

GE-139 Turbidity Measure Meter

User Maunal



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1. Installation

1.1. Do the operation by sequence

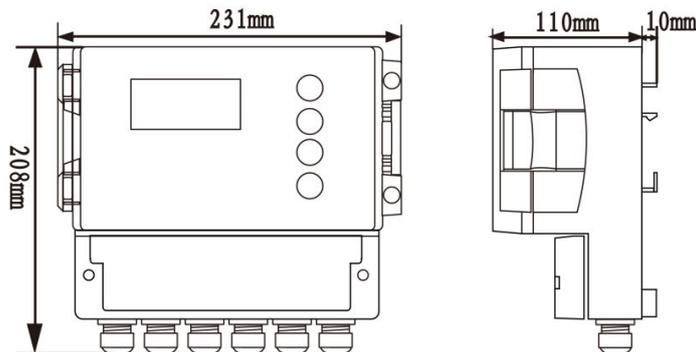
- * Install the Meter Box and the Sensor Mounting Bracket
- * Put the Transmitter (meter) into the box, fix it
- * Install the sensor
- * Connect the cable and Electricity (set a **switch** to control the power supply for the transmitter)

1.2. the Installation for the transmitter (meter)

1.2.1 To protect the transmitter, you could pay attention to:

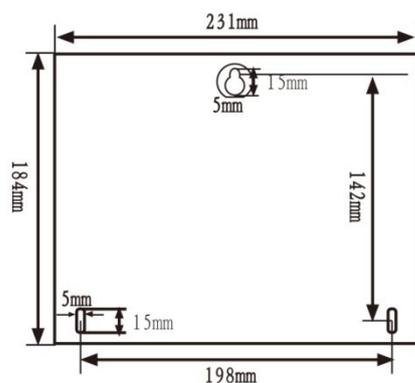
- * Preferred mounting in protection case, avoid direct exposure to sunlight and rainfall, to maintain transmitter's functional stability and longer service life.
- * Avoid Vibration
- * Enough space for the opening of transmitter

1.2.2 The size of transmitter



1.2.3 The Install Size for the transmitter

There are 3 hole in the behind of the transmitter, just look the below drawing. The above hole is used to hang, the below 2 hole is for fixed by screw.



1.2.4 Sensor



Circulation Sensor

Technical Parameter:

Material: ABS
Cables: Shielded 10m (standard)
Installation: Circulation
Dimensions: 280×375mm
Level of Protection: IP65
Range of Temperature: 0~50°C measurement
Process Connection: Quick connector



Plug-in Sensor

Cables: Shielded 10m (standard)
Installation: Circulation, Plug-in
Process Connection: G1pipe thread
Dimensions: 49×122mm
Medium Pressure: ≤3 bar
Level of Protection: IP68
Range of Temperature: 0~60°C measurement

1.3. the Installation

The instrument should be installed in the room or a protective device location, and should not place flammable items around. The equipment should be installed in the location that can facilitate the user and installation and maintenance personnel to read instrument nameplate, screen information, and ease of use, maintenance and repair.

All electrical and plumbing connections must meet national and local standards. Insulation switch or circuit disconnect switch must be installed in front of the instrument power. For safety and avoiding interference caused by an external signal on the instrument, the instrument power cord should be connected to the outlet with appropriate specifications, a ground sign, in line with electrical standards, and to ensure that the ground is well grounded.

The instrument's internal circuit as shown in the wiring diagram, and ratings of voltage and power can be found in the nameplate on the product, and the user power capacity must meet the requirements of normal use of the instrument.

1.3.1 Transmitter Installation Notes:

- * Avoid direct sunlight and shock;
- * Transmitter shall be installed in a slightly higher than the operator head-up position, facilitate

the operator browsing panel or control operation;

* Leave enough space for turning and maintaining the transmitter box.

1.3.2 Sensor Installation Notes

* Install the sensor in the proper position in order to obtain ensure a representative measurement results.

* Install the sensor in an easily accessible location to facilitate regular cleaning and maintenance of the sensor.

* Avoiding installing the sensor air in a bubbles gather position to prevent signal interference.

