



Principle characteristics

Based on the thermal principle, the sealed probe contains two resistors, one of which is heated as the detection resistance, the other is not heated as the reference resistance, when the medium flows, the heat on the heating resistance is taken away, the resistance value is changed, and the difference between the two resistors is used as the basis for judging the flow rate. No moving parts, maintenance-free, easy to install, one model is suitable for a variety of pipe diameter requirements, the switching quantity is continuously adjustable, extremely low pressure loss, compact structure, color crystal display flow trend and switching state, integrated temperature measurement function, support temperature alarm and remote measurement.

- New digital design
- Replace traditional thermal flow switches
- Integrated temperature integration function
- Save installation space
- Color crystal digital visual display window

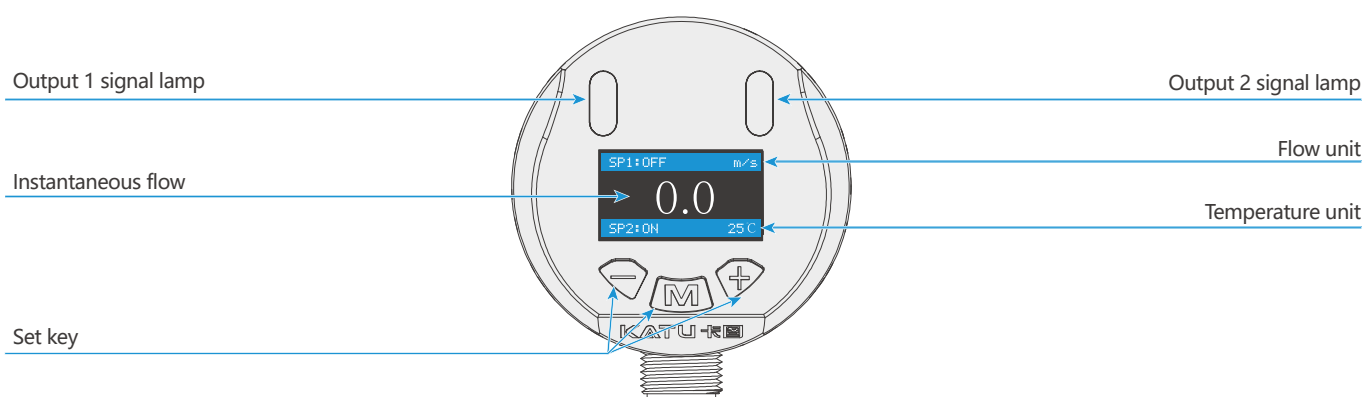
Product application

Low flow rate alarm, can be used for circulating water, cutting fluid cut-off detection, and pump idling protection.

Technical parameter

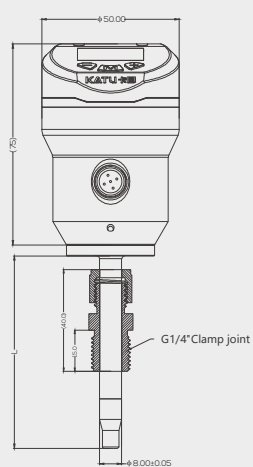
◇ Flow range: 0... 3m/s (water)	◇ Measuring dead zone: $\leq 0.01\text{m/s}$
◇ Measuring accuracy: $< 10.0\%$	◇ Response time: 1-13s, typical value 2s
◇ Temperature range: 0... 100 °C	◇ Initialization time: $< 16\text{s}$
◇ Temperature accuracy: probe immersed in the medium $\pm 1.5^\circ\text{C}$	◇ Electrical protection: reverse phase, short circuit, overload protection
◇ Signal output: PNP/NPN/IO-link, analog 4... 20mA, 1-5V	◇ Protection grade: IP67
◇ Power supply: $24\text{V} \pm 20\%\text{DC}$	◇ Medium temperature: 0... 100°C
◇ Connecting current: Maximum 200mA(PNP or NPN type)	◇ Ambient temperature: $-20 \dots 80^\circ\text{C}$
◇ Current consumption: $< 100\text{mA}$	◇ Storage temperature: $-20 \dots 80^\circ\text{C}$
◇ Flow display: Color crystal display (0.96 inch)	◇ Connection mode: M12 connector
◇ Temperature display: Color crystal display (0.96 inch)	◇ Material:
◇ Setting mode: button setting	Head: stainless steel/engineering plastic
◇ Pressure range: 60bar	Housing: stainless steel
◇ Temperature gradient: $\leq 4^\circ\text{C/S}$	Liquid material: Stainless steel 316L/EPDM (EPDM)

Panel diagram

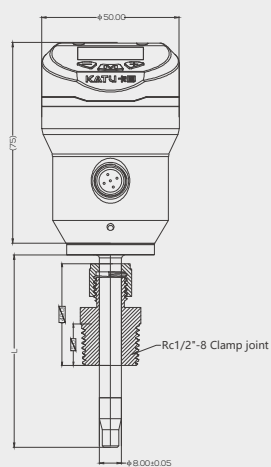


Dimension drawing (mm)

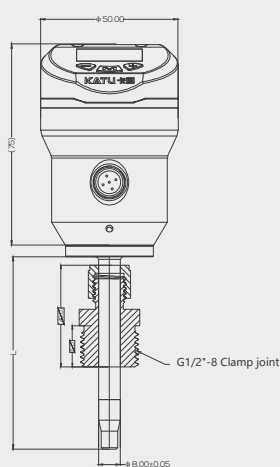
Smooth rod sleeve joint installation dimensions



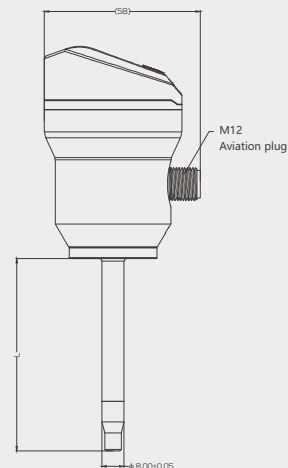
Name: G1/4" -8 clamp connector
Order number: KT28941



