Electronic turbine flow sensor FM120

Internal thread type

External thread type

Cassette type

Flange type

Principle characteristics

FM120 electronic turbine flow sensor is another intelligent flow switch, is a compact flow sensor. It has the advantages of small size, easy setting, built-in intelligent circuit, can set the upper and lower limit of flow alarm value, support IO-Link/RS485 data communication, support temperature measurement. The real-time flow condition can be monitored remotely, the full parameters can be set arbitrarily on site, and the turbine measuring medium can be programmed arbitrarily after the flow is processed by the sensor functional circuit.

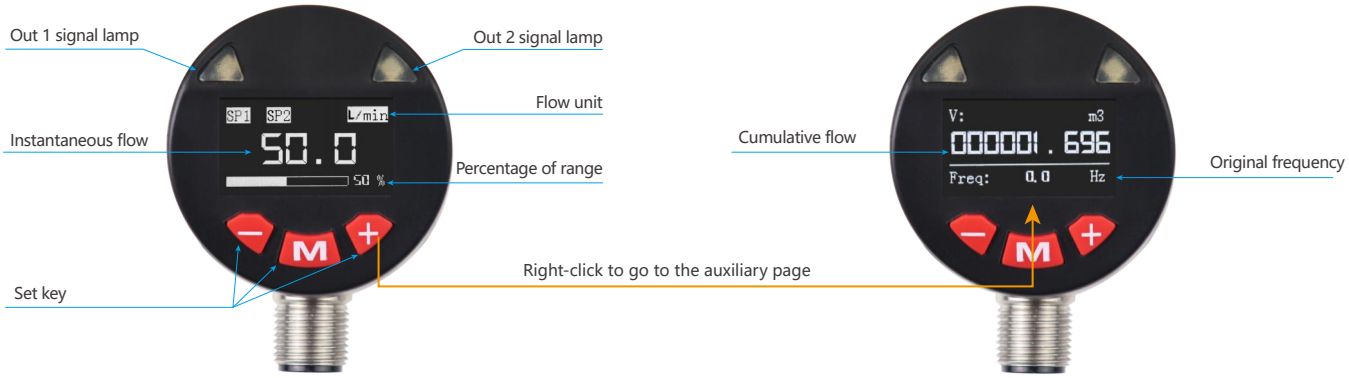
Application field

Suitable for measuring low viscosity media, such as water, diesel, gasoline. Widely used in the field of industrial automation, petroleum, chemical industry, metallurgy, scientific research and so on.

Technical parameter

- Measuring caliber: DN6... DN300
- Supply voltage: 12... 30Vdc
- Output type: switching, analog, pulse, IO-link, RS485
- Load: Switch <200mA/analog <500mA
- Response time: 10ms~5s (factory default 1s)
- Switching accuracy: ≤±0.5% range
- Current type analog output: ≤±0.5% range
- Wiring protection: reverse phase, overload, short circuit protection
- Display: Design: LCD screen
  Display range: four digits
- Applicable to: viscosity>$5x10^{-6}m^2/s$
- Measuring accuracy: ≤±1.0% range
- Temperature:
  Medium temperature: -30... 100°C/130°C/180°C
  Ambient temperature: -10... 70°C
  Storage temperature: -20... 80°C
- Material:
  Case: stainless steel/engineering plastic
  Housing: stainless steel 304
  Turbine: 3cr13 (Martensitic stainless steel)
- Protection grade: IP67
- Outlet: M12x1 connector

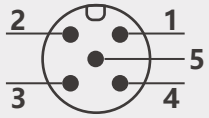
Panel diagram

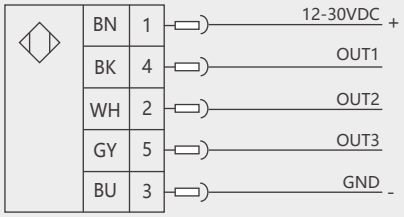


Main interface

Auxiliary interface

Wiring diagram





A3: Two switches + one analog

colour	stitch	instructions	Colour	stitch	instructions	Colour	stitch	instructions
BN	1	power supply (+)	BU	3	power supply (-)	GY	5 (OUT3)	Flow: 4-20mA (factory default) Flow: 1-5v Flow : 0-10v
BK	4 (OUT1)	Flow switch PNP (Factory default) Flow switch NPN Linear pulse (full scale 100Hz) Original pulse Quantitative pulse (full scale *0.1)	WH	2 (OUT2)	Flow switch PNP (Factory default) Flow switch NPN			

AR: RS485 communication/analog

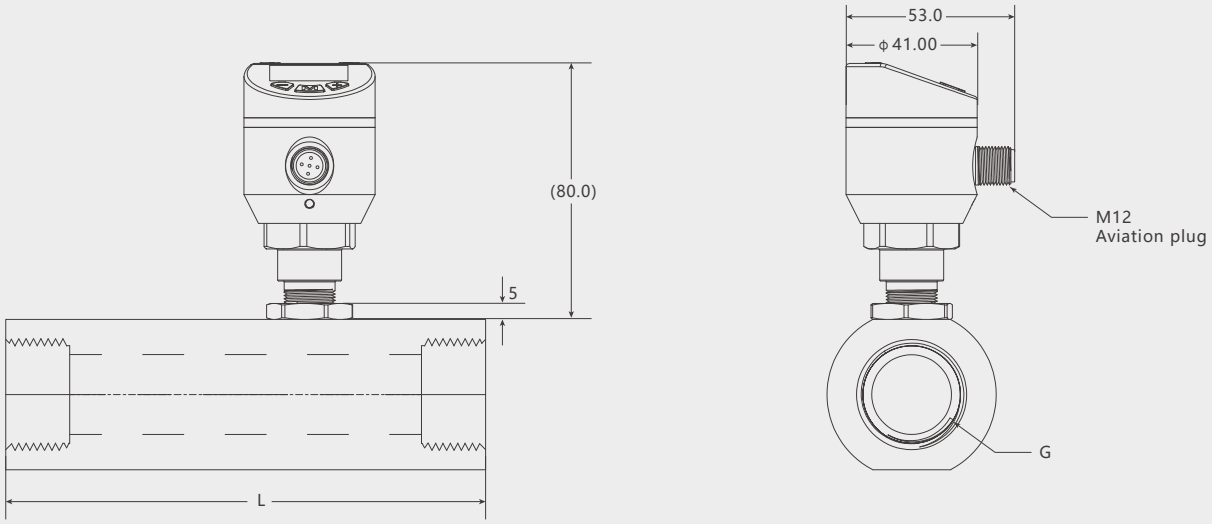
colour	stitch	instructions	colour	stitch	instructions	colour	stitch	instructions
BN	1	power supply (+)	BU	3	power supply (-)	GY	5 (OUT3)	Flow: 4-20mA (factory default) Flow: 1-5v Flow : 0-10v
BK	4 (OUT1)	RS485(B)	WH	2 (OUT2)	RS485(A)			

SA: Analog (flow/temperature)/switch/pulse/frequency /IO-Link

colour	stitch	instructions	Colour	stitch	instructions	Colour	stitch	instructions
BN	1	power supply (+)	BU	3	power supply (-)	GY	5 (OUT3)	Temperature: 4-20mA (Factory default) Temperature: 1-5v Temperature: 0-10v
BK	4 (OUT1)	Flow switch PNP Flow switch NPN Temperature switch PNP Temperature switch NPN Linear pulse (full scale 100Hz) Original pulse Quantitative pulse (full scale *0.1) IO-Link	WH	2 (OUT2)	Flow: 4-20mA (factory default) Flow: 1-5v Flow: 0-10v			

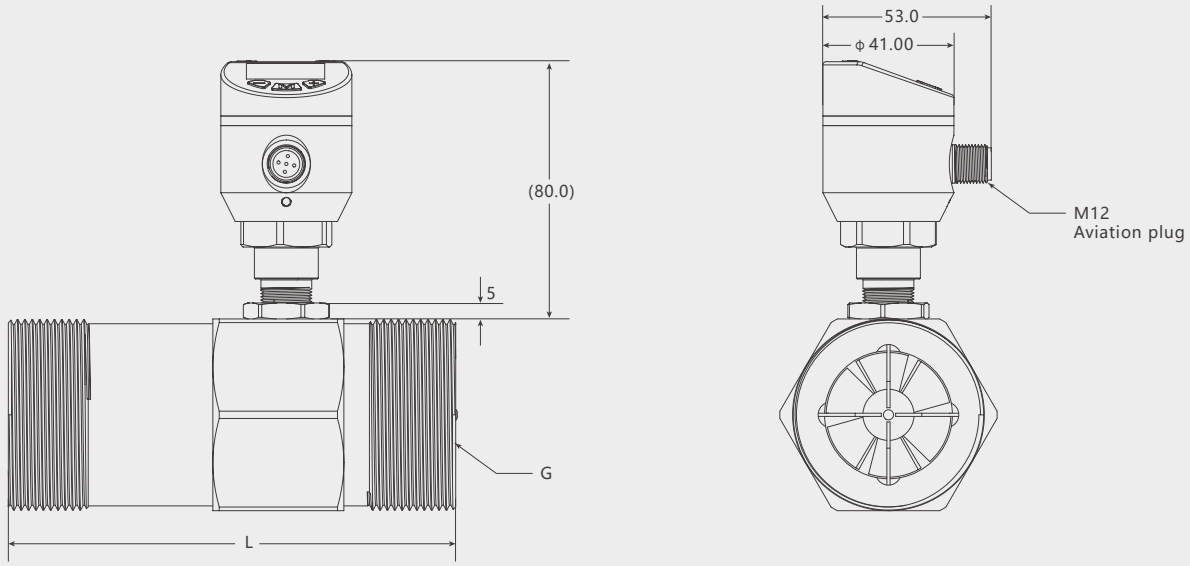
Size drawing (mm)

■ Internal thread connection



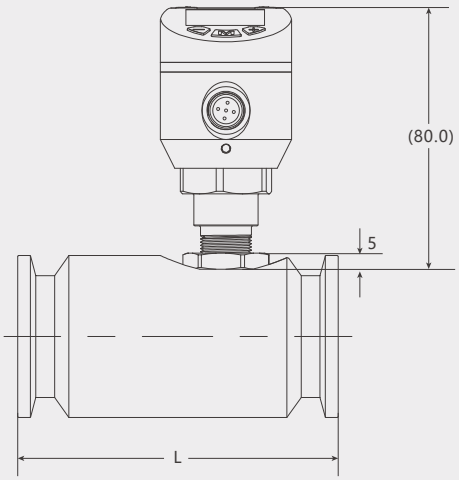
Sealing method: It is recommended to use card sleeve type ED sealing joint

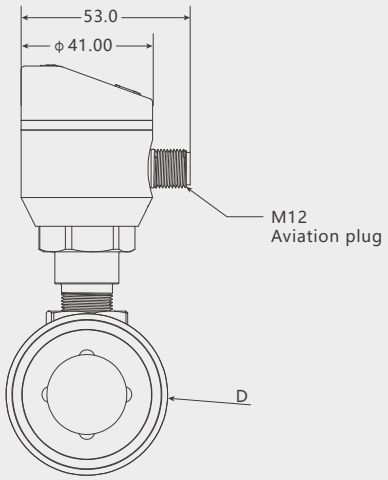
■ External thread connection



Sealing method: Flat gasket is recommended

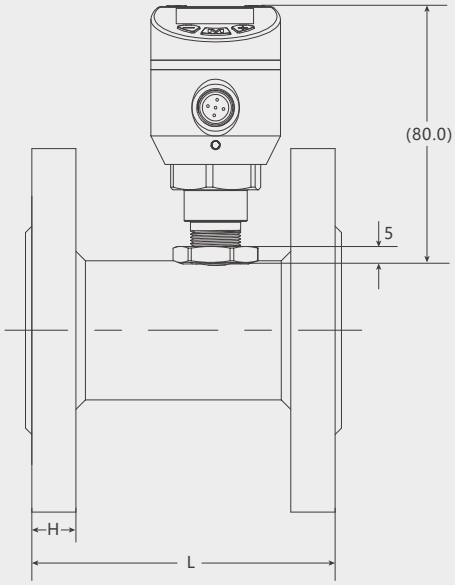
■ **Clamp connection**

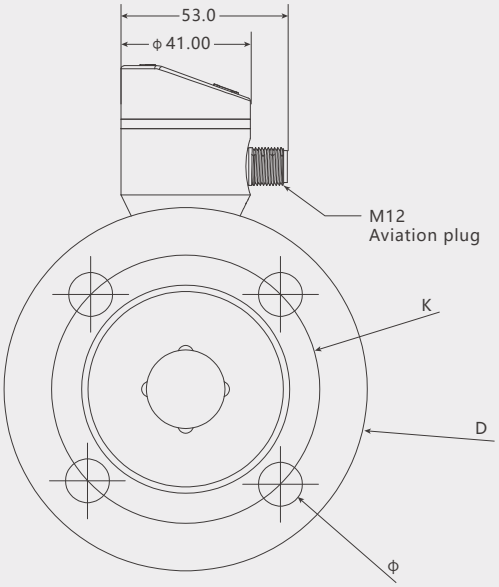




Sealing method: chuck type sealing gasket

■ **Flange connection**





Sealing method: flange type sealing gasket

Size table

Nominal diameter DN(mm)	Flange connection (1.6MPa)					external thread			Internal thread		Clamp connection	
	Flange outside diameter D	Distance between centers K	aperture ϕ	Hole number N	thickness H	Body length L		Process connection	Body length L	Process connection G	Outside diameter of chuck D	Body length L
						Straight pipe	No straight pipe section					
6						345	65	G1/2	80	1/2	50.5	50
10						345	65	G1/2	80	1/2	50.5	50
12	95	65	14	4	14	65		G3/4	80	1/2	50.5	50
15	95	65	14	4	14	75		G1(33.2)	110	1/2	50.5	75
20	105	75	14	4	16	85		G1(33.2)	115	3/4	50.5	85
25	115	85	14	4	16	100		G1-1/4(41.9)	140	1	50.5	100
32	140	100	18	4	18	120		G1-1/2(47.8)	172	1-1/4	50.5	120
40	150	110	18	4	18	140		G2(59.6)	180	1-1/2	64	140
50	165	125	18	4	20	150		G2-1/2(75.1)	200	2	78	150
65	185	145	18	8	20	175		G3	235	2-1/2	91	175
80	200	160	18	8	20	200			260	3	106	200
100	220	180	18	8	22	220					119	220
125	250	210	18	8	22	250						
150	285	240	22	8	24	300						
200	340	295	22	12	26	360						
250	400	355	26	12	28	400						
300	460	410	26	12	32	500						

