Open Channel Ultrasonic Flow Meter User Manual

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1. Introduction

1.1 Application

The series is a remote version ultrasonic open channel flow meters (O.C.M.). It consists of two elements, a wall mounted host, which has a display and an integral keypad for programming, and a probe, which must be mounted directly above the surface to be monitored. Both of the host and the probe are plastic leak-proof structure.

The series OCM can be widely applied to the environmental protection, water treatment, irrigation, chemical, and other industries.

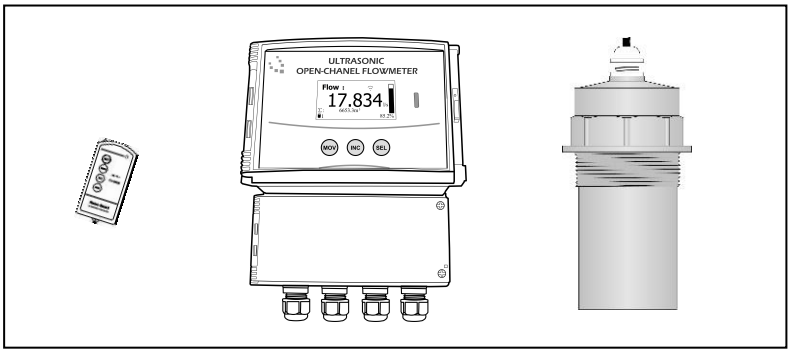
1.2 Features

The series O.C.M. is capable of the following functions:

- High detection accuracy, the flow meter measurement changes with 1mm, the accuracy of change in level is 1 mm;
- Suitable for a variety of weirs and flumes, Parshall flumes (ISO), V-Notch weirs, Rectangular weirs(With or Without End Contractions) and custom Formula type weir;
- Displays flow rate in L/S ,M^3/h or M3/min;
- Excellent anti-interference capability;
- Clear display with Graphical LCD(with backlight) ;
- The cable length between probe and host up to 1000m;
- The probe with leak-proof structure and IP68 protect grade;
- Chemically resistant probe materials for maximum application flexibility;
- Provided 4-20mA output and RS485 serial communication (MODBUS-RTU) output;
- Provided programmable 6 relays at most for alarms;
- Three button for programming or remote control for easy configuration and operation（opt.）;

1.3 Structure

The series O.C.M. consists of a probe and a host. The remote control is optional.

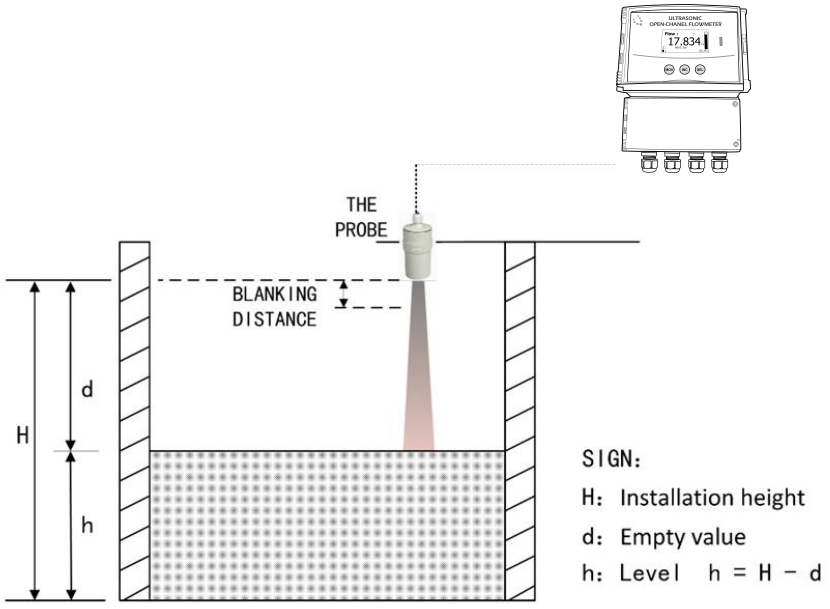


1.4 Measuring principle: Time-of-flight method

The probe is mounted on the top of the flume, and ultrasonic pulse is transmitted by the probe to the surface of the monitored material. There, they are reflected back and received by the pro be. The host measures the time t between pulse transmission and reception. The host uses the time t (and the velocity of sound c) to calculate the distance d between the sensor bottom and the monitored liquid surface: d = c •t/2. As the host knows the installation height H from parameters setting, it can calculate the level as follows: h = H – d.

Since speed of sound through air is affected by changes in temperature, the O.C.M. has integrated a temperature senor to improve accuracy.

For determined flumes, there is a fixed functional relationship between the instantaneous flow and liquid level. The formula is Q=h (x). Q means instantaneous flow, h means liquid level in flumes. So the host can calculate the flow rate though determined flumes and the level value.
It is very important to understanding the working principle for further installation and operation.



Blind zone: Level echo from the blind zone cannot be evaluated due to the transient characteristics of the sensor. Span F may not extend into the blanking distance B.

1.5 Technical data

1.5.1 The host

Power supply	DC24V (±5%) 0.2A; AC220V (±20%) 0.1A
Display	Graphical LCD
The instantaneous flow rate range	0.000~999999L/S ,m^3/h or m^3/min
The maximum of cumulative flow	99999999.9 m^3 (can be user-defined)
Accuracy of change in level	1mm or 0.2% of measured distance from the probe at still water. (whichever is greater)
Resolution	1mm
Analogue output	4-20mA into 500 Ohms, corresponding to instantaneous flow rate.
Relays outputs	6 multi-function SPDT relays at most（optional）, rated 5A /250VAC/30VDC, High, low and failsafe alarm and control corresponding to instantaneous flow rate or level. And also can be set as the pulse output.
Serial communication	RS485, MODBUS-RTU standard protocol
Ambient temperature	-20℃~70℃
Temperature compensation	Integral in probe
Pressure range	±0.1MP (press definitely)
Measure cycle	1 second (changeable)
Parameter setting	3 induction buttons / remote control
Cable gland	PG9 /PG11/ PG13.5
Material	ABS
Protect grade	IP67
Fix	Hang
Dimensions	248H*184W*122D(mm)

1.5.2 The probe

Type	LA-4 (probe)
Range	0.00-4.00m
Blind zone	0.20m
Ambient temperature	-40℃~70℃
Temperature compensation	Integral in probe
Pressure range	0.2MPa
Beam angle	10 (3db)
Cable length	10m standard (can be extended to 1000m)
Material	ABS, PVC or PTFE (optional)
Protect grade	IP68
Fix	Screw (G2) or flange (DN65/DN80/etc.)

