User’s Manual for BACnet IP Concentrator

一、 Hardware Preparation

（1） Mbus Concentrator;

（2） One 103E Energy meter(serial number：30002096)、one 280T meter （serial number：70171389）and one 280W-SI water meter（serial number：82619500)(Here’s just to illustrate with these three meters in conjunction with the concentrator);

（3） One BACnet IP Module;

（4） One USB to RS232 Tool（9-pin male connector with USB-A male end and 232 serial port at one end);

（5） A network cable.

1、Mbus Concentrator

Diagram of Concentrator、 parameters and communication interface

The diagram of concentrator is shown in Figure 1.

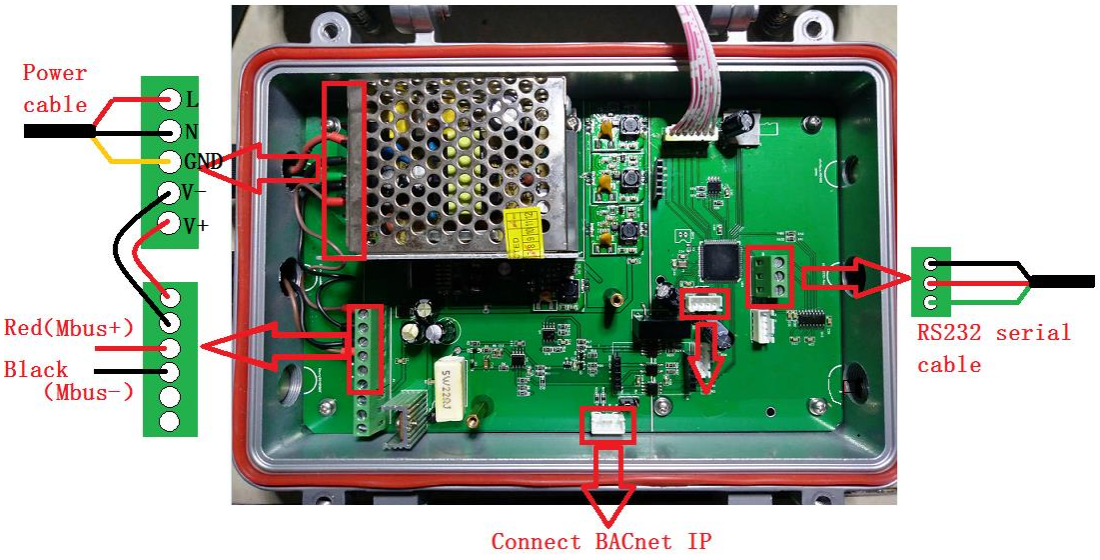


Figure 1 Hardware connection diagram of BACnet IP concentrator

The parameter of BACnetIP Concentrator

Item		Specification
Uplink A (BACnet network)	Baud Rate	Baud rate:9600,Parity:NONE,Data bits:8,Stop bits:1
Uplink B (RS232)		Baud rate:2400,Parity:EVEN,Data bits:8,Stop bits:1
Downlink(Mbus)		Baud rate:2400,Parity:EVEN,Data bits:8,Stop bits:1
Data transmission		Uplink：BACnet，Downlink：90 slaves(Mbus meter)

load capacity	90 slaves
Dimension	290mm×200mm×80mm（length×witdh×height）
Enclosure	IP65

1）Uplink BACnet IP

The network interface of the uplink BACnet IP module is connected to the network interface of the PC, and the measurement data of the surface of the ultrasonic water meter, the ultrasonic heat meter and the energy meter are read on the SMC sierra monitor monitoring platform.

（2）Uplink RS232 serial port

The upstream RS232 serial port of the concentrator is connected with the PC, and the metering data of the ultrasonic water meter, the ultrasonic heat meter and the energy meter are read and read by the Mbsheete software for on-site debugging.

（3）Downlink Mbus serial port

In the downlink Mbus bus connection end of the concentrator, it supports ultrasonic water meter, ultrasonic heat meter and energy meter, etc. The total number of connectable meter is 100, which can be mixed with various types of meter ends.

2、Type of meter

The image of the 280T meter, 280W-SI and 103E meter is shown in Figure 2(a).

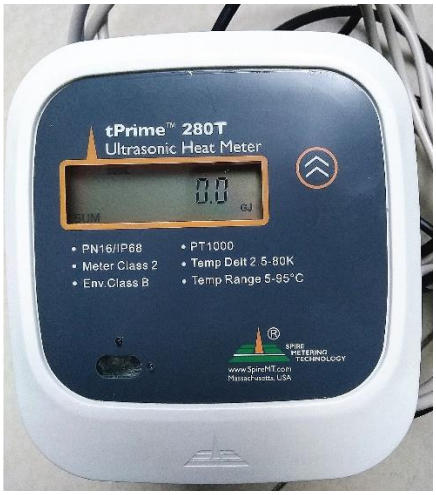


Figure 2(a) 280T meter

Figure 2(b) 280W-SI water meter

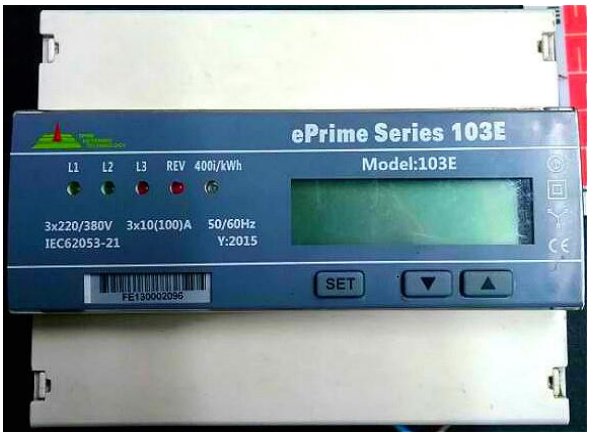


Figure 2(c)103E Energy meter

3、BACnet IP Module

BACnet IP Module as shown in Figure3(a)、3(b)

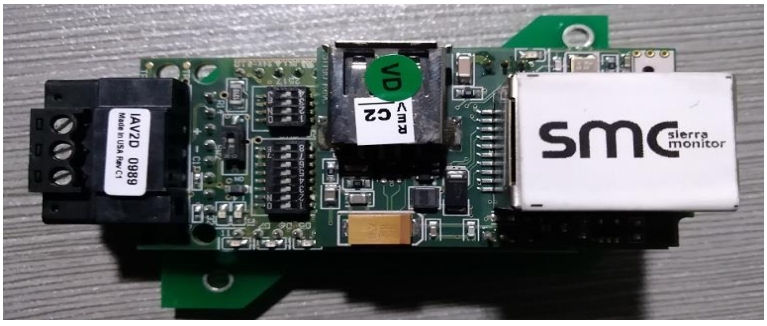


Figure3(a)

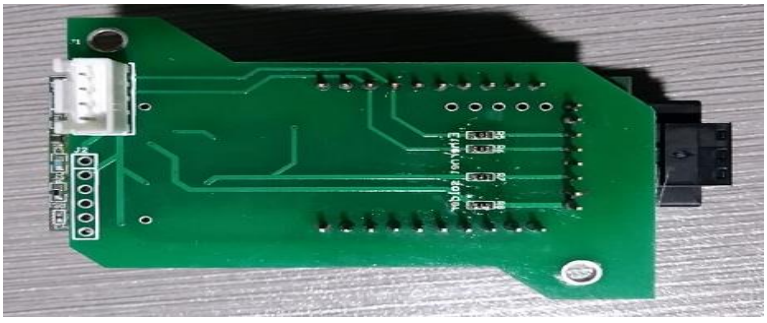


Figure3(b)

二、 The software preparation

The tools that the software needs to prepare are as follows.

（1） Mbsheete.exe;

（2） FieldServer Toolbox;

三、Set the address

Set the meter address with Mbsheete software

Set the meter address with Mbsheete software

An ultrasonic water meter, an ultrasonic heat meter or an energy meter is connected to the downlink Mbus bus of the concentrator. Since the SMC sierra monitor platform can only recognize the device address of 1 to 100, the Mbus bus of the concentrator can only connect 100 meters. After connecting the meter, open the “Mbsheete” software, and then select the serial port number according to the serial port, and set the baud rate to “2400”, as shown in Figure 4 below.