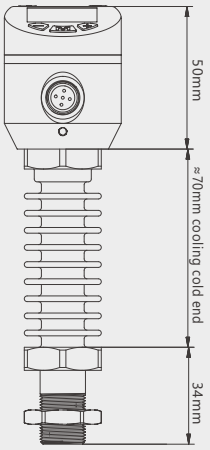
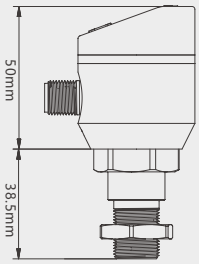
Range range table

Nominal diameter DN(mm)	Flow range (m³/h)		Nominal pressure PN	Maximum pressure loss (MPa)
	lower limit	Upper limit		
6	Hall type 0.04	0.6	6. 3 16 25 40*	0 . 05
10	0. 2 (Hall type 0.06)	1. 2		
12	0.4 (Hall type 0.12)	4		0. 035
15	0. 6 (Hall type 0. 2)	6		
20	0. 8 (Hall type 0.25)	8		
25	1 (Hall type 0.36)	10		
32	1. 5	15		
40	2	20	2. 5	0. 025
50	4	40		
65	8	80		
80	10	100		
100	20	222		
125	25	250	1. 6	
150	40	400		
200	80	800		
250	120	1200	1. 6	
300	180	1800		

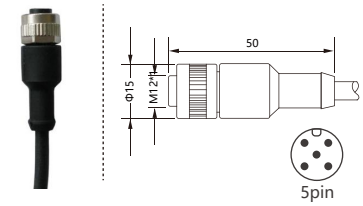
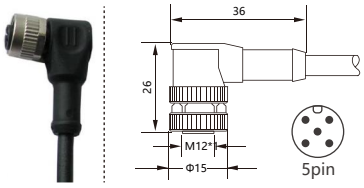
Selection list

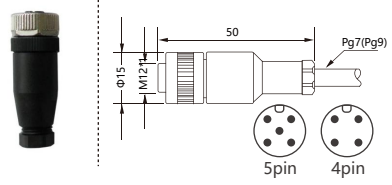
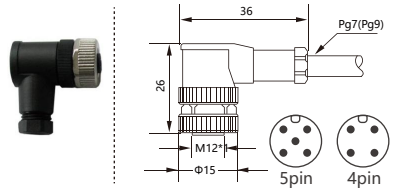
FM120-	015	DC	A3	M	-	-	-	expatiate	
FM120-								FM120 turbine flowmeter	
	006							Measuring caliber DN6	
	006B							Measuring caliber DN6(with straight pipe section)	
	010							Measuring caliber DN10	
	010B							Measuring caliber DN10(with straight pipe section)	
	012							Measuring caliber DN12	
	015							Measuring caliber DN15	
	020							Measuring caliber DN20	
	025							Measuring caliber DN25	
	032							Measuring caliber DN32	
	040							Measuring caliber DN40	
	050							Measuring caliber DN50	
	065							Measuring caliber DN65	
	080							Measuring caliber DN80	
	100							Measuring caliber DN100	
	125							Measuring caliber DN125	
	150							Measuring caliber DN150	
	200							Measuring caliber DN200	
	250							Measuring caliber DN250	
	300							Measuring caliber DN300	
		DC						DC24V±20% power supply	
			A3					Two way switch/pulse/frequency + analog	
			SA					Analog (flow/temperature)/switch/pulse/frequency /IO-Link	
			AR					RS485 communication + analog	
				M				External thread connection (for ≤DN50)	(Withstand pressure 15MPa)
				K				Internal thread connection (for ≤DN50)	High pressure customization
				F				Flanged joint（Max pressure 4MPa）	
				H				Sanitary clamp connection (for ≤DN100)（Max pressure 1.6MPa） Execution standard :ISO2852-1993	
					-			Coil type (display unit detachable)	
					G			Hall type (available caliber ≤DN25, display unit disassembly prohibited)	
						-		Conventional type (medium temperature: ≤100℃)	
						H		High temperature type (medium temperature: ≤130℃)	
						H1		Ultra-high temperature type (medium temperature: ≤180 ° C, must choose Coil type, instrument installation position from the power frequency source >500mm)	
							-	Measuring medium: oil (factory default)	
							S	Measuring medium: water	

High temperature display unit size reference drawing

High temperature type	Conventional type
	

Optional accessories - Electrical accessories (M12-5Pin: Factory default ZL05-PC02G)

name	Outline drawing/dimension drawing (unit :mm)	material	Model number	Shielded wire
M12*1-5Pin (2m cable)		PUR	ZL05-PU02G	-P
M12*1-5Pin (5m cable)			ZL05-PU05G	
M12*1-5Pin (10m cable)			ZL05-PU010G	
		PVC	ZL05-PC02G	
			ZL05-PC05G	
			ZL05-PC010G	
M12*1-5Pin (2m cable)		PUR	ZL05-PU02W	
M12*1-5Pin (5m cable)			ZL05-PU05W	
M12*1-5Pin (10m cable)			ZL05-PU010W	
		PVC	ZL05-PC02W	
			ZL05-PC05W	
			ZL05-PC010W	

M12*1-4Pin/5Pin self-connector/Dimensions (Unit :mm)	Model number
	GL04 (4 Pin connector)
	GL05 (4 Pin connector)
	WL04 (4 Pin connector)
	WL05 (5 Pin connector)

Optional accessories - Protective cover

Color crystal screen series (switch) sensor

Order number: KTCS33661

Sensor and controller

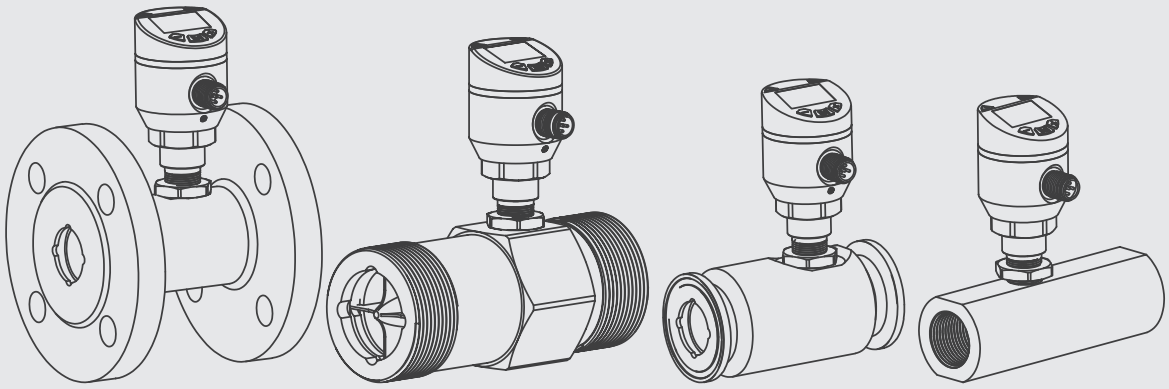
■ Flow ■ pressure ■ temperature ■ level ■ position

KATU 卡图

Operation instruction

Electronic turbine flow sensor

FM120 Series



Safety statement

- Before installing this device, please read this document to ensure that the product is suitable for your application and is not limited in any way;
- Failure to follow the operating instructions or technical data may result in personal injury or property damage;
- Check the compatibility of the product material with the medium to be tested in all applications;
- The equipment is only used as the medium to be tested, and it must only be ensured that the equipment is used correctly for long-term stable operation.

Ensure that the tested medium will not cause damage to the tested part of the product;

! The responsibility for determining whether the measurement sensor is suitable for the application lies with the operator, and the manufacturer accepts no responsibility for the consequences of improper use by the operator. Improper installation and use of the sensor results in invalid claims under warranty.

Flow sensors monitor the medium flow of fluids

Precautions: Beware of personal injury, overpressure danger!

目录

1.1 Product profile

FM120 series electronic flow sensor is a collection of flow measurement, display, output, control in one of the intelligent digital display flow measurement and control products. The product is A turbine body and electronic structure, the output pulse signal is amplified by a high-precision, low-temperature bleach-amplifier, sent to a high-precision A/D converter, converted into a digital signal that can be processed by the microprocessor, and the signal is remotely monitored and controlled by the arithmetic processing to measure and control the system flow. Flexible use, simple operation, easy debugging, safe and reliable. Widely used in hydropower, tap water, petroleum, chemical, mechanical equipment, hydraulic lubrication and other industries, to measure the flow of fluid media display and control.

1.2 Product characteristics

- Color crystal digital display instantaneous flow value, cumulative flow value
- Remote traffic detection and control
- Any calibration on site
- Arbitrary switch between measurement control mode and unit
- With switch alarm setting function
- Output signals can be generated according to the operating mode and parameter Settings
- Switch control PNP/NPN arbitrary switching, normally open/normally closed arbitrary switching

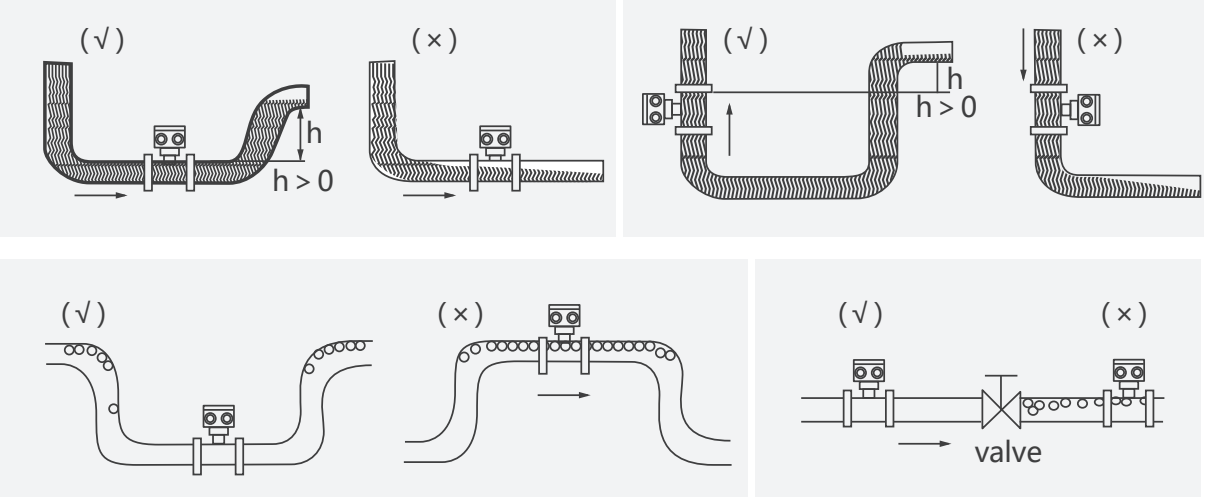
2.1 Installation instructions

! Before installing or removing a sensor, ensure that no media exists in the system to prevent leakage.

- Connect the sensor device to the selected process port
- Full tightening, recommended tightening torque range: 25 to 35Nm
- Hose fastening is an option in critical applications such as severe vibration or shock Perform mechanical decoupling.

2.2 Installation precautions

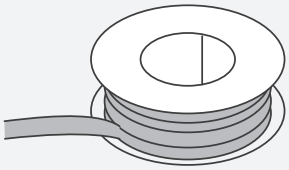
- The upstream and downstream of the flow meter must have a sufficiently long straight pipe section: the front straight pipe section is 10 times the caliber, and the back straight pipe section is 5 times the caliber.



【Installation precautions】

- Please purge the new pipeline before installing the flowmeter to prevent foreign matter in the pipeline from damaging the flowmeter.
- Do not weld flanges with flowmeters; After the flange is welded, the welding slag burr in the pipe must be cleaned.
- Installation flow timing should pay attention to the direction, keep the flow meter arrow and the medium flow direction consistent.
- When installed outdoors, waterproof treatment should be done, if the position of the cable is higher than the position of the case,
Before the signal line enters the case, it should be bent downward into the case to prevent rain from leaking into the case along the cable.
- Avoid installation in high temperature (above 50 ° C) and low temperature
(below minus 20 ° C).
- Avoid installation in the case of strong electromagnetic interference (such as high-power frequency converter, motor, etc.), strong current and weak current should be separated during wiring.
- Avoid installation on pipes with mechanical vibration, if installation is necessary, vibration mitigation measures must be taken.
Like a hose transition, or a shock pad.
- Avoid the installation on the overhead long pipe, the pipe sag caused the sealing between the flow meter and the flange leakage; If it must be installed,
Pipe support points should be located near the upstream and downstream of the flow meter.