2. Installation

Reasonable installation is critical factor of the instrument's normal working. Installation must be carried out by trained person in accordance with the manual.

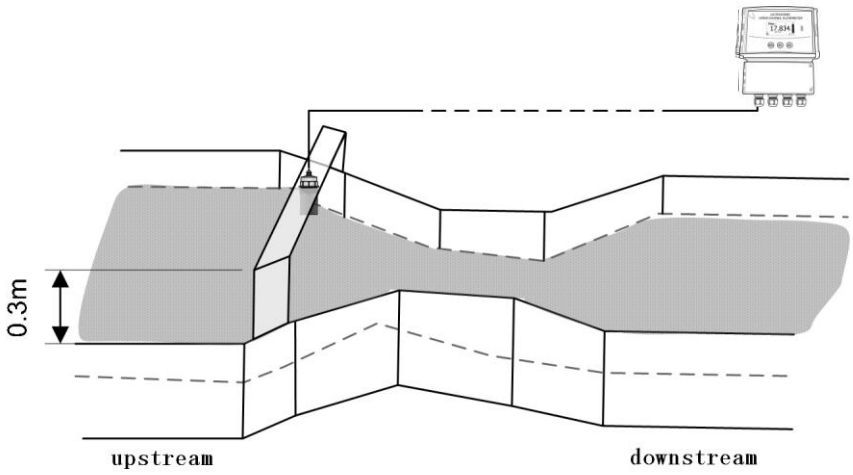
2.1 Installation considerations

2.1.1hints for the host mounting

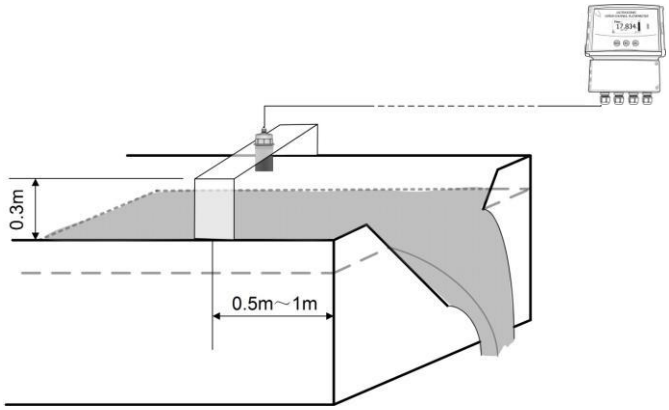
- The host should not be mounted in a confined space where temperatures may exceed the normal working temperature (-20~+70), if the host is mounted outside, it must be protected from direct sunlight or severe weather conditions.
- Ensure that the mounting surface is not subject to vibration and is not in close proximity to high voltage cables, contactors or drive controls.
- Select appropriate knockouts in the base of the enclosure and fit appropriate cable glands to maintain the IP67 rating.
- Do not use excessive force when tightening the fixing and avoid any distortion of the enclosure.
- Pay attentions to the dimensions of the host and the enclosure.

2.1.2 Hints for probe mounting

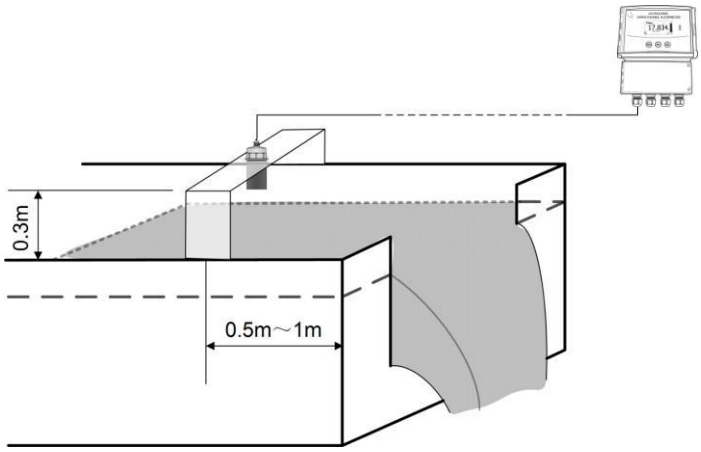
- The probe can be supplied as standard or with a screw nut or with an ordered flange.
- For applications requiring chemical compatibility the probe is available fully enclosed in PTFE.
- The use of metallic fittings or flanges is not recommended.
- For exposed or sunny locations a protective hood is recommended.
- Make sure that the probe is mounted perpendicular to the monitored surface and ideally, at least 0.25 meters above it, because the probe cannot get response in the blind zone.
- The probe has a 10 inclusive conical beam angel at 3 db and must be mounted with a clear unobstructed sight of the liquid to be measured. But smooth vertical sidewalls weir tank will not cause false signals.
- The probe must be mounted upstream of the flume or weir.
- Do not over-tighten the bolts on flange.
- The stilling well can be used when there is volatility in the water or needs to improve the accuracy of level measurement. The still well connect with the bottom of the weir or flume, and the probe measures the level in the well.
- When install to the cold area, should choose the lengthen sensor and make the sensor extend into the container, shun frost and icing.
- For Parshall flume, the probe should be installed in a position the 2/3 contraction away from the throat.
- For V-Notch weir and rectangular weir, the probe should be installed on the upstream side, the maximum water depths over the weir and 3~4 times away from the weir plate.



