Mini Vortex Flow Meter

Instruction Manual

I.Working Principle

The basic principle of an intelligent vortex flow meter is the Karman vortex street principle, which states that "the frequency of vortex separation is directly proportional to the flow velocity."

The diameter of the flow meter's main body is approximately the same as the instrument's nominal diameter, as shown in the figure. An approximately isosceles triangular cylinder is inserted into the flow body, with its axis perpendicular to the flow direction of the measured medium and its base facing the fluid.

When the measured medium flows past the cylinder, vortices are alternately generated on both sides of the cylinder. These vortices continuously generate and separate, forming two staggered rows of vortices downstream of the cylinder, known as a "vortex street." Theoretical analysis and experiments have proven that the frequency of vortex separation is directly proportional to the flow velocity of the medium on the cylinder side.

II. Main Technical Parameters

Nominal diameter (mm)	DN 8	DN 10	DN 15	DN 20	DN 25
Flow rate range (L/ Min)	/	/	3-100	5-150	5-150
Critical flow rate (L/ min)	/	/	5	8	10
Measuring medium and temperature	Liquid;≤80℃				
Pressure level	1.6 MPa				
Material	Valve body: 304 stainless steel; Sensor: PPS; Display housing: Aluminum				
Accuracy	±1.5%		±2.0%		±3.0%
Range ratio	10:1		20:1		30:1
Power supply	12-24 VDC				
Output	4-20 mA & RS485				
Protection level	IP65				
Environmental conditions	-20~55℃; Relative humidity: 5~95%; Atmospheric pressure: 86~106 Kpa				
Display	LCD Display				
Electrical interface	5-pin aviation connector				
Connection method	G1/4	G3/8	G1/2	G3/4	G1
Total length (mm)	100				
Total height (mm)	85/45				
Wiring	Brown: 24V+； Blue: 24V-； Gray : 4~20 mA +； White: A； Black: B				

