

# AC/DC current and voltage type intelligent electric quantity transmitter/sensor/transformer instructions

## 1. Physical interface and functional characteristics:

- 1.1 RS485 is adopted for serial communication.
- 1.2 The transmission mode is half-duplex asynchronous mode, with 1 start bit, 8 data bits and 1 stop bit, without check.
- 1.3 The factory address defaults to 01H, and the baud rate defaults to 9600bps.
- 1.4 In the bus equipment, this sensor is a slave, with current (or voltage) input and standard RS-485 digital interface output, which realizes the interconnection with computers, PLC, touch screens and other upper computers. It is widely used in electric power, communication, transportation, environmental protection, petrochemical, steel and other fields to detect the current or voltage consumption of AC and DC equipment.
- 1.5 Adopt professional algorithm of industrial imported chip, with high precision.
- 1.6 With automatic thermal shutdown and ESD protection functions.
- 1.7 A variety of power supply modes are available, such as DC12V, DC15V, DC24V, 220V, etc.
- 1.8 A variety of installation methods are available, including standard guide rail installation, plane screw fixation, detachable split structure, PCB welding installation, etc.
- 1.9 Adopt new electromagnetic isolation and photoelectric isolation technology with low power consumption.
- 1.10 The average working time is more than 100,000 hours, and the working environment temperature is -20°C ~ 80°C
- 1.11 Support special customization of three parameters: input range, output type and working power supply.

## 2. Example of read data command:

### 2.1 Single input transmitter COMMAND (download command):

Slave address	function code	Start register address		Number of registers		CRC-L	CRC-H
01H	03H	00H	56H	00H	01H	64H	1AH

### RETURN (return information):

Slave address	function code	Number of bytes in data area	A/D-H	A/D-L	CRC-L	CRC-H
01H	03H	02H	24H	F6H	23H	02H

**Description:**

2.1.1 Calculation formula:  $I_z = \text{DATA} \times \text{electric quantity range} / 10000$ ; if the ordered transmitter measures in positive and negative directions, the calculation formula is:  $I_z = \text{DATA} \times (A_f - A_0) / 10000 - |A_0|$  ( $A_f$  is the nominal maximum value entered on the label, and  $A_0$  is the nominal minimum value)

2.1.2 Where A/D-H= the upper 8 bits of current (or voltage) data and A/D-L= the lower 8 bits of current (or voltage) data. In the above example, A/D-H=0x24 , A/D-L=0xF6 are combined into hexadecimal =0x24F6 , and the return data is calculated as the formula:  $I_z = \text{DATA} \times I_0 / 10000$ ; Where DATA is the returned data value (A/D-H + A/D-L), the data type is unsigned number, and if  $I_0$  is the current measuring range 100A; If the return data is 0x24F6=9462 (decimal), the measured actual current  $I_z = 9462 \times 100 / 10000 = 94.62\text{A}$ ; ; The voltage sensor is calculated in the same way as the current sensor.

**2.2 Two-way input transmitter COMMAND (download command):**

Slave address	function code	Start register address		Number of registers		CRC-L	CRC-H
01H	03H	00H	10H	00H	02H	C5H	CEH

**RETURN (return information):**

Slave address	function code	Number of bytes in data area	First circuit electric quantity		The second circuit electricity		CRC-L	CRC-H
			A/D-H1	A/D-L1	A/D-H2	A/D-L2		
01H	03H	04H	1FH	3FH	0AH	74H	CBH	6CH

**2.3 Three-way input transmitter COMMAND(downtransmission command) :**

Slave address	function code	Start register address		Number of registers		CRC-L	CRC-H
01H	03H	00H	10H	00H	03H	04H	0EH

**RETURN (return information):**

Slave address	function code	Number of bytes in data area	First circuit electric quantity		The second circuit electricity		Third circuit electricity		CRC-L	CRC-H
			A/D-H1	A/D-L1	A/D-H2	A/D-L2	A/D-H3	A/D-L3		
01H	03H	06H	1EH	AFH	1EH	1CH	1EH	B1H	F8H	E9H

3. Example of the command for changing the address (station number) : (Change the slave address from ADD1 to ADD2) COMMAND(send down a command)

Slave address	function code	Start register address		Number of registers		Number of data bytes	Data written to a register		CRC-L	CRC-H
01H (ADD1)	10H	00H	57H	00H	01H	02H	00H	02H (ADD2)	2AH	76H

RETURN (return information):

02H	10H	00H	57H	00H	01H	B0H	2AH
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Description:

3.1. The above command ADD1 is the original address number of the transmitter, and ADD2 is the address number to be changed.