Parshall flume



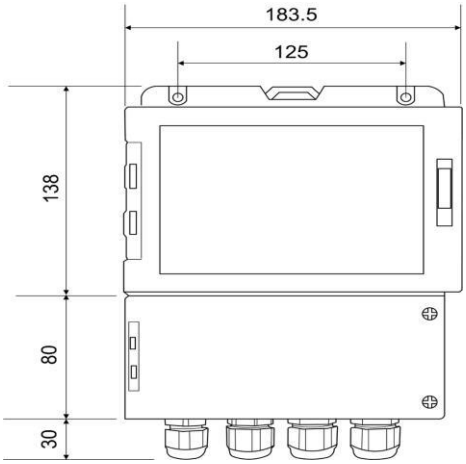
V-Notch weir

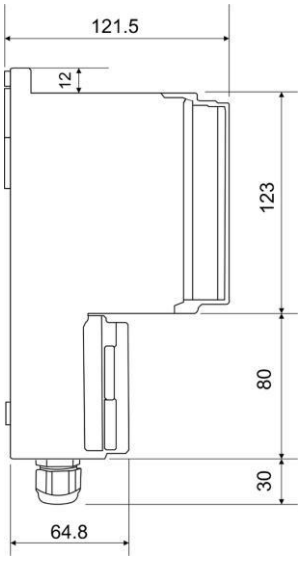


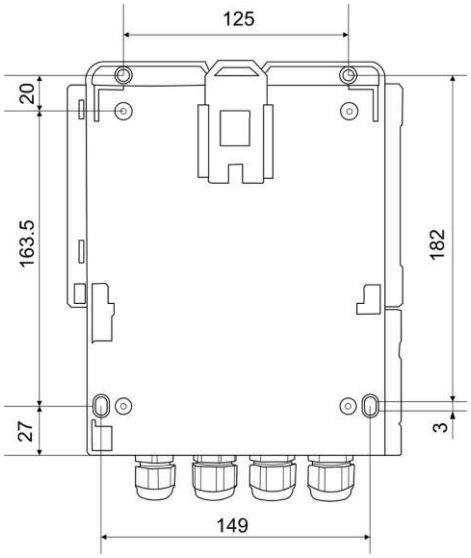
Rectangular weir

2.2 Mounting dimensions

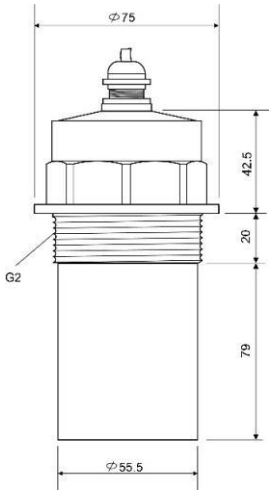
- The host



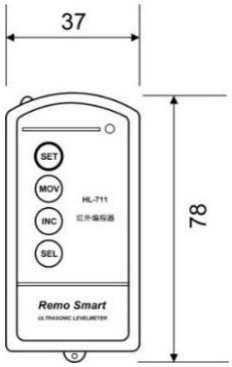




- The probe



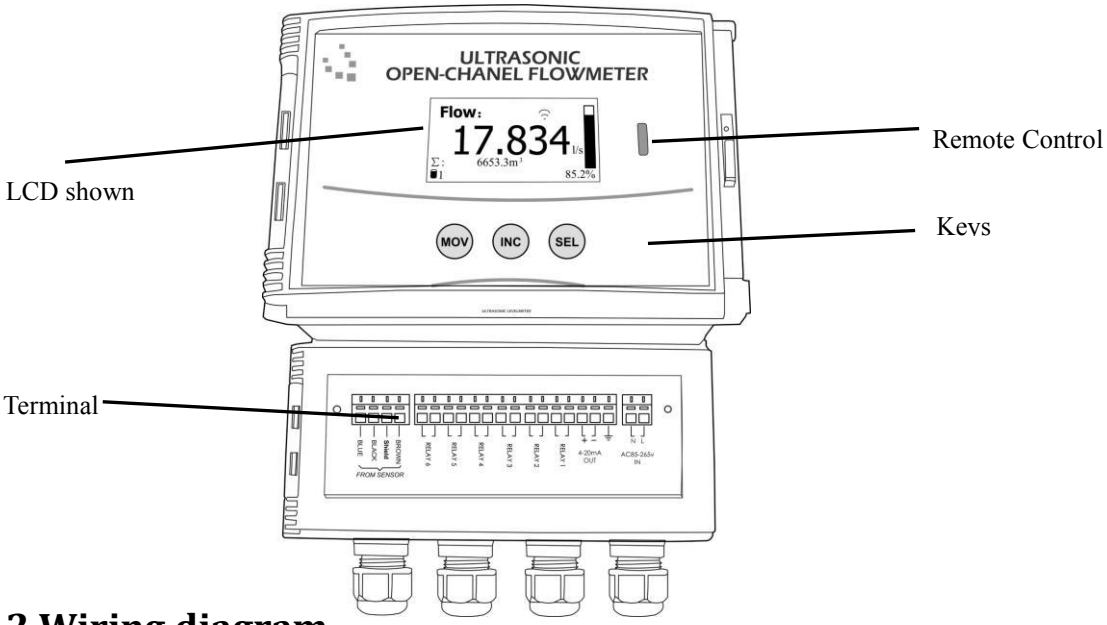
- The remote control



3. Wiring

The series O.C.M. has one LCD show and three keys for setting and some terminal blocks, which are located within the host housing and can be operated when the terminal cover is open.