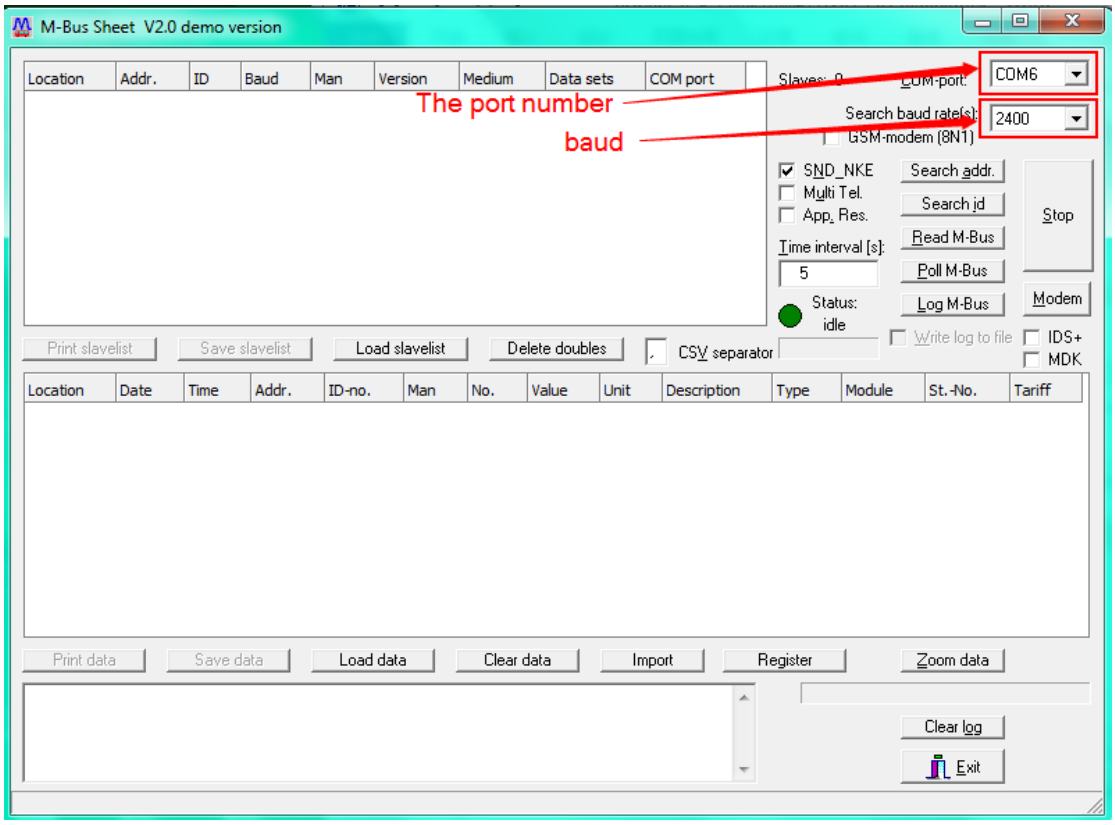


Figure 4

Click the “Search id” button to search the serial number of the meter. As shown in Figure 5(a) below, the data of the meter searched by serial number is as shown in Figure 5(b).

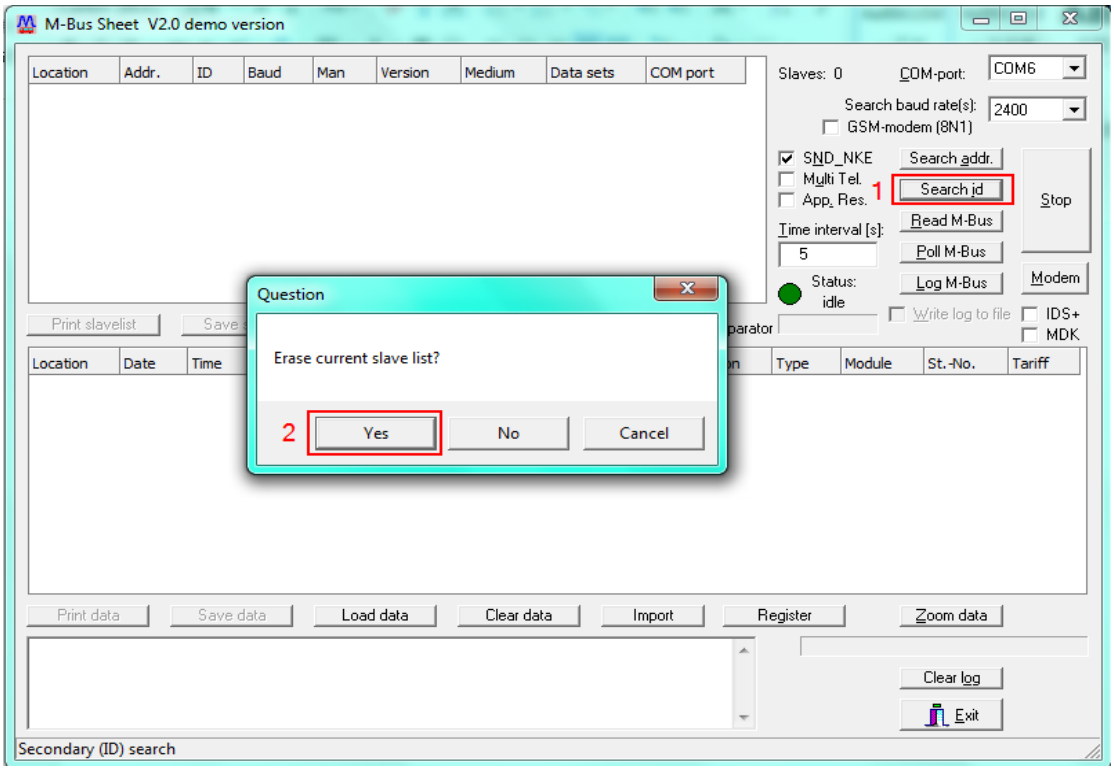


图 5（a）

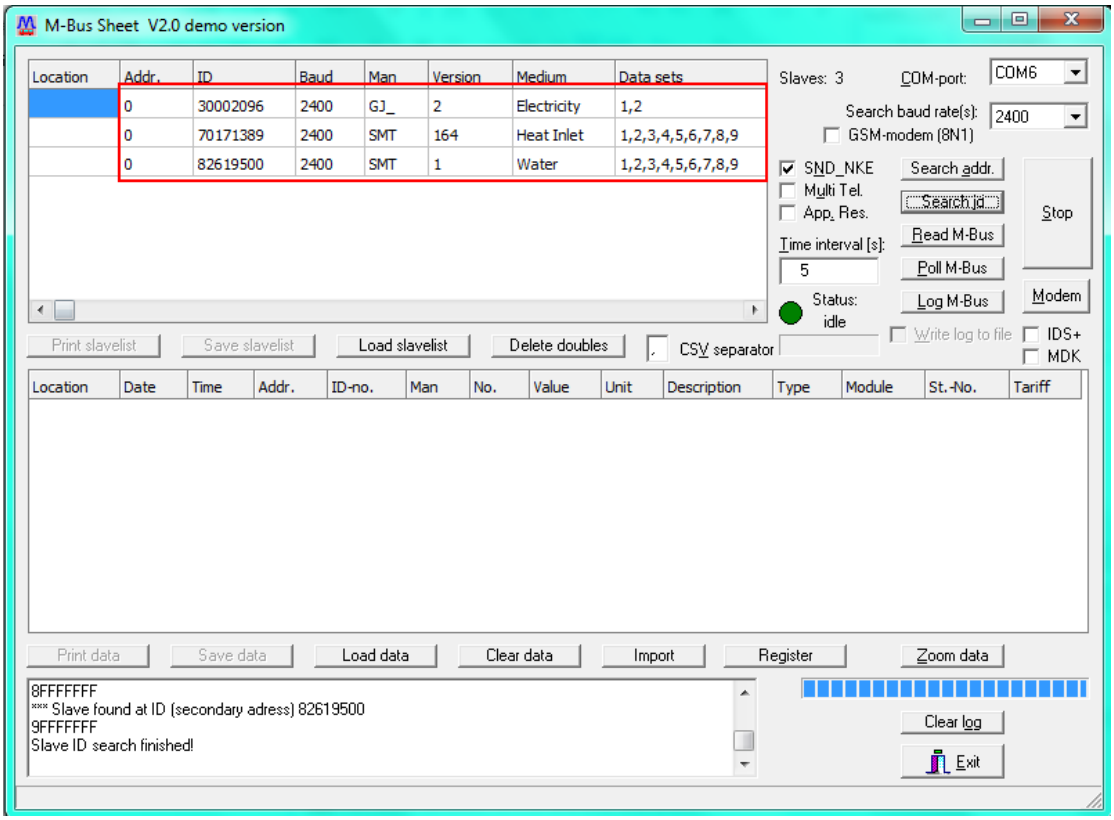


Figure 5(b).

If the Mbus bus of the concentrator is connected to 100 meters, the addresses of the 100 meters may not be sorted from 1 to 100. Use the

"Mbsheete" software to search by serial number, and after searching the meters serial number, set the meters address from "1".

Now we only have three meters under this concentrator. Figure 5(b) above is the serial number of the three meters that the Mbsheete software searches for by serial number. Now we start to reset the meters address, left click In the "Addr." column in front of the serial number of the "Mbsheete" software, enter the meters address with "1", then right-click to the menu box, and then select "Set addr.via ID" as shown in Figure 6 below.

Set the meter address with the serial number "30002096" to "1".

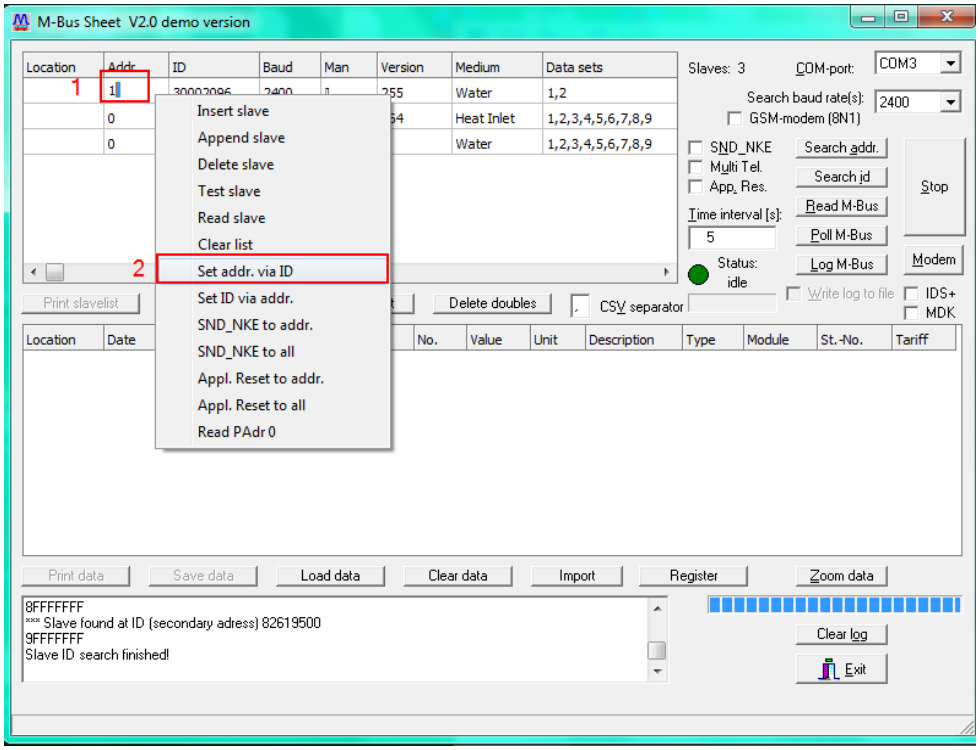


Figure 6

After the setting is successful, the Mbsheete software will reply with an "E5" response, as shown in Figure 7 below.