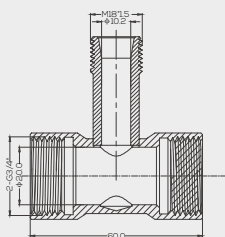
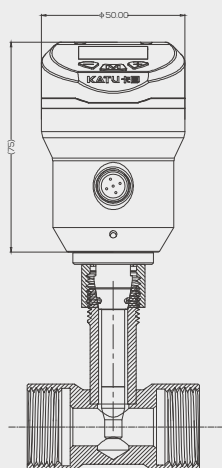
Name: Rc1/2" -8 clamp connector
Order number: KTYLLC28808



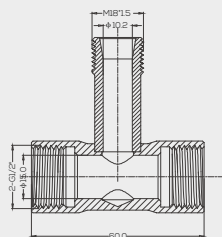
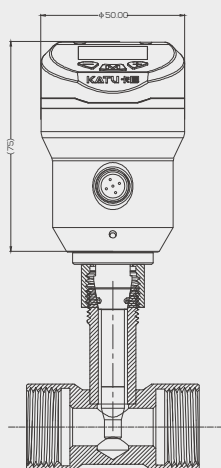
Name: G1/2" -8 clamp connector
Order number: KTYLLC28467



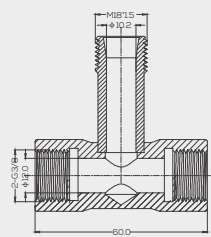
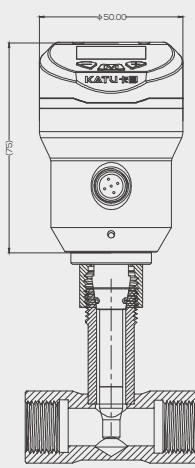
Tee (M18) installation dimensions



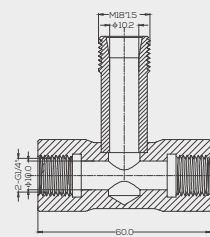
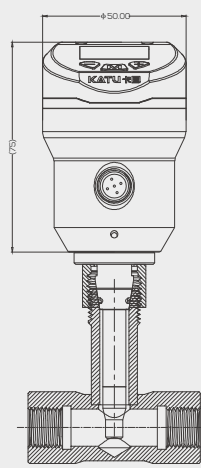
Name: M18*1.5 internal thread
with G3/4 tee
Order number: KT7154



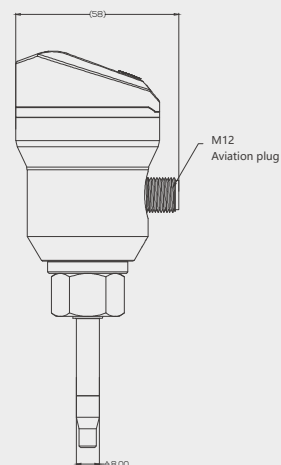
Name: M18*1.5 internal thread
with G1/2 tee
Order number: KT7153



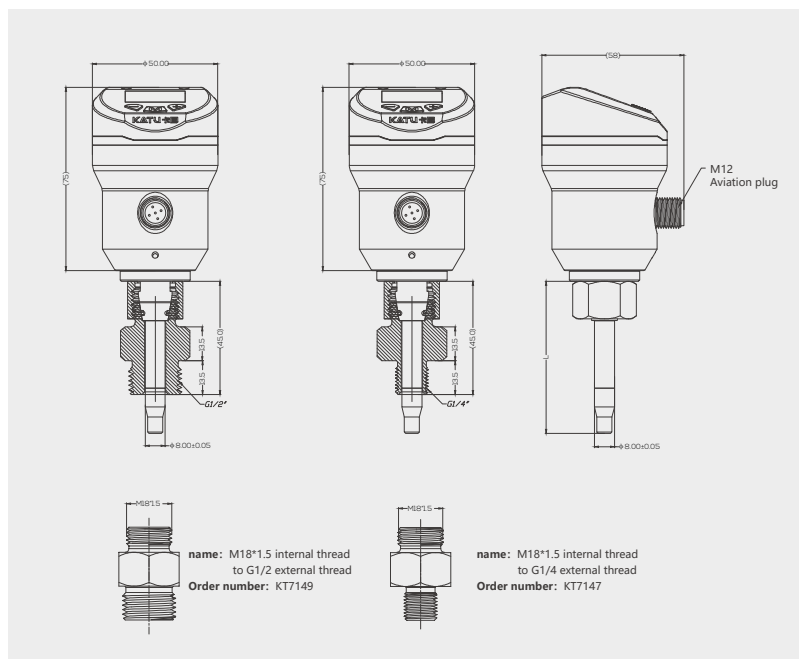
Name: M18*1.5 internal thread
with G3/8 tee
Order number: KT28810



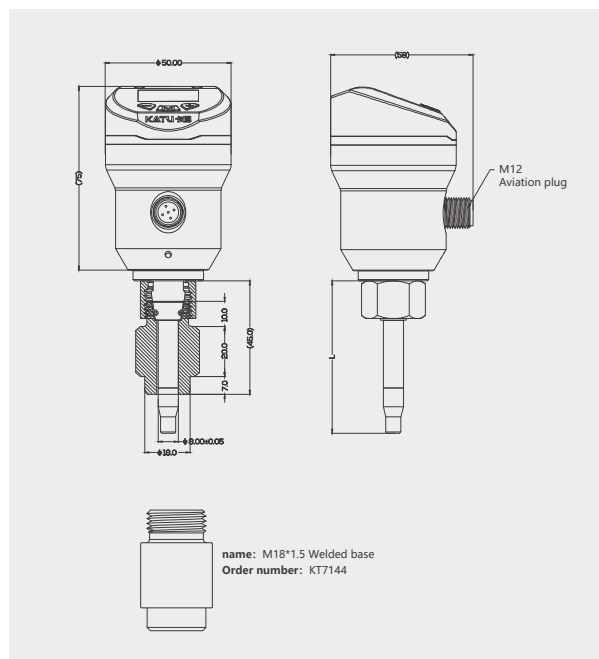
Name: M18*1.5 internal thread
with G1/4 tee
Order number: KT7151



