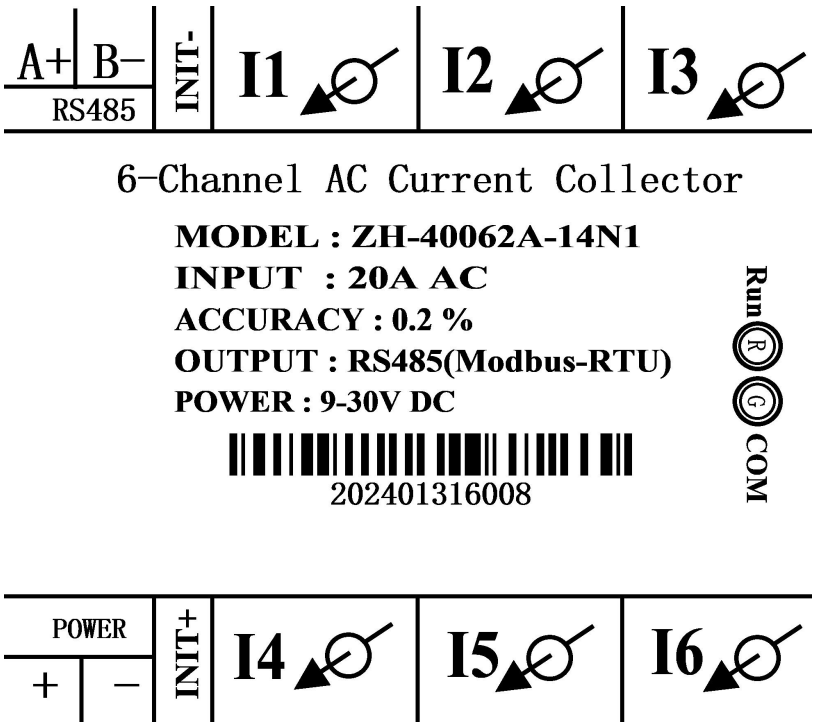
4.Product Outline Structure Diagram

Appearance diagram (rail installation)



Product dimension diagram（Unit:mm,Height:40 mm）

5.Product wiring diagram



Product wiring reference diagram

Definition and Explanation of Pin Wiring	
VCC	DC power supply positive or 220V power supply
G	DC power supply ground or 220V power supply
initialization (Positive and negative terminals)	Address and baud rate reset to factory settings 1 and 9600 baud rate. After short circuiting the two terminals, power on the module to complete initialization
DATA+	RS485 communication interface
DATA-	
I1/I2/I3/I4/I5/I6	1-6 current perforation inputs
Operation/communication light	When the product is powered on,Run light flashes once every 100mS, it indicates that the AD acquisition is running normally; The communication RX and TX lights flash when there is data transmission and reception. RX (green) is the communication receiving light, and TX (red) is the communication transmitting light Simple communication fault diagnosis: 1. If the RX green light stays on after connecting the RS485 communication line after power on, it indicates that the communication line is connected in the wrong direction; 2. When the communication host sends a command, only the RX light flashes, and the TX light does not flash, indicating that the communication command is incorrect or the serial port parameters are incorrect. The module has received the command but the data is incorrect and has not responded to sending data; When the host sends commands, the communication lights on the module do not flash. Please check the hardware communication line. If there is an error in the serial port setting or if there is a fault in the communication line, the data has not been sent to the module port;

6.MODBUS Communication protocol

Message format

(1) Function code 03H -- Query the contents of the device register

Main device message

From device address	(01H-FFH	1 byte)
Function code	(03H	1 byte)
Starting register address	(2 bytes)	
Number of registers	(2 bytes)	
CRC check code	(2bytes)	

Correct message from device

From device address	(01H-FFH	1 byte)
Function code	(03H	1 byte)
Number of bytes in the data area (2*Number of registers 1 byte)		
Data area (Register Content 2 * Register Number Section)		
CRC check code	(2 bytes)	

(2)Function code 10H - Set data to slave device register

Main device message

From device address	(01H-FFH	1 byte)
Function code	(10H	1 byte)
Starting register address	(2 bytes)	
Number of registers	(2 bytes)	
Number of bytes in the data area (2 * Number of registers 1 byte)		
Write data to the register (2 * Number of registers in bytes)		
CRC check code	(2 bytes)	

Correct message from device

From device address	(01H-FFH	1 byte)
Function code	(10H	1 byte)
Starting register address	(2 bytes)	
Number of registers	(2 bytes)	
CRC check code	(2 bytes)	

Note: 1. The low bit of the CRC check code is before and the high bit is after, and the register address, number of registers, and data are all before and after the high bit;

2. The register word length is 16 bits (two bytes)

Register Description and Command Format

(1) Definition Table of Electrical Parameter Data Register

(H in the Address Table represents hexadecimal data)