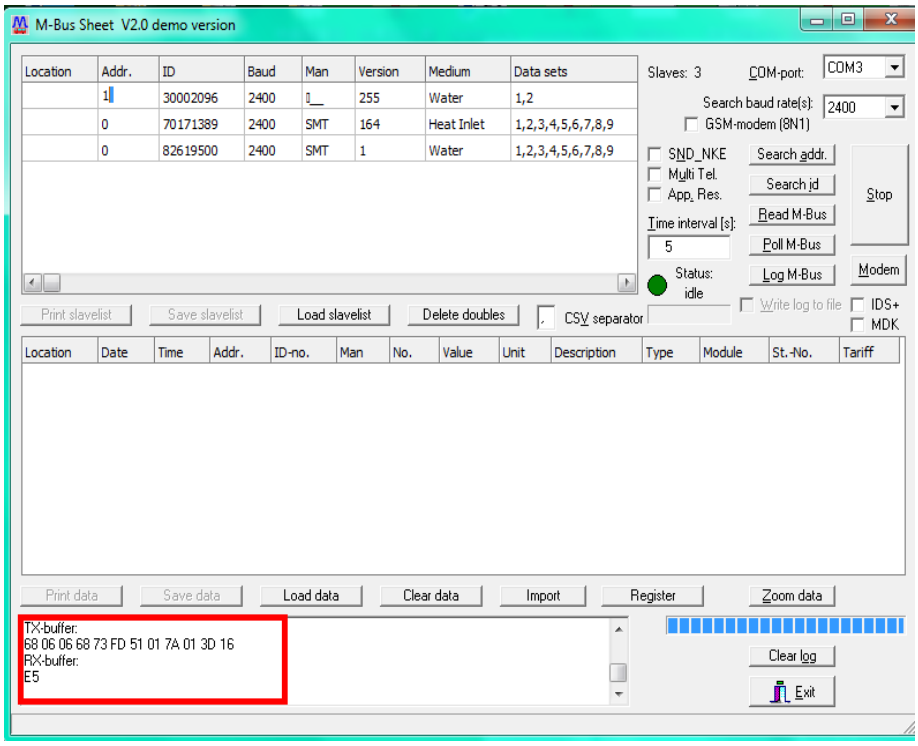


Figure 7

The other meter address setting method is similar to the setting table address being "1". The set meter address is as shown in Figure 8.

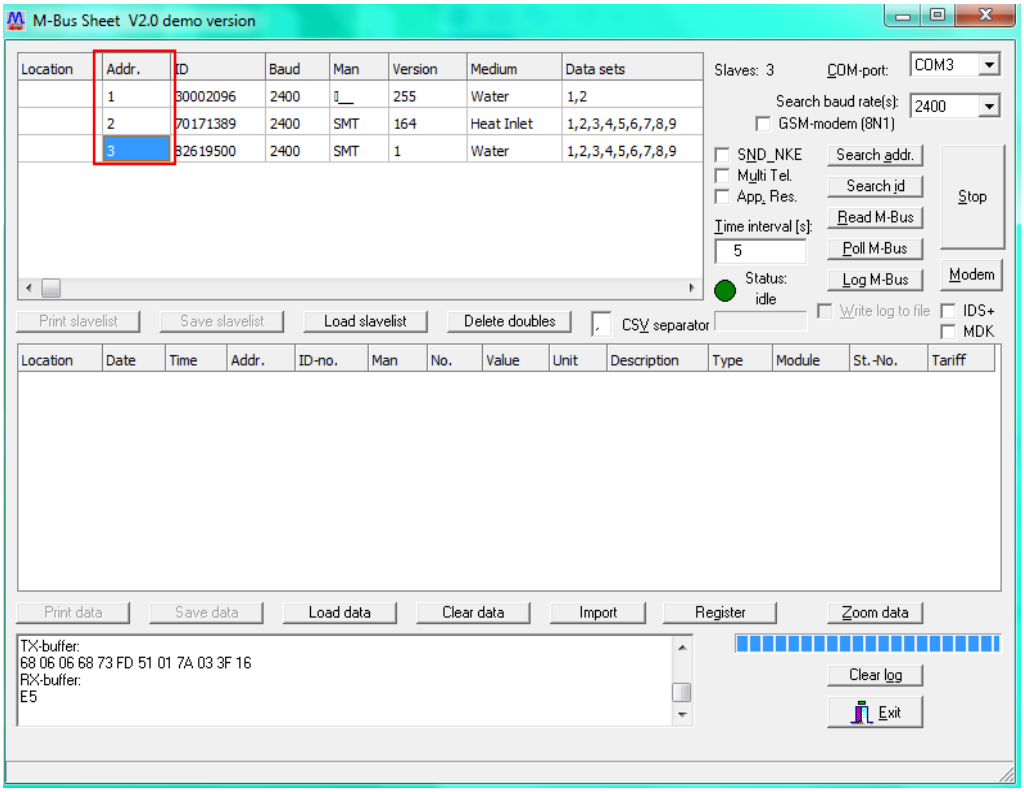


Figure 8

Tips 1:

On the MBsheete software, when searching the meter managed by the

concentrator with "Search id", the serial number of the individual meter may not be searched. As shown in Figure 9, the serial number of meter "70171389" is not searched.

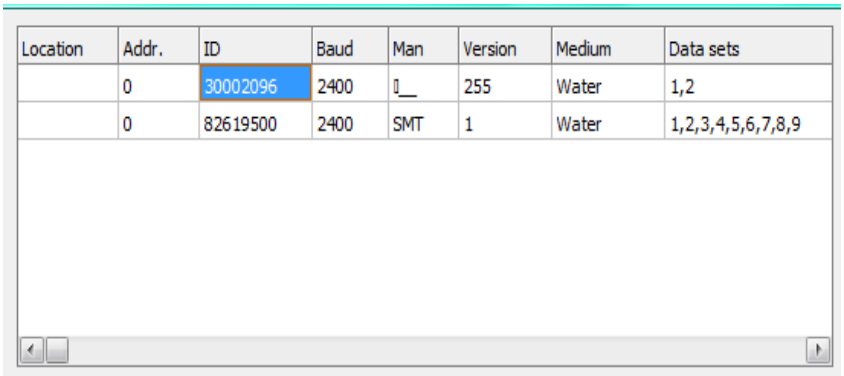


Figure 9

You need to manually enter the serial number on the Mbsheete software to search. Click the serial number of a meter under the "ID." column, right click and select "Insert slave", as shown in Figure 10 below.

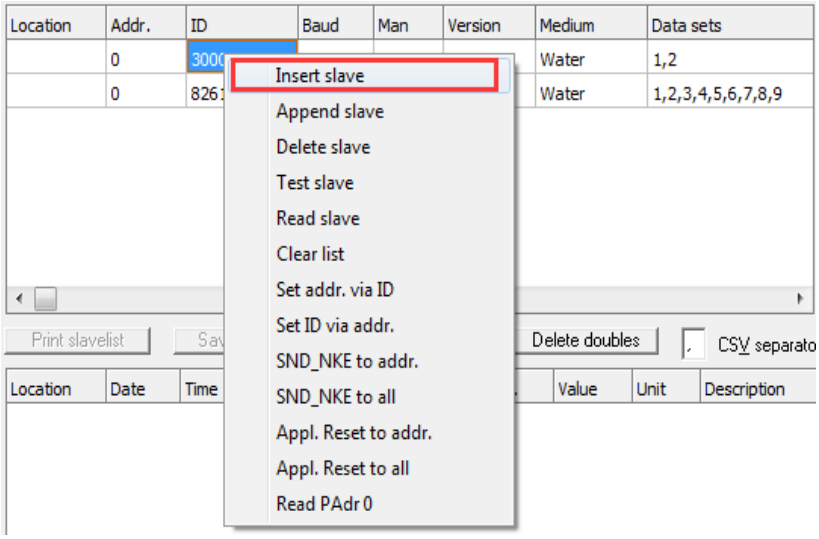


Figure 10

Enter the serial number and point to the serial number box you just entered, then right-click and select "Read slave" to read the metering data of the meter. If the reading is successful, it will appear as shown in Figure 11 below.