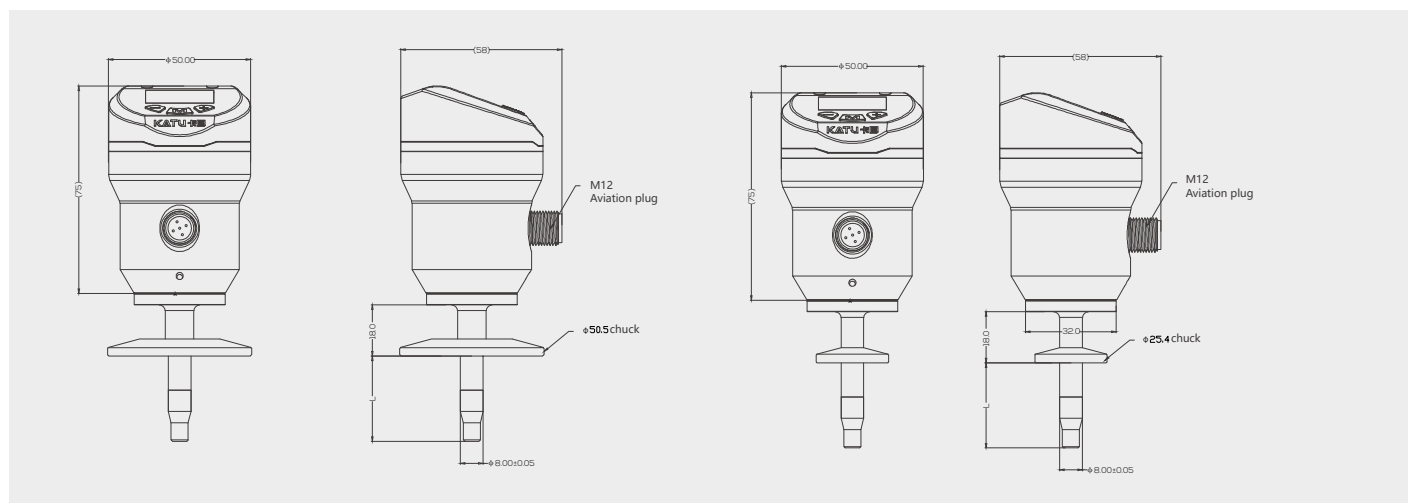
Mounting dimensions of threaded locking joint (M18)



Solder lock joint (M18) installation dimensions

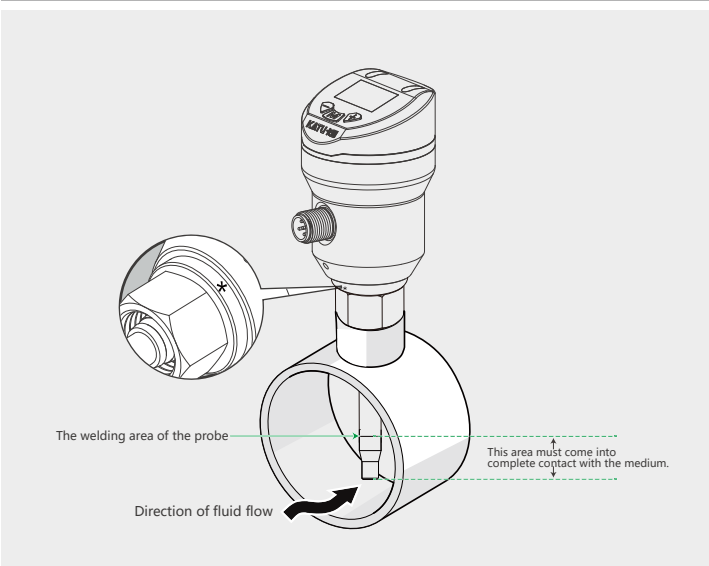


Chuck mounting dimensions

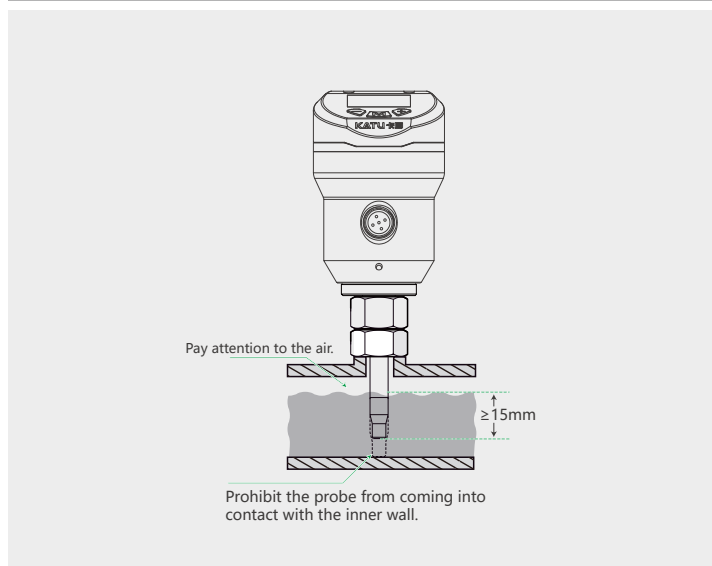


Installation precautions

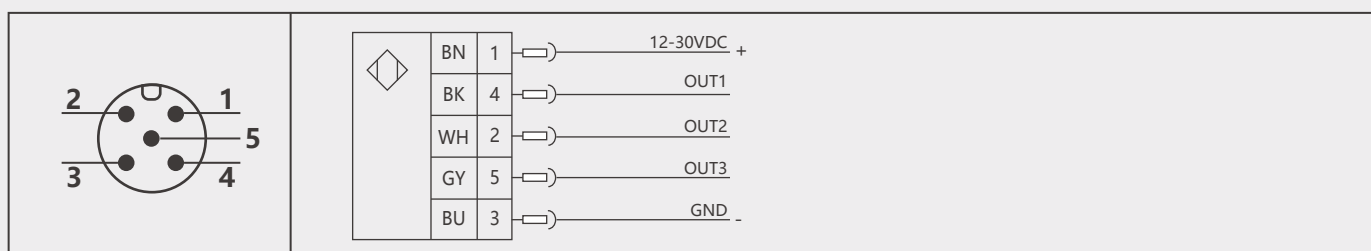
When installing the sensor, ensure that the water flow direction is consistent with the direction of the star