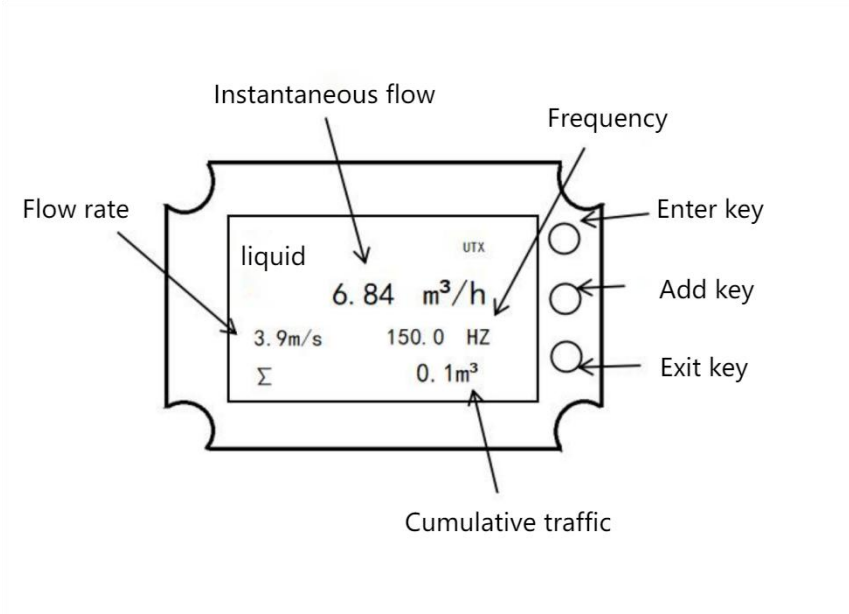
III. Parameter Settings

1. Keyboard Definition and Display

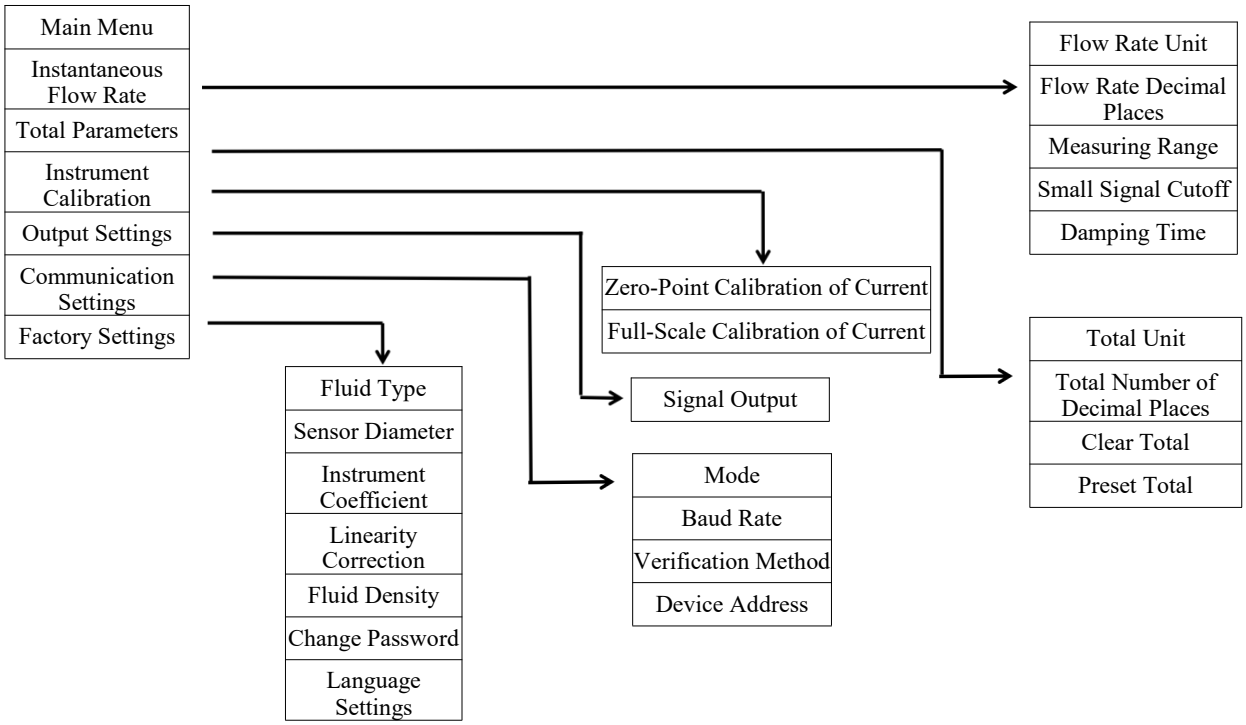
Exit Key  Confirmation key for parameter settings and exit subdirectory

Increase Key  Shift down and decrement keys;

Enter key  Move right to enter parameter settings .



2. Converter Menu Structure



3. Converter Parameter Description

- **Instantaneous flow parameters**

Flow Unit	Options: L/s L/m L/h m³/s m³/m m³/h Nm³/h USG/s USG/m USG/h Kg/s Kg/m Kg/h t/s t/m t/h Default value: m³/h Defines the units of instantaneous flow rate L (liters), h (hours), t (tons), s (seconds), m (minutes)
Total Number of Decimal Places	Options: 0 1 2 3, Default: 1 Defines the number of decimal places for instantaneous flow rate.
Range	Floating-point number: 99999999.00 - 0.00 m³/h， Default value: 100.0 m3/h When the instantaneous flow rate reaches the range, the converter outputs 20 mA . Changing this parameter will affect the current output, high alarm, and low alarm. Notice： When you modify this setting (range), please note the unit of this parameter (range). You can modify the unit of this parameter (range) as needed.
Small Signal Resection	Floating-point number: 9.90 ～ 0.00%， Default value: 0.0% This setting is a percentage of the measurement range.
Damping Time	Floating-point numbers: 30.0 ～ 0.1， Default value: 1