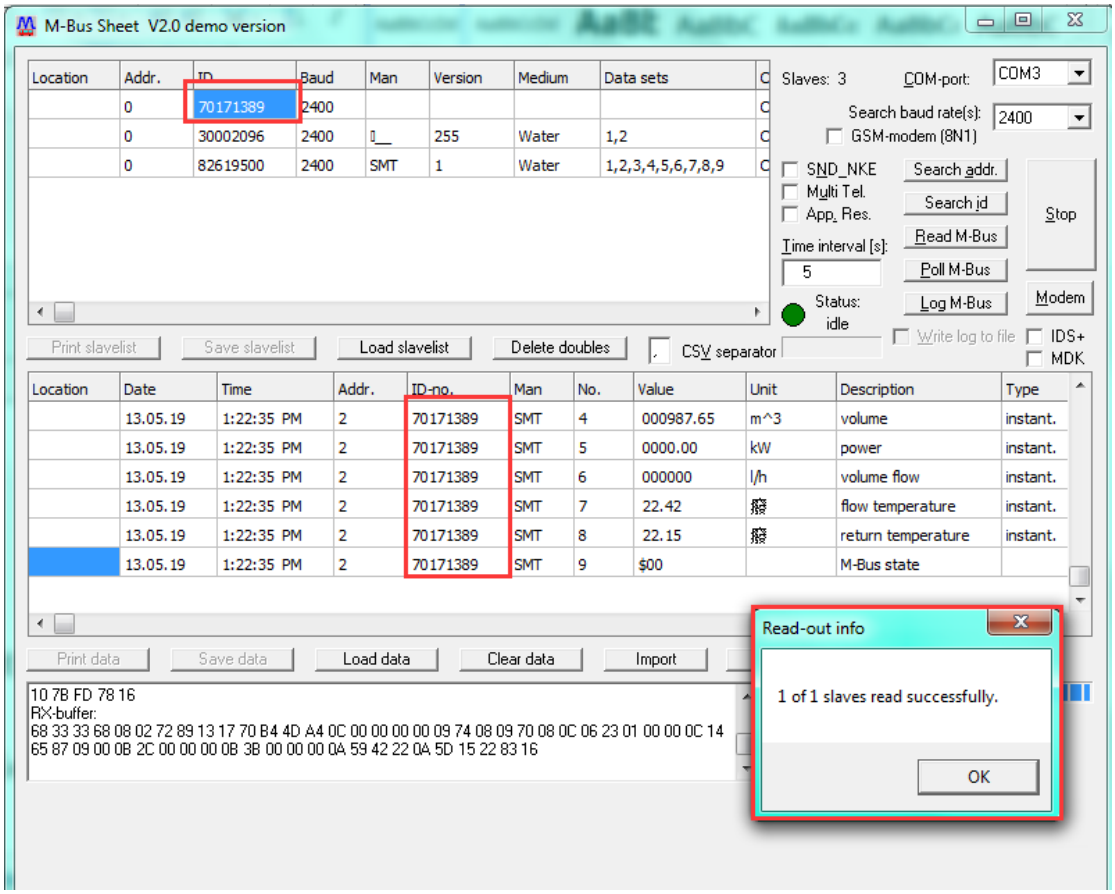


Figure 11

After reading the meter according to the serial number, it is determined that the meter with the serial number "70171389" has been correctly connected to the concentrator MBus, and then set the address of this meter.

Then click "Search addr." to search the address of the meter, verify that the meter address just set is correct and the meter address read is as shown in Figure 12 below.

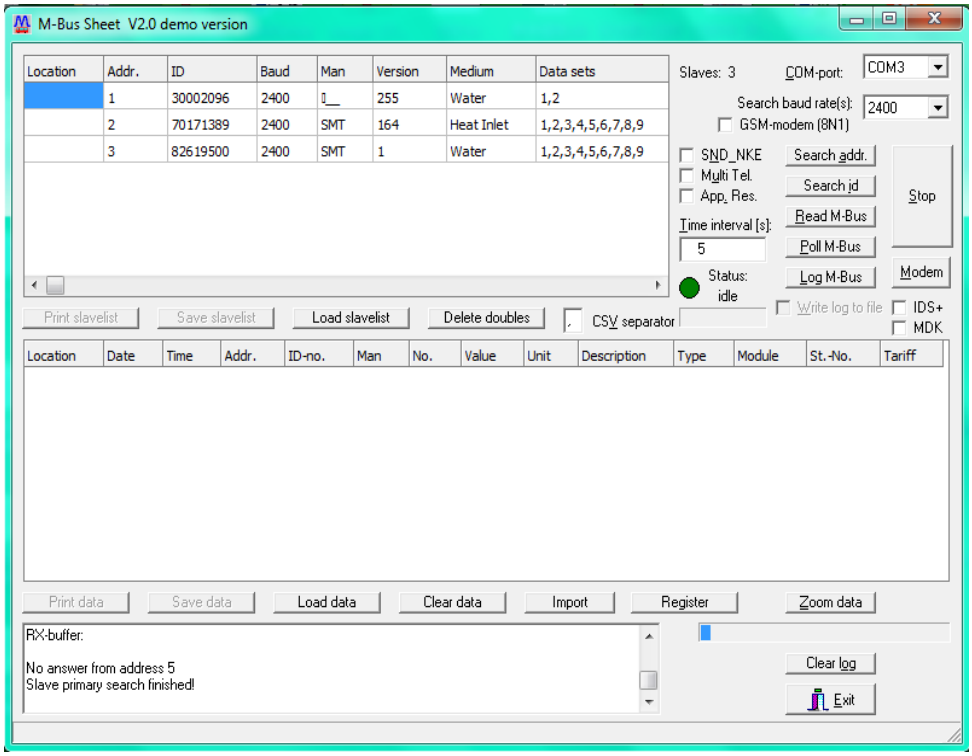


Figure 12

Tips 2:

During the search for the meter address by clicking the "Search addr.", there may be some or a small number of meter addresses not read, and the meter address needs to be manually entered for reading. As shown in Figure 13 below, the meter with the address "2" is not read.

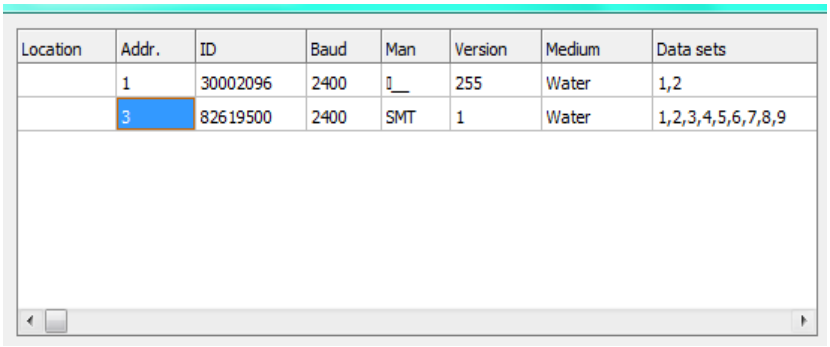


Figure 13

The mouse arrow points to the address of a meter in the "Addr.", right click, select "Insert slave", and then enter the meter address as "2", as shown in Figure 14 below.

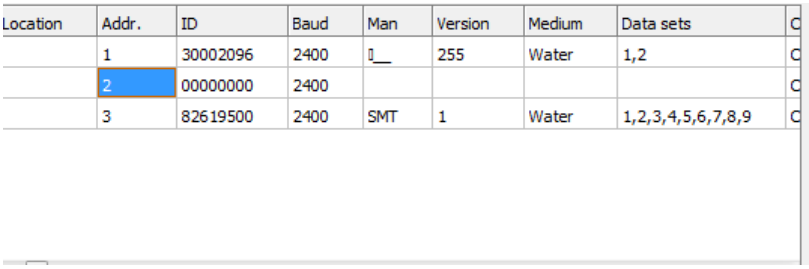


Figure 14

The mouse arrow points to the meter address where the address just entered is "2", right click and select "Read slave" to read the meter, as shown in Figure 15 below.

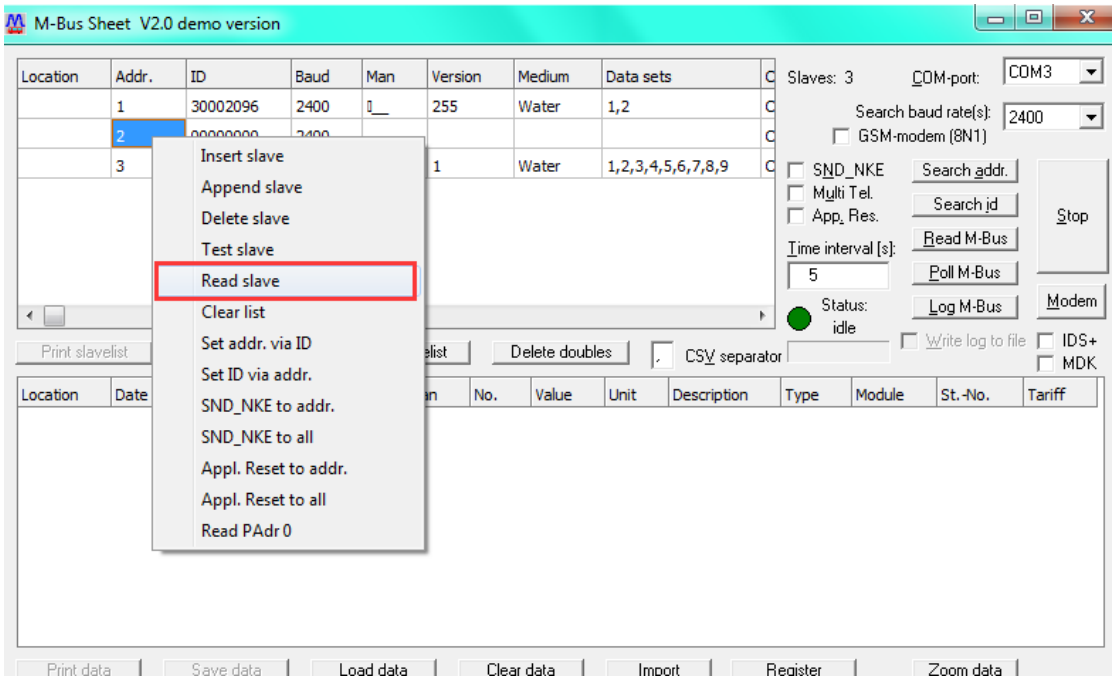


Figure 15

The meter and metering data with the address "2" read out are as shown in Figure 16 below.