The medium must completely surround the sensor probe



Wiring diagram



Two switches + one analog

color	stitch	Instructions	color	stitch	Instructions	color	stitch	Instructions
BN	1	power supply (+)	BU	3	power supply (-)	GY	5 (OUT3)	Flow Analog (factory default) Temperature Analog
BK	4 (OUT1)	Temperature switch PNP (factory default) Temperature switch NPN Flow switch PNP Flow switch NPN IO-link Flow frequency (200Hz full scale)	WH	2 (OUT2)	Flow switch PNP (Factory default) Flow switch NPN Temperature switch PNP Temperature switch NPN			

one switch + two analog channels (flow/temperature)

color	stitch	Instructions	color	stitch	Instructions	color	stitch	Instructions
BN	1	power supply (+)	BU	3	power supply (-)	GY	5 (OUT3)	Temperature Analog (factory default)
BK	4 (OUT1)	Flow switch PNP (Factory default) Flow switch NPN IO-link Flow frequency (200Hz full scale)	WH	2 (OUT2)	Flow Analog (factory default)			

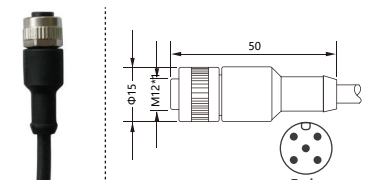
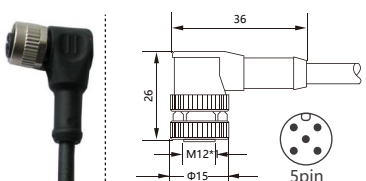
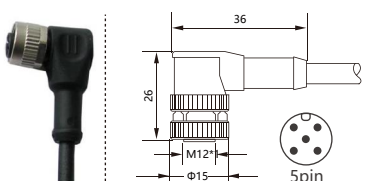
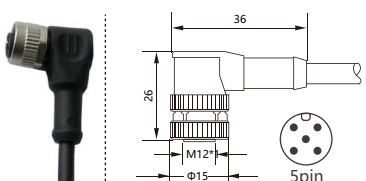
Flow relation table

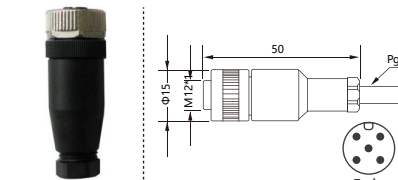
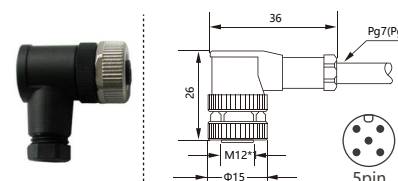
caliber (DN)	flow	m ³ /h			
	Velocit	0.3 m/s	0.6 m/s	1 m/s	3 m/s
10		0.085	0.17	0.28	0.85
15		0.19	0.38	0.64	1.9
20		0.34	0.68	1.13	3.4
25		0.53	1.06	1.76	5.3
32		0.87	1.74	2.9	8.7
40		1.36	2.71	4.52	13.55
50		2.12	4.24	7.07	21.2
65		3.58	7.17	11.95	35.85
80		5.43	10.86	18.1	54.3
100		8.48	16.96	28.27	84.8
125		13.25	26.5	44.18	132.5
150		19.09	38.17	63.62	190.85
200		33.93	67.86	113.1	339.3
250		53.01	106.03	176.71	530.15
300		76.34	152.68	254.47	763.4
350		103.9	207.82	346.36	1039.1
400		135.72	271.43	452.39	1357.15
450		171.77	343.53	572.56	1717.65
500		212.06	424.12	706.86	2120.6

Selection list

FTS220-	M18K	L30	SA	expatiate	
FTS220-				FTS220 electronic water flow sensor	
	M18K			Process connection: M18×1.5 internal thread	
	G			Process connection: probing rod	
	H25			Process connection: Outer diameter 25.4mm,	
	H50			Process connection: Outer diameter 50.5mm,	
		L30		Rod length L=30mm	You are advised to select only the chuck type
		L50		Rod length L=50mm	
		L60		Rod length L=60mm	It is recommended that M18K internal thread type ≤DN32 be selected
		L70		Rod length L=70mm	It is recommended that M18K internal thread type ≥DN40 be selected
		L80		Rod length L=80mm	It is recommended that M18K internal thread type ≥DN50 be selected
		L100		Rod length L=100mm	It is recommended that M18K internal thread type ≥DN80 be selected
			SA	Output signal: one switch + two analog channels (4-20mA)	
			SV	Output signal: one switch + two analog channels (1-5V)	
			A3	Output signal: two switches + one analog (4-20mA)	
			V3	Output signal: two switches + one analog (1-5V)	

Optional accessories - electrical accessories Factory standard:ZL05-PC02G

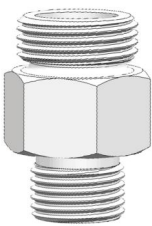
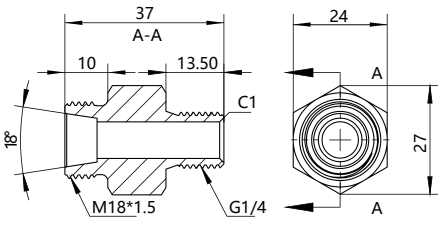
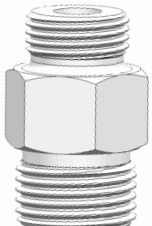
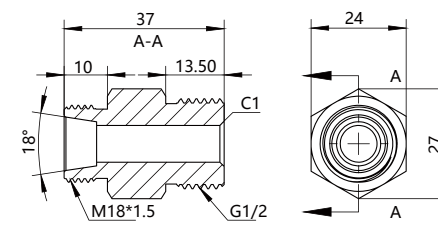
name	Outline drawing/dimension drawing (mm)	material	model
M12*1-5Pin (2m cable)		PUR	ZL05-PU02G
M12*1-5Pin (5m cable)			ZL05-PU05G
M12*1-5Pin (10m cable)			ZL05-PU010G
M12*1-5Pin (2m cable)		PVC	ZL05-PC02G
M12*1-5Pin (5m cable)			ZL05-PC05G
M12*1-5Pin (10m cable)			ZL05-PC010G
M12*1-5Pin (2m cable)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

M12* 1-5Pin self-connector/size drawing (mm)	model
	GL05 (5Pin joint)
	WL05 (5Pin joint)