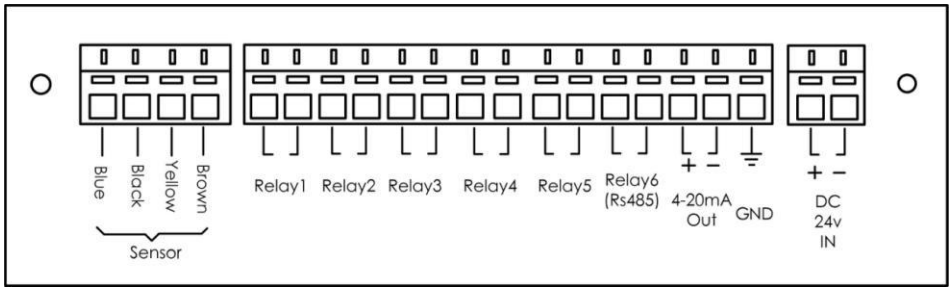
3.1 The host



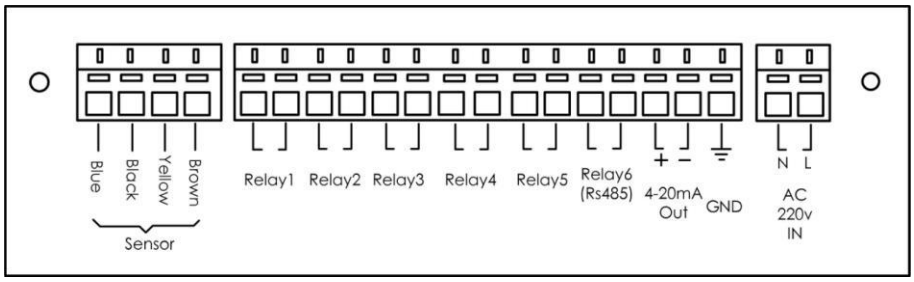
3.2 Wiring diagram

Remove the terminal cover to expose the terminals shown below. The wiring instructions are on bottom of the terminals as below.
When MODBUS function is provide Relay 6 is used for RS485 output.

- DC24V power supply



- AC220V power supply



NOTES: The connection maybe different according to the different power supply and signal output.
When the RS485 serial communication function is provided, the relays can be provided with 5 pcs at most.
Carefully confirm the marked power supply terminals, to ensure the correct power supply connection.

3.3 The cable

The cable between probe and host is 10m standard. Users can extend the cable when desired, and the max distance between probe and host is 1000m.
The cable with three core shield wire is recommended.

4. Operation

4.1 Display and keys

The series is displayed with the Graphical LCD, and it has three keys, with its functions as follow:

Keys	Functions
SEL	1: Go into the next level menu or program 2: Saves the current Settings 3: Switch the measurement page
INC	1. Select the menu from up to down in turn; 2. Adjust the parameters of a particular value (0 ~ 9)
MOV	1. Cycle select other parameters 2. Cycle select other digit of a value.
MOV+SEL Short Press	1. Go from the running Mode into the programming Mode. 2. Exit from the setting program to the last menu, or return the Main Menu to the Running Mode.
MOV+SEL Long Press 6 seconds	Restart the instrument.

4.2 Two working mode

The instrument has two working mode: running mode and programming mode. In running mode, the measurement data is displayed. In programming mode, user can setup parameters of the instrument.

4.2.1 **Running mode**

When the power is turned on, the instrument takes several seconds to initialize and then runs into the running mode to start the normal level and flow measurement.

In the running mode, the flow meter shows the flow or liquid level measurement, in which the state contains 2 pages: the main measuring page and other measurement information page, press SEL key to quickly switch two pages. The

main measuring page can display the flow value, the sensor state, the bar chart, the accumulative flow rate and the relay state. Other information pages can display liquid level, distance value, probe temperature and output current.

The main measurement page (display content sample is as follows):

Graphic description:

1 **PV indicator:** indicator is the main variable is the instantaneous flow, current output corresponding to it.

2 **Instantaneous flow value:** real-time display of the current instantaneous flow value, decimal point position is automatic adjustment.

3. **Cumulative value:** Show cumulative flow value since the instrument first installed or since the cumulative set to zero. The maximum cumulative flow can be set in the settings. It can also be manually cleared in the weir advanced settings, and modify the current accumulated value in the Factory setting. Cumulative flow will be saved when no power.

4. **Relay state**: When an alarm condition is reached according to the relay setting, 1-6 high or low relay alarm icon would be shown here.

5. **The sensor status**: flashing show host and probe communication is normal, and the echo is normal. icon shows probe has no echo. icon shows the host couldn't detect the probe.

6. **Flow bar**: Flow bar chart corresponding to the instantaneous flow.

7. **Flow units**: Display instantaneous flow unit (L/s, m^3/h or m^3/min), can be modified in the Settings.

8. **Flow percentage**: The instantaneous flow percentage.

Relay Alarm display:

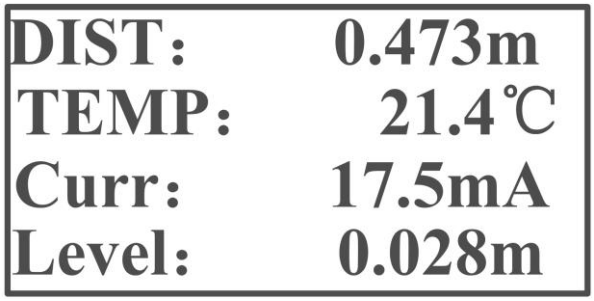
Relay 1，2，3 corresponding to the instantaneous flow, Relay 4,5,6 corresponding to the level value.

Relay 1,3 achieve high operating point setting (high alarm)

Relay 2 reaches the low operating point (low alarm)

Other measurement information page (display content sample is as follows):

In the main measurement page press the SEL button to enter into other measurement information page, press SEL button again to return to the main measurement page or it will automatically return to the main measurement page after 60s.



This page shows the probe temperature (℃), output current (mA), the distance value and the level value (m / ft can be changed in settings).