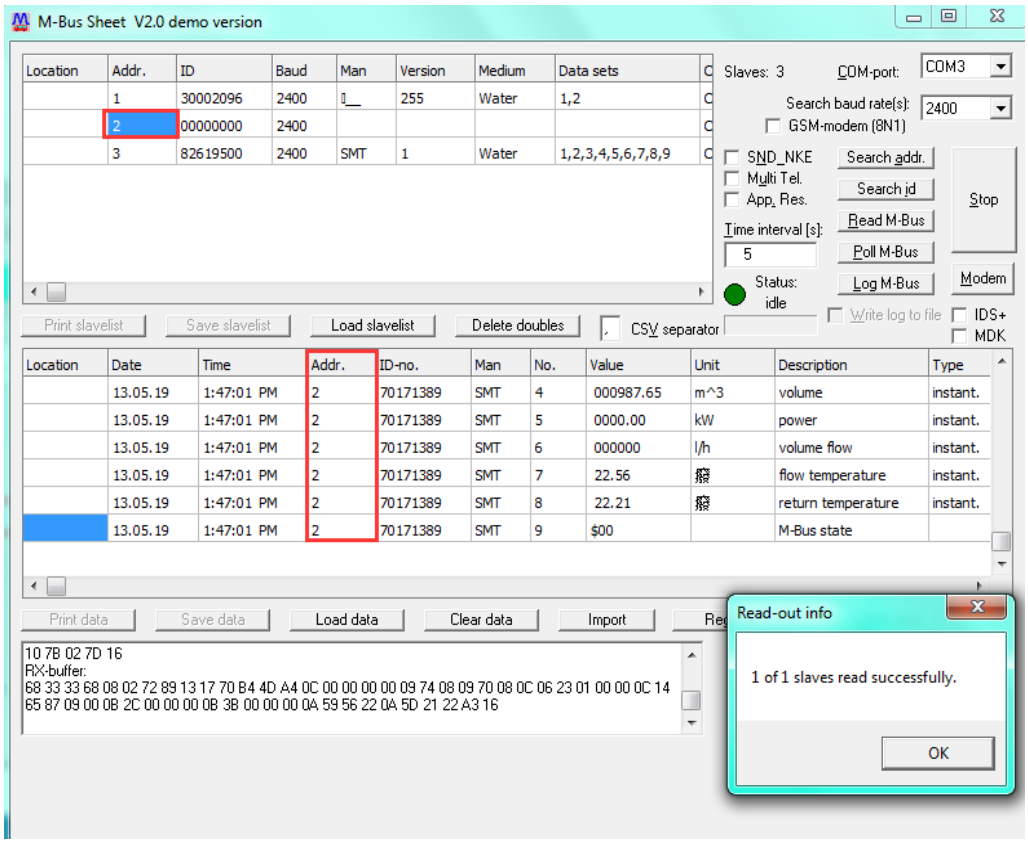


Figure 16

Notice: After setting the address, pls restart the concentrator.

四、the FieldServer Toolbox network parameter settings

Connect the network cable from the BACnet IP module to the computer, then power on the concentrator, and click to open the "FieldServer Toolbox" software just installed, as shown in Figure 17 below.

Figure 17

Just like the Figure 18 below, click on the "Discover Now" button.

Figure 18

You can see that the FieldServer Toolbox recognizes the IP address of the BACnetIP module. The IP address of the BACnet IP module is "192.168.0.6", as shown in Figure 19 below. The yellow solid dot in the figure indicates that the current BACnetIP module is not connected to the SMC sierra Monitor platform.

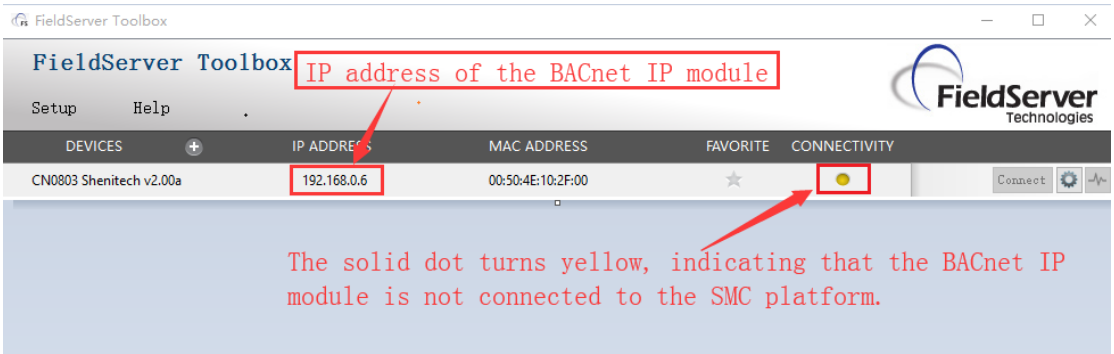


Figure 19

Right click the “ 

” icon in the red box, then select “Open Network and Sharing Center” as shown in Figure 20, then click “Ethernet”.

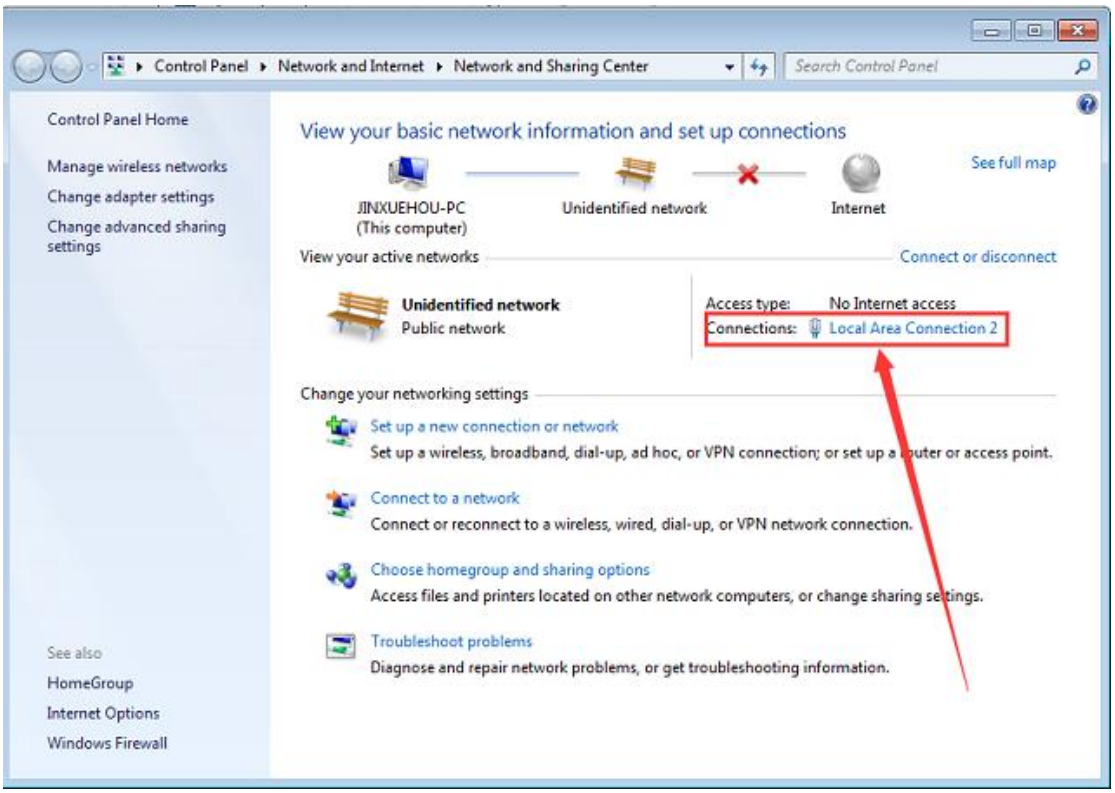


Figure 20

Then the below box appeared, as shown in Figure 21, click the “Properties”

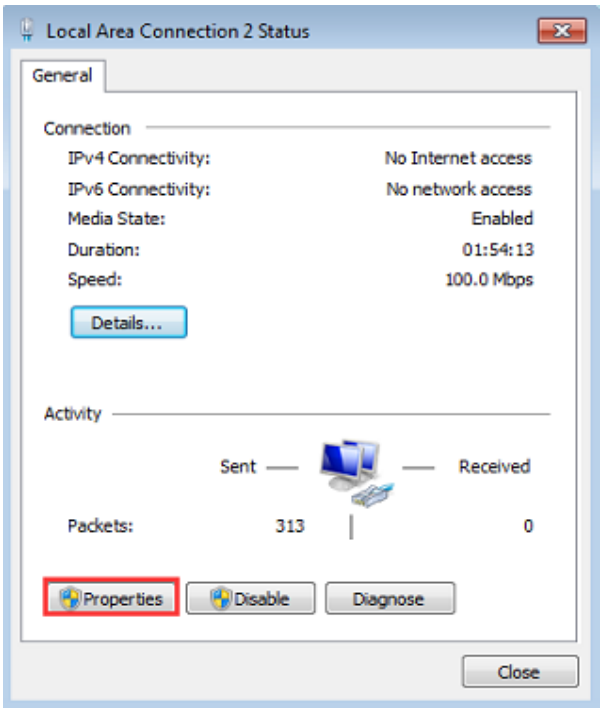


Figure 21

The Ethernet Properties box is displayed, as shown in Figure 22 below. Select Internet Protocol Version 4 (TCP/Ipv4) and double-click it to open it.