Register address(Hex)	Register content	Number of registers	Register Status	Range
0000H	1 channel current	1	read only	Value=DATA/10000*Range
0001H	2 channel current	1	read only	Value=DATA/10000*Range
0002H	3 channel current	1	read only	Value=DATA/10000*Range
0003H	4 channel current	1	read only	Value=DATA/10000*Range
0004H	5 channel current	1	read only	Value=DATA/10000*Range
0005H	6 channel current	1	read only	Value=DATA/10000*Range
0006H	F frequency	1	read only	Value=DATA/100; When the frequency is greater than 500Hz, only divide by 10; The frequency can be measured up to 2kHz
0028H	Onboard temperature	1	read only	Reserved function, currently unavailable

Note: The range value multiplied should be calculated based on the range on the product label

(2)Module Name, Address, and Baud Rate Register Definition Table

Register address(Hex)	Register content	Number of registers	Register Status	Range
004FH	response time	1	Write	0:100 mS;1:80 mS;2:60 mS;3:40 mS 4:20 mS;5:400 mS;6:1000mS
0050H	address	1	Read/write	Address(0-256) (note 1)
0051H	Baud rate	1	Read/write	Baud rate(00-10)
0052H	Parity check	1	Read/write	0-No parity,1-Odd Parity,2-even parity check, 3-2 stop bit,Sign position 4-2 stop bit,Space position
0053H	Voltage range	1	Read/write	0-65536 (Not involved in calculation)
0054H	Current range	1	Read/write	0-65536 (Not involved in calculation)
0055H	Module Name - High	1	Read/write	Default: 3430H
0056H	Module Name - Medium	1	Read/write	Default: 3430H
0057H	Module Name - Low	1	Read/write	Default: 3430H

(Note 1): Baud rate code settings: 00-115200bps 01-9600bps 02--19200bps 03--38000bps 04--2400bps 05--4800bps 06--9600bps 07--19200bps 08--38400bps 09--57600bps 0A --115200bps; When setting the baud rate with the hardware dip switch, please refer to the setting method on the last page;

(3)Command examples

All register address bytes, register digit sections, and data bytes in the command are placed first and last, respectively; The low byte of the CRC checksum comes first, followed by the high byte

A:Example of command to read all data

From device address	Function code	Starting register address		Number of registers		CRC-L	CRC-H
01H	03H	00H	00H	00H	06H	C5H	C8H

Explanation: 00H is the high byte of the register address, 01H is the low byte of the register address, and the data output sequence is shown in the<<Electric Parameter Data Register Definition Table>>; Modify the number of registers to be read according to the required parameters.

B:Example of modifying address and baud rate commands

(Address changed from 01 to 02, baud rate changed to 19200bps)

From device address	Function code	Starting register address		Number of registers		Number of data bytes	Write data to the register				CRC-L	CRC-H
							Address		Baud rate			
01H	10H	00H	50H	00H	02H	04H	00H	02H	00H	07H	16H	91H

Explanation: Baud rate code settings: 00-115200bps 01-9600bps 02--19200bps 03--38000bps 04--2400bps 05--4800bps 06--9600bps 07--19200bps 08--38400bps 09--57600bps 0A --115200bps; When setting the baud rate with the hardware dip switch, please refer to the setting method on the last page

C:Example of reading module names and configuration commands:

From device address	Function code	Starting register address		Number of registers		CRC-L	CRC-H
01H	03H	00H	50H	00H	09H	85H	DDH

D:Example of command to modify parity check method: (changed to send check method)

From device address	Function code	Starting register address		Number of registers		Number of data bytes	Write data to the register		CRC-L	CRC-H
01H	10H	00H	52H	00H	01H	02H	00H	01H	6AH	22H

E:Example of broadcasting command to modify address to 1

(in this case, regardless of the original address, it should be modified to address 1)

From device address	Function code	Starting register address		Number of registers		Number of data bytes	Write data to the register		CRC-L	CRC-H
FAH	10H	00H	81H	00H	01H	02H	00H	01H	0EH	B5H

7.Hardware dial address and software address selection function

（1）Hardware or software configuration function selection

There is a hardware address and software address selection switch inside this board. When DZ1 is short circuited, it sets the communication address and baud rate mode for the hardware; Set the communication address and baud rate mode for the software without inserting a short-circuit block. (The product defaults to software settings at the factory)

Hardware setting address and baud rate: switch short circuit

Software settings address and baud rate: switch off

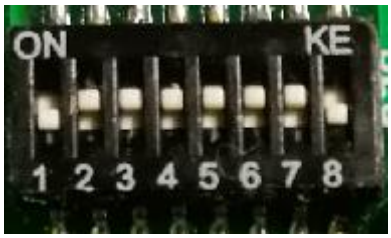
（2）Instructions for setting the address and baud rate of the dip switch