Note:

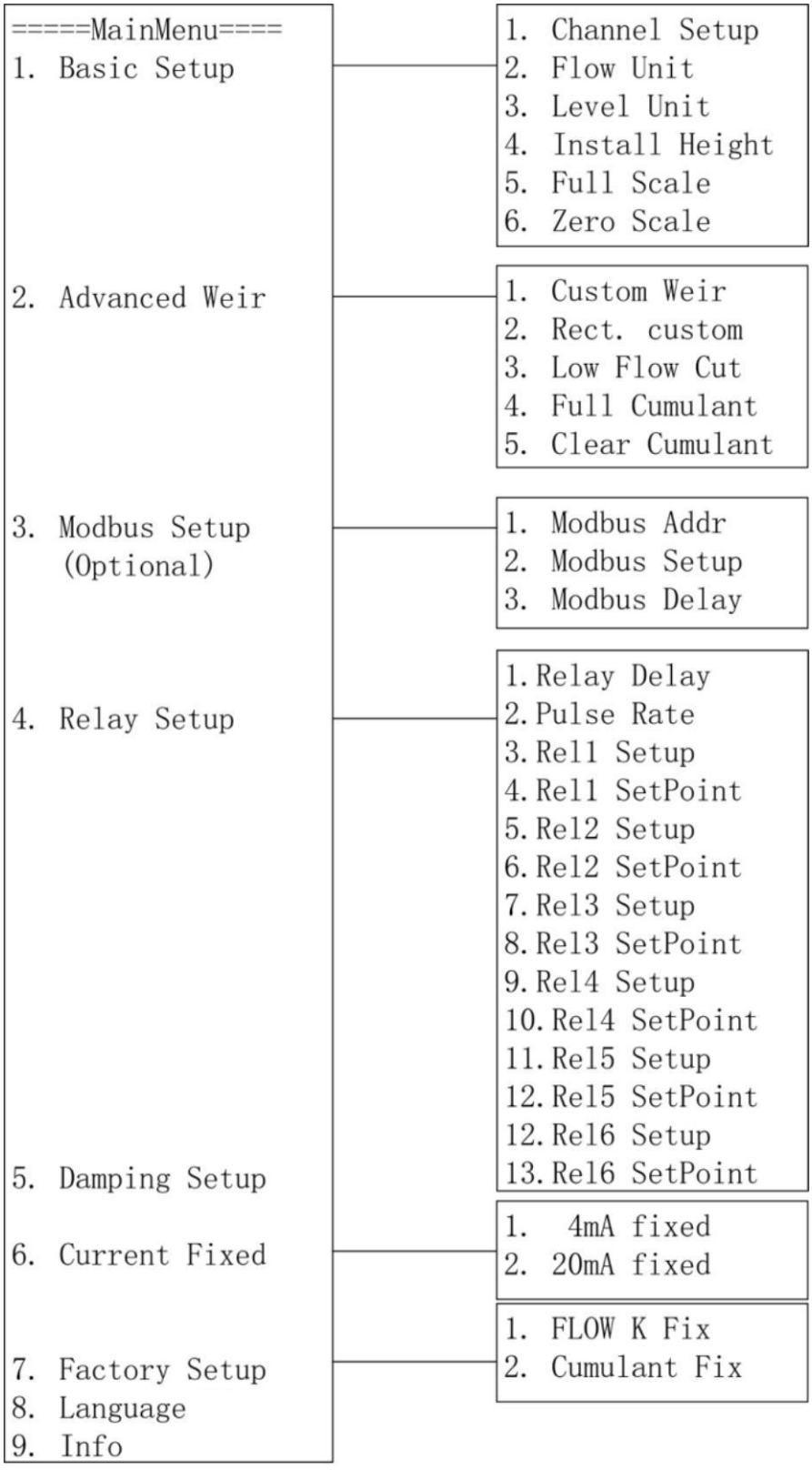
- The installation height (H) must be set NO less than (≧) the measured distance (D) value. If H is less than D, then the Flow Value and the words "Flow" in the main measurement page will keep flashing; except the distance value, the instantaneous flow rate and level value and the output current will not change.
- The series can provide 6 relays which may be used for control purposes. These relays are for light duty and should be used as signal relays only, with control functions being performed by external control relays.

4.2.2 **Programming mode**

In programming mode, user can setup parameters of the instrument.

In this state, the instrument displays the parameters set by the user's needs. In the measurement mode user pressing SEL+MOV together in short to enter the main menu of the programming mode.
Press INC to choose item down in cycle in menu.
Press SEL to enter the next level menu or program
Press SEL + MOV together in short to go back to the upper level menu, or quit.

This instrument uses two menu structures, menu structure is as follows:



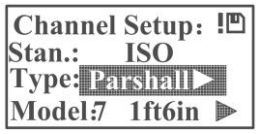
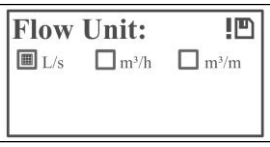
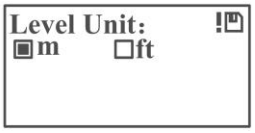
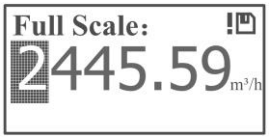
Parameter modification operation

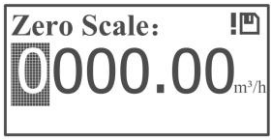
When parameters are modified, the upper right corner of the screen !Pwill appear, prompt parameter has been changed, but not save. If press the MOV + SEL to

exit, instrument will not save the changes. If want to save the setting, press the SEL button icon shows the modified setting have been saved, then press MOV + SEL exit to the upper menu.

Basic setup

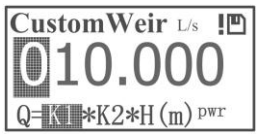
If you are using the weir type that the instrument supported， after finish this part ， the open channel flow-meter would work normally.

