BD Flow Online Doppler

Flowmeters Operating

bd flow

flow, level, pressure, temperature

CONTENTS

1.Product overview

The Acoustic Doppler Point Flowmeter is a flow detection instrument for rivers, open channels and pipelines. It adopts ultrasonic detection technology, with high measurement accuracy, high stability, low influence by environmental factors, no rotating parts, low maintenance frequency and high working reliability, and is the product of choice for online and portable measurement.

1.1 Principle and characteristics

1.1.1 Principle

Doppler effect, the frequency difference between transmission and reception and flow velocity to establish a relationship, the time difference between ultrasonic transmission and reception and liquid level to establish a relationship, static pressure level for special working conditions, ambient temperature measurement for correction of the actual speed of ultrasonic propagation.

1.1.2 Characteristics

●Industrial stainless steel and industrial plastic material, waterproof, anti-corrosion, strong and durable
●No wearing parts, less maintenance and low cost of use
●High resolution, high measurement accuracy
●The service life of the sensor is more than 5 years
●Not afraid of the interference of chemical reagents, liquid viscosity and other factors
●18-key keypad operation, Chinese and English menus
●4~20mA isolated current output
●Isolated RS485 (Modbus RTU) communication interface
●Upper and lower limit alarm function relay output

1.2 Performance indicators

1.2.1 Meter head performance

Dimensions	178×175×85mm
Weight	2.1kg
Ambient temperature	-20~60℃
Storage temperature	-40~80℃
Protection class	IP65
Power supply	AC 220V、DC11~28V
Power consumption	5W
Operation menu	18-bit keyboard operation
Screen display	Chinese 13:00 LCD
Output signals	1ch/2ch analog output (default 1ch)
	4 relay outputs
	RS485 output ModBus RTU
	HART communication output (customized)
Electrical interface	M16×1.5

1.2.2 Sensor performance

Flow rate range	0 ~ 10m/s
Flow rate resolution	0.001m/s
Flow rate accuracy	0.001m/s (when velocity <= 5m/s); 0.02m/s or 0.3% of

	actual peak velocity (whichever is greater) (when velocity > 5m/s)
Ultrasonic level range	6.5m
Ultrasonic level accuracy	0.001m
Ultrasonic level resolution	0.0005m
Hydrostatic level range	0~10m
Hydrostatic level accuracy	±0.1%FS
Hydrostatic level resolution	0.001m
Temperature range	-20~60℃
Install	Special bracket
Material	Metal, POM, Rubber
Protection class	IP68
Power supply	DC 12V/24V
Power consumption	<90mA during measurement; <25mA during sleep
Communication interface	RS485，Modbus
Working temperature	-20~60℃
Working pressure	Max. 6Bar
Lightning protection	support
Anti-surge	support
EMI suppression	support

1.3 Application areas

Scenarios such as natural rivers, open channels and pipelines in the fields of sponge cities, river management and inland river monitoring.

2. Product installation

2.1 Installation instructions

To ensure the safety of the installer and the proper operation of the sensor, please install in the following order:

1) Mount the meter box and sensor bracket.

2) Fit the meter head into the meter case and secure it.

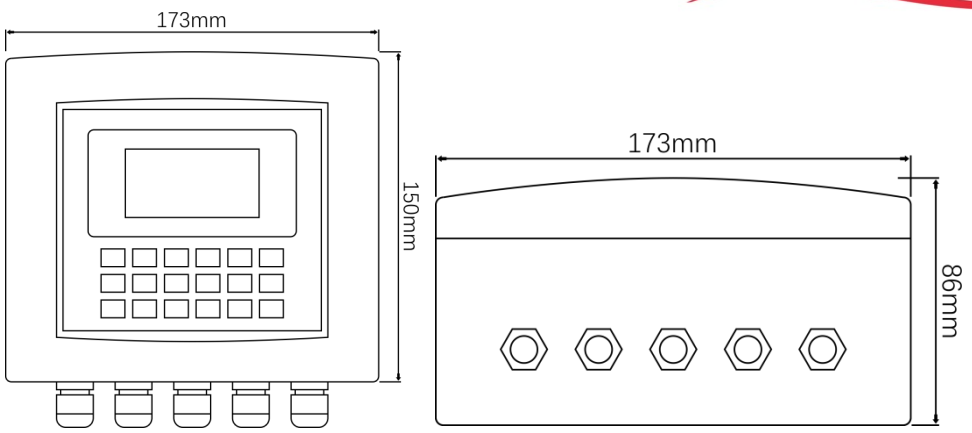
3) Mounting the sensor.