Metal/iron filings

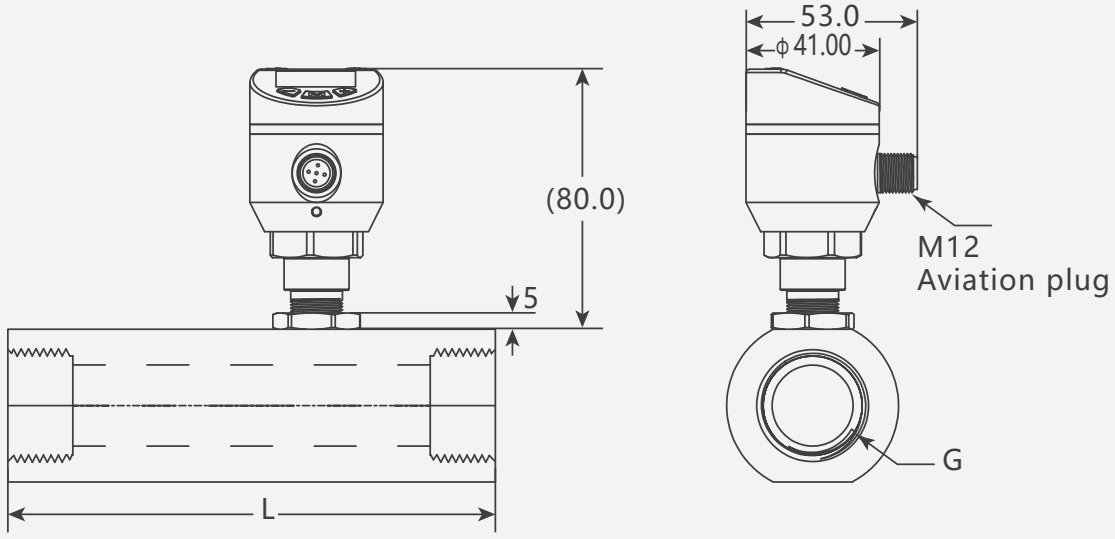


entangle

Note: No foreign matter is allowed in the pipe

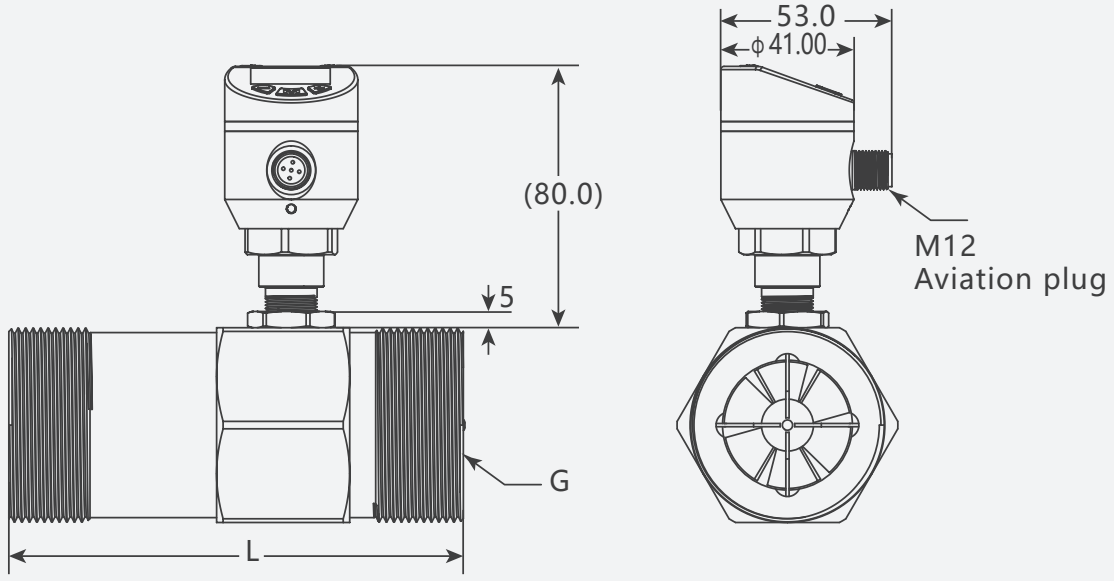
3.1 Dimension drawing (mm)

■ Internal thread connection



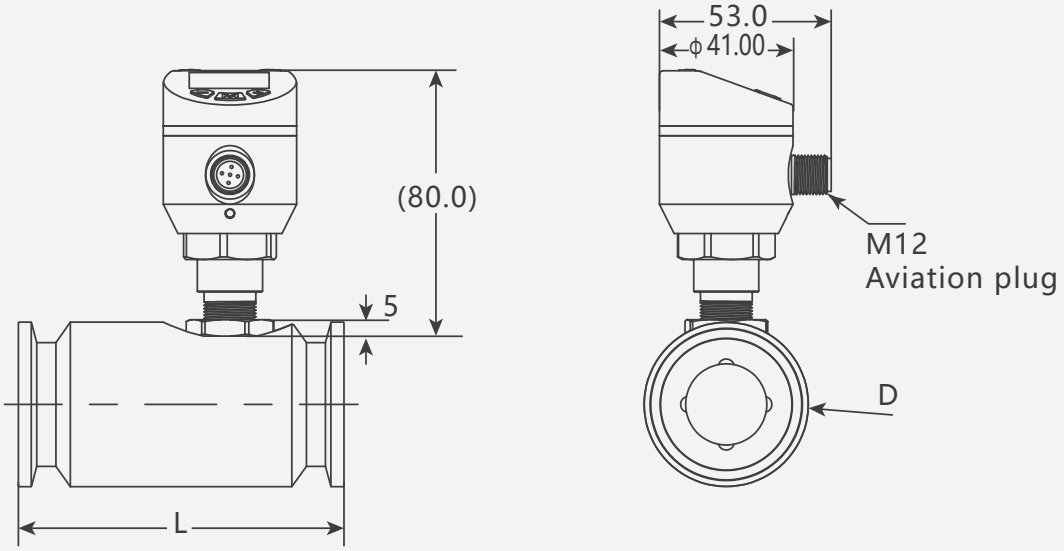
Sealing method: It is recommended to use card sleeve type ED sealing joint

■ External thread connection



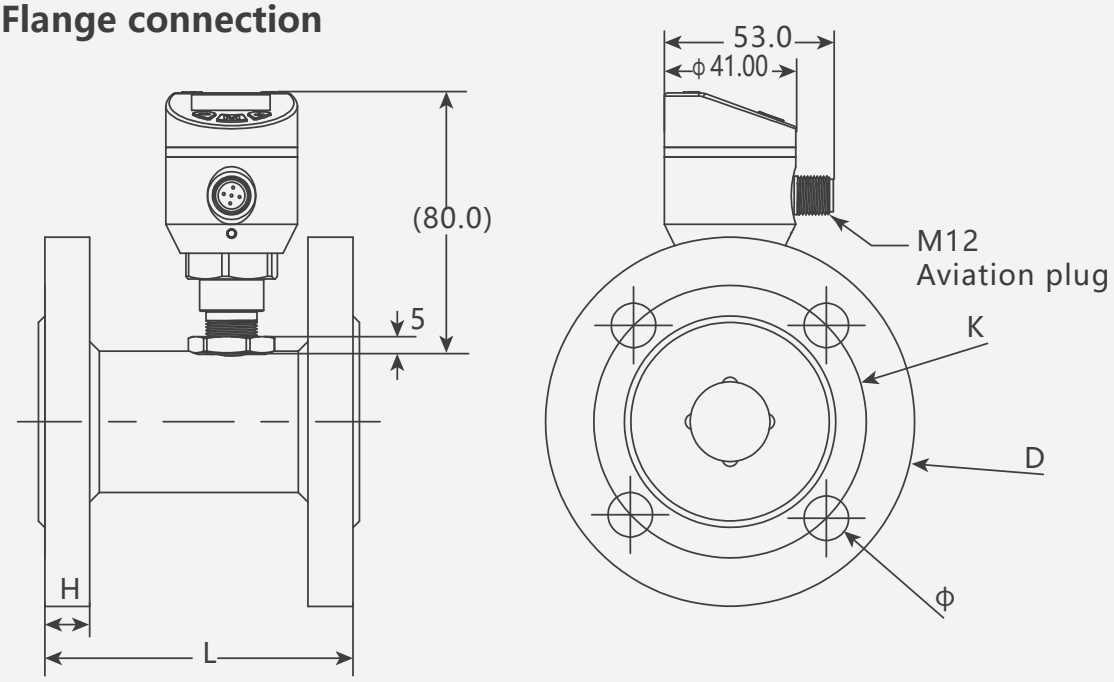
Sealing method: Flat gasket is recommended

■ Clamp connection



Sealing method: chuck type sealing gasket

■ Flange connection



Sealing method: flange type sealing gasket

3.2 Size table (mm)

caliber (mm)	Flange connection (1.6MPa)					male screw			Internal thread		Clamp connection	
	Outside diameter D	Center distance K	Hole diameter ϕ	Hole number N	thickness H	Body length L		Process connection	Body length L	Screw thread G	Outside diameter of chuck D	Body length L
						Straight pipe	No straight pipe					
6						345	65	G1/2	80	1/2	50.5	50
10						345	65	G1/2	80	1/2	50.5	50
12	95	65	14	4	14	65		G3/4	80	1/2	50.5	50
15	95	65	14	4	14	75		G1(33.2)	110	1/2	50.5	75
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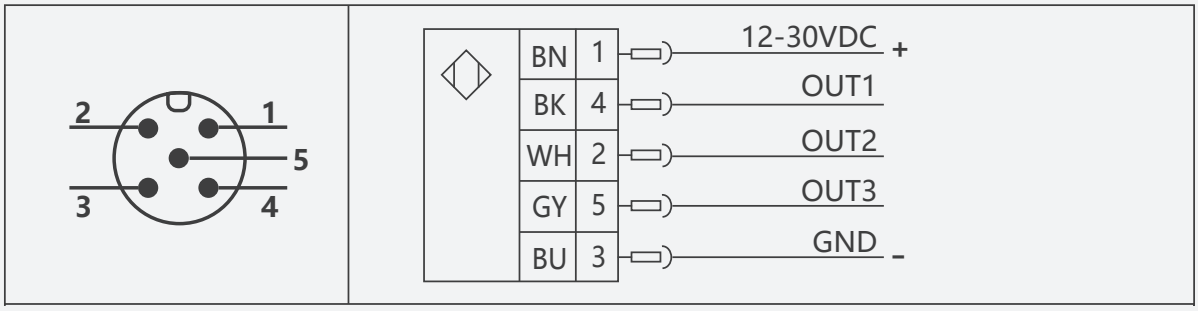
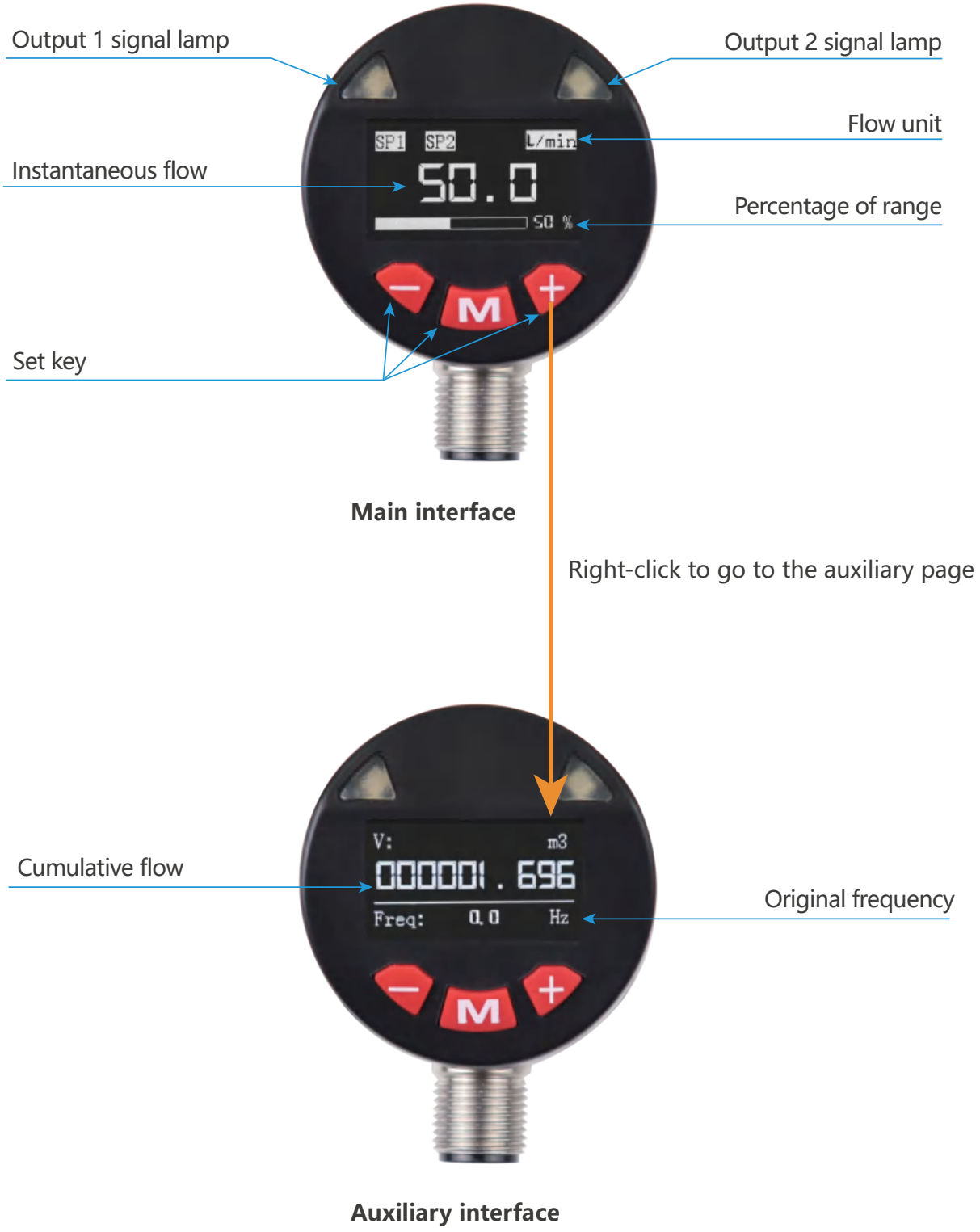
80	200	160	18	8	20	200			260	3	106	200
100	220	180	18	8	22	220					119	220
125	250	210	18	8	22	250						
150	285	240	22	8	24	300						
200	340	295	22	12	26	360						
250	400	355	26	12	28	400						
300	460	410	26	12	32	500						

4.1 Wiring diagram



A3: Two switches + one analog		
color	**stitch**	**Instructions**
BN	1	power supply (+)
BU	3	power supply (-)
BK	4 (OUT1)	Flow switch PNP (Factory default) Flow switch NPN Linear pulse (full scale 100Hz) Original pulse Quantitative pulse (full scale *0.1)
WH	2 (OUT2)	Flow switch PNP (Factory default) Flow switch NPN
GY	5 (OUT3)	Flow: 4-20mA (factory default) Flow: 1-5v Flow: 0-10v