There is also an 8-bit DIP dual row dial switch inside this board, which is used for setting the address and baud rate when selecting the hardware communication address and baud rate mode. When the switch is "ON", it is "0"; When 'OFF' is' 1 '

1~6 are address settings, optional addresses are: 00H~3FH (hexadecimal) 0~63D (decimal)

7-8 are baud rate settings, with optional baud rates of 00H~03H (hexadecimal) 0~3D (decimal)

Code definition:0--115200bps 1--9600bps 2--19200bps 3--38400bps



Attachment 1: Address Code Comparison Table

Switch address setting	Address code（HEX）	Address code (decimalism)	Baud rate setting	Baud rate
1st OFF state, 2nd to 6th ON state	01	1	No 7,8 ON	115200
2nd OFF state, 1st/3-6 ON state	02	2	No 7 OFF, No 8 ON	9600
1/2 OFF status, 3-6 ON status	03	3	No 7 ON, No 8 OFF	19200
3 OFF status, 1-2/4-6 ON status	04	4	No 7,8 OFF	38400
1/3 OFF status, 2/4-6 ON status	05	5		
2/3 OFF status, 1/4-6 ON status	06	6		
……..	…	…		
2nd ON status, 1st/3-6 OFF status	3D	61		
1st ON status, 2nd to 6th OFF status	3E	62		
FF Status 1-6	3F	63		

8.Frequently Asked Questions

Serial Number	related issues	Explanation and Answer
1	Red light status	1. Power on, the red light flashes at a frequency of 100mS ,it works normally. 2. The red light flashes slowly, and when the flashing frequency is around 1.6 seconds, the watchdog resets, causing on-site interference or product abnormalities. If the red light does not light up when powered on, first test the working current of the power supply (normal working 30mA). If there is no working current or the working current is very high, then the power supply is abnormal.
2	Communication RX, TX light status	1. When communication is normal, the RX light for data reception and the TX light for data transmission should flash once every transmission and reception; 2. When the host sends a command, both lights do not respond. It is recommended to first check if the wiring is correct or if the intermediate circuit conversion device is functioning properly. This situation is generally due to a wiring issue between the host and the product. RX light flashes, TX light does not flash. Please check if the communication address/baud rate and the verification code of the communication command are correct;
3	Testing software usage	1. If the software prompts for missing "*. ocx" files when running, please download the relevant control files from the network and register. The specific registration method for Baidu related controls is as follows:; 2. The testing software can modify the address and baud rate.
4	Used on PLC or touch screen	This product is compatible with the standard MODBUS-RTU protocol, and all PLCs and touch screens that support the MODBUS communication protocol can be used with this power meter

Attachment 1: MODBUS_CRC16 Verification Code Calculation Method

The CRC area of the cyclic redundancy check is 2 bytes and contains a 16 bit binary data. The sending device calculates the CRC value and attaches it to the message. When the receiving device receives the message, it recalculates the CRC value and compares it with the actual value received in the CRC area. If the two are not the same, an error is generated.

At the beginning of CRC, all 16 bits of the register are set to "1", and then the data of two adjacent 8-bit bytes are put into the current register. Only the 8-bit data of each character is used to generate CRC, and the start bit, stop bit, and parity bit are not added to CRC.

During the generation of CRC, every 8 bits of data are XORed with the value in the register, and the result is shifted one bit to the right (towards LSB direction), and "0" is filled into the MSB to detect LSB. If LSB is "1", it is XORed with the preset fixed value, and if LSB is "0", no XOR operation is performed.

Repeat the above process until it is shifted 8 times. After completing the 8th shift, the next 8-bit data is XORed with the current value of the register. After all information is processed, the final value in the register is the CRC value.

The process of generating CRC:

1. Set the 16 bit CRC register to FFFFH

2. XOR the first 8-bit data with the lower 8 bits of the CRC register and place the result in the CRC register.

3. Move the CRC register to the right by one bit, zero the MSB, and check the LSB

4. (If LSB is 0): Repeat by 3 and move one more bit to the right.

(If LSB is 1): XOR CRC register with A001 H

5. Repeat steps 3 and 4 until 8 shifts are completed, completing the processing of 8-bit bytes.

6. Repeat steps 2 to 5 to process the next 8-bit data until all bytes are processed.

The final value of the CRC register is the CRC value.

When inserting CRC values into information, the high 8 bits and low 8 bits should be placed separately.

Put the CRC value into the information

When sending a 16 bit CRC value in a message, send the lower 8 bits first and then the higher 8 bits.

If the CRC value is 1241 (0001 0010 0100 0001):

Addr	Func	Data Count	Data	Data	Data	Data	CR C_{Lo}	CR C_{Hi}
							41	12

Figure 1: The external current clamp method, our company can provide current clamp matching calibration with high accuracy

Version: @ 19.2