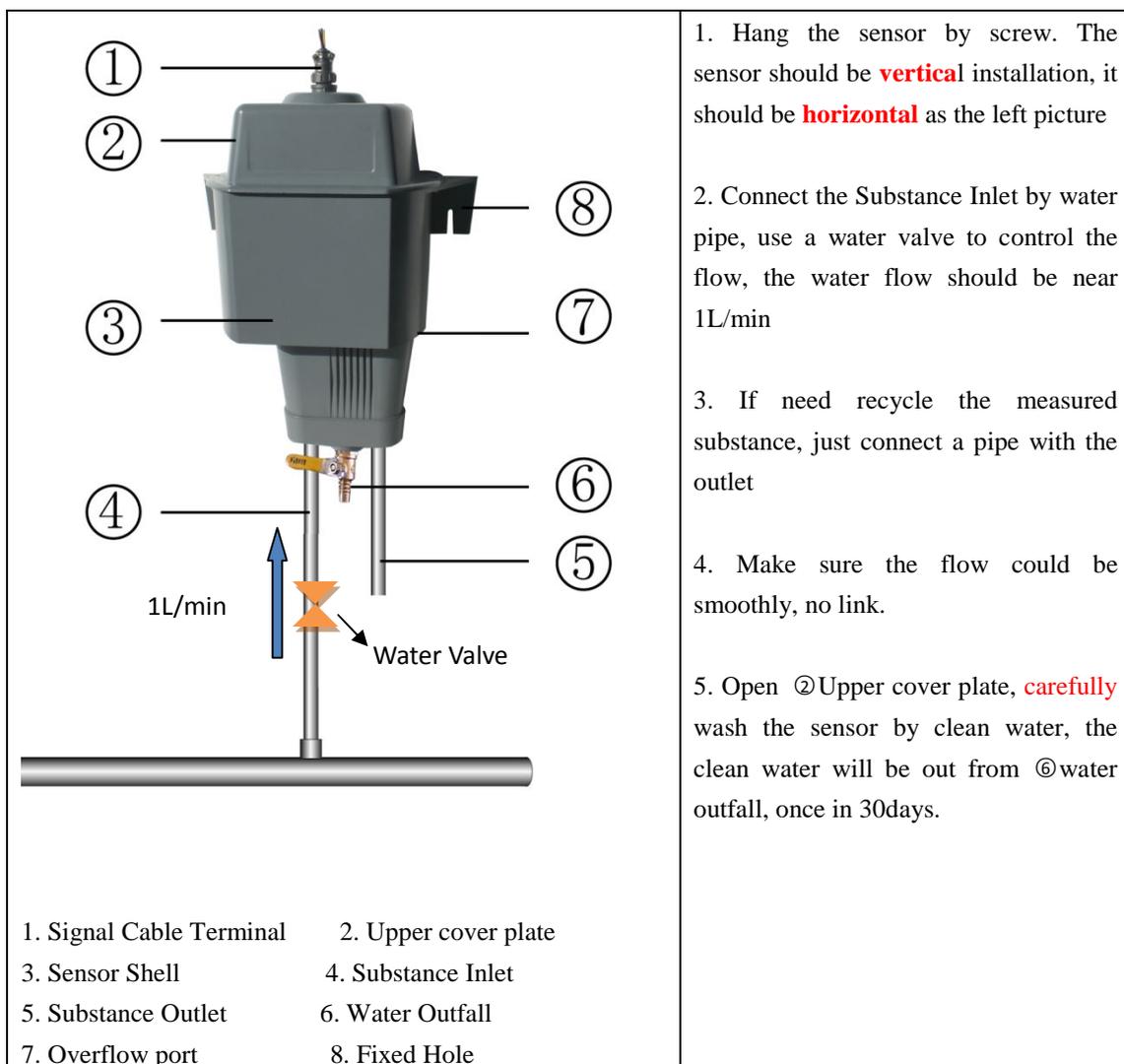
* Install the sensor near the representative, good sampling point.

1.3.3 Installation for the sensor

3.3.1

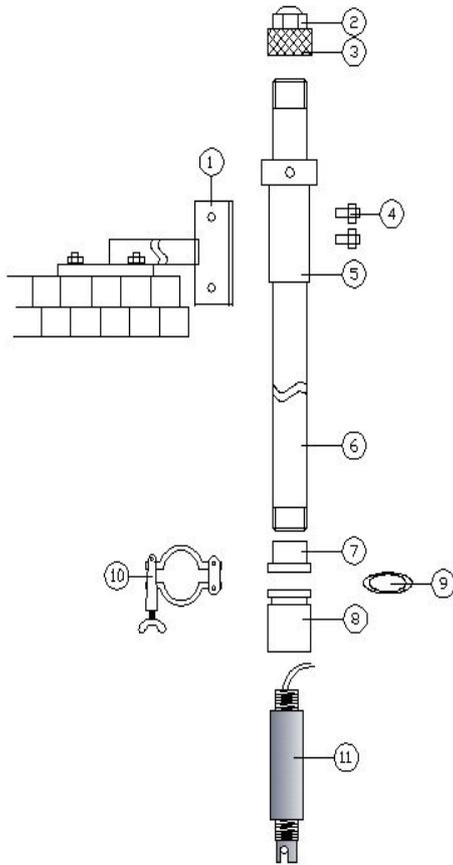
* the position should be easy operation, so it will be easy cleaning and maintenance