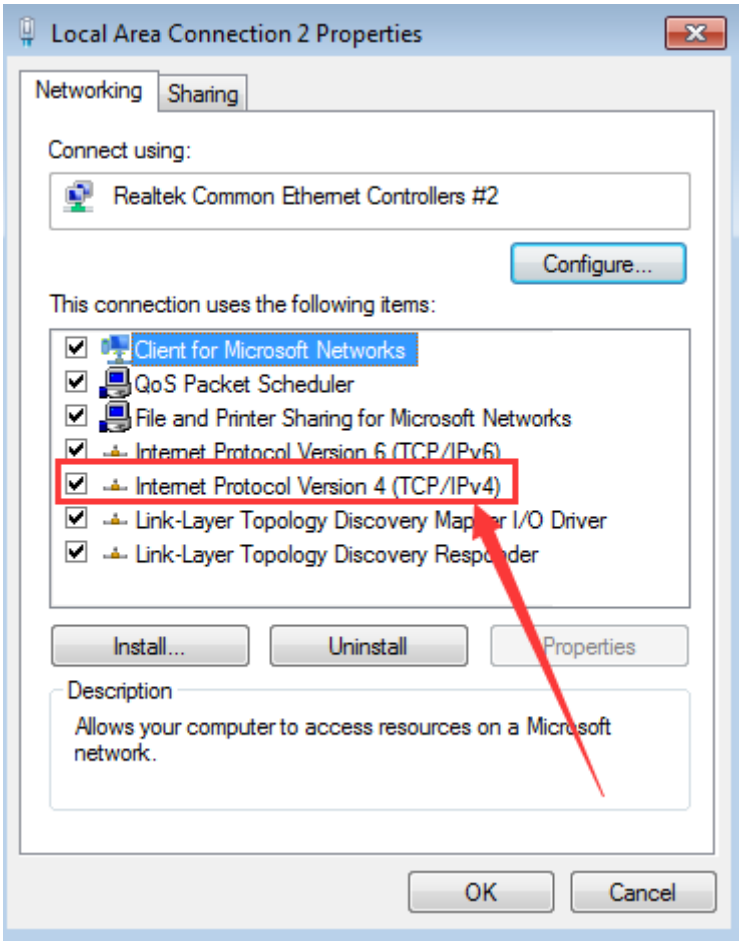


Figure 22

After opening, according to the IP address of the BACnet IP module, set as shown in Figure 23 below (Note: the last segment of the "2" point and the last segment of the IP address cannot be repeated), after setting, click the "OK" button.

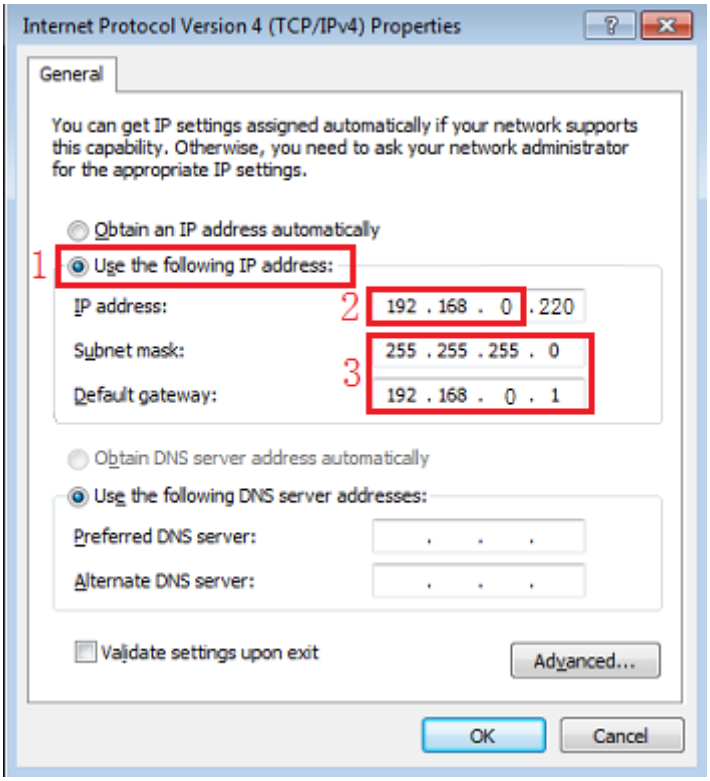


Figure 23

六、Reading metering data on the SMC platform

1、Reading address

Open "FieldServer Toolbox" as shown in Figure 24 below.

Figure 24

Then click the "Discover Now" button to open as shown in Figure 25 below, you can see that the solid dot turns green, indicating that the BACnet

IP module is connected to the BACnet SMC platform.

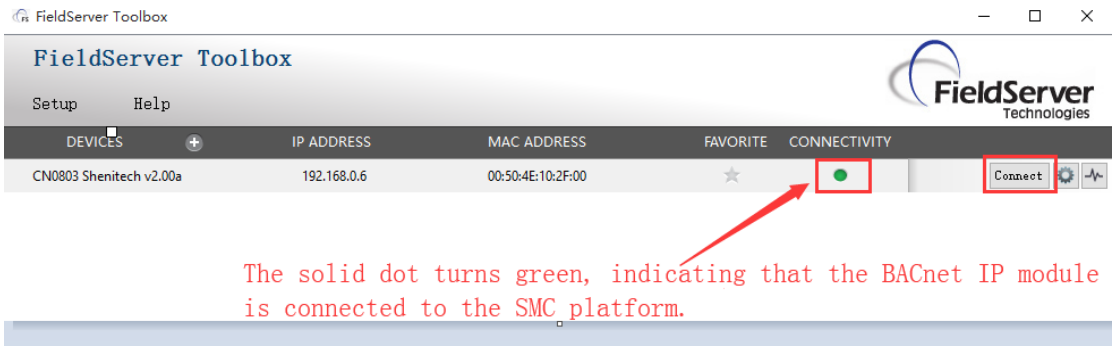


Figure 25

Click the "Connect" button to enter the SMC platform, as shown in Figure 26 below.

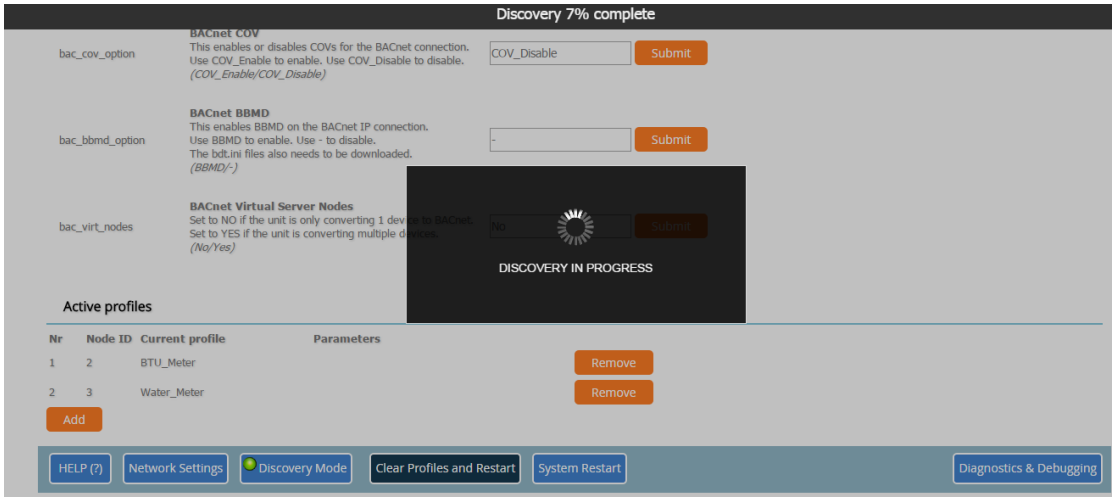


Figure 26

Figure 27 below shows the address and type of the meter read by the SMC platform. The "Node ID" column is the meter address, and the "Current profile" is the meter type.

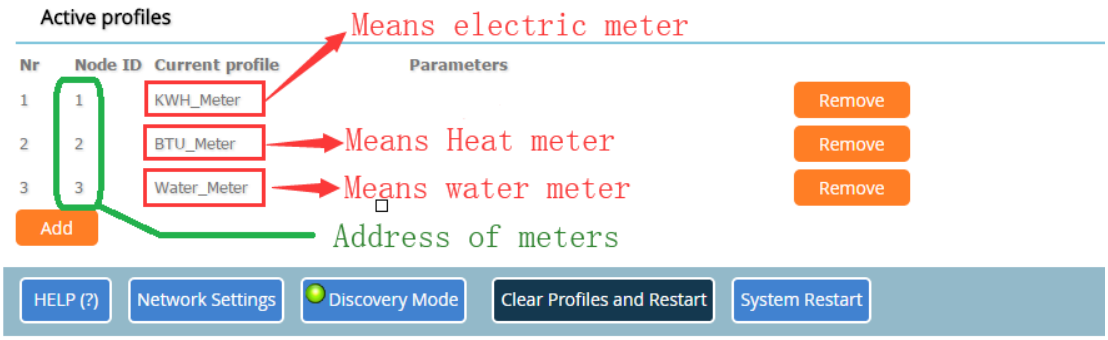


Figure 27

2、Reading the meter data

As shown in Figure 28 below, click the "Diagnostics&Debugging" button

to view the metering data interface of the meter, as shown in Figure 29 below.