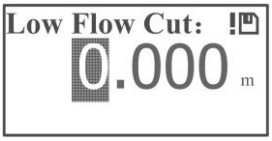
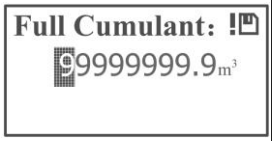
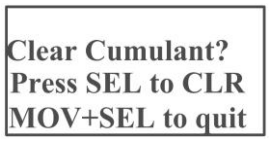
Basic Setup	1.Channel Setup		Press INC, switch between type and model Press MOV switch different Types of weirs or different Models Type： Parshall/V-Notch/Rectangular with end /Rectangular without end/Custom Weir Model: Please reference the supported weir type and model in this manual.
	2.Flow Unit		Press MOV，select unit from l/s,m³ /h and m³ /min（**default unit is m³ /h**）
	3.Level Unit		Press MOV，switching between m and ft，（the default unit is m） Change affects measurement information Page, and change all the Settings about the level or distance values.
	4.Install Height		From the probe emission surface to the weir lowest liquid level. Unit depends on the level unit settings.
	5.Full Scale		The instantaneous flow value corresponding to 20mA output current Value would be set automatically after the user choose the weir type and model， the full scale value is the weir's maximum flow value. The user can also manually adjust. （ Unit depends on the flow unit setting, the number of digit depends on the weir type and model）

	6. Zero Scale		The instantaneous flow value corresponding to 4mA output current. The default value of every weir type is 0 .The user can also manually adjust. (Unit depends on the flow unit setting, the number of digit depends on the weir type and model）

Advanced weir setup

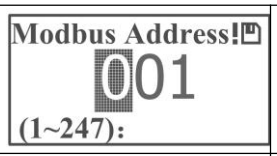
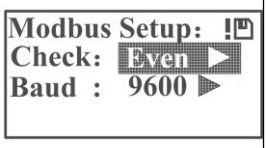
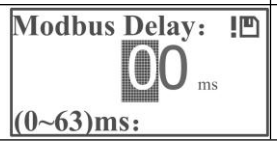
This part set implementation can customize the weir type,
The custom the full cumulant and reset the cumulant.

Advanced weir setup	1.Custom Weir (User-defined formulas)		When users select to use the Custom weir type in the basic settings, this setting would take effect。 Users can manually enter custom formulas. $Q1=K1*K2*H^{PWR}$ Q is flow, unit is L/S K1 K2,represent the user-defined coefficient H represent level, unit is m PWR is the user-defined index When the user modifying a parameter press SEL to save and modify the next parameter. When three parameters are modified and saved, press SEL + MOV exit.
	2.Custom rectangle width		When user select the rectangle weir (with end or without end) and select the model of custom width, this setting take effect. Users can enter their own rectangle width according to the actual needs, Please reference to the ISO standard.

	3.Low Flow Cut off		Users can set up when the level value falls below a certain point the flow is cut to zero. To prevent bias because of the low level of water. （ default is0.000m） Note：by default parshall weir inside the instrument is automatic cut-off by the ISO standard）
	4.Full Cumulant		Modify the maximum Cumulative flow value, when the cumulant reaches the set maximum cumulant, it will reset the cumulant to zero.(**Default 99999999.9m³**)
	5.Clear the Cumulant flow		Clear the Cumulant to zero Press SEL, to set the cumulant to zero. Press SEL+MOV quit

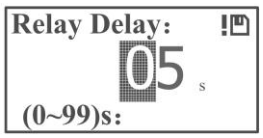
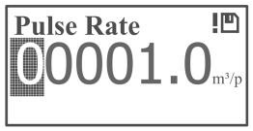
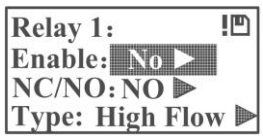
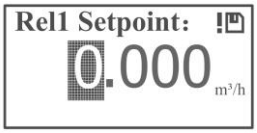
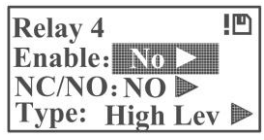
Modbus Setup (Optional)

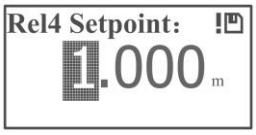
After finish the part MODBUS setting, communication function can be normal use.

Modbus Setup	1.Modbus Address		Address 1 ～ 247 is valid （**default:001**）
	2.Modbus Setup		Press INC select between Check and Baud. Press MOV right change the parameter in cycle. Check：None（8n1）/None（8n2）/odd/Even（**Default**） Baud Rate： 1200 / 2400 / 4800 /9600**(Default)**/19200
	3.Modbus Delay		Modify the Modbus delay time, make some host communication compatibility. 0 ~ 63 ms is valid , **Default 0 (ms)**

Relay setting

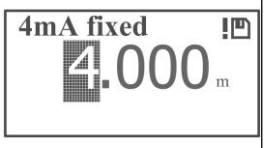
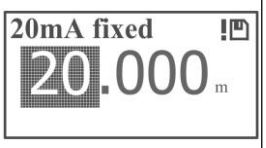
If you want to use the relay, first set relay (1 ~ 6) setup and then configure the corresponding relay action points, the corresponding relay can work properly. The relay 1-3 corresponding to the flow and can be set as pulse output. Relay 4-6 corresponding to the level and can be set as fault output.