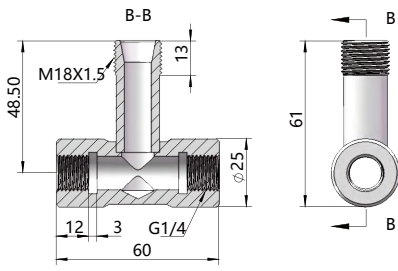
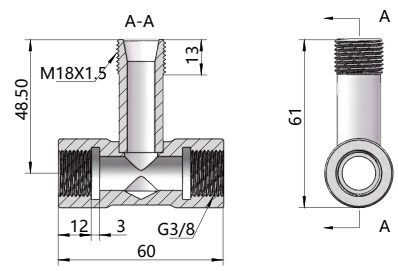
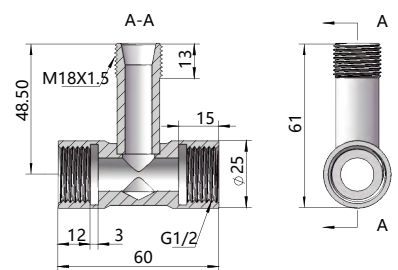
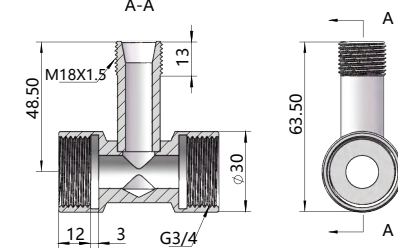
Welded base (optional external thread only)

name	External drawing	Size drawing (unit :mm)	model
G1/4 Welded base			FA002-G14 (Material: 304 stainless steel)
G1/2 High pressure welded base			FA002-G12H (Material: 304 stainless steel)
G1/2 Welded base			FA002-G12 (Material: 304 stainless steel)
Rc1/4 Welded base			FA002-R14 (Material: 304 stainless steel)
Rc1/2 Welded base			FA002-R12 (Material: 304 stainless steel)
M12*1 Welded base			FA002-M12 (Material: 304 stainless steel)

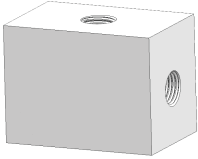
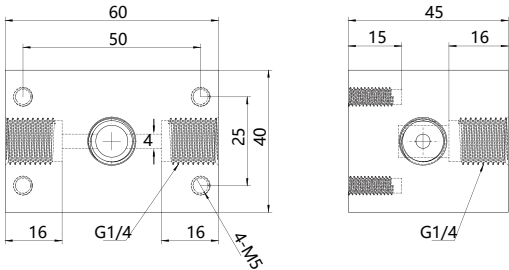
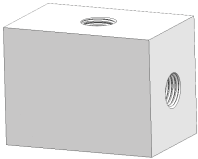
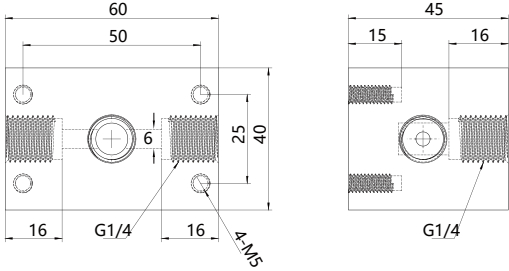
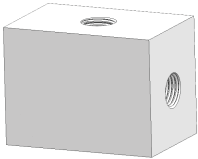
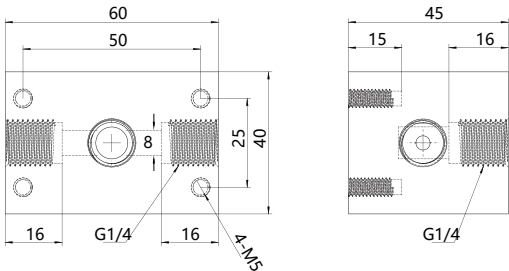
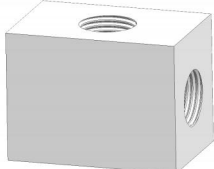
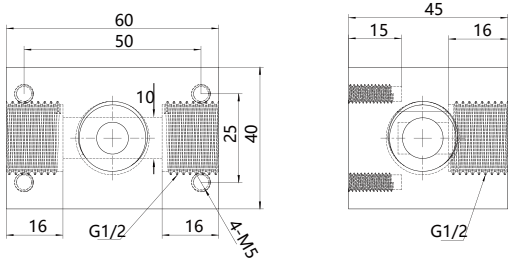
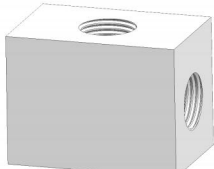
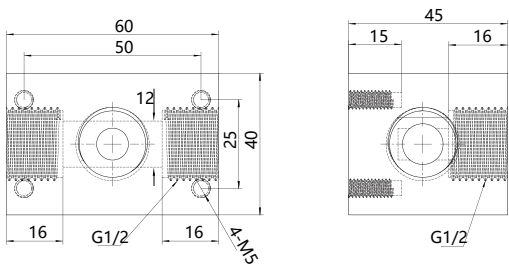
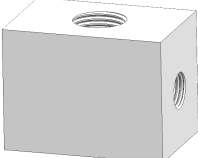
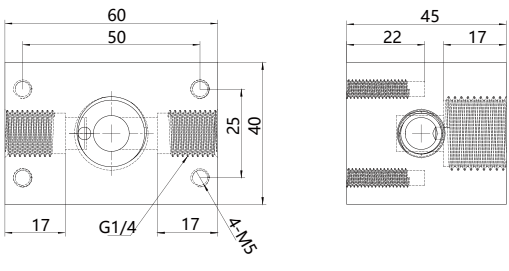
Adapter (M18 internal thread only optional)

name	External drawing	Size chart (mm)	model
M18 * 1.5 internal thread To g1/4 male thread, Probe insertion depth 15mm			FA004-M18G14S (Material: 304 stainless steel)
			FA004-M18G14T (Material: brass)
M18 * 1.5 internal thread To g1/2 male thread			FA004-M18G12S (Material: 304 stainless steel)
			FA004-M18G12T (Material: brass)