- **Total parameters**:

Total Unit	Options: L (liter) m³ Nm 3 USG Kg t (ton) , Default value： m³ Define the total quantity unit
Total Number of Decimal Places	Options: 0 1 2 3 ， Default value : 1 Define the number of decimal places in the total amount.
Preset total	Options: 99999999.00-0.00 m3/h ， Default value : 0.0 m3/h Clear total or set total value

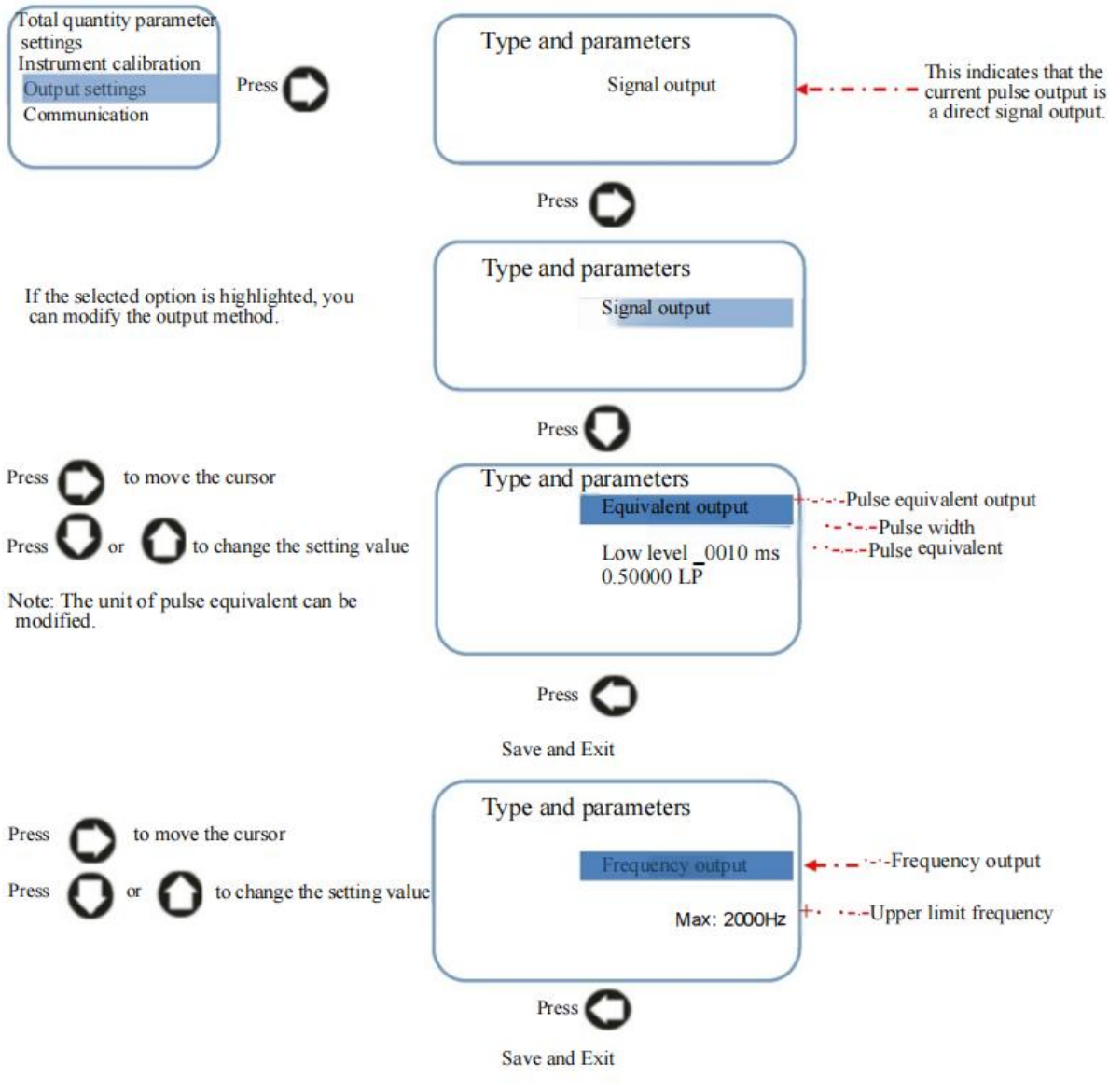
- **Instrument calibration:**

Current Zero-Point Calibration	After entering this submenu, use a multimeter to measure the current output value. If the current value is not equal to 4.0mA, enter the actual value measured by the multimeter, and the converter will automatically complete the 4mA current output calibration standard value. If the current output deviation is too large, multiple corrections are required to verify the requirements. The maximum input value for each correction is 5.0mA.

Full-Scale Current Calibration	Floating-point: 21.0 ~ 19.0, Default: 0.0 After entering this submenu, use a multimeter to measure the current output value. If the current value is not equal to 20.0mA, enter the actual value measured by the multimeter, and the converter will automatically complete the 20mA current output calibration. If the current output deviation is too large, multiple corrections are required to verify the requirements. The maximum input value for each correction is 21.0.