4.2 Panel diagram



4.3 Menu description

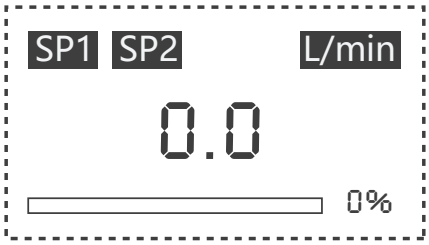
Level 1 menu	
SP1 Set	Switch 1 sets the value
RP1 Set	Switch 1 resets the value
SP2 Set	Switch 2 sets the value
RP2 Set	Switch 2 resets the value
F-URV	range
Menu 2 Set	Menu 2 Enter

Level 2 menu	
Factory Reset	factory data reset.
out1 Set	OUT1 Output mode
	W-NC: The window is always closed W-NO: The window is always open H-NC: hysteresis normally closed H-NO: normally open with hysteresis S-Hz-OUT: sets the pulse output F-Hz-OUT: indicates the original pulse output
out2 Set	OUT2 utput mode
	W-NC: The window is always closed W-NO: The window is always open H-NC: hysteresis normally closed H-NO: normally open with hysteresis
ds1 Set	Switch 1 output delay
dr1 Set	Switch 1 Reset delay
ds2 Set	Switch 2 output delay
dr2 Set	Switch 2 Reset delay

unit Set	Unit setting
	L/min, mL/min, m^3/h
PNP/NPN Set	PNP/NPN Settings
F-L-data	Historical minimum
F-H-data	Historical maximum
P-PACE	Filter damping
Low flow cut	Lower flow rate excision
A0-Mode	Analog output
	4-20mA 0-20mA 1-5V 0-5V 2-10V 0-10V
d-P-set	Decimal place
digit colour	Master data color
BG colour	Main background color
SCRN-Set	Screen off setting value