4) Electrical connection.

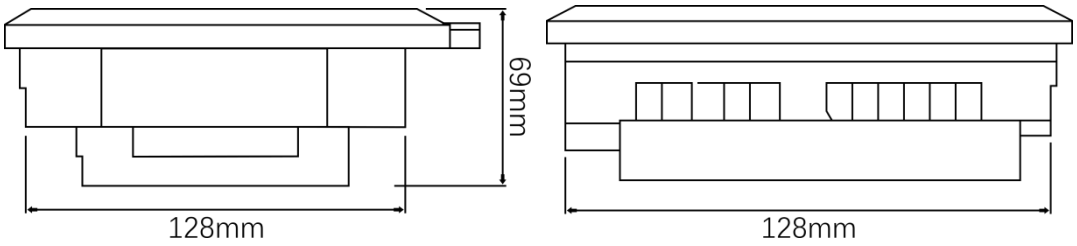
2.2 Mainframe installation

The mainframe has two types of installation, embedded and wall-mounted.

1) Mainframe external dimensions 176 x 150 x 86mm.



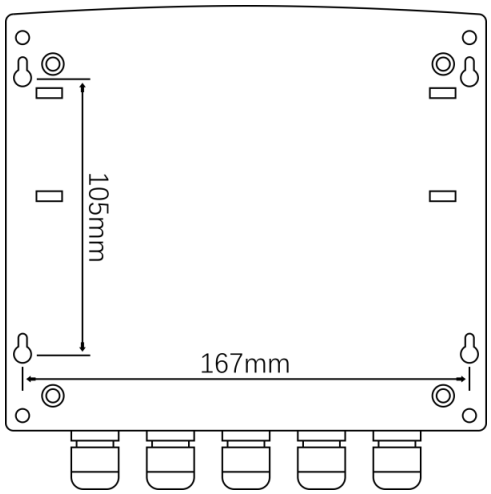
2) Recessed installation opening size 160 x 126mm.



Wall mounting dimensions 167 x 105mm

The product is designed with four quick wall mounting holes, simply fix the screws in accordance with the wall mounting fixing points and then hang the static product on it.

Note: Probe installation when the British line commissioning products in fixed. In order to extend the service life of the instrument, the instrument should be well protected from the sun and water.



2.3 Sensor installation

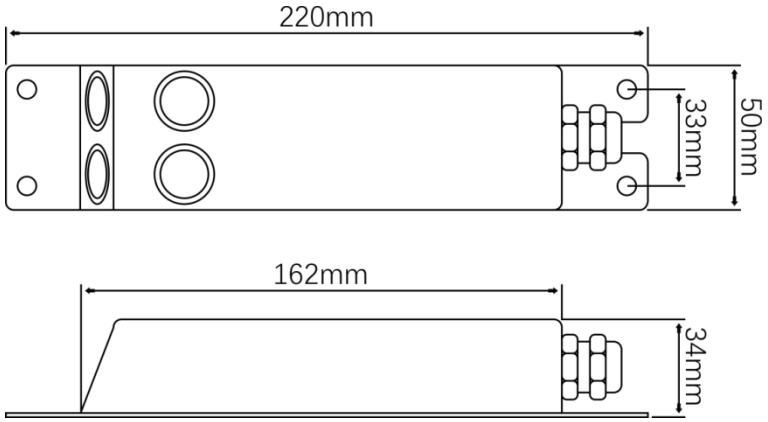
Precautions:

1） Do not shock the sensor!

2） Do not unscrew the locking wire connector on the sensor when it is installed, as this may cause damage to the sensor!

3） When the sensor is in water, make sure that the water does not freeze, otherwise the sensor may be damaged!

Sensor dimensions as shown:



1) The following criteria need to be followed when selecting a sensor mounting location.

2) The sensor should be mounted at the appropriate location in the process to ensure that representative measurement results are obtained.

3) The sensor should be installed in an easily accessible location to facilitate regular cleaning of the sensor.

4) The sensor should be installed in a location where the process is well mixed and where there is no downtime, which is usually where the sampling point is located.

5) The sensor should be installed near a representative process sampling point, which should be easy for the operator to perform the sampling operation, and the distance between the sensor and the sampling point should not exceed a maximum of 1.5m (5 feet). During calibration and in subsequent use, it is necessary to sample the process to compare instrument readings with laboratory analysis results. Improper sampling operations are a common cause of erroneous comparison results.