Relay Setting	1.Relay Delay		Change the relay delay time Relay delay action after reaching the set value of relay set point, so as to avoid fluctuations in the level, can be modified (0-99s) **(Default 5s)**
	2.Pulse Rate		When the relay 1,2 or 3 set as the pulse output，this part take effect. cumulant relay output pulse： Every time the cumulative flow increased to the setting value the relay action once and hold for 500ms (Default1m³) ！Please select the appropriate pulse Rate according to the actual flow situation and the type of weir, to prevent relay operation is too frequent.
	2.Relay 1Setup (Relay1~3 Setup is same here)		Press INC switch from the Enable ，NC/NO and Type. Press MOV change the setting . Enable：Yes/No**(Default)** NC/NO(normal close /normal open)：NO**(Default)**/NC Type ： High Flow **(Default)**/Low Flow/Pulse Out
	3.Relay1 Set Point (Relay 1~3 Set point Setting is same here)		According to the corresponding relay parameter flow value is greater than or less than this value, the relay 1-3 action, on or off, determined by the corresponding parameters of the relay. （When set to pulse output, this value is invalid; The unit is depend on the flow unit; The number of integer digits are depend on weir type and model）
	4.Relay 4Setup (Relay4~6Setup is same here)		Press INC switch from the Enable ，NC/NO AND Type. Press MOV change the setting.

			Enable：Yes/No**(Default)** NC/NO(normal close /normal open)：NO(Default)/NC Type ： High Level **(Default)**/Low Level/Fail Alarm（When there is no echo or lost the sensor）
	5.Relay4 Set Point (Relay 4~6 Set point Setting is same here)		According to the corresponding relay parameter flow value is greater than or less than this value, the relay 4-6 action, on or off, determined by the corresponding parameters of the relay. （When set to Fail Alarm the value is invalid, the unit depending on the flow unit, the integer digits depending on weir type）

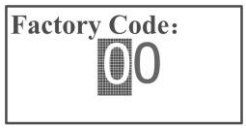
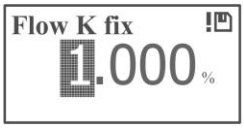
Current Fixed

Under special circumstances, the instrument has a larger error between actual output current and display current, the instrument need to do current fixing. (The factory has been set to optimal values, do not need to modify)

Current Fixed	4mA fixed		After connecting to the ammeter, the instrument will output no fixed 4mA current, you need to input actual ammeter readings and then press SEL, instrument would calibration automatically, repeat the steps until the output current is 4.0mA. Press SEL +MOV to quit
	20mA fixed		After connecting to the ammeter, the instrument will output no fixed 20mA current, you need to input actual ammeter readings and then press SEL, instrument would calibration automatically, repeat the steps until the output current is 20.0mA. Press SEL +MOV to quit

Factory Setup

Instrument internal parameter adjustment, the user does not have to set the value, do not enter into the state of internal work parameter Settings.

	Factory Code		Input the correct values, the instrument would enter into the state of Factory parameter Settings. The user does not have to set this value, do not enter into the state of internal work parameter Settings. (When the input password is 26, user can enter into the flow-meter fixed menu.)
Flow Fix	Instantaneous flow fix		Fix the instantaneous K Q=K*H(X)。 **Do not change the parameters when there is no essential ！ Default is 1.00%**
	Cumulant Fix		When a user needs to change the total flow, change the current cumulative flow value.

Language Settings:

If need to change other language, enter the option to choose.

	Language		Switch the system Language ： Chinese /English

Info

Instrument Info

	Info		display instrument type and the connected probe type.

Notes:

- Push the buttons firmly, but not too hard, to avoid damaging the circuit boards.
- When the instrument is used for pump control, please avoid to directly connect the relays to pump power supply circuit.
- When there is RS485 serial communication, the relay No.6 is invalid.

- The remote control can also be used to configure the parameters. There are four keys SET、MOV、INC、SEL. MOV、INC and SEL three keys have same functions as they are in the host panel. SET key is the same function of MOV SEL press together in short.

The weir type table:

Parshall flume

Weir Type(ISO)	Throat Width and number shown in the OCM	Head Height
Parshall flume	1 1 in	0.21m
Parshall flume	2 2 in	0.24m
Parshall flume	3 3 in	0.33m
Parshall flume	4 6 in	0.45m
Parshall flume	5 9 in	0.6m
Parshall flume	6 1 ft	0.75m
Parshall flume	7 1ft6in	0.75m
Parshall flume	8 2 ft	0.75m
Parshall flume	9 2ft6in	0.75m
Parshall flume	10 3 ft	0.75m
Parshall flume	11 4 ft	0.8m
Parshall flume	12 5 ft	0.8m
Parshall flume	13 6 ft	0.8m
Parshall flume	14 7 ft	0.8m
Parshall flume	15 8 ft	0.8m
Parshall flume	16 10 ft	1.07m
Parshall flume	17 12 ft	1.37m
Parshall flume	18 15 ft	1.67m
Parshall flume	19 20 ft	1.83m
Parshall flume	20 25 ft	1.83m
Parshall flume	21 30 ft	1.83m
Parshall flume	22 40 ft	1.83m
Parshall flume	23 50 ft	1.83m

Customer Weir type (User-defined formulas)

Weir Type	Formulas	Head Height
Customer Weir type	$Q=K1*K2*H^{PWR}$	Q is flow, unit is L/S K1 K2represent the user-defined coefficient H represent level, unit is m PWR is the user-defined index

V-Notch weir

Weir Type (ISO)	Model and number shown in the OCM	Head Height
V-Notch weir	1 30°	31cm
V-Notch weir	2 45°	31cm
V-Notch weir	3 60°	31cm
V-Notch weir	4 90°	31cm
V-Notch weir	5 120°	31cm

Rectangular weir with End Contractions

Weir Type(ISO)	Gaps width and number shown in the OCM	Head Height
Rectangular weir with End	1 25cm	31cm
Rectangular weir with End	2 50cm	46cm
Rectangular weir with End	3 75cm	62cm
Rectangular weir with End	4 100cm	62cm
Rectangular weir with End	Custom Width	

Rectangular weir without End Contractions (Suppressed Weir)

Weir Type(ISO)	Gaps width and number shown in the OCM	Head Height
Rectangular weir without End	1 25cm	31cm
Rectangular weir without End	2 50cm	46cm
Rectangular weir without End	3 75cm	62cm
Rectangular weir without End	4 100cm	62cm
Rectangular weir without End	Custom Width	

1. Calibration

The instrument should be calibrated indoor before installation to ensure the normal performance.