3.2. The factory default address of the sensor is 01H. The ADD1 and ADD2 addresses range from 00 to FFH.

3.3. If the current address of the transmitter is not clear, you can reset the address to 01H by using the FA broadcast command as follows:

FAH	10H	00H	57H	00H	01H	02H	00H	01H	1DH	43H
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When ADD1 is FA, it is a broadcast command. At the current correct baud rate, no matter how many transmitter addresses are on the 485 bus, this command will forcibly change the address to 01H. It should be noted that this command should be used with caution in the networking of multiple slave computers, so as not to change the other slave computers.

4. Example Command for modifying the baud rate: (Change the Baud rate to 4800bps) COMMAND(send down a command) :

Slave address	function code	Start register address		Number of registers		Number of data bytes	Data to be written to the register		CRC-L	CRC-H
01H	10H	00H	20H	00H	01H	02H	00H	05H Baud rate coding	61H	33H

Note: Code matching wave rate: 03H-1200bps 04H-2400Bps 05H-4800bps 06H--9600bps 07H -- 19200bps 08H-28800bps 09H-57600bps; After sending the command to modify the baud rate, communicate according to the baud rate corresponding to the modified code. The factory default baud rate is 9600bps.

5. Example command for reading transmitter address and baud rate.

**COMMAND(send down a command) :**

Slave address	function code	Start register address		Number of registers		CRC-L	CRC-H
01H	03H	00H	20H	00H	02H	C5H	C1H

**RETURN (return information):**

Slave address	function code	Number of registers		Address of the current slave		Current slave baud rate	CRC-L	CRC-H
01H	03H	04H	00H	01H	00H	09H	6BH	F5H

Note: In the data frame returned after the downtransmission command is sent (yellow mark) : 01H is the address of the current slave machine, 09H is the baud rate of the former slave machine 57600bps (see the fourth baud rate code).

**6. Message format**

**6.1 Function code 03H-- Query slave register data**

**Host Packet (downtransmission)**

Slave address	1 byte (00H~FFH)
Function code	1 byte (03H)
Start register address	2 bytes
Number of registers	2 bytes
CRC check code	2 bytes

**Slave Message (Response)**

Slave address	1 byte (00H~FFH)
Function code	1 byte (03H)
Number of registers	1 byte
Data field	2*Number of register bytes Register content
CRC check code	2 bytes

**6.2 Function code 10H—number of slave units**

**Host Packet (downtransmission)**

Slave address	1 byte (00H~FFH)
Function code	1 byte (10H)
Register address	2 bytes
Number of registers	2 bytes

Number of bytes in data area	1 byte 2*Number of registers
Data written to the register	Number of bytes=2*Number of registers
CRC check code	2 bytes

### Slave Message (Response)

Slave address	1 byte (Data written to the register)
Function code	1 byte (10H)
Register address	2 bytes
Number of registers	2 bytes
CRC check code	2 bytes

## 7. Register description

### 7.1 Single-channel electric quantity sensor register definition table

Register address	Register content	Number of registers	Register status	Scope of data
0056H	Single circuit power	1	read-only	0~10000

### 7.2 Dual-channel and three-channel sensor register definition table

Register address	Register content	Number of registers	Register status	Scope of data
0010H	First circuit electric quantity	1	read-only	0~10000
0011H	The second circuit electricity	1	read-only	0~10000
0012H	Third circuit electricity	1	read-only	0~10000

Description:

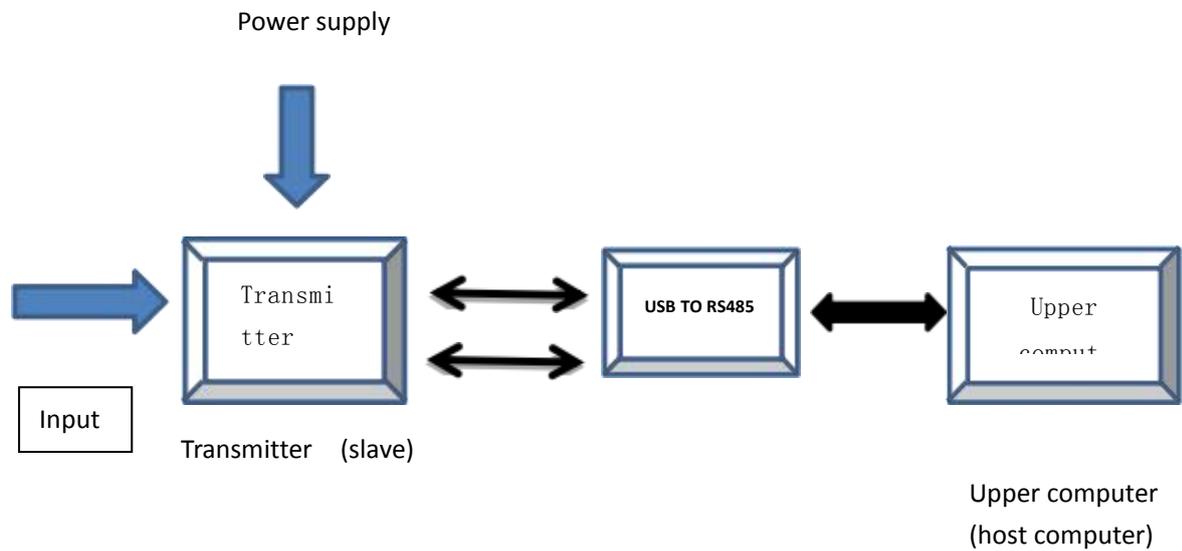
1. When the transmitter input is double, take the first and second electric quantity
2. For the dual input of the transmitter with the combination of current and voltage, the first input is voltage data and the second input is current data.
3. For the transmitter with multiple inputs such as two and three channels, if it is necessary to read a certain path of electricity separately, it is only necessary to read the corresponding register of that path separately, and the number of registers is set to one. (For example: Now you only need to read the third circuit, do not want to read the first and second circuit, send down the command: 01H 03H 00H 12H 00H 01H 24H 0FH)

### 7.3 Address, baud rate register definition table

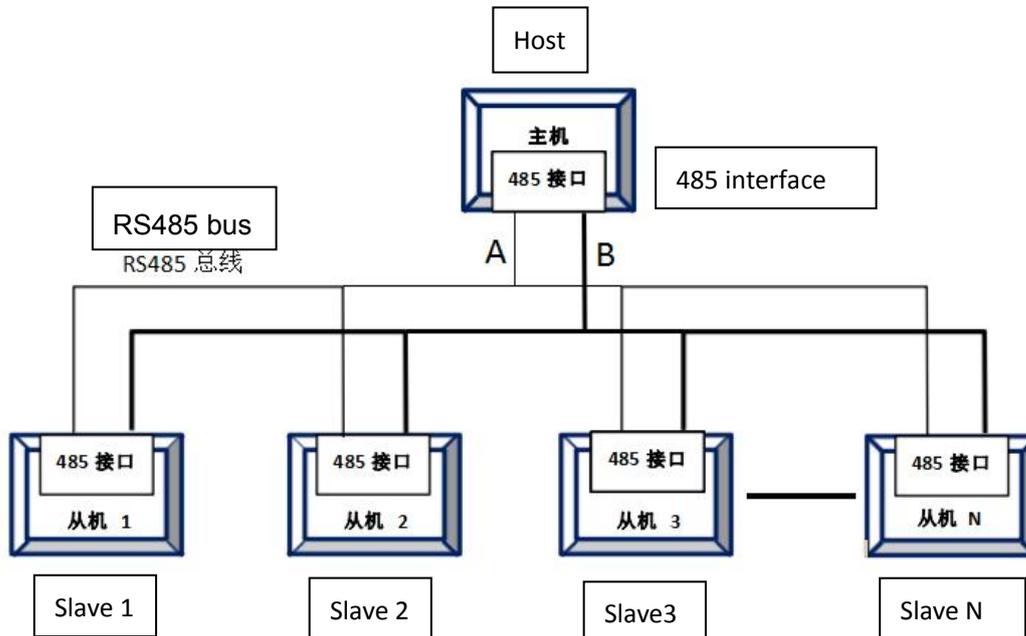
Register address	Register content	Number of registers	Register status	Scope of data
0057H	Address	1	Read/write	00H~FFH
0020H	Baud rate	1	Read/write	03H~09H