2.4 Sensor installation method

The installation method of immersing the sensor in the channel or pipe through the mounting bracket is suitable for general open channels, pipelines and other occasions.

The sensor must be installed on the mounting bracket. Never hang the sensor in the water with the sensor cable. The sensor should be immersed to a depth of not less than 30cm below the water surface, or to the depth normally reached when sampling, and avoid direct exposure to strong light.

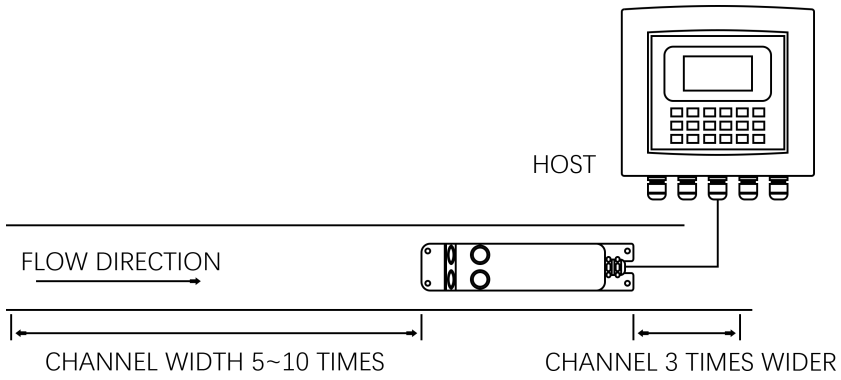
1) Choice of installation site

Choose a place where the water flow is smooth to measure.

Where the water flow is not smooth, in most cases turbulent, the flow velocity measured under turbulent conditions is jumpy and unstable, and the error will be large.

2) Requirements for upstream and downstream channels

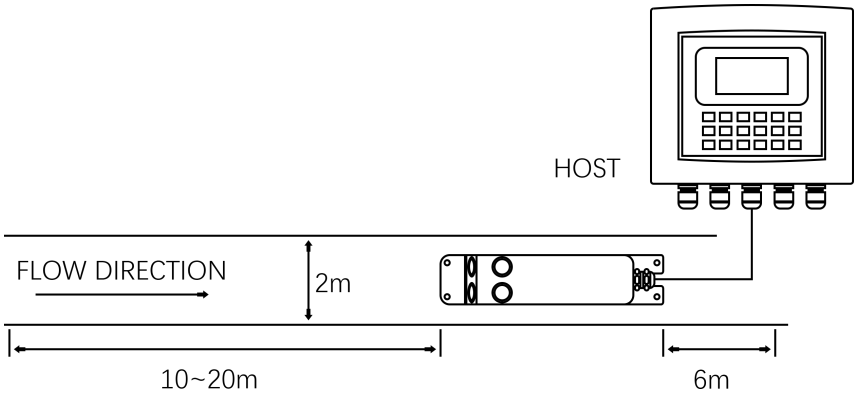
Under ideal conditions, the flowmeter installation site upstream of the channel width of 10 times the straight channel, downstream of 3 times the straight channel.



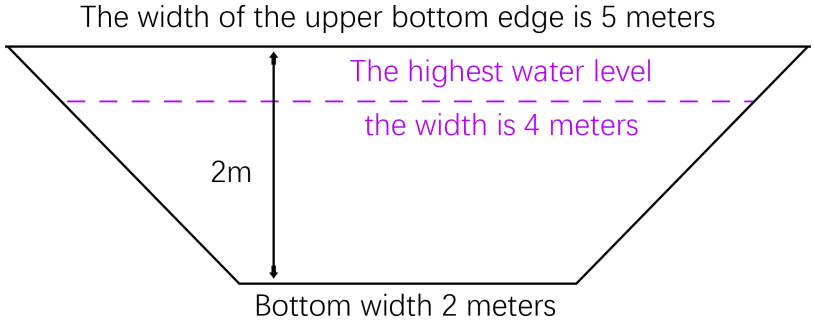
The longer the length of the straight upstream channel the better, the smoother the flow and the closer the velocity measurement will be to the actual flow. And this section should not have any obstructions, such as: gates, weirs, etc., to ensure that the front of the sensor flow pattern is smooth and turbulence-free.

If it does not reach 10 times the straight channel upstream, it must be at least 5 times the width of the channel and not less.

●For example, if a rectangular channel has a width of 2 metres, how many metres should the straight channel be upstream and downstream of the sensor installation site?