General consideration

- Let the probe be perpendicular to a wall, and make sure the measuring distance is larger than the blacking distance, and no barriers within the beam angle zone.
- Wiring and connecting the instrument correctly according to the guide.
- Turn on the power and after a few seconds the instrument will enter the running mode. Check the instantaneous flow rate, sensor state, and press SEL key to check liquid level value, distance value and temperature value.
- Move the probe slowly, the level value and distance value should change slowly accordingly.
- Press SEL and MOV keys simultaneously in short and then enter the Programming mode. Adjust the weir type, and the installation height,, then the instantaneous flow rate and level value should change accordingly, and the accumulate flow rate will increase too.
- Adjust the full scale of instantaneous flow rate, and test the output current with a multi-meter, the output current should change, too. Because the output current is always in accordance with the instantaneous flow rate.
- Adjust the status of relays, and test with a multi-meter if the relays

working on the right condition.

- If the instrument has RS485 serial communication function, it should be tested with the host computer online.

2. Serial communication-Modbus-RTU

The serial communication is optional for the O.C.M, with standard Modbus protocol, RTU serial transmission mode. (This function should be confirmed when it is ordered.)

Address number

The valid address numbers are in the range 1-247, and the address number is corresponding to the address code in Modbus communication. It can be set in the programming mode.

Baud rate

This series allows the following baud rate(RTU mode): 19200bit/s, 9600bit/s, 4800bit/s,2400bit/s,1200bit/s. .The baud rate can be set in the programming mode.

Parity Check

Three check modes: Odd parity、 even parity , no parity(8n1) and no parity(8n2) . The check mode can be set in the programming mode.

Function code

According to the specific application of this instrument, only one function code ”03” is used, to read the read holding registers. Other Modbus function code is not valid in this instrument.

Abnormal corresponding

According to the specific application of this instrument, three abnormal data are supported in the RTU mode.

01: false function
02: false data address
03: false data

Electrical connection

The instrument supports the EIA/TIA-485 standard 2-wire communication link.
This instrument does not require polarity of the bias circuit.
The cable is suggested to be a pair of balanced twisted-pair cable, and shielded cable is best. When the baud rate is 9600bit / s, maximum length of the cable (AWG26 specification and above) is 1000m.

The RTU mode

The RTU frame format: the representation of data is hexadecimal byte. Each byte has 11 bits: 1 start bit, 8 data bits, 1 parity check bit, 1 stop bit, 2 stop bits when without parity check.

1) The master request:

1	2	3	4	5	6	7	8
Slave Address	0x03	Starting register high byte	Starting register low byte	number of registers to read high byte	number of registers to read low byte	CRC Check High	CRC Check Low

1: Slave Address: Slave address range (001 ~ 247)
2:0x03: function code of read keep register
3, 4: The starting register
5, 6: number of registers to read
7, 8: CRC check

2) The slave response :

1	2	3	4、5	6、7		M-1、M	M+1	M+2
Slave Address	0x03	Data Count	Register Data 1	Register Data 2	.....	Register Data M	CRC Check High	CRC Check Low

1: Slave Address: Slave address range (001 ~ 247)
2:0x03: function code of read keep register
3: Data count.
4, 5: Register Data 1
6, 7: Register Data 2
M-1, M: Register Data M
M+1, M+2: CRC check

3) The Modbus Table:

The Function 0x03 Read Holding Register

Register Address	Data Form	
0x0000	Unsigned int (32bit) 2 WORD	0.001*Instantaneous Flow l/s Unit is L/S

0x0002	Unsigned int (32bit) 2 WORD	0.1*Cumulant flow m^3, Unit m^3
0x0004	Unsigned int (32bit) 2 WORD	temperature Unit ℃
0x0005	Signed short int (16bit) 1 WORD	Level Value , Unit mm
0x1000	Float (swapped float/Big Endian Format) Byte order :4,3,2,1	Instantaneous Flow Unit l/s
0x1002	Float (swapped float/Big Endian Format) Byte order :4,3,2,1	Cumulant flow Unit m3/h
0x1004	Float (swapped float/Big Endian Format) Byte order :4,3,2,1	Level Unit mm

Example:

1.read the Instantaneous flow and the cumulant flow

Host: 0x01 0x03 0x00 0x00 0x00 0x04 0x44 0x09

Slave: 0x01 0x03 0x08 0x00 0x00 0x44 0xD9 0x00 0x01 0x52 0xA8 0xEA 0x5E

Instantaneous flow: 0x00 0x00 0x44 0xd9 17625*0.001L/S =17.625l/S

Cumulant flow:0x00 0x01 0x52 0xA8 86696 *0.1 m^3=8669.6m^3

(Recommend to use the float format if the host support to direct read the float value)

3. Trouble-shooting

Trouble Phenomenon	Trouble Reason	Solution
The instrument does not show, and does not work.	Power supply error. Wiring error.	Check the power supply. Check the wiring.
The instrument doesn't work but with show.	The probe doesn't aim at the liquid or the material. The surface has great fluctuations. Liquid surface with lots of foam. The container is empty and the bottom is not flat.	Adjust the sensor and aim at the material. Add a tube to the container or Use the static water Wells. Add a tube to the container. Add the water and the instrument will work well.
The instrument shows unstable or the measured value has a great deviation.	Wrong setting about the weir type number or the installation height or the flow rate unit. The level enters the blanking distance. There is strong electromagnetic interference. There is Obstruction of the ultrasonic wave. There are floaters on the liquid.	Check the settings. Increase the installation height of the instrument, or prevent the level too high. Increase shielding to the instrument. Change the installation site or using a plastic tube. Eliminate floater.
The probe is fixed in circular tube	Suggest the diameter of the tube is greater than 80 mm, the length is not more than 400 mm.	