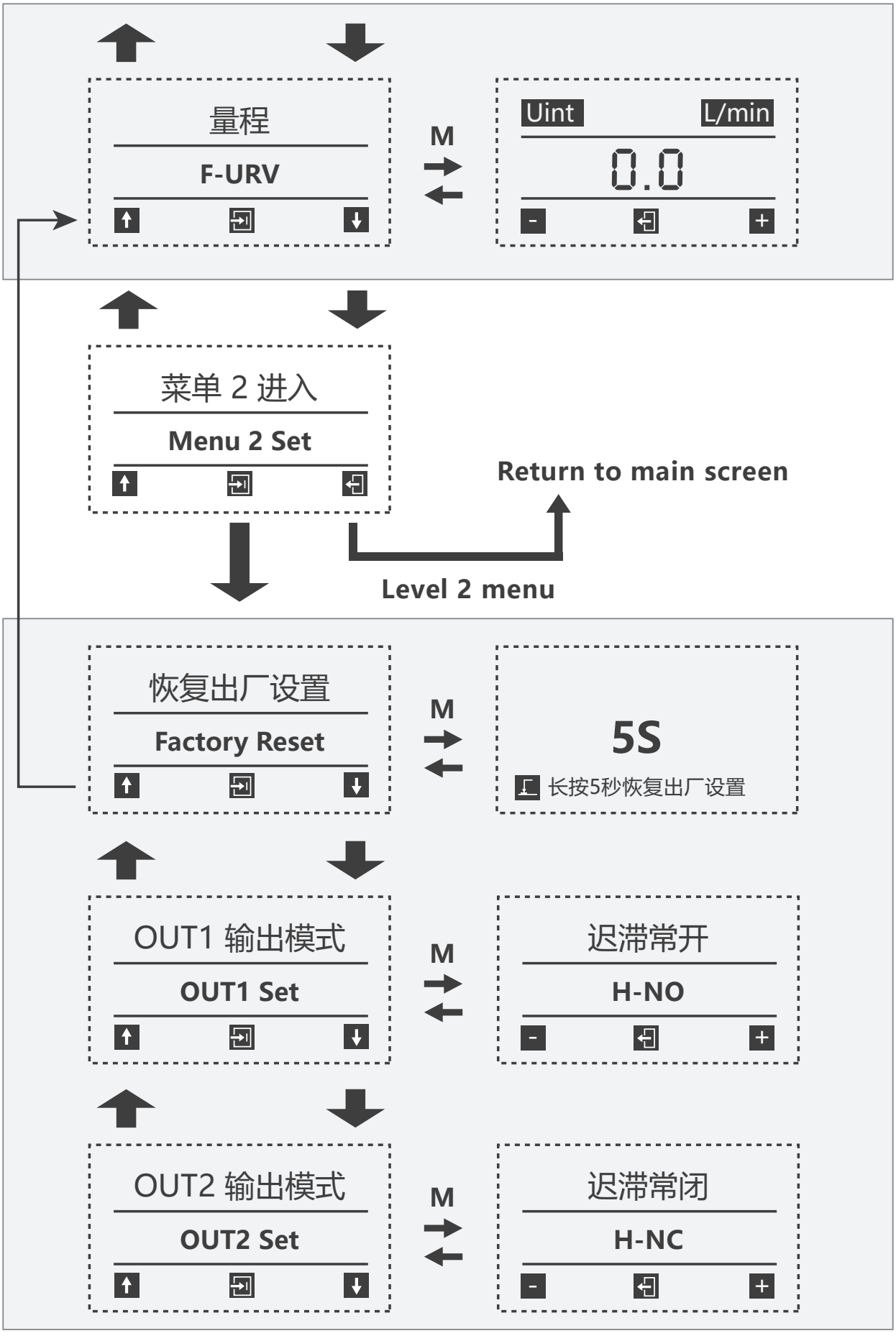
4.4 Menus and Settings

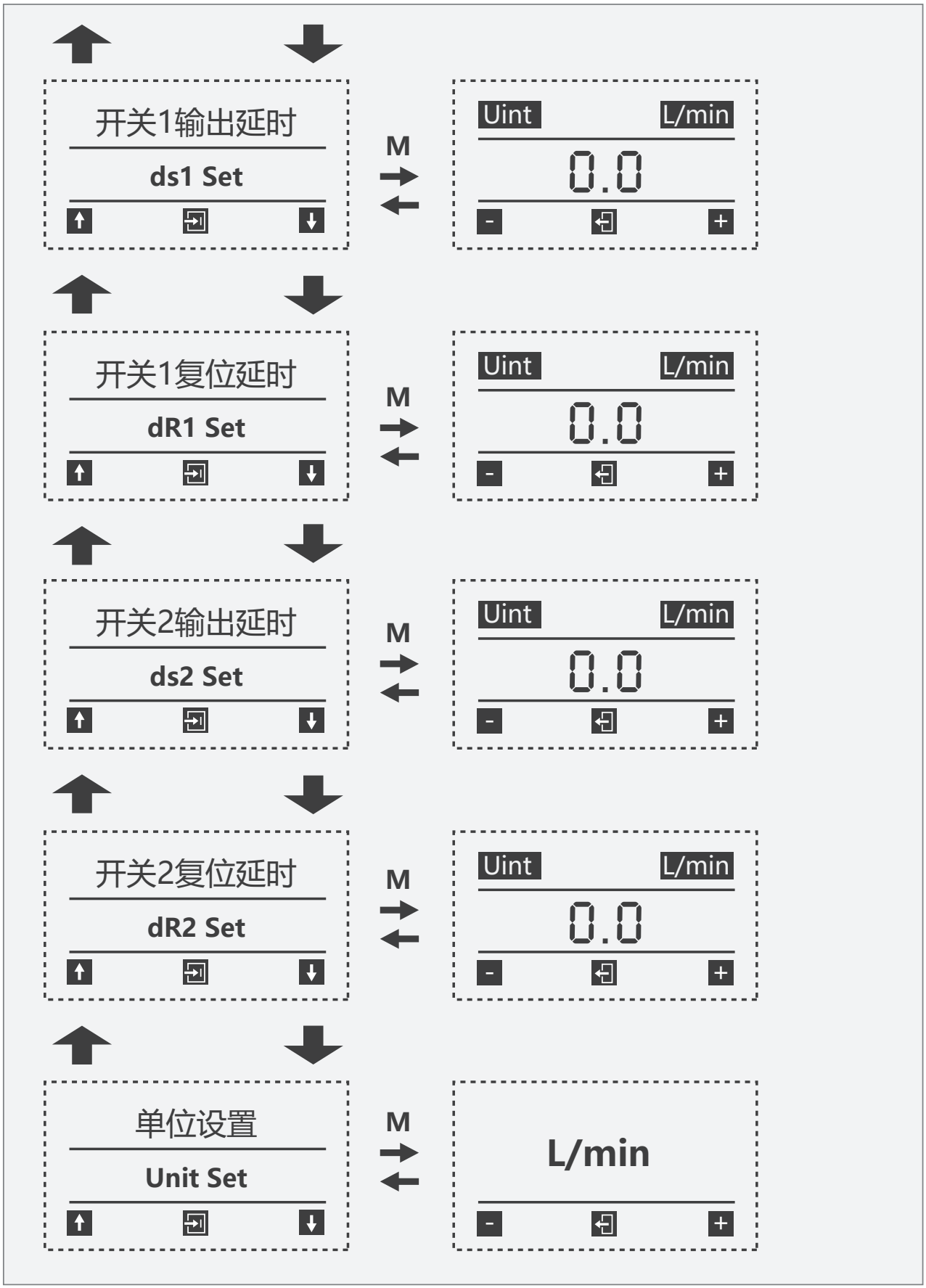
Main interface

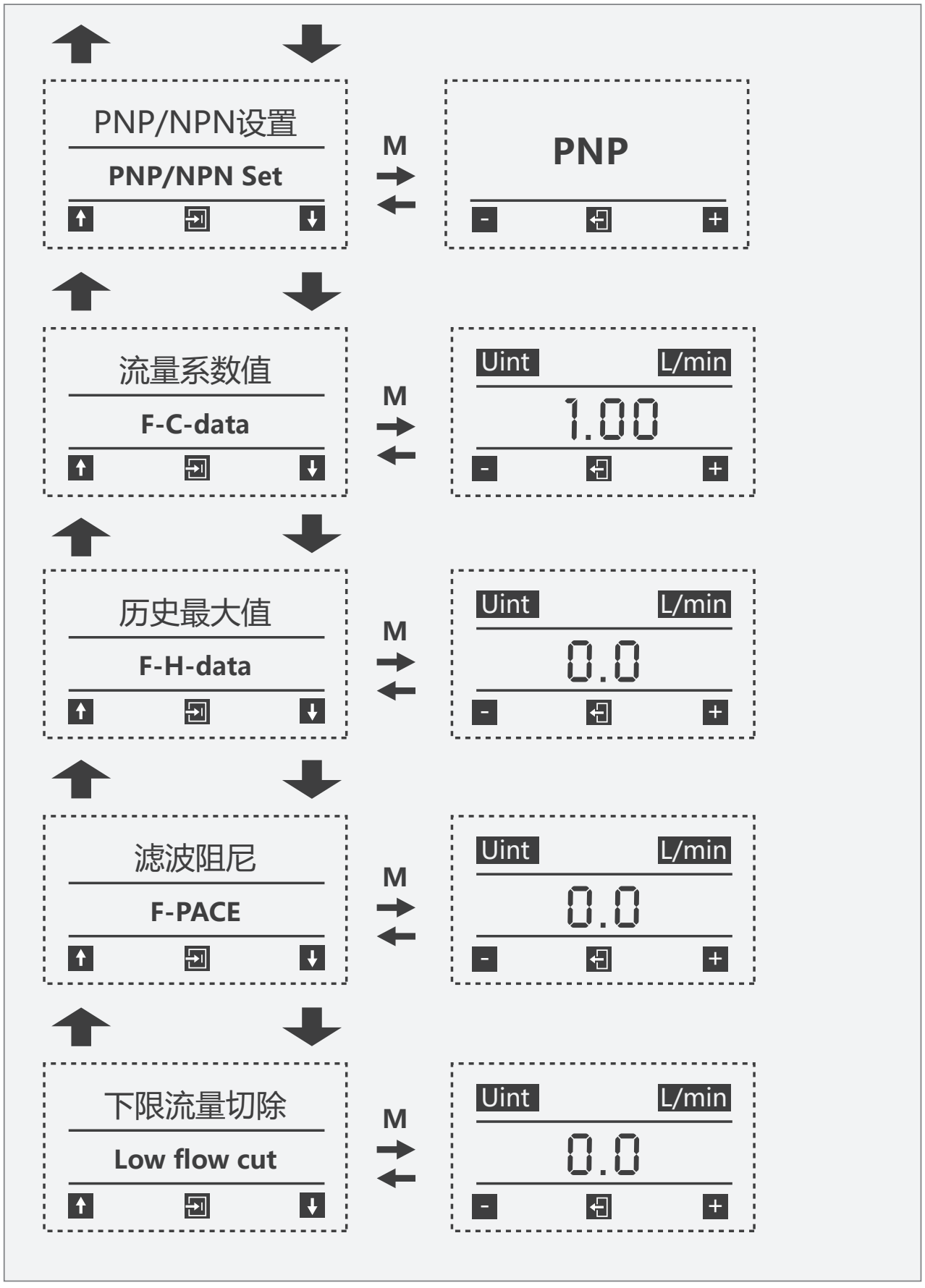


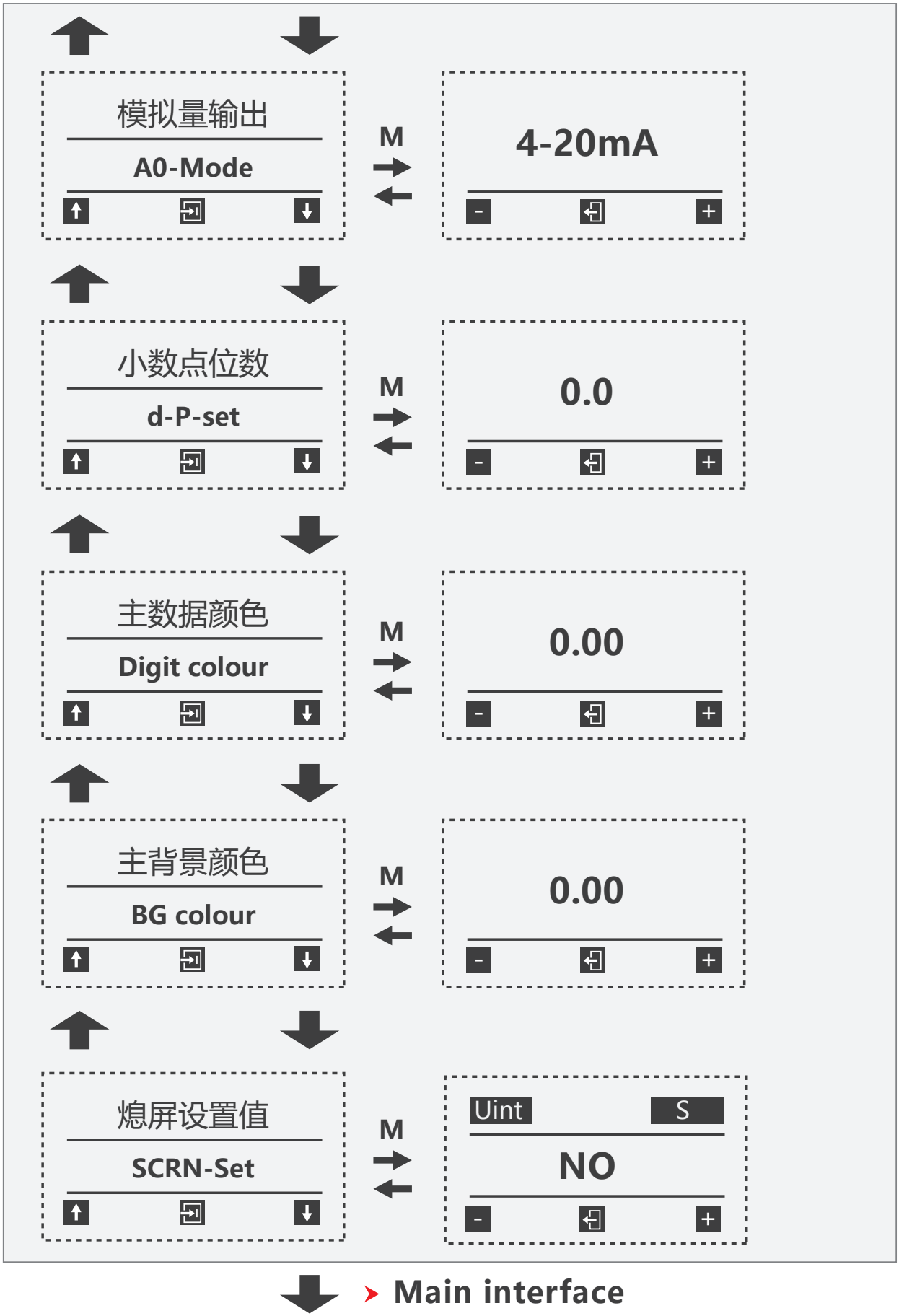
M

Level 1 menu

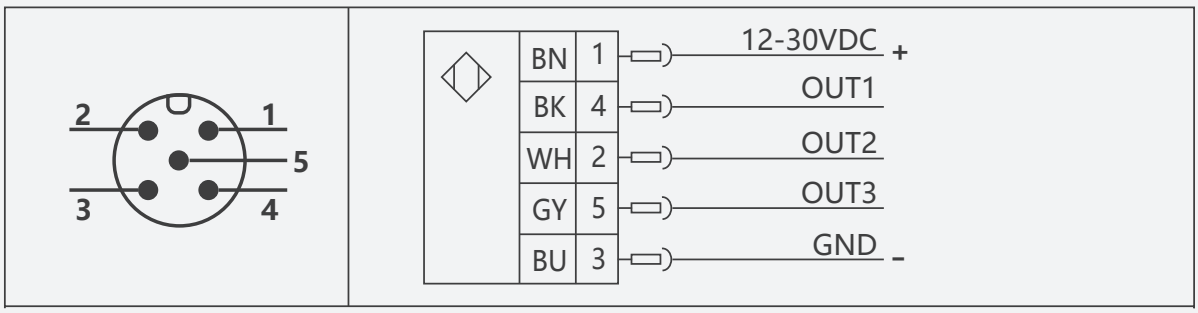

量程
F-URV
M
Uint
L/min
0.0
菜单 2 进入
Menu 2 Set
Return to main screen
Level 2 menu
恢复出厂设置
Factory Reset
5S
长按5秒恢复出厂设置
OUT1 输出模式
OUT1 Set
迟滞常开
H-NO
OUT2 输出模式
OUT2 Set
迟滞常闭
H-NC


开关1输出延时
ds1 Set
M
Uint
L/min
0.0
开关1复位延时
dR1 Set
M
Uint
L/min
0.0
开关2输出延时
ds2 Set
M
Uint
L/min
0.0
开关2复位延时
dR2 Set
M
Uint
L/min
0.0
单位设置
Unit Set
M
L/min


PNP/NPN设置
PNP/NPN Set
M
PNP
-
+
流量系数值
F-C-data
M
Uint
L/min
1.00
-
+
历史最大值
F-H-data
M
Uint
L/min
0.0
-
+
滤波阻尼
F-PACE
M
Uint
L/min
0.0
-
+
下限流量切除
Low flow cut
M
Uint
L/min
0.0
-
+

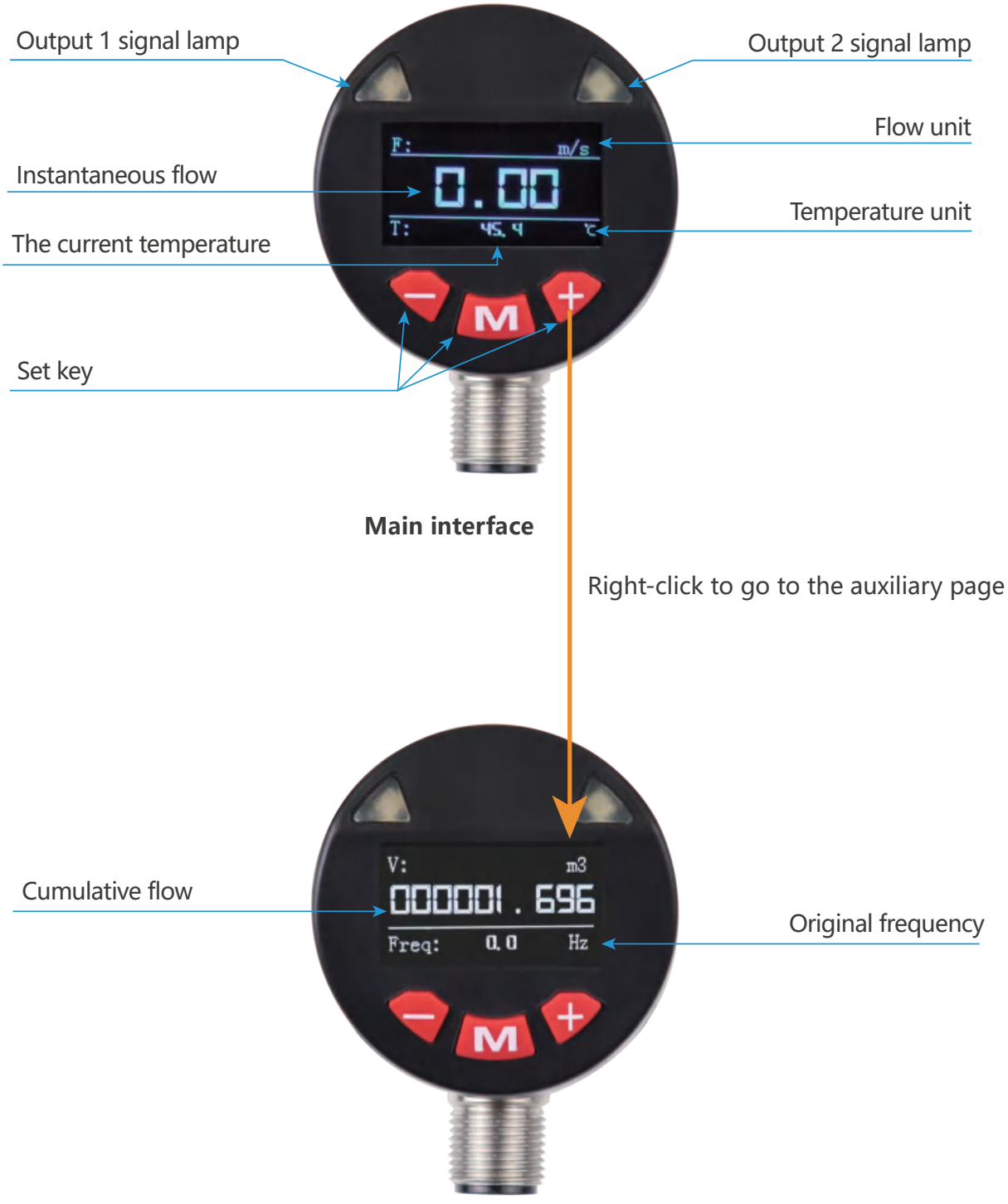

模拟量输出
A0-Mode
M
4-20mA
小数点位数
d-P-set
M
0.0
主数据颜色
Digit colour
M
0.00
主背景颜色
BG colour
M
0.00
熄屏设置值
SCRN-Set
M
Uint
S
NO
Main interface

5.1 Wiring diagram



AR: RS485 Communication/analog		
color	**stitch**	**Instructions**
BN	1	power supply（+）
BU	3	power supply（-）
BK	4 (OUT1)	RS485(B)
WH	2 (OUT2)	RS485(A)
GY	5 (OUT3)	Flow: 4-20mA (factory default) Flow: 1-5v Flow: 0-10v

5.2 Panel diagram



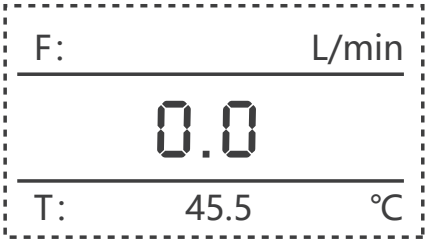
5.3 Menu description

Level 1 menu	
485 ID	485 address
Baud set	Baud rate setting
parity set	Check bit setting
stop bit set	Stop bit setting
F-URV	range
Menu 2 set	Menu 2 Enter

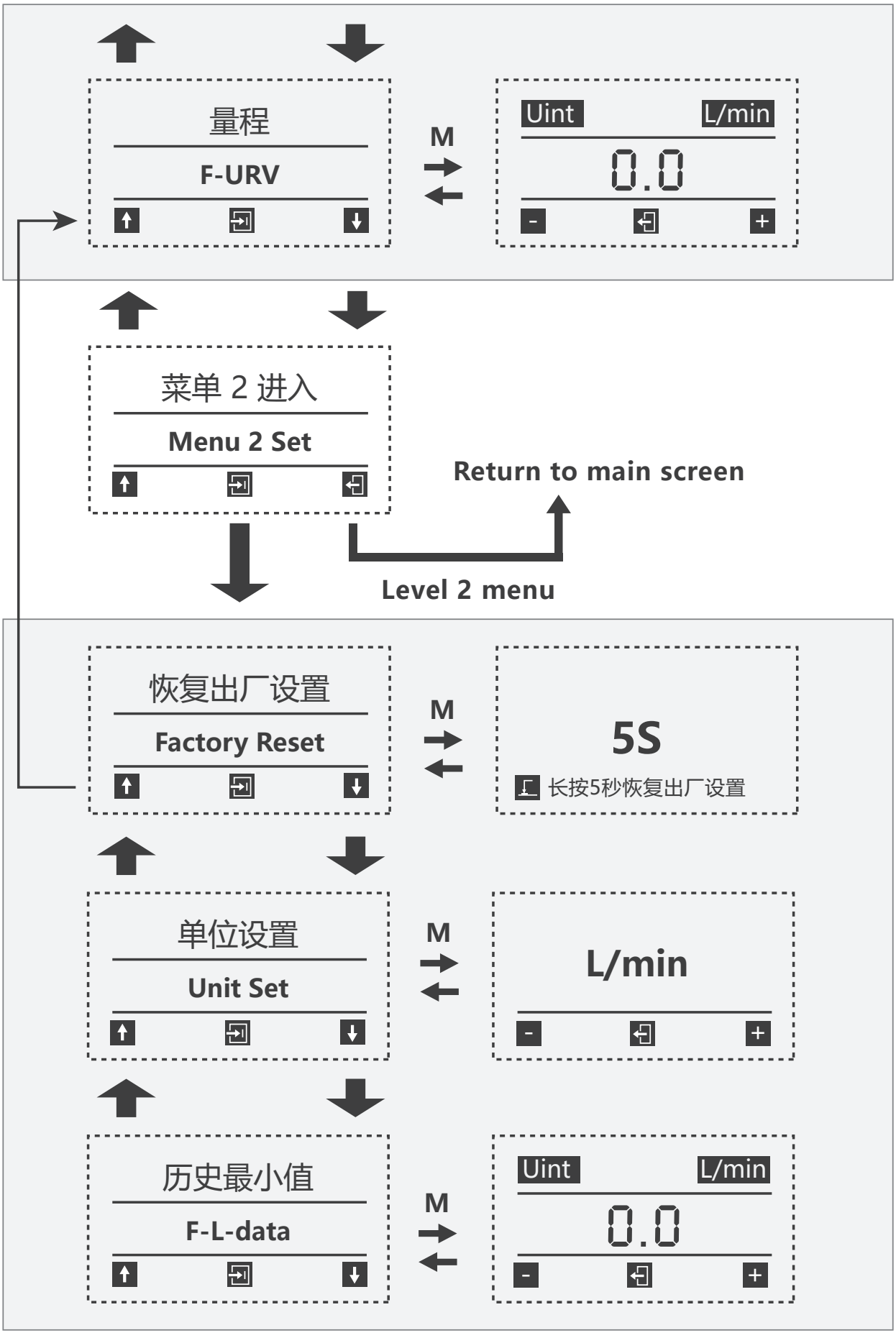
Level 2 menu	
factory reset	factory data reset.
unit set	Unit Settings (L/min, ml/min, m^3/h)
F-L-data	Historical minimum
F-H-data	Historical maximum
F-PACE	Filter damping
Low flow cut	Lower flow rate excision
A0-Mode	Analog output
	4-20mA
d-P-set	Decimal place
digit colour	Master data color
BG colour	Main background color
SCRN-Set	Screen off setting value