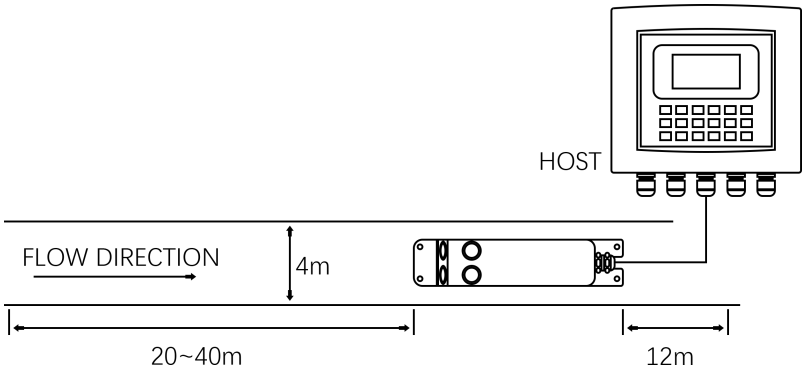


●For example: The width of the upper base of a trapezoidal channel is 5 meters, the width of the lower base is 2 meters, and the height is 2 meters. How should the width of the channel be calculated?



The width of the channel is based on the width of the highest water level during the flood season, if the water level during the flood season exceeds the highest point of the trapezoidal channel then the width of the upper bottom edge of the trapezoidal channel is used as the standard.

If the maximum flood level is 4 metres, a straight channel of 20-40 metres upstream and 12 metres downstream of the installation site is required.



3) Requirements for installation downstream of the gate

If installed downstream of the gate, special attention must be paid to observing the water surface and whether it is smooth.

If the sensor installation site away from the gate is already 10 times the width of the channel, but the water surface is still not smooth, then it is necessary to increase the distance of the sensor from the gate, only until the water flow is smooth.

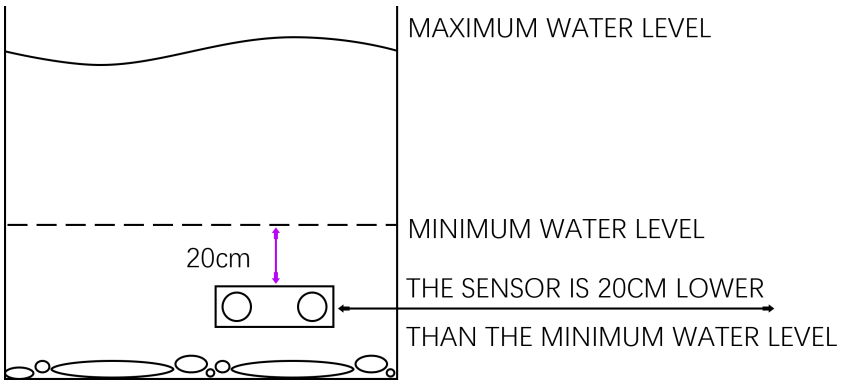
Because the gate down a certain distance, there are generally reinforced concrete made of channels, more regular, many sites for the convenience of installation, choose to install the distance closer to the downstream of the gate, this place is generally rapid water flow, are turbulent, the measured data and the actual flow rate is very different.

4) Selection of the installation height

The first thing to do is to determine the height of the water level during the dry period, the sensor should be a further 20 cm lower than the lowest water level.

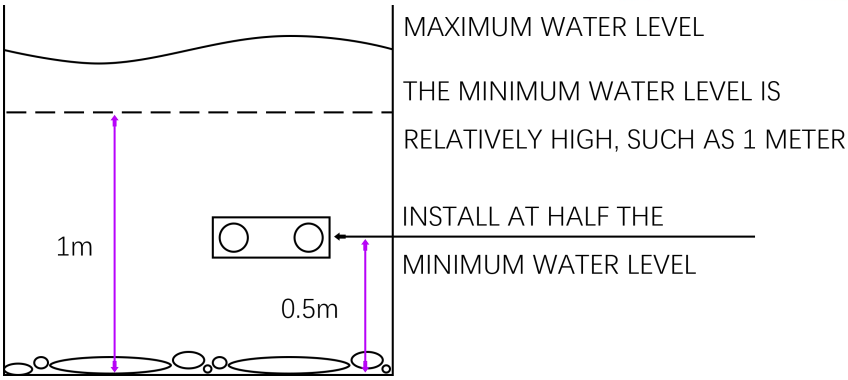
The sensor should be installed as close to the bottom of the canal as possible, if there is a lot of sediment, silt, water plants or stones that will roll at the bottom of the canal, the installation position can be raised to avoid the probe being covered by sediment and water plants, or the probe being impacted by stones.