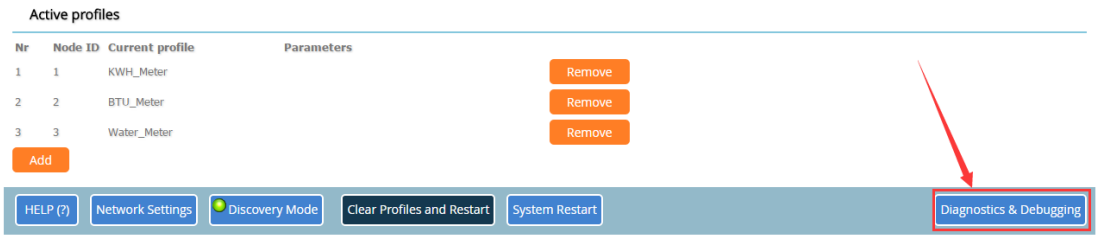


Figure 28

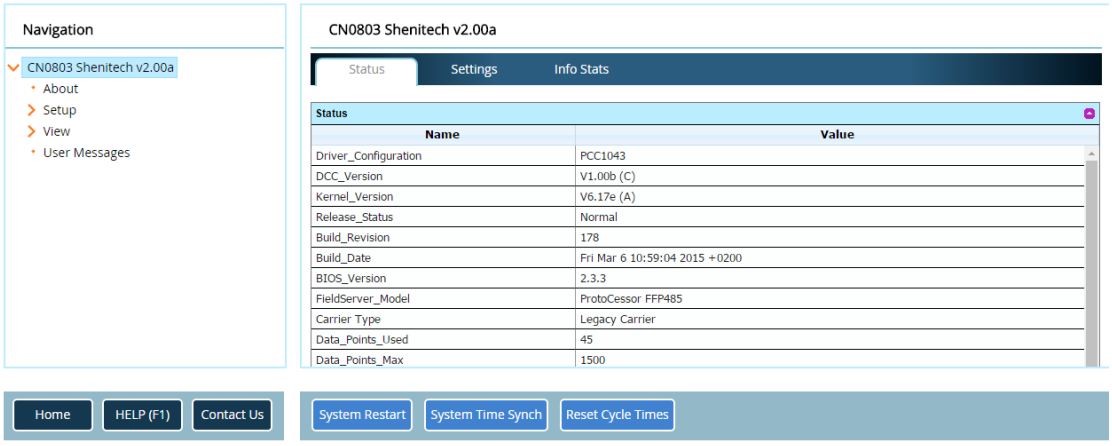


Figure 29

Click on "User Messages", then click on "View" to expand and select "Data Arrays" as shown in Figure 30 below.

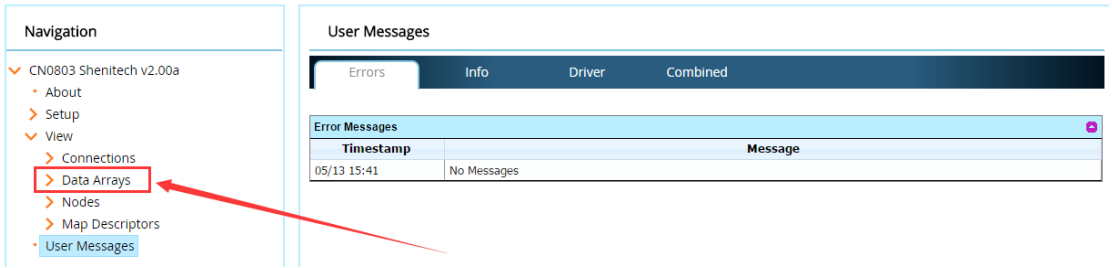


Figure 30

After expanding "View", you can see the content shown in Figure 31, followed by the prefix "DA_U16_" is the meter address.

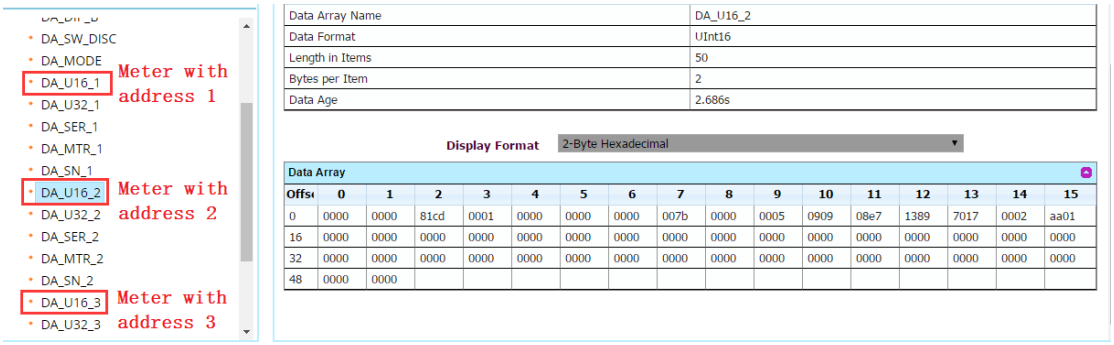


Figure 31

To check whether the SMC platform reads the metering data connected to the concentrator, if you want to see the metering data of the heat meter, the address of the heat meter is "2", and the data can be seen in "DA_U16_2". Click "DA_U16_2", then select "2-Byte Hexadecimal" in "Display Formet", as shown in Figure 32 below.

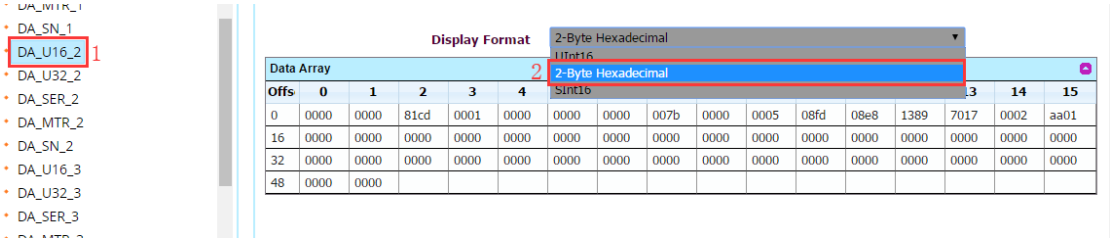


Figure 32

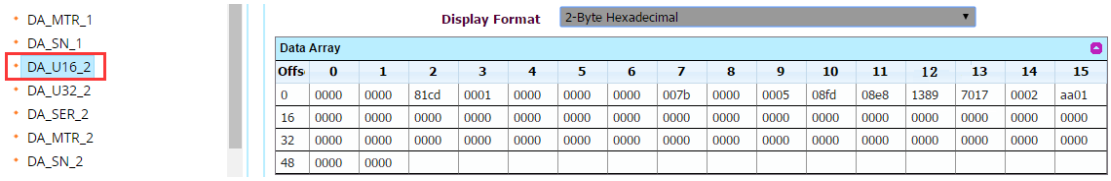
Looking at the data in "DA_U16_2", you can't intuitively read the meter's metering data. You need to parse the data read by the SMC platform according to the data format of the Modbus register. The Modbus register data table is shown in Table 1 below.

Table 1

Object name	**Registers Num**	**Remark**
Flow Rate	0、 1	The uint is fixed in L/h
Positive Cumulative Flow	2、 3	
Positive Cumulative Flow Unit	4	0--0.01m3,1—0.1m3,2—1m3
Power Energy Rate	5、 6	The uint is fixed in kW
HeatEnergy Total	7、 8	
HeatEnergy Total Unit	9	0---0.01Wh 1---0.1Wh 2---1Wh 3---0.01kWh 4---0.1kWh 5---1kWh 6---10kWh 7---1J

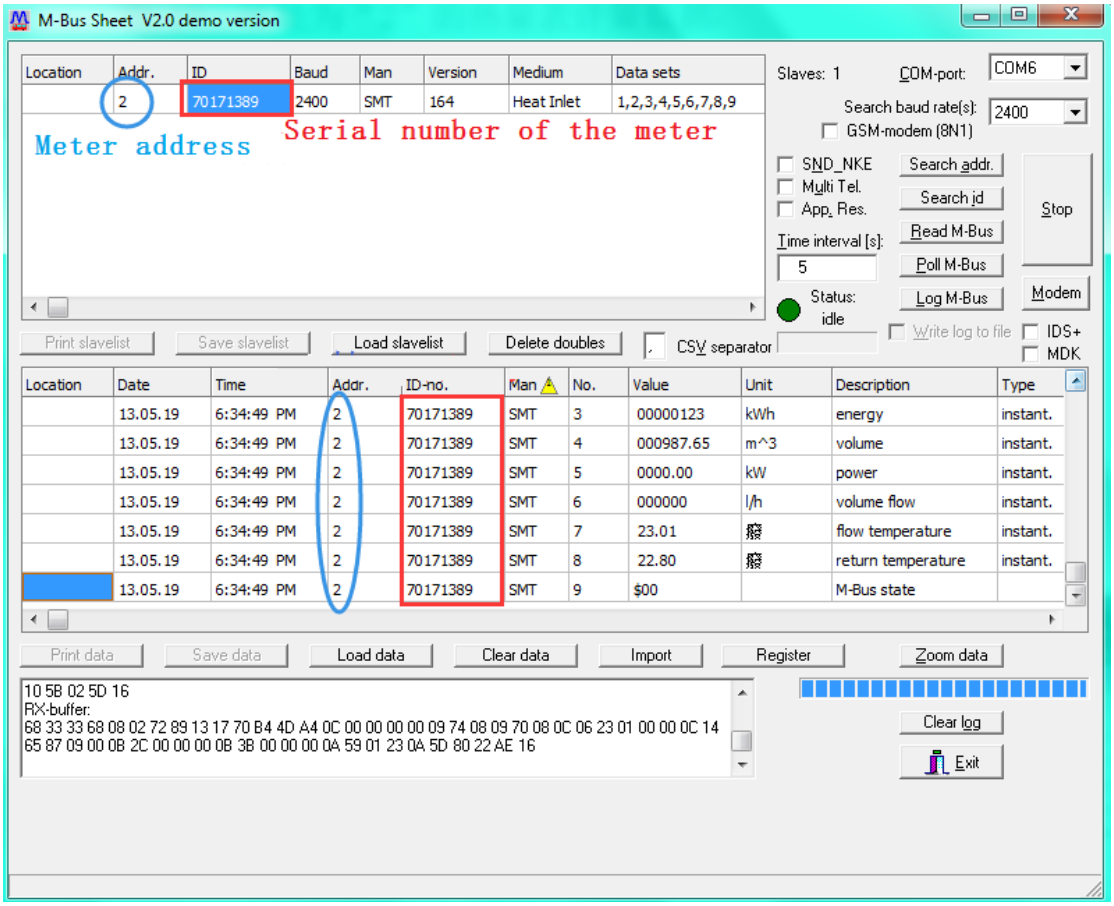
		8---0.01kJ 9---0.1kJ 10---1kJ 11---10kJ 12---100kJ
Supply temp	10	Accuracy is 0.01℃
Return temp	11	Accuracy is 0.01℃
SN	12、 13	
Address	14	
Meter Type	15	AA01、 AA02、 AA03、AA04 is BTU_Meter AA05 is WATER_meter AA06 is KWH_meter

As shown in Figure 33 below, it is the measurement data of the heat meter read by the SMC platform, and Figure 34 is the heat meter measurement data read by the Mbsheete software.