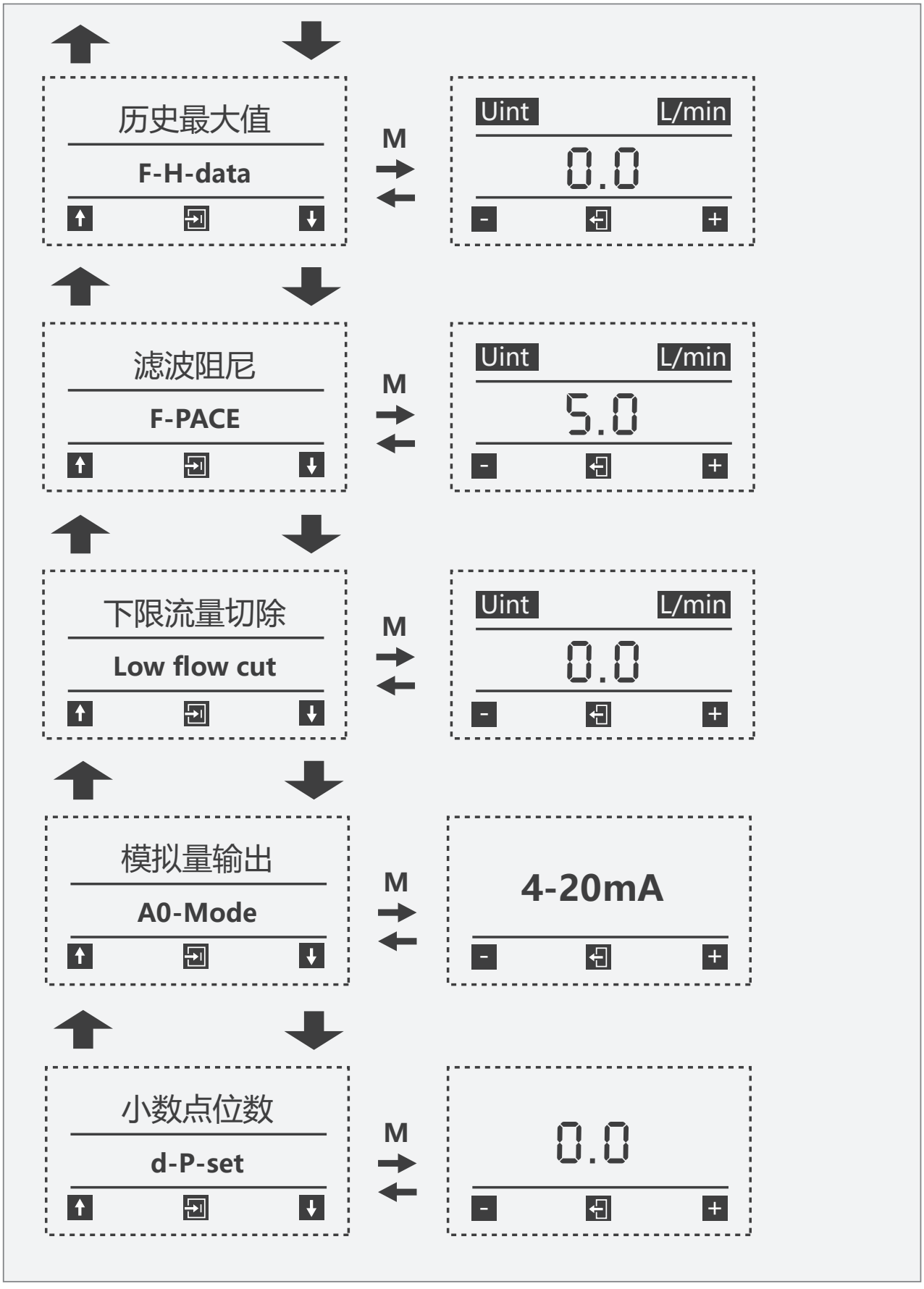
5.4 Menus and Settings

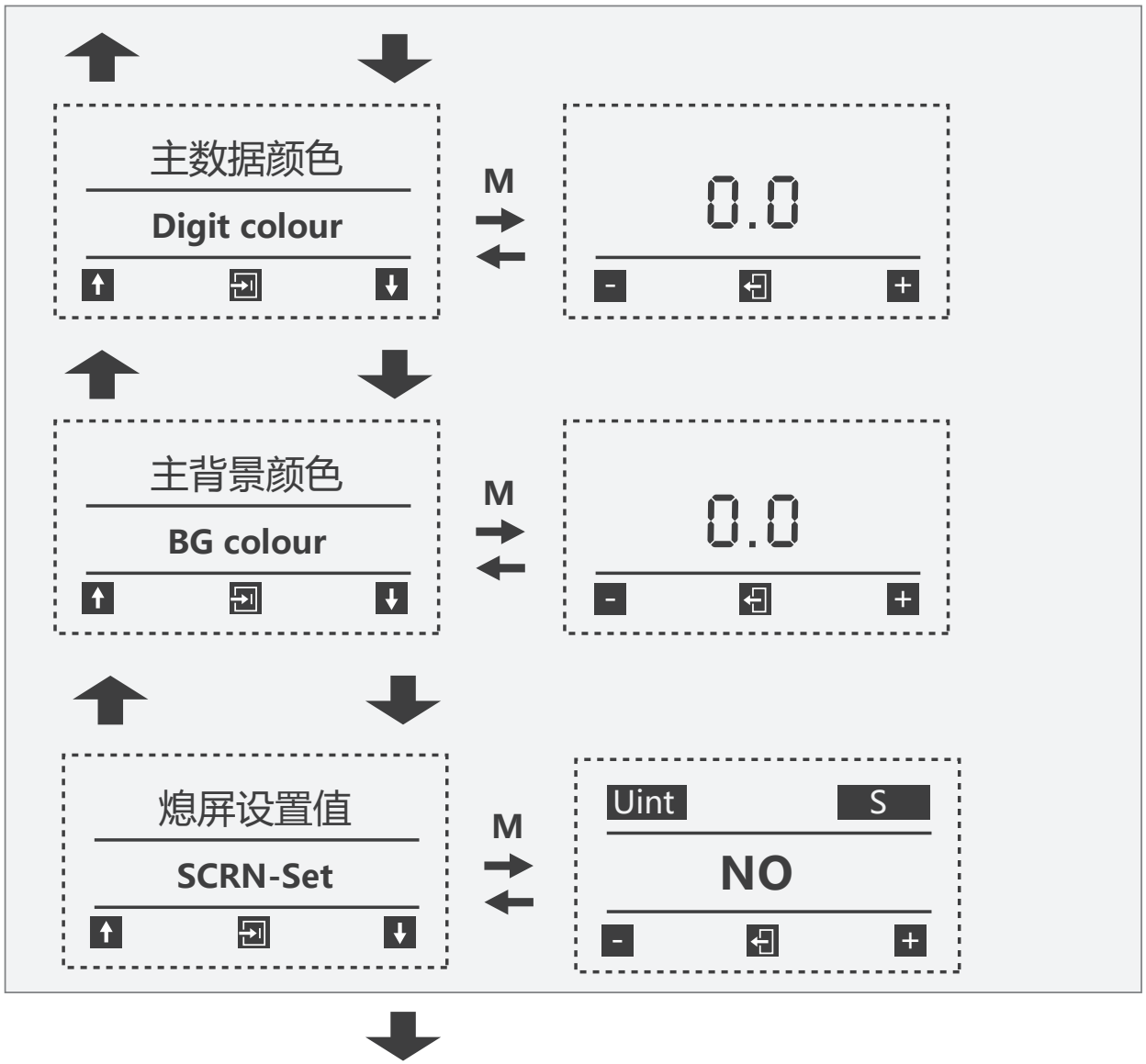
Main interface



M Level 1 menu

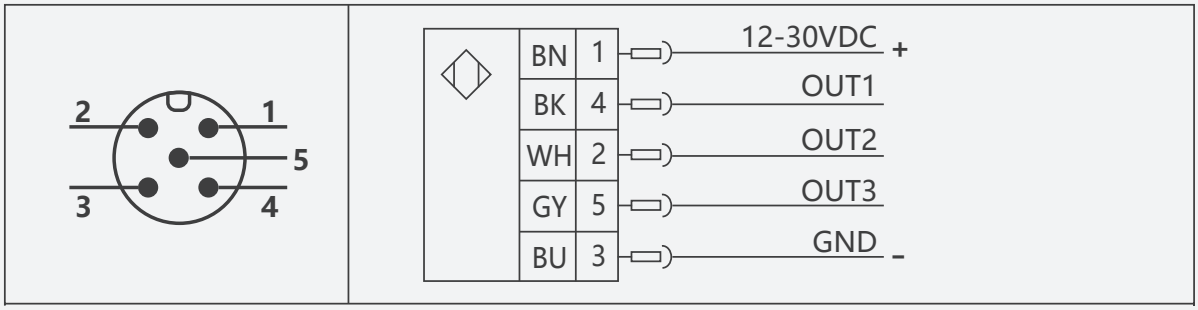

量程
F-URV
M
Uint
L/min
0.0
-
+
菜单 2 进入
Menu 2 Set
Return to main screen
Level 2 menu
恢复出厂设置
Factory Reset
M
5S
长按5秒恢复出厂设置
单位设置
Unit Set
M
L/min
-
+
历史最小值
F-L-data
M
Uint
L/min
0.0
-
+


历史最大值
F-H-data
M
Uint
L/min
0.0
滤波阻尼
F-PACE
M
Uint
L/min
5.0
下限流量切除
Low flow cut
M
Uint
L/min
0.0
模拟量输出
A0-Mode
M
4-20mA
小数点位数
d-P-set
M
0.0



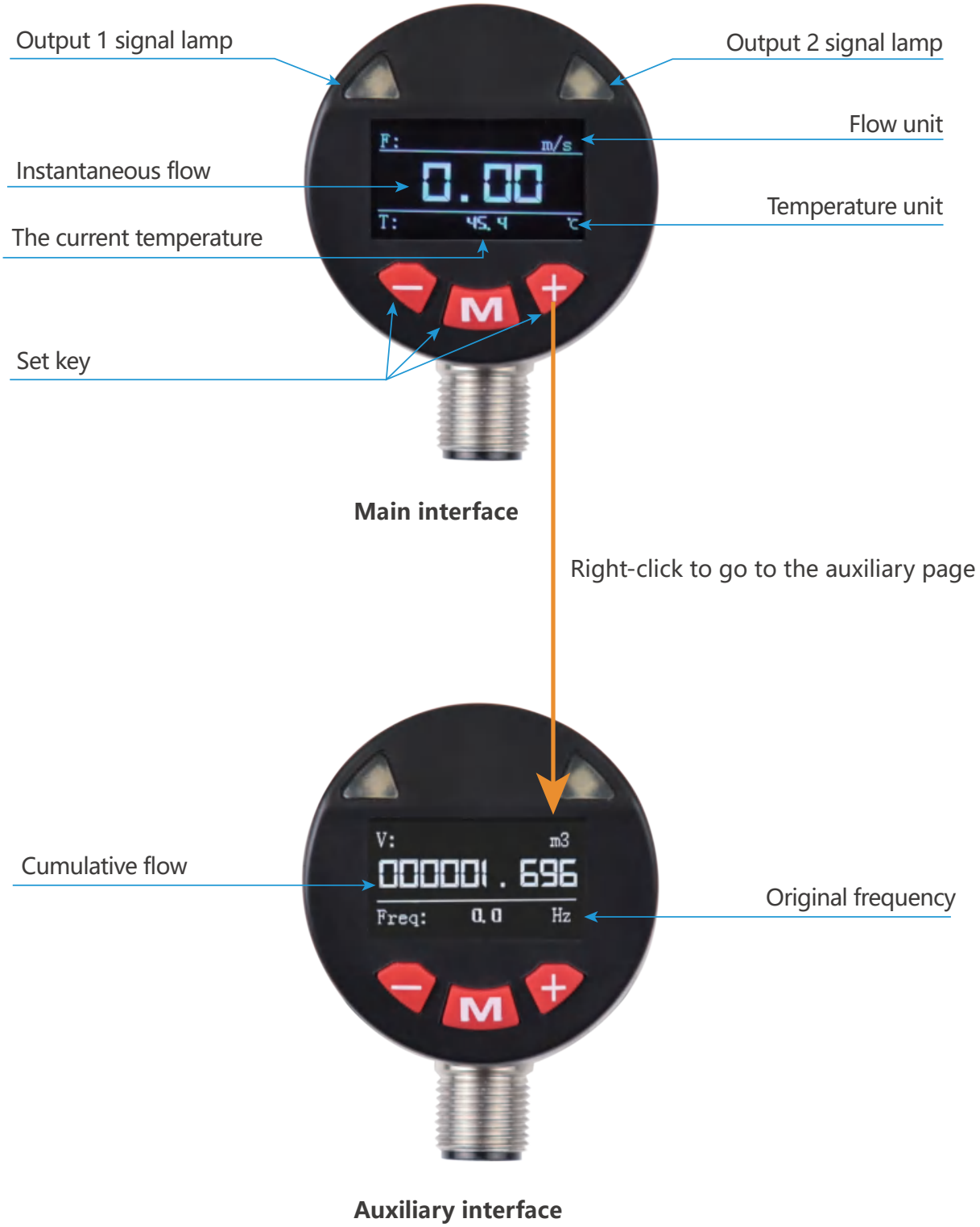
› **Main interface**

6.1 Wiring diagram



SA: Analog (flow/temperature)/switch/pulse/frequency /IO-Link		
color	**stitch**	**Instructions**
BN	1	power supply（+）
BU	3	power supply（-）
BK	4 (OUT1)	Flow switch PNP Flow switch NPN Temperature switch PNP Temperature switch NPN Linear pulse (full scale 100Hz) Original pulse Quantitative pulse (full scale *0.1) IO-Link
WH	2 (OUT2)	Flow: 4-20mA (factory default) Flow: 1-5v Flow: 0-10v
GY	5 (OUT3)	Temperature: 4-20mA(Factory default) Temperature: 1-5v Temperature: 0-10v