The ideal height of the probe from the bottom of the canal is 100mm-250mm, depending on the lowest water level in the canal.



When the water level in the channel is high and the minimum water level is also high, the probe can be installed 0.5 times below the minimum water level for ease of installation.

●For example, if the minimum water level is 1.00m, the probe can be installed 0.50m up from the bottom of the channel.

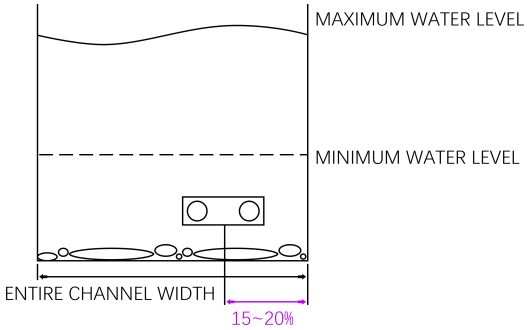


5) Choice of horizontal installation position

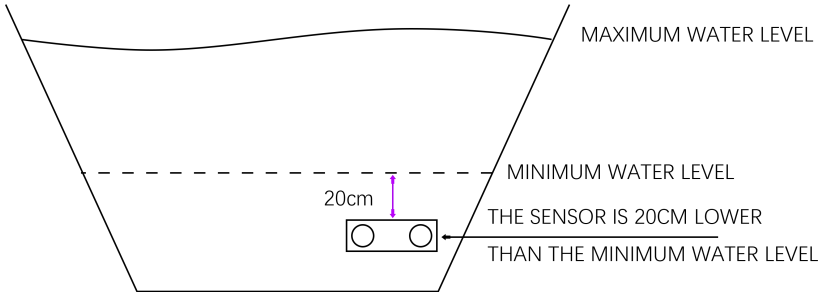
Channels up to 20 metres wide are installed at 15-20% of the entire width of the channel if it is a rectangular channel.

Why is it installed in this position?

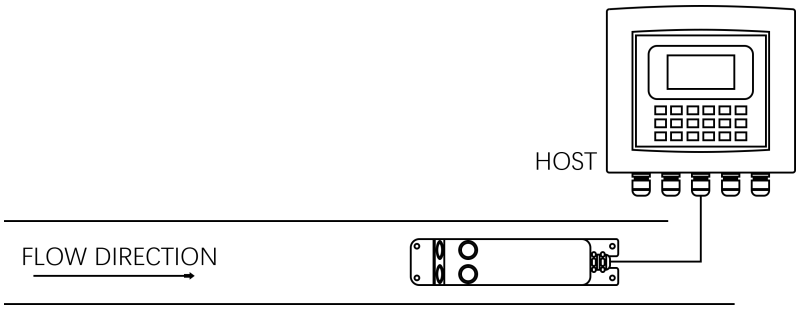
Because at this position, the average flow velocity in the horizontal direction of the entire channel is closest.



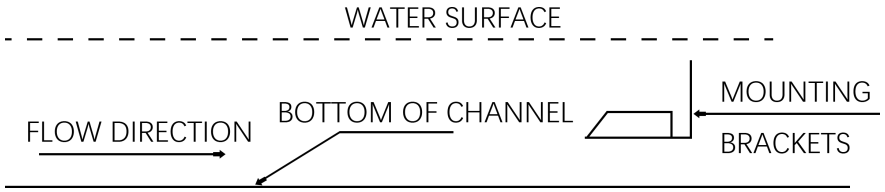
For trapezoidal channels, the sensor is installed at the junction of the slope and the bottom edge, also known as the "foot of the slope".



The sensor should be facing the direction of the water flow with a deviation of no more than ±3° from left to right.