Tee (stainless steel) (M18 internal thread only optional)

name	External drawing	Size chart (mm)	model
M18 * 1.5 internal thread Equipped with G1/4 tee			FA003-M18G14 (Material: 304 stainless steel)
M18 * 1.5 internal thread With G3/8 tee			FA003-M18G38 (Material: 304 stainless steel)
M18 * 1.5 internal thread Equipped with G1/2 tee			FA003-M18G12 (Material: 304 stainless steel)
M18 * 1.5 internal thread With G3/4 tee			FA003-M18G34 (Material: 304 stainless steel)

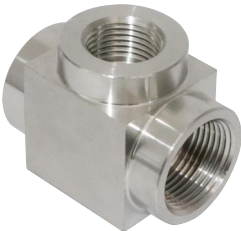
Tee (PP) (external thread only optional)

name	External drawing	Size chart (mm)	model
Type G1/4 small flow tee			FA010-04G14 (material: PP)
Type G1/4 straight hole tee			FA010-06G14 (material: PP)
Type G1/4 small flow tee			FA010-08G14 (material: PP)
Type G1/2 straight hole tee			FA010-10G12 (material: PP)
Type G1/2 straight hole tee			FA010-12G12 (material: PP)
G1/4 gas only Tee adapter			FA012-01 (material: PP)

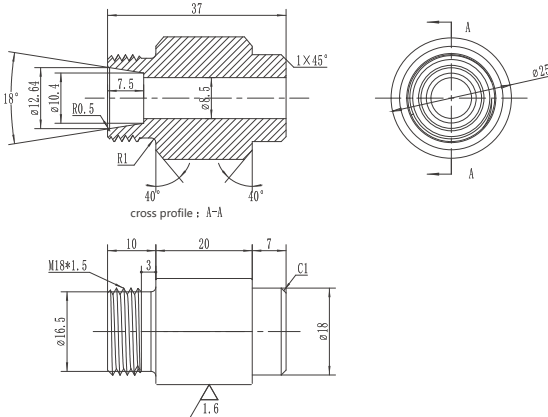
Tee (conventional stainless steel :40bar) (external thread only optional)

External drawing	Size table					
	Conventional tee					
	Diameter of thread	Inch code	Pipe thread (R)	Model number		
	DN15	4 points	1/2	FA013-R12K		
	Reducing tee					
	Diameter of thread	Inch code	Pipe thread left (R)	Pipe thread center (R)	Pipe thread right (R)	Model number
	DN20	6 points×4 points	3/4 "	1/2"	3/4 "	FA013-R12KR34K
	DN25	1 inch x 4 points	1"	1/2"	1"	FA013-R12KR1K
	DN32	1.2 inches x 4 points	1.2 "	1/2"	1.2 "	FA013-R12KR1.2K

Tee (high pressure stainless steel :200bar) (external thread only optional)

External drawing	Size table					
	Conventional tee					
	Diameter of thread	Inch code	Pipe thread (G)	Model number		
	DN15	Four points	1/2	FA014-G12K		
	Reducing tee					
	Diameter of thread	Inch code	Pipe thread left	Pipe thread center	Pipe thread right	Model number
	DN20	6 points x 4 points	G 3/4 "	G 1/2"	G 3/4 "	FA014-G12KG34K
	DN25	1 inch x 4 points	G 1"	G 1/2"	G 1"	FA014-G12KG1K

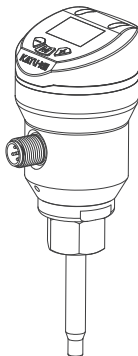
Welded base (M18 internal thread only optional)

name	External drawing	Size drawing (unit :mm)	model
M18*1.5 Welded base			FA002-M18 (Material: 304 stainless steel)

—— Sensor and controller ——
■ Flow ■ pressure ■ temperature ■ level ■ position

KATU 卡图

Operation instruction Electronic flow sensor FTS 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!

catalogue

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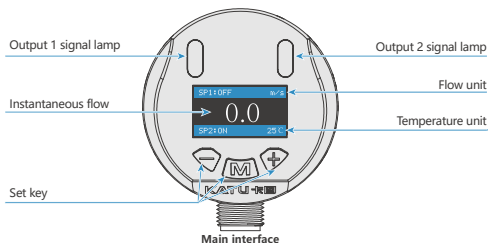
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1.1 Principle characteristics

Based on the thermal principle, the sealed probe contains two resistors, one of which is heated as the detection resistance, the other is not heated as the reference resistance, when the medium flows, the heat on the heating resistance is taken away, the resistance value is changed, and the difference between the two resistors is used as the basis for judging the flow rate. No moving parts, maintenance-free, easy to install, one model is suitable for a variety of pipe diameter requirements, the switching quantity is continuously adjustable, extremely low pressure loss, compact structure, color crystal display flow trend and switching state, integrated temperature measurement function, support temperature alarm and remote measurement.

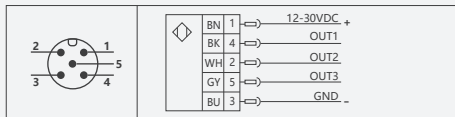
- New digital design
- Replace traditional thermal flow switches
- Integrated temperature integration function
- Save installation space

2.1 Panel diagram



- **Home screen Clear:** Hold down the left key to clear the screen.

3.1 Wiring diagram



Two switches + one analog

color	stitch	Instructions
BN	1	power supply (+)
BU	3	power supply (-)
BK	4 (OUT1)	Temperature switch PNP (factory default) Temperature switch NPN Flow switch PNP Flow switch NPN IO-link Flow frequency (100Hz full scale)
WH	2 (OUT2)	Flow switch PNP (Factory default) Flow switch NPN Temperature switch PNP Temperature switch NPN
GY	5 (OUT3)	Flow Analog (factory default) Temperature Analog

One switch + analog (flow/temperature)		
color	stitch	Instructions
BN	1	power supply (+)
BU	3	power supply (-)
BK	4 (OUT1)	Flow switch PNP (Factory default) Flow switch NPN IO-link Flow frequency (100Hz full scale)
WH	2 (OUT2)	Flow Analog(factory default)
GY	5 (OUT3)	Temperature Analog(factory default)