- **Output settings: Configure parameters for three output modes: equivalent output, frequency output, and signal output.**

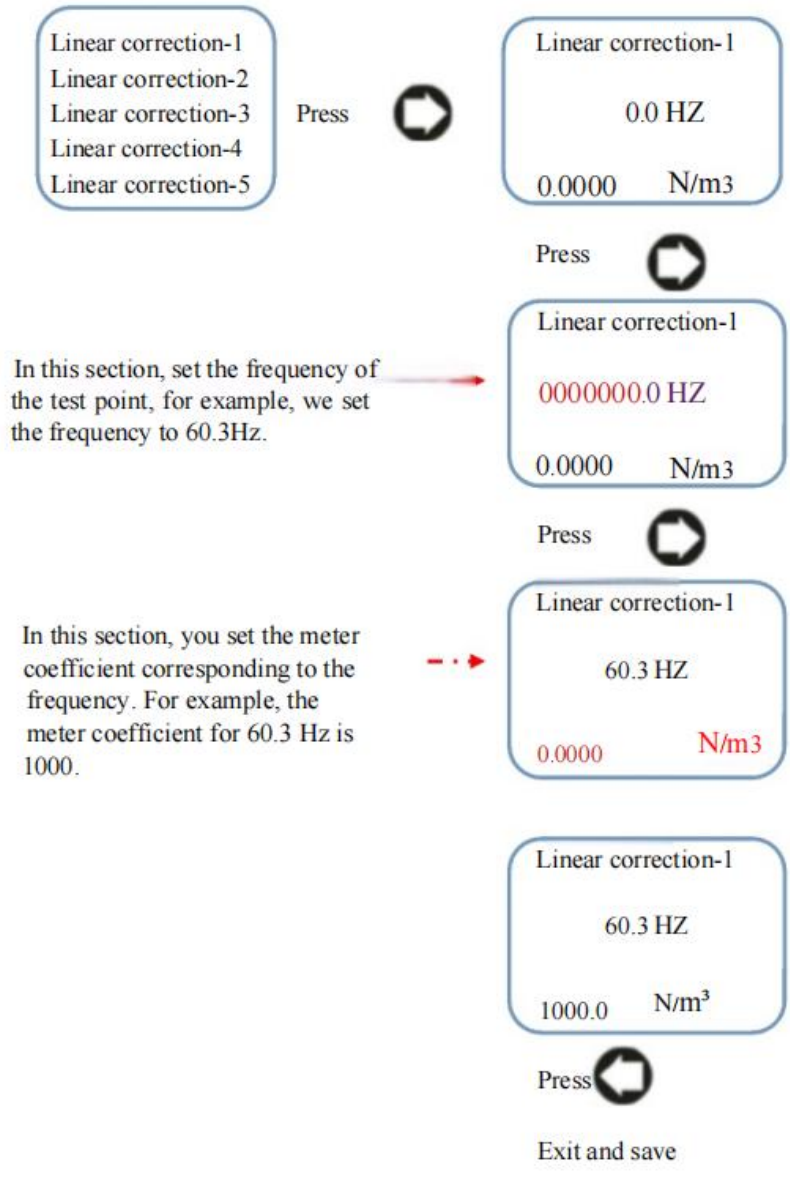
Frequency Limit	Floating-point numbers: 5000.0 - 100.0 Hz ， Default value: 2000.0 Output frequency (Hz) = Instantaneous flow rate (m^3/h)÷ Measuring range (m^3/h)× Upper frequency limit (Hz) For example: if the instantaneous flow rate is 100 m^3/h, the range is 200 m^3/h, and the upper frequency limit is set to 2000 Hz, then the output frequency corresponding to the instantaneous flow rate of 100 m^3/h is 1000 Hz.
Pulse Equivalent	Floating-point number: 9999.0 - 0.0 ， Default value: 0.0 The unit of pulse equivalent is L (liters)/pulse. Users can change the unit of pulse equivalent to: USG /P, Kg /P, t/P as needed. Nm^3/P, m^3/P
Pulse Width h (ms)	Floating-point numbers: 1000.0 ~ 0.0 ms ， Default value: 0.0 When the pulse width is set to "0", the pulse duty cycle is 1:1.
Signal Output	Original signal output Note: 1. Only frequency output and equivalent output are distinguished. 2. Nonlinear correction also applies to the original signal output. 3. It is related to the instrument coefficient K. F(HZ)=3600/(Q*K) Q: Instantaneous flow rate (m^3/h); K: Instrument coefficient