Offs	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	0000	0000	81cd	0001	0000	0000	0000	007b	0000	0005	08fd	08e8	1389	7017	0002	aa01
16	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
32	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
48	0000	0000														

Figure 33



Location	Addr.	ID	Baud	Man	Version	Medium	Data sets
	2	70171389	2400	SMT	164	Heat Inlet	1,2,3,4,5,6,7,8,9

Location	Date	Time	Addr.	ID-no.	Man	No.	Value	Unit	Description	Type
	13.05.19	6:34:49 PM	2	70171389	SMT	3	00000123	kWh	energy	instant.
	13.05.19	6:34:49 PM	2	70171389	SMT	4	000987.65	m^3	volume	instant.
	13.05.19	6:34:49 PM	2	70171389	SMT	5	0000.00	kW	power	instant.
	13.05.19	6:34:49 PM	2	70171389	SMT	6	000000	l/h	volume flow	instant.
	13.05.19	6:34:49 PM	2	70171389	SMT	7	23.01	癈	flow temperature	instant.
	13.05.19	6:34:49 PM	2	70171389	SMT	8	22.80	癈	return temperature	instant.
	13.05.19	6:34:49 PM	2	70171389	SMT	9	$00		M-Bus state	

10 5B 02 5D 16
RX-buffer:
68 33 33 68 08 02 72 89 13 17 70 B4 4D A4 0C 00 00 00 00 09 74 08 09 70 08 0C 06 23 01 00 00 0C 14
65 87 09 00 0B 2C 00 00 00 0B 3B 00 00 00 0A 59 01 23 0A 5D 80 22 AE 16

Figure 34

According to the measurement data of the "Table 1" analysis table, the analysis is as follows.

Instantaneous flow: The data loaded in the register "0~1" is the instantaneous flow rate monitored by the heat meter, and the instantaneous flow rate is "0 L/h";

Positive cumulant: The data loaded in the register "2~3" is the positive cumulant of the heat meter monitoring, the "4" register is the unit type, and the "0" is the "0.01m3". The SMC platform analyzes the meter-side measurement data, if the metering data is loaded with two registers, it needs to be calculated from right to left. If the positive cumulant is loaded by register "2~3", the value of forward cumulant (Hex format, ie 16 Data): 181cd.
Here we use the calculator that comes with the computer to calculate the positive cumulative amount of this heat meter,
Open the calculator on your computer and select "Programmer" as shown in Figure 35 below.

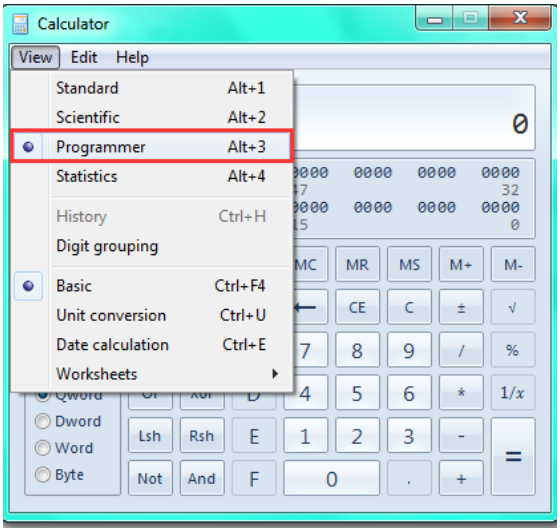


Figure 35

After opening the format of the "programmer" mode, select the "Hex" format, as shown in Figure 36 below.

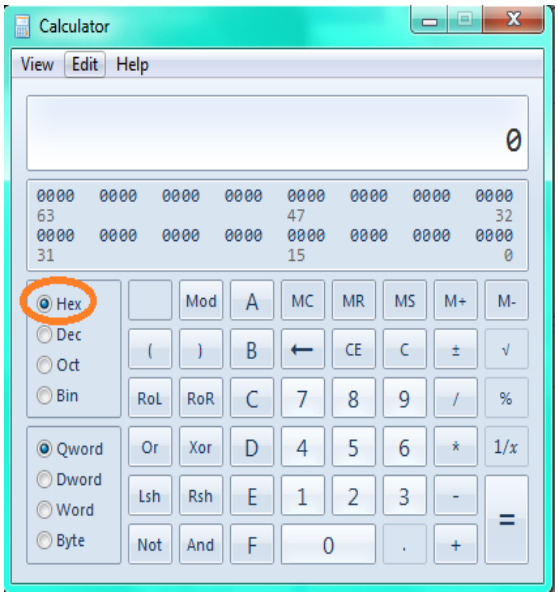


Figure 36

Enter "181cd" on the counter (the input data is hexadecimal), as shown in Figure 37 below.

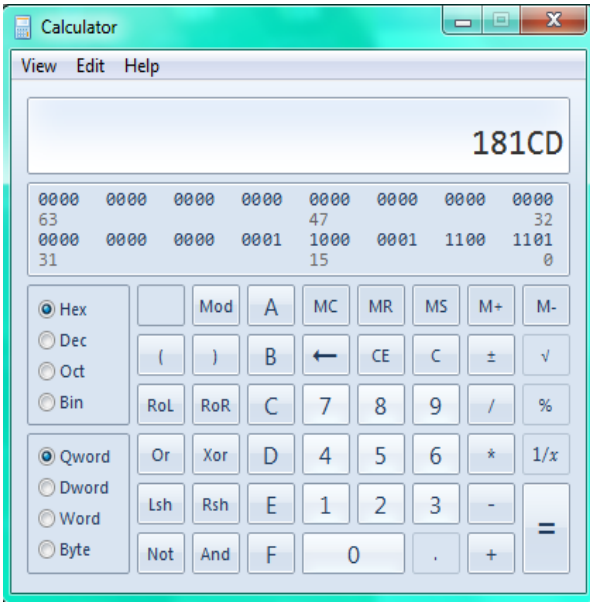


Figure 37

Need to convert the hexadecimal number (Hex) to a decimal number (Dec), as shown in Figure 38 below.

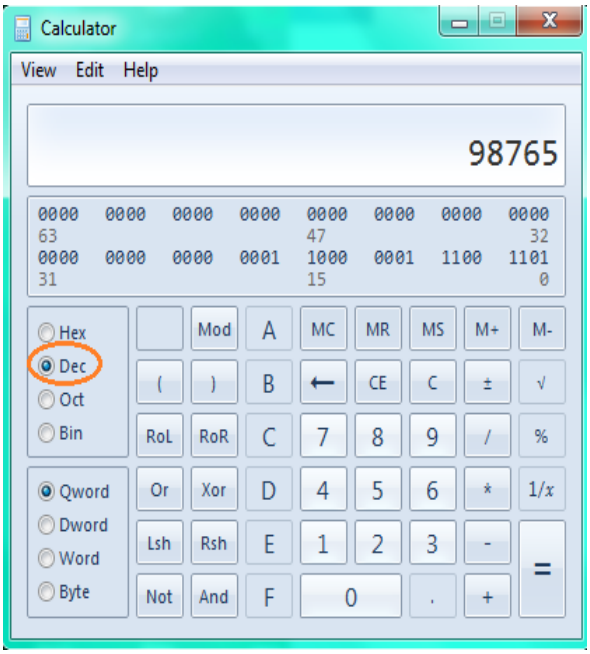


Figure 38

Convert hexadecimal to decimal number: 98765, multiply by the "0.01m3" unit reprinted by register "4", ie: 98765*0.01m3= 987.65m3,
The positive cumulant data read from the Mbsheete software is also 987.65 m3, so the metering data of the meter read by the SMC platform is correct.

Thermal energy: The data loaded in the register "5~6" is the thermal energy monitored by the heat meter, and the unit is fixed to "kW". As shown in Fig. 33, the thermal energy value loaded in the register "5-6" is "0 kW"

Heat accumulation: The data loaded in the register "7~8" is the total amount of thermal energy monitored by the heat meter. The value is "7B" in hexadecimal, converted to "123" in decimal, the unit is "kWh", and the total amount of thermal energy is: 123 *1kWh = 123kWh.

Forward Temperature: The data loaded in register "10" is the forward temperature data monitored by the heat meter. As can be seen from Fig. 33, the forward temperature is hexadecimal "8FD", the hexadecimal is converted to decimal is "2301", and the data is multiplied by The unit is the positive temperature monitored by the heat meter, ie: 2301*0.01° C=23.01° C.

Return Temperature: Calculated in the same way as "forward temperature".

Serial Number: The data loaded in the register "12~13" is the serial number of the meter. It should be noted that the serial number of the meter does not need to be converted, and the serial number of the meter read from

right to left is: "70171389".

Meter Address：The address of the data sheet loaded in the register "14" is as shown in Fig. 34, the meter address is "2", and the meter address read by the SMC platform is also "2".

Meter Type：The type of the heat meter is “BTU_Meter”, the type code is “AA01” or “AA02” or “AA03” or “AA04”, and the type code of the meter read by the SMC platform is “AA01”, and the type code is correct.