6.2 Panel diagram



6.3 Menu description

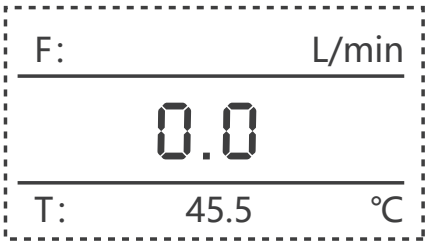
Level 1 menu	
SP1 Set	Switch 1 sets the value
RP1 Set	Switch 1 resets the value
T-LRV	Lower limit of temperature
T-URV	Upper temperature limit
F-URV	Flow range
Menu 2 Set	Menu 2 Enter

Level 2 menu	
Factory Reset	factory data reset.
out1 Set	OUT1 Output mode
	F-W-NC: The flow window is normally closed F-W-NO: The flow window is normally open F-H-NO: Flow hysteresis is normally open F-H-NC: Flow hysteresis is normally closed T-W-NC: The temperature window is normally closed T-W-NO: The temperature window is normally open T-H-NO: Temperature hysteresis is normally open T-H-NC: Temperature hysteresis is normally closed F-Hz-OUT: Flow pulse output
out2 Set	OUT2 Output mode
	F-A-OUT: Flow analog output T-A-OUT: Temperature analog output
ds1 Set	Switch 1 output delay
dr1 Set	Switch 1 Reset delay
T-ofst	Temperature offset
Flow-C	Flow coefficient value

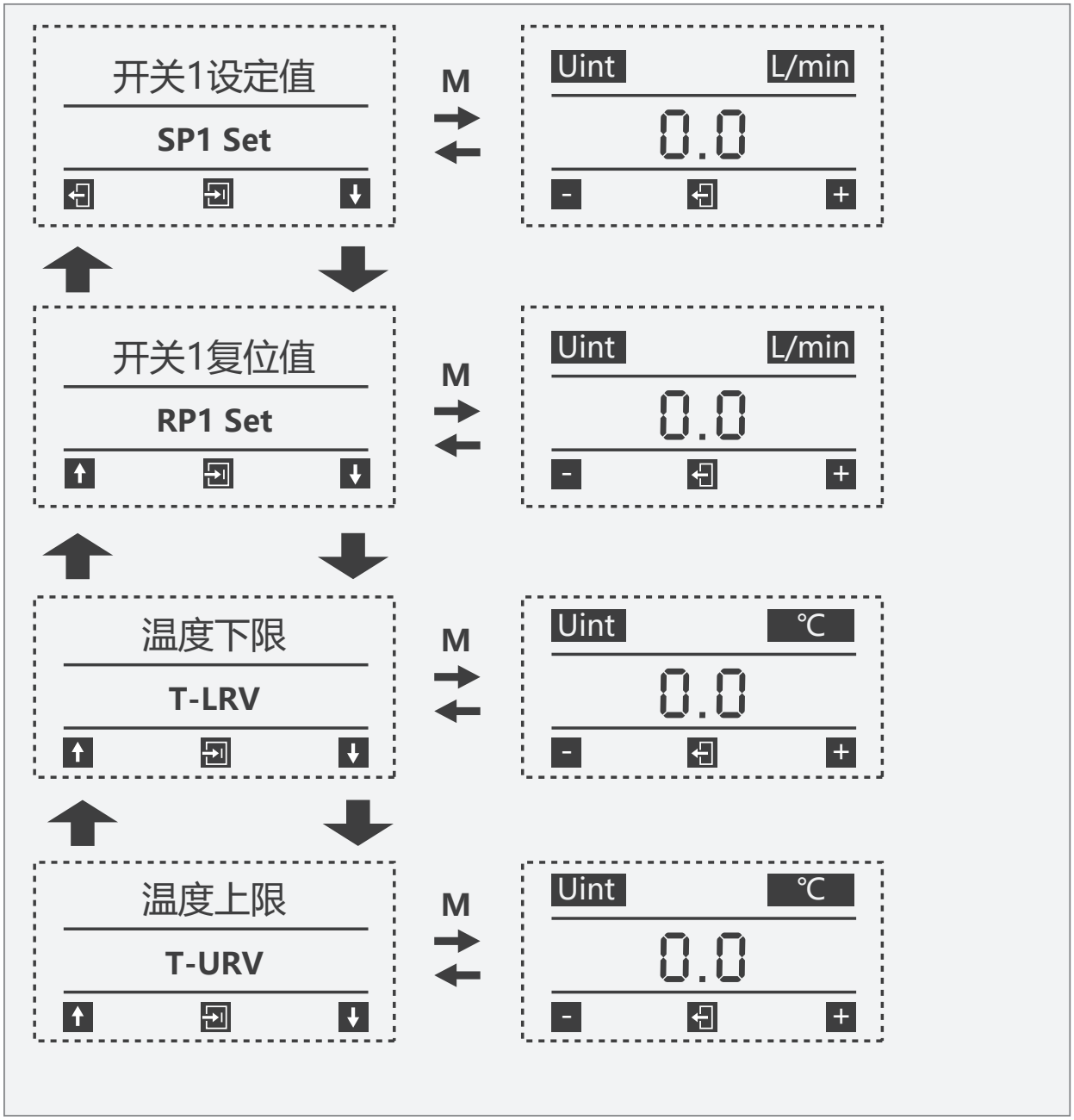
unit Set	Unit setting
	L/min, mL/min, m^3/h
PNP/NPN Set	PNP/NPN Settings
F-L-data	Historical minimum
F-H-data	Historical maximum
P-PACE	Filter damping
Low flow cut	Lower flow rate excision
A0-Mode	Analog output
	4-20mA 0-20mA 1-5V 0-5V 2-10V 0-10V
d-P-set	Decimal place
digit colour	Master data color
BG colour	Main background color
SCRN-Set	Screen off setting value

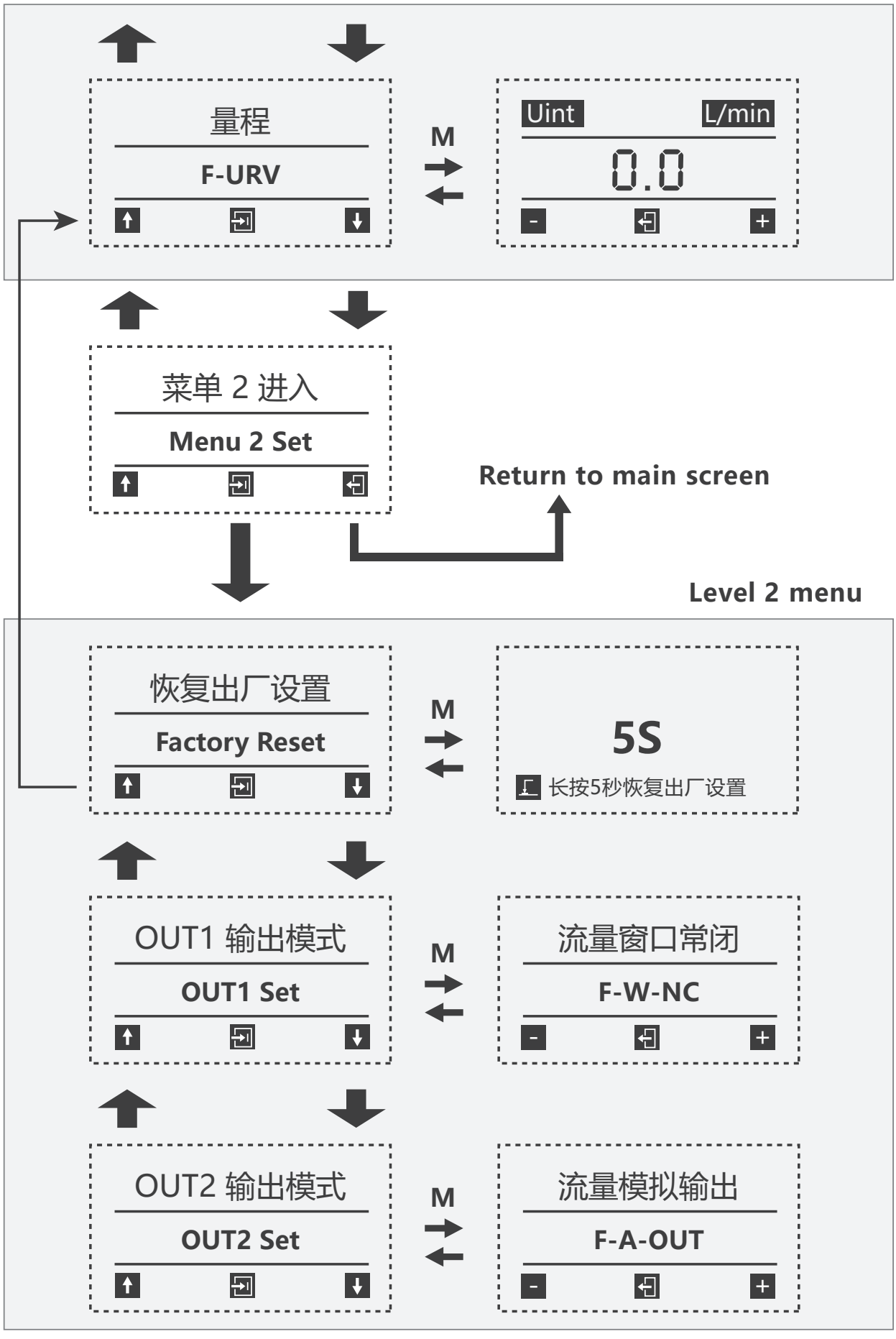
6.4 Menus and Settings

Main interface

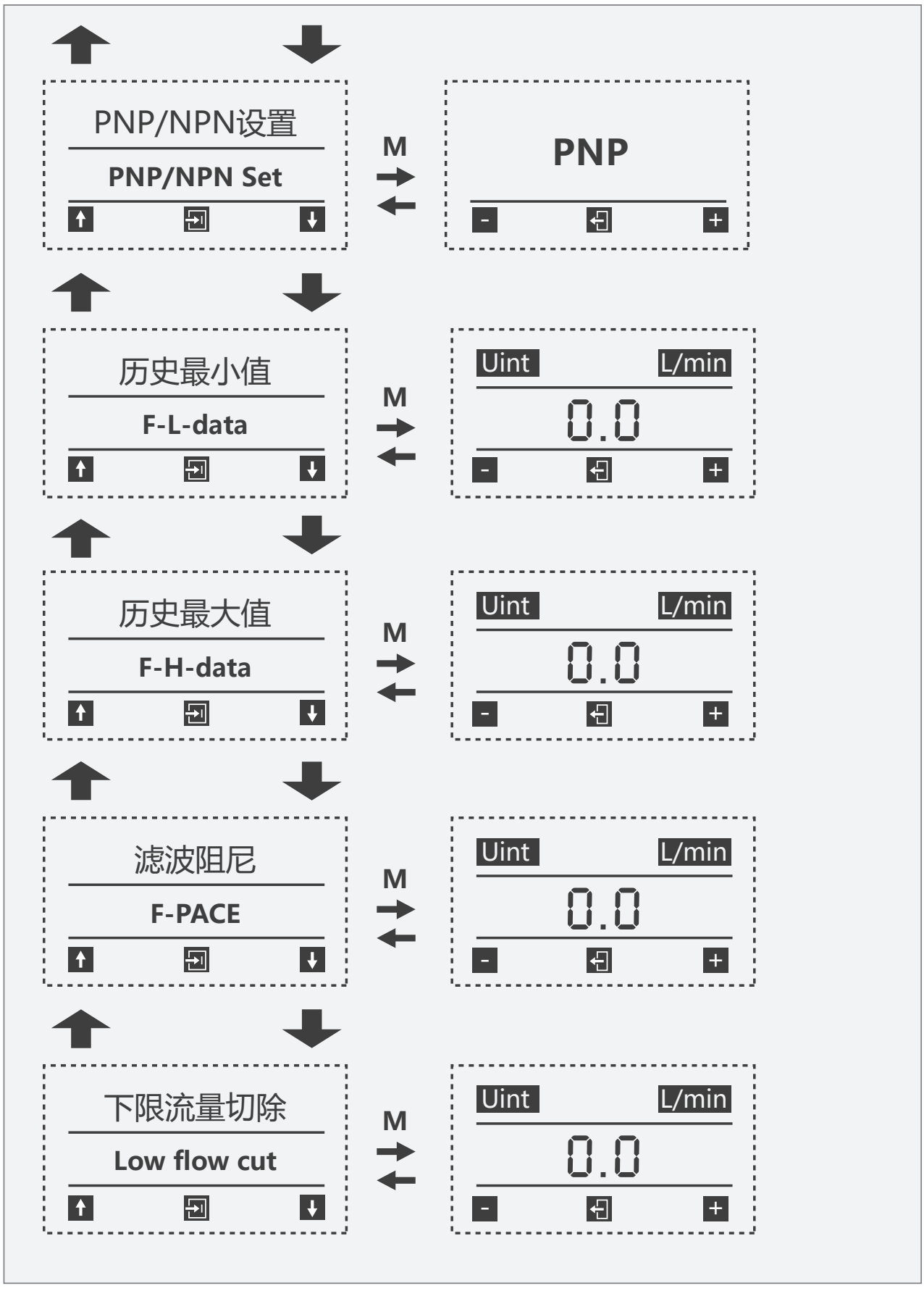


M Level 1 menu




量程
F-URV
M
Uint
L/min
0.0
菜单 2 进入
Menu 2 Set
Return to main screen
Level 2 menu
恢复出厂设置
Factory Reset
M
5S
长按5秒恢复出厂设置
OUT1 输出模式
OUT1 Set
M
流量窗口常闭
F-W-NC
OUT2 输出模式
OUT2 Set
M
流量模拟输出
F-A-OUT


开关1输出延时
ds1 Set
M
Uint
L/min
0.0
开关1复位延时
dR1 Set
M
Uint
L/min
0.0
温度偏移量
T-ofst
M
Uint
℃
0.0
流量系数值
Flow-C
M
Uint
P-L
0.0
单位设置
Unit Set
M
L/min


PNP/NPN设置
PNP/NPN Set
M
PNP
历史最小值
F-L-data
M
Uint
L/min
0.0
历史最大值
F-H-data
M
Uint
L/min
0.0
滤波阻尼
F-PACE
M
Uint
L/min
0.0
下限流量切除
Low flow cut
M
Uint
L/min
0.0

➤ **Main interface**

7.1 Fault situation and handling method

Fault phenomenon	Possible cause	Elimination method
There is no output signal after the power is turned on	1. No medium flow in the pipeline or the flow rate is lower than the starting flow rate; 2. The power supply is incorrectly connected to the output cable. 3. The display circuit is damaged	1. Increase the medium flow rate or change to a smaller diameter flowmeter to meet the requirements of the flow range; 2. Connect cables correctly. 3. Replace the flowmeter
The flowmeter has signal output when there is no flow	1. Poor grounding of the flowmeter and interference of strong electricity and other ground lines; 2. The sensitivity of the amplifier is too high or produces self-excitation; 3. The power supply is unstable. Poor filtering and other electrical interference.	1. Connect the ground correctly to eliminate interference; 2. Replace the preamplifier; 3. Repair and replace the power supply to eliminate interference.
The instantaneous flow indicator is unstable	1. The medium flow is unstable; 2. The sensitivity of the amplifier is too high or too low, and there are multiple and missing pulse phenomena; 3. There are debris in the shell; 4. Poor grounding; 5. The flow rate is lower than the lower limit; 6. Foreign matter enters the pipe, forming a disturbance.	1. Test after the flow rate is stable; 2. Replace the preamplifier; 3. Remove dirt; 4. Check the ground cable to ensure that it is normal
The indicated cumulative flow does not match the actual cumulative flow	1. Incorrect input of meter coefficient; 2. The normal flow rate of the user is lower than or higher than the normal flow range of the selected flowmeter; 3. The flow meter itself is out of tolerance	1. Enter the correct instrument coefficient after re-calibration; 2. Adjust the flow rate of the pipeline to make it normal or choose a flowmeter of appropriate specifications; 3. Recalibrate.
Key exception	The converter key is in poor contact or locked.	Replace the display board.