- **Communication Settings: Settings RS485 communication parameters**

Model	Option: Modbus - RTU Modbus - ASCII Default value: Modbus - RTU
Baud Rate	Options: 1200 2400 4800 9 600 19200 38400 Default value: 9600 Note: Please set the baud rate to no lower than 9600.
Verification Method	Options: No parity, Even parity, Odd parity Default value: No verification
Device Address	Value: 247 ~ 1 Default value: 1

Factory parameter settings:

Fluid Type	Liquid
Caliber	Options: 8, 10, 15, 20, 25 mm
Instrument Coefficient	Floating-point number, default value: automatically corresponds to each diameter Q (instantaneous flow rate, m^3/h) = 3600 × F (frequency, Hz) ÷ k (k coefficient) After completing the actual flow test, the final K coefficient needs to be set here. Number of pulses output per cubic meter
Linear Correction	 After completing the first linear correction, proceed to "Linear Correction-2". Note: The test point with the highest frequency must be used as the first point. Set the frequencies from highest to lowest.
Language Settings	Default value: Chinese. You can switch to English.

Advanced Settings: Configure spectrum analysis parameters (If you are unfamiliar with spectrum analysis, please do not modify them arbitrarily).

Sampling Rate	The floating-point number and sampling rate correspond to the flow meter diameter and must not be changed.
Spectrum Limit	Define the upper limit of signal frequency The default value corresponds to the instrument diameter, but it can also be adjusted according to the upper limit of the flow range.
Lower Limit of Spectrum	Define the lower limit of the signal frequency The default value corresponds to the instrument diameter, but it can also be adjusted according to the lower limit of the flow range.
Power Threshold	Floating-point numbers The default value is automatically set based on the flow meter's diameter. You can also modify it according to the actual signal power threshold . The power threshold corresponds to the "m" value in the spectrum display interface."