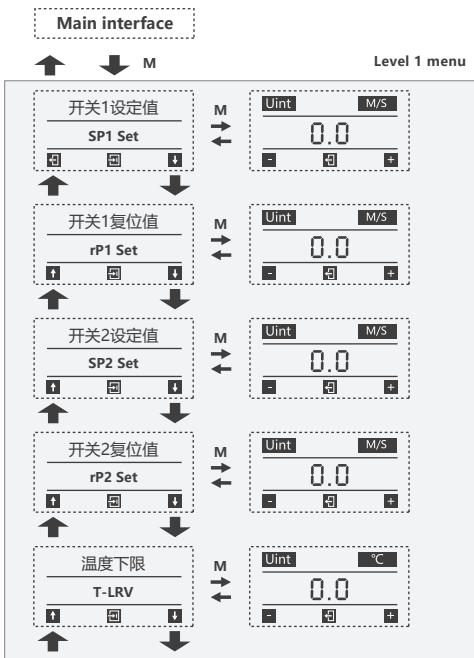
4.1 Menu description

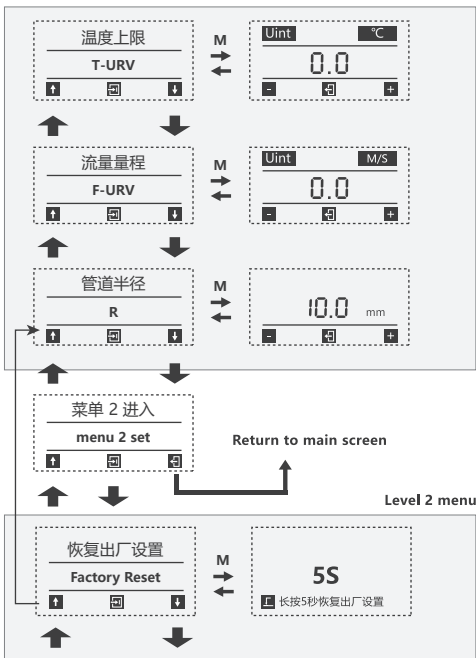
Level 1 menu	
SP1 Set	Switch 1 sets the value
RP1 Set	Switch 1 resets the value
SP2 Set	Switch 2 sets the value <i>Note:1 switch + 2 analog No such channel</i>
RP2 Set	Switch 2 resets the value <i>Note:1 switch + 2 analog No such channel</i>
T-LRV	Lower limit of temperature
T-URV	Upper limit of temperature
F-URV	Flow range
R	Pipe radius
Menu 2 set	Menu 2 Enter

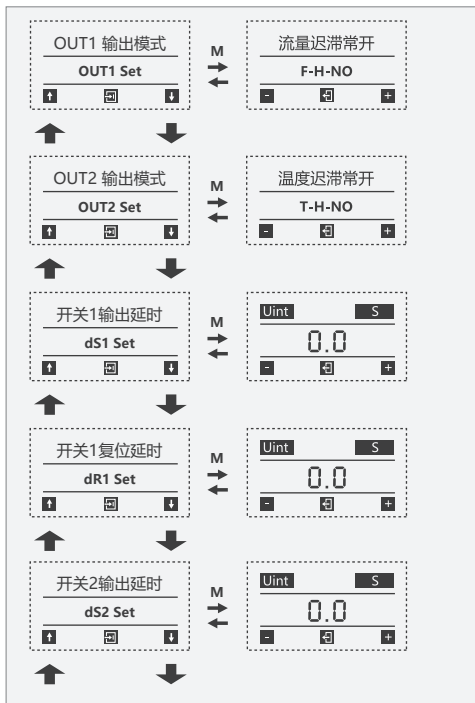
Level 2 menu	
Factory Reset	factory data reset
OUT1 Set	out1 Output mode F-W-NC: The flow window is usually closed F-W-NO: The flow window is usually open F-H-NO: The flow retardation is usually open F-H-NC: The flow retardation is usually closed T-W-NC: The temperature window is normally closed T-W-NO: The temperature window is normally open T-H-NO: The temperature retardation is usually open T-H-NC: The temperature retardation is usually closed F-Hz-OUT: Flow pulse output
OUT2 Set	out2 Output mode F-W-NC: The flow window is usually closed F-W-NO: The flow window is usually open F-H-NO: The flow retardation is usually open F-H-NC: The flow retardation is usually closed T-W-NC: The temperature window is normally closed T-W-NO: The temperature window is normally open T-H-NO: The temperature retardation is usually open T-H-NC: The temperature retardation is usually closed <i>Note:1 switch + 2 analog No such channel</i>

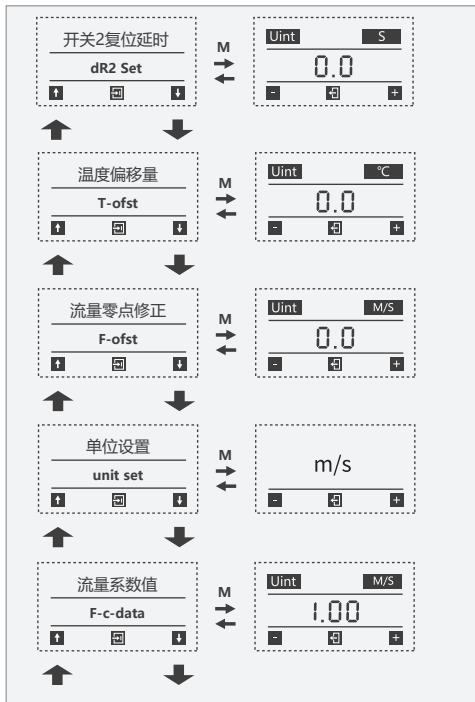
ds1 set	Switch 1 output delay
dr1 set	Switch 1 Reset delay
ds2 set	Switch 2 output delay Note:1 switch + 2 analog No such channel
dr2 set	Switch 2 Reset delay Note:1 switch + 2 analog No such channel
T-ofst	Temperature offset
F-ofst	Flow zero correction
unit set	Unit setting (m/s, m ³ /h, L/min)
F-c-data	Flow coefficient value
F-H-data	Historical maximum
F-PACE	Filter damping
Low flow cut	Lower flow rate excision
d-p-set	Decimal place
A0-mode	Analog output: flow/temperature
PNP/NPN Set	PNP/NPN Settings
digit colour	Master data color
BG colour	Main background color