FM120-RS485

Communication Protocol of Electronic Turbine Flow Sensor (MODBUS-RTU)

1. RTU Data Format Description

1.1 Communication Mode

The instrument adopts MODBUS RTU format, and the protocol is used for master-slave query mode data communication.

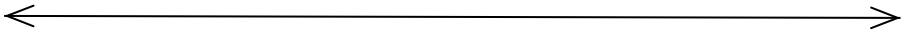
1.2 Data Format

In RTU mode, each byte (11 bits) is formatted as follows: the encoding system is 8-bit binary.

Bits per byte: 1 start bit, 8 data bits (send the least significant bit first), no parity bit, 1 stop bit **Note:** When using no parity, 1 stop bit or 2 stop bits can be selected.

The baud rate is optional: 2400,4800,9600,14400,19200,28800,115200

Modbus message



Origin	Address	FC	Data	CRC verification	Finish
≥3.5 character	8 bit	8 bit	n*8 bit	16 bit	≥3.5 character

pour :

(1) In RTU mode, idle intervals lasting at least 3.5 character time are used to separate message frames.

(2) The whole frame must be sent as a continuous character stream.

(3) The idle interval between two characters should not exceed 1.5 character time.

1.3 Address

The protocol specifies that the instrument addresses range from 0 to 255, with 0 reserved for broadcast (which this protocol does not support), and the remaining addresses are reserved.

2. Command Description

2.1 This Instrument Utilizes Two Commands from the MODBUS Protocol:

Command 03	Read single hold register
Command 06	Write single hold register

The Format of Command 03 Is as Follows (read Register Command):

pour :

MODBUS request

Instrument address	1 BYTE	01-255
FC	1 BYTE	0x03
Start address	2 BYTE	00-06
Read count	2 BYTE	1-7
CRC low-order	1 BYTE	
CRC high-order	1 BYTE	

MODBUS response

Instrument address	1 BYTE	01-255
FC	1 BYTE	0x03
Byte count	1 BYTE	02-0E
Input mode	N*2 BYTE	
CRC low-order	1 BYTE	
CRC high-order	1 BYTE	

The format of command 03 is as follows (read register command):

Send a read command to the 01 sensor to retrieve data from 7 registers in the MODBUS request

Instrument address (default)	FC	Register address	Read count	CRC verification
01	03	00 00	00 07	04 08

MODBUS response

Instrument address	FC	Return the number of bytes	Register 1	Register 2 and 3	Register 4	Register 5	Register 6	Register 7	CRC verification
01	03	0E	00 00	00 00 01 12	00 00	00 E1	00 00	00 01	17 A6

Explanation: 01 The sensor responds to the read command and returns 14 bytes.

00 00: The decimal value is 0, indicating a flow rate of 0.0 L/min;

00 00 01 12 : The decimal value is 274, indicating a cumulative flow of 274 liters.

00 00: The decimal value is 0, indicating a positive temperature.

00 E 1: The decimal value is 225, which corresponds to a temperature of 22.5°C.

00 00: The unit is L/mim;

00 01:1 decimal place;

Flow rate: 0.0 L/min Temperature: 22.5°C Total flow: 274L

The format of command 06 is as follows (write register command):

Clear accumulated count: Write register value 1 to register address 1

MODBUS request

Instrument address (default)	FC	Register address	Read-in data	CRC verification
01	06	00 01	00 01	19 CA

MODBUS response

Instrument address (default)	FC	Register address	Read-in data	CRC verification
01	06	00 01	00 01	19 CA

3. Data Item Definition

10 16 base,**modbus** register is the same parameter in different writing, different upper computer software writing is different, one does not recognize when you can try another 2 kind.

(Recommended polling interval: more than 100ms. Wait 100ms after reading the previous sensor before reading this one)

03H instruction

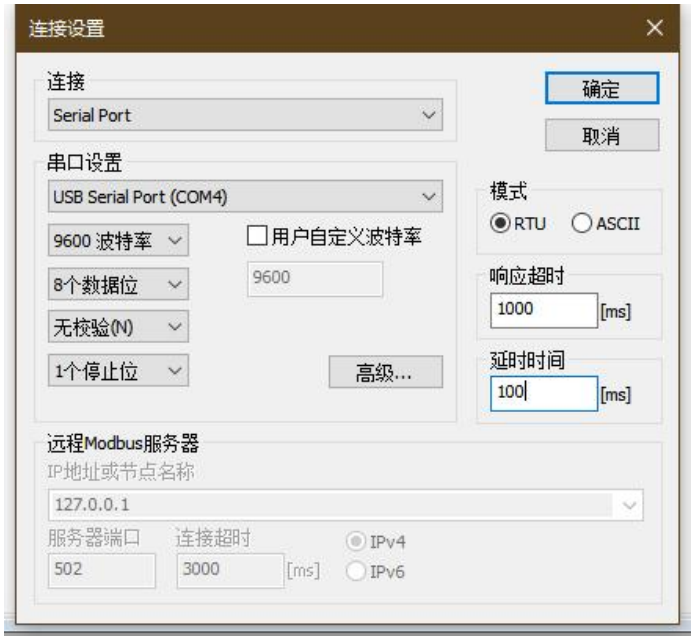
10 address by base	16 address by base	Modbus address	Register data type	Explain
0	0	40001	16 unsigned integer	Instantaneous flow rate (displayed as *0.1 L/min when one decimal place)
1	1	40002	32 unsigned integer	Cumulative flow (m^3) (read value*0.001)
3	3	40004	16 unsigned integer	Temperature ± (positive: 0, negative: 1)
4	4	40005	16 unsigned integer	Absolute value of current temperature
5	5	40006	16 unsigned integer	Display the unit for the current value (default: L/min)
6	6	40007	16 unsigned integer	Display the decimal place of the current value (default: 1 decimal place)

4. Modbus Poll Communication Reference

(1) Open modbus-poll, click Settings in the menu, set the slave ID to 1, function to 03 Read, address to 0, and quantity to 7

(2) Click Menu> Connect-Connect

Connection method: Serial Port (select serial port), baud rate 9600,8-bit data, no parity, 1-bit stop bit, RTU mode, delay time 100ms.



(3) You Can See the Current Read Value

Address 0 is 0, and the current flow rate is 0.0 L/min.

Address 1 is 0,

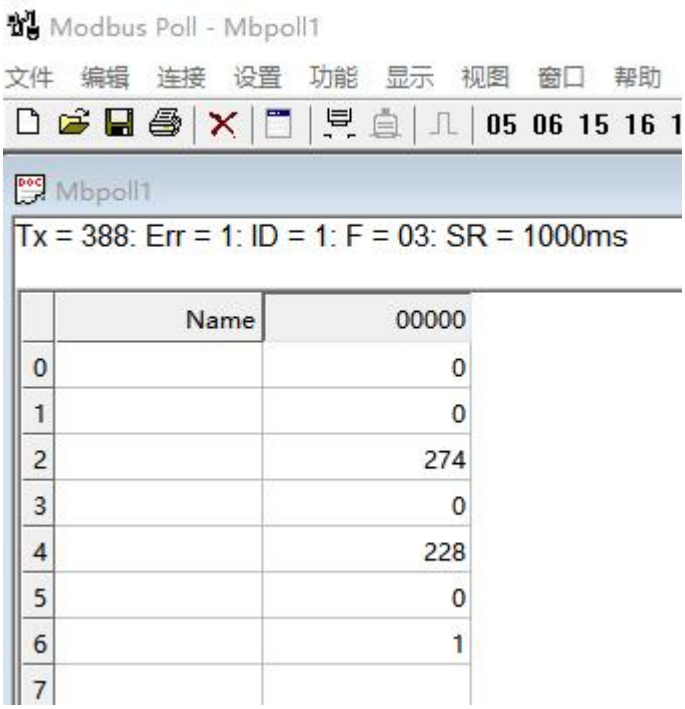
Address 2 is 274. Address 1 and Address 2 together form a 32-bit unsigned integer, with a cumulative flow of 274L.

Address 3 is 0, and the temperature is positive.

Address 4 is 228, and the temperature is 22.8℃;

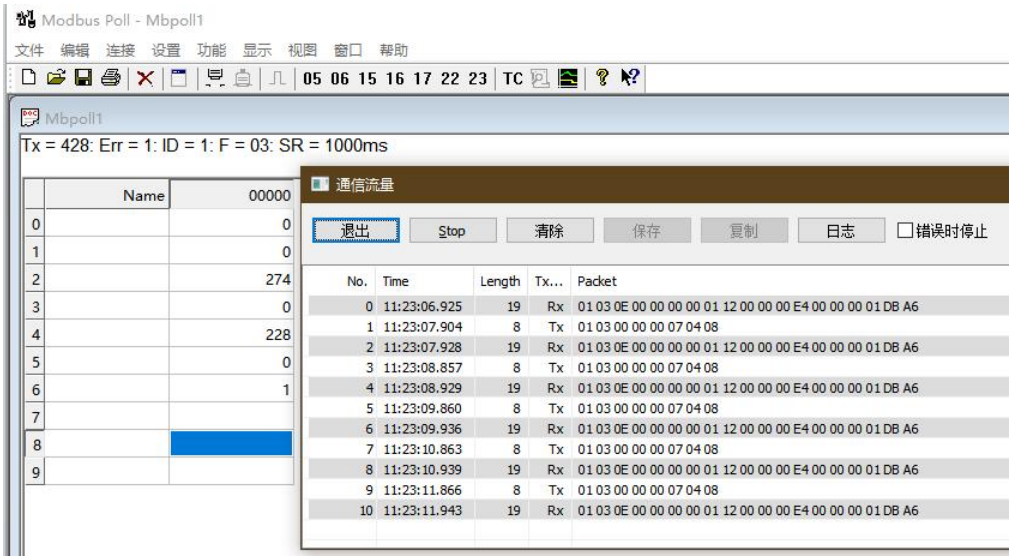
Address 5 is 0, in units of L/mim;

Address 6 is 1.1;

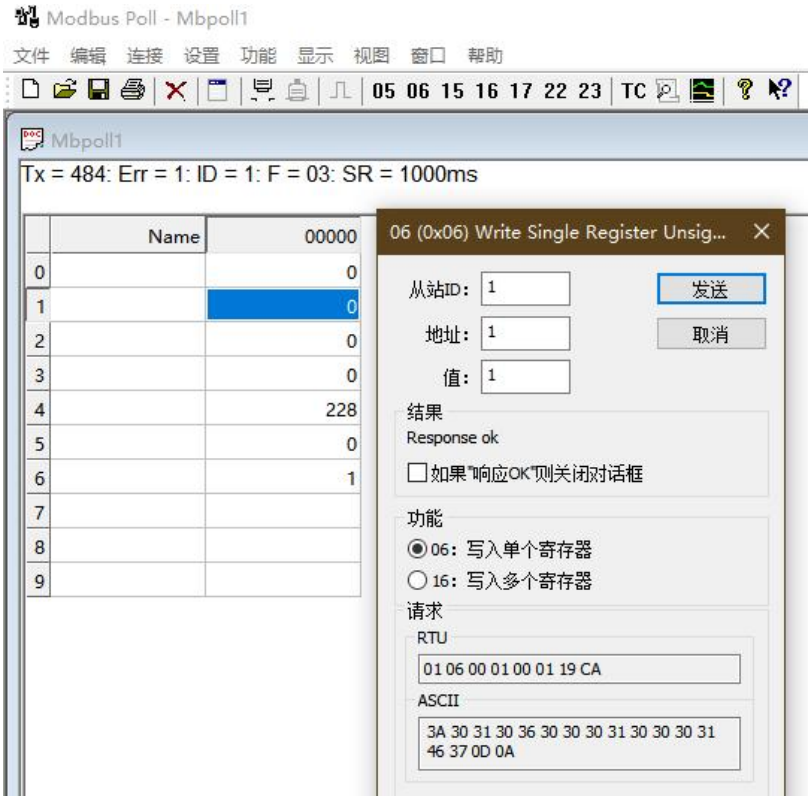


	Name	00000
0		0
1		0
2		274
3		0
4		228
5		0
6		1
7		

(4) Click the Communication Menu to View Real-Time Command Sending and Receiving.



(5) Double-Click the Address 1 Value, Change It to 1, and Click Send. You Will See the Accumulated Traffic Reset to Zero.



File revision history

Revise	Description	Date
V1.0	Initial version	
V1.1	Add 4. Modbus-poll communication reference	2025.12.20

The company reserves the right to modify the specifications contained herein without prior notice.

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Website: www.katusensor.com

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