4. How to set parameters

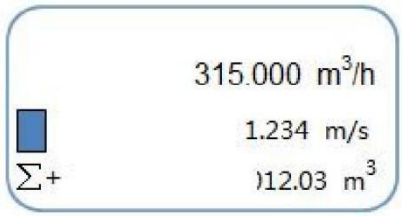


Figure 1 Instantaneous flow rate display interface

Press  to enter the menu settings, as shown in Figure 2:

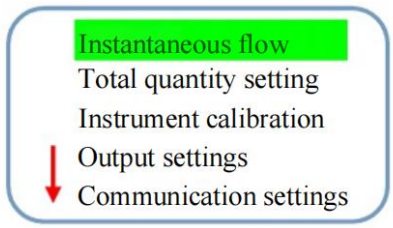


Figure 2

In the interface shown in Figure 2, press  or  You can select different sub-menus. Press  Then return to the traffic display interface, as shown in Figure 1;

Press  or  Select the submenu.Press  Enter the submenu to set parameters. For example: We need to set the "Instantaneous Flow Rate Parameter". When the Instantaneous Flow Rate Parameter submenu becomes highlighted,press  the result will be displayed as shown in Figure 3 below:

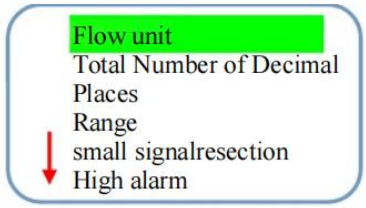


Figure 3

Press or Select the parameter you want to modify; the selected parameter will be highlighted. To return to the menu shown in Figure 2, press To access the next menu level, press to set the parameters, see Figure 4:

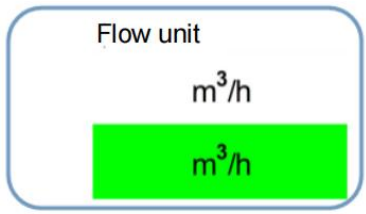


Figure 4

In this case, press or To modify the parameters, for example, as shown in Figure 4, if you need to change the instantaneous flow unit from "m³/h" to "m²/m", then press The instantaneous flow rate unit will become "m²/m", as shown in Figure 5:

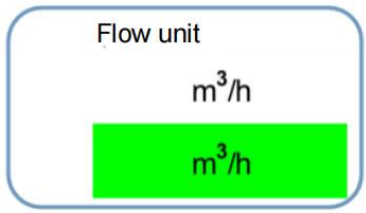


Figure 5

After modifying the parameters, if you need to save the settings, press The system will save automatically, as shown in Figure 6:

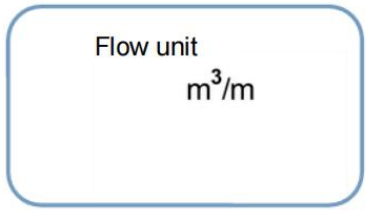
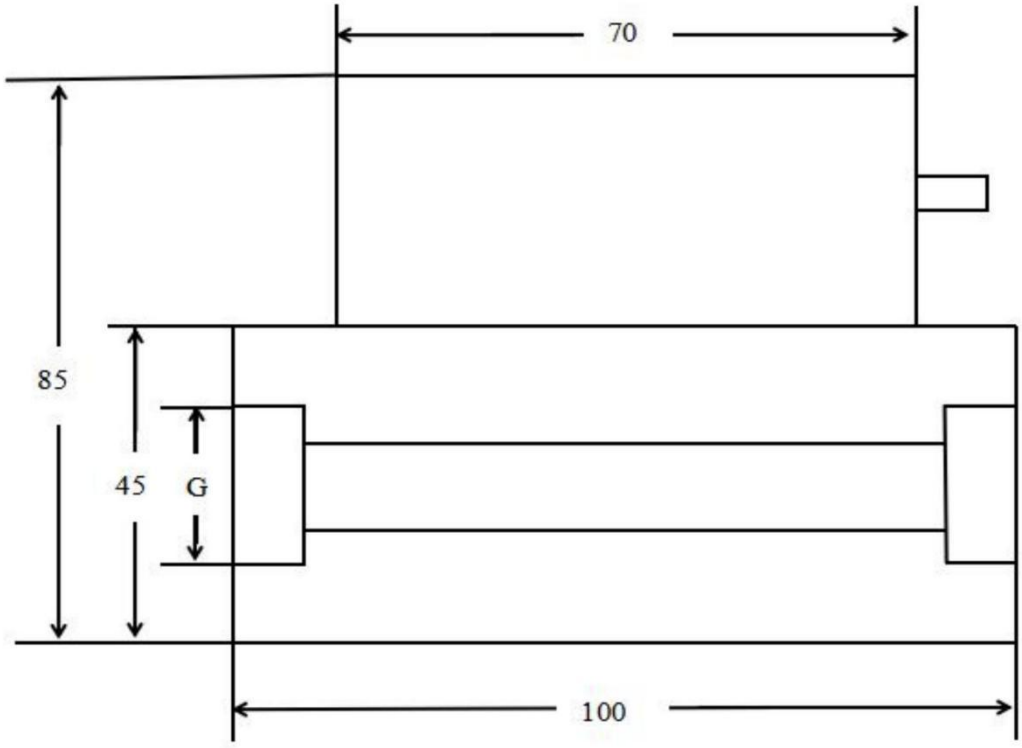