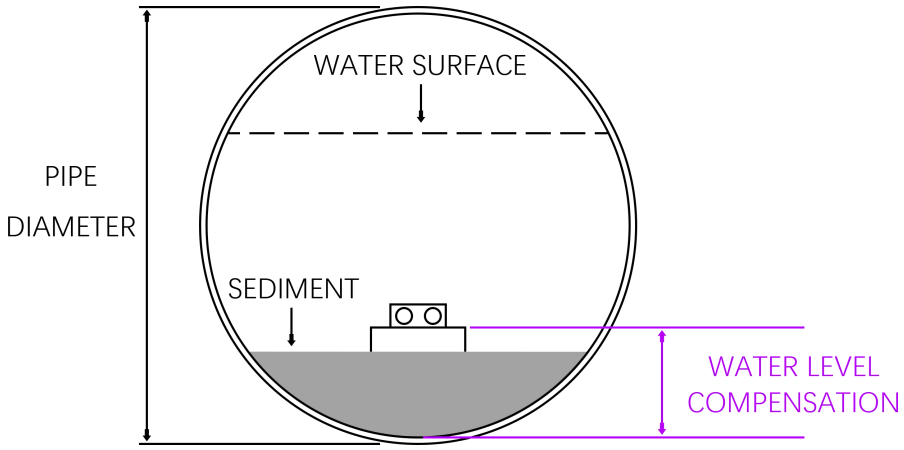


The sensor should be parallel to the water surface.



6) Sensor installation in circular channels

In circular channels, if there is sediment, install the sensor above the sediment to avoid the sediment covering the sensor and affecting the measurement.



2.5 Electrical connections

Serial number	Name	Function
	L	220V power supply
	N	220V supply
	GND	Earth wire
01	DC24+	24V supply positive pole
02	DC24-	24V supply negative pole
03	GND	Earth wire
04	Sensor input	Red wire
05		White wire
06		Blue wire
07		Black wire
08	/	/
…	…	…
15	/	/
16	RS485 output	Ground line
17		485 A positive pole
18		485 B negative pole
19	/	/
…	…	…
25	/	/
26	Analogue output	4~20mA output positive pole
27		GND output negative pole

29	/	/	
…	…	…	
30	/	/	
31	Fourth circuit relay	J4NO	No. 4 normally open terminal
32		J4COM	No. 4 public terminal
33		J4NC	No. 4 normally closed terminal
34	Third circuit relay	J3NO	No. 3 normally open terminal
35		J3COM	No. 3 public terminal
36		J3NC	No. 3 normally closed terminal
37	Second circuit relay	J2NO	No. 2 normally open terminal
38		J2COM	No. 2 public terminal
39		J2NC	No. 2 normally closed terminal
40	First circuit relay	J1NO	No. 1 normally open terminal
41		J1COM	No. 1 public terminal
42		J1NC	No. 1 normally closed terminal

3.Operating Instructions

3.1 Main screen

Before the measurement starts, just complete the installation as required, set the basic parameters, and then power up for normal measurement. 18-key keyboard input, key basic functions

As shown:

MENU	Menu button	Access the menu	ESC	Exit button	Exit menu

	Left button	Move to the left		Symbol button	Enter a symbol
	right button	Move to the right		“0”	Enter "0"
	Confirm button	Confirmation / Save go to menu		Up and down button	Move up and down

3.2 Operation menu

Press the menu key and enter the password 00000 to confirm entry.

First level menu	Second level menu	Third level menu	Note
Probe settings	Flow Rate Threshold		Range 0~999, default is 10
	Filter coefficients		Range 0~999, default is 10
	Multiplication factor		Range 0~999, default is 10
	Addition factor		Range 0~999999, default is 1
	Level selection		Range 0~999999, default is 0
	Ultrasonic level algorithm	Ultrasonic level	Two level mode options
		Hydrostatic level	
Flow Accumulation	General settings	Type of pipe	Choice of pipe types, rectangular, circular, isosceles trapezoidal, triangular
		Instantaneous flow units	Cubic metres per second (m^3/s), cubic metres per hour (m^3/h)
		Flow rate zeroing	Clear accumulated flow
	Weir parameter setting	Bottom compensation	Distance from the probe to the bottom of the channel, default 0
		Channel width	Range 0~999999 in m, default 1
		Installation angle	Range 0~999999, unit degrees, default 45
Output settings	Current output		Corresponding values for analogue outputs
	Serial output		485 communication settings, serial port address (default 001), baud rate (default 9600), parity mode (default N, 8, 1)
	Switch outputs		Relay output settings
Data collection	Timed acquisition		
	Lower limit alarm acquisition		
	Upper limit alarm acquisition		
System setup	Language settings		Chinese and English language selection

	Time settings		Date and time setting
	Display settings		Screen contrast, backlight delay setting
	Data Management		Parameter restore, clear memory
	Change password		Change user login password
Historical data	Time-sharing statistics		Query monthly, daily and hourly accumulated traffic
	Timed records		
	Alarm records		
	Power outage records		