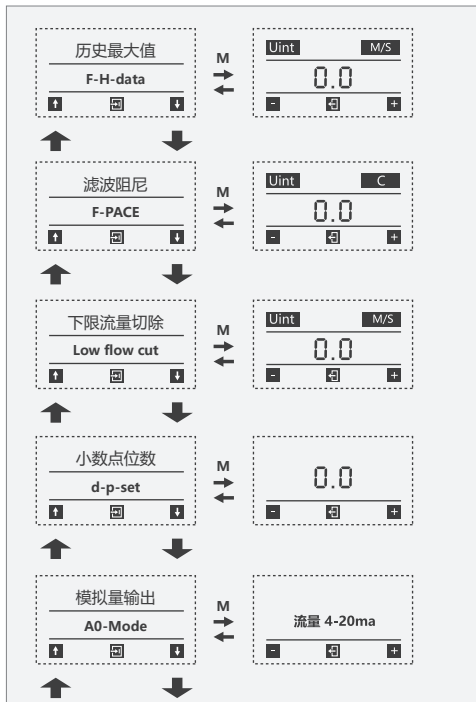
4.2 Menus and Settings

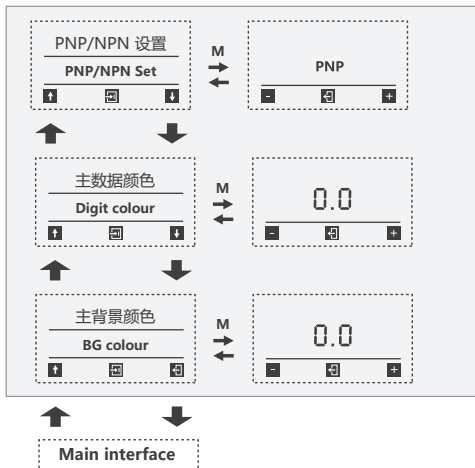






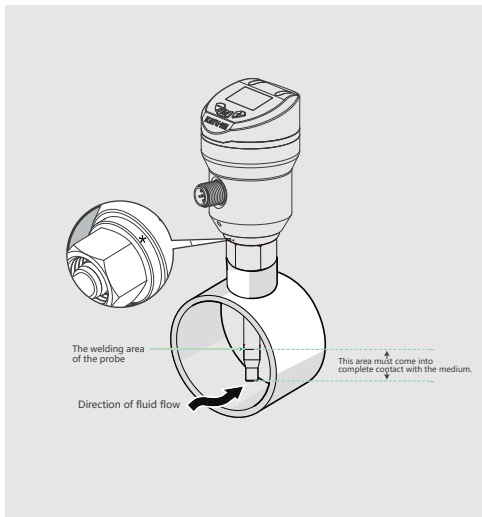




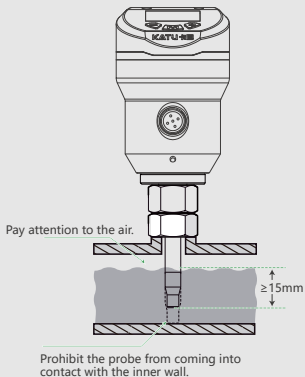


5.1 Installation precautions

When installing the sensor, ensure that the water flow direction is consistent with the direction of the star



The medium must completely surround the sensor probe



5.2 FAQ

Installation Precautions:

The probe should be installed to half the inner diameter of the pipe. At the same time, the area below the welding point of the probe must be immersed in the medium.

2. The plum blossom point and the arrow indicate the installation orientation, with the plum blossom point and the arrow directly facing the water inlet. Not directly aligning the water inlet will affect the accuracy of the flow velocity and may lead to a large deviation in the flow velocity.

3. When in use, it is necessary to check that the medium in the pipeline is full. When the tube is not filled, the sensing part of the probe may not have come into contact with the medium, which may cause a series of problems, such as: resulting in the flow rate display being 0, large flow rate deviation, high temperature, or the flow rate display value jumping, etc.

Relevant issues that may be encountered during use

1. Large flow deviation

The flow rate can be adjusted by manually modifying the parameters in Menu 2 Settings → Flow Coefficient Value. The instantaneous flow rate is too high. The flow coefficient value is adjusted to be less than 1. The instantaneous flow rate is relatively low, and the flow coefficient value is adjusted to be greater than 1. The specific adjustment values shall be subject to the actual situation.

Note: Instantaneous flow rate = Instantaneous flow rate x flow coefficient value (default 1.00)

2. Debugging related to analog output

The default unit at the factory is m/s, and the default flow range is 3m/s.

If flow-related units are used, the parameters of flow range and pipe radius in menu - Settings need to be manually modified.

(1) Menu - Settings → Flow Range: Flow Analog Output range.

(2) Parameters of the flow range: Refer to the flow relationship table in the official website's selection manual.

(3) Pipe radius: Half of the actual inner diameter of the pipe in use.

3. Deviation occurs in the analog quantity.

Access to factory Channel 10 to fine-tune the parameters within f_4ma-d, f_20ma-d, t_4ma-d, and t_20ma-d.

(1) f_4ma-d: The flow analog quantity 4mA can be modified

(2) f_20ma-d: Modifiable flow analog quantity 20mA

(3) t_4ma-d: The temperature analog quantity 4mA can be modified

(4) t_20ma-d: Modifiable temperature analog quantity 20mA

4. Data is not displayed when there is traffic

(1) First, check whether the medium in which the probe is located is in a flowing state;

(2) Check whether the bottom of the probe touches the bottom of the pipeline. Note: The bottom of the probe must not touch the bottom of the pipe.

(3) Check in sequence whether the installation is correct according to the above installation precautions.

(4) If all the above steps are confirmed to be correct, you can perform zero-point calibration by long-pressing the left button.

5. Large temperature deviation

First, check whether the probe is in the medium. Compare the actual medium temperature with the displayed temperature to see if it is consistent. If there is any inconsistency, you can manually adjust the temperature value by modifying the parameters in Menu 2 Settings → Temperature Offset.

The default temperature offset is 0.0. Increase it by 1°C and adjust the temperature offset to 1.0. Lower by 1°C and adjust the temperature offset to -1.0. The specific adjustment values shall be subject to the actual situation.

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