Figure 6

In this case, press Save the settings and exit (as shown in Figure 3).

IV. External Dimensions



Appendix: RS485 Communication Address Table

Variable Name	Register Address	Register Length	Instruction Code	Data Type
Instantaneous Flow Rate	0x01-0x02	0x02	0x04	Floating-point numbers
Instantaneous Flow Rate Unit	0x03	0x01	0x04	Plastic surgery
Total Flow Rate	0x04-0x07	0x04	0x04	Double precision
Total Flow Rate Unit	0x08	0x01	0x04	Plastic surgery
Temperature	0x09-0x0a	0x02	0x04	Floating-point numbers
Pressure	0x0b-0x0c	0x02	0x04	Floating-point numbers
Total Amount (unit: m^3, write allowed; writing 0 will clear the total amount)	0x0d-0x0e	0x02	0x03 0x04	Floating-point numbers
Read consecutive floating-point numbers (32-bit floating-point numbers, with the lower 16 bits first).				
Instantaneous Flow Rate	0x14-0x15	0x02	0x04	Floating-point numbers
Total Flow Rate	0x16-0x17	0x02	0x04	Floating-point numbers
Temperature	0x18-0x19	0x02	0x04	Floating-point numbers
Pressure	0x1a-0x1b	0x02	0x04	Floating-point numbers
Read consecutive floating-point numbers (32-bit floating-point numbers, with the high 16 bits first).				
Instantaneous Flow Rate (40031-40032)	0x1e-0x1f	0x02	0x04	Reversed floating-point number
Total Flow Rate (40033-40034)	0x20-0x21	0x02	0x04	Reversed floating-point number
Temperature (40035-40036)	0x22-0x23	0x02	0x04	Reversed floating-point number
Pressure (40037-40038)	0x24-0x25	0x02	0x04	Reversed floating-point number

Unit definition

	Unit	Code	Unit	Code
Instantaneous Flow Rate	Nm 3/h	0x00	usg /h	0x09
	Nm 3/m	0x01	usg /m	0x0a
	Nm 3/s	0x02	usg /s	0x0b
	m3/h	0x03	kg /h	0x0c
	m3/m	0x04	kg /m	0x0d
	m3/s	0x05	kg /s	0x0e
	L/h	0x06	t/h	0x0f
	L/m	0x07	t/m	0x10
	L/s	0x08	t/s	0x11
Total Flow Rate	Nm 3	0x00		
	m3	0x01		
	L	0x02		
	USG	0x03		
	kg	0x04		
Temperature	t	0x05		