## 8. Schematic diagram of master-slave connection:

### 8.1 Single machine Communication



### 8.2 Multi-machine communication:



### 9. Application instance

Model: the T4I

Input: AC0 ~ 20 a

Output: RS485

Power supply: + 12 v

Baud rate: 9600bps

Address: 01 h

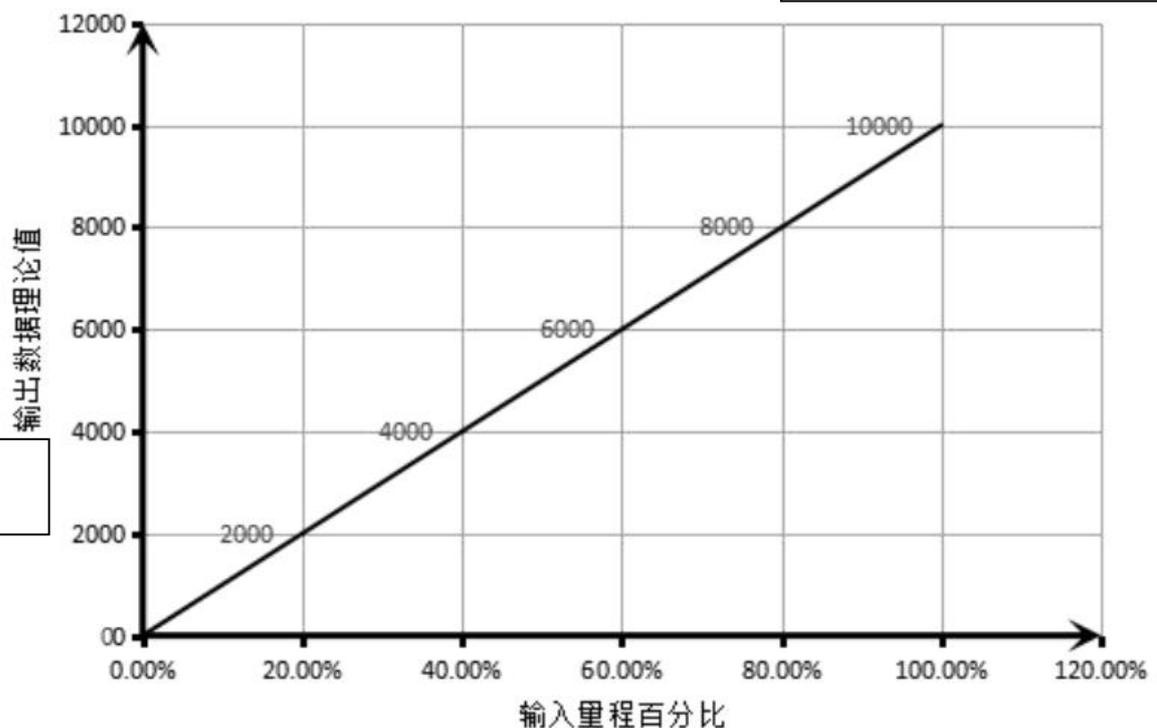
Calculation formula:  $I_z = \text{DATA} * I_0 / 10000$  ( $I_0$  is the current range 20A, DATA is the returned data value A/D-H + A/D-L)

Input and output reference table (theoretical value) :

	Current input	Output (A/D-H+A/D-L)	Output (decimal)
0%	0	0000H	0
20%	4	07D0H	2000
40%	8	0FA0H	4000
60%	12	1770H	6000
80%	16	1F40H	8000
100%	20	2710H	10000

典型参数特性曲线

Typical parameter characteristic curve



Theoretical value of output data

Input range percentage

Description: Sensor indicator state: red light interval flashing frequency 500ms, then the work is normal; The green light blinks during normal communication and goes off during no communication. Please correctly connect sensor output terminals A and B, but the connection fails to communicate. The sensor has been accurately calibrated before delivery, and the user generally does not need to check again. Some models have no indicator light, subject to the specific model and parameters, normal use can be.

### PC software debugging -- Modbus Poll