* Avoid the position with so much **Air Bubble**



1.3.3.2 Installation of Bracket Immersion (Top of Tank)

✧ Fixing base



- 1、fulcrum bracket
- 2、waterproof head
- 3、tube cap
- 4、locking screw M6
- 5、mounting tube
- 6、stand pipe
- 7、sleeve 1 8、sleeve 2
- 9、seal ring
- 10、quick connector
- 11、sensor

I. Place 4 M10 steel expansion bolts in position of sidewall of tank

II. Connection (as left picture)

1、After the thread of stand pipe wrapped tape, connect it with the sleeve 1;

2、Make the cable of sensor through the sleeve 2、 seal ring、 sleeve 1、 stand pipe、 tube cap and waterproof head in turn.

3、After the thread of sensor wrapped tape, connect and tighten it with the threaded hole of sleeve 2, and needs seal processing.

4、Put seal ring into sleeve 1 and sleeve 2, and fixed them by quick connector.

5、Fastening

1、 Make the mounting tube through the stand pipe. Then according to the depth of measuring, fix the sleeve in the position of the mounting tube by 2 locking screws.

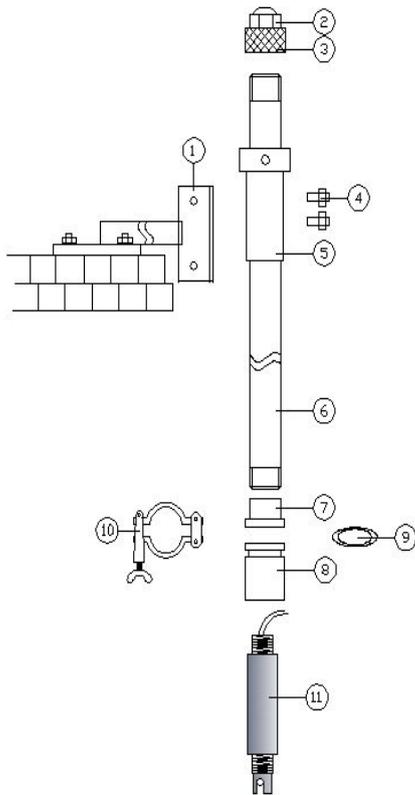
2、 Tighten the tube cap with mounting tube; Tighten the waterproof head, fix cable, prevent rain and other substances into the installing pipe.

✧ Installation

Set up the installed mounting tube of sensor on the fulcrum bracket of the sidewall of tank, and fixed them by 2 M6 bolts.

Notice: When connecting the sensor and the mounting tube, please rotating the mounting tube instead of rotating the sensor. Otherwise, the cable of sensor shall be damaged.

1.3.3.3 Installation of Bracket Immersion (Top of Tank)



- 1、fulcrum bracket
- 2、waterproof head
- 3、tube cap
- 4、locking screw M6
- 5、mounting tube
- 6、stand pipe
- 7、sleeve 1
- 8、sleeve 2
- 9、seal ring
- 10、quick connector
- 11、sensor

◇ Fixing base

I Place 4 M10 steel expansion bolts in position of sidewall of tank

II Connection (as left picture)

2、 After the thread of stand pipe wrapped tape, connect it with the sleeve 1;

2、 Make the cable of sensor through the sleeve 2、 seal ring、 sleeve 1、 stand pipe、 tube cap and waterproof head in turn.

3、 After the thread of sensor wrapped tape, connect and tighten it with the threaded hole of sleeve 2, and needs seal processing.

4、 Put seal ring into sleeve 1 and sleeve 2, and fixed them by quick connector.

5、 Fastening

1、 Make the mounting tube through the stand pipe. Then according to the depth of measuring, fix the sleeve in the position of the mounting tube by 2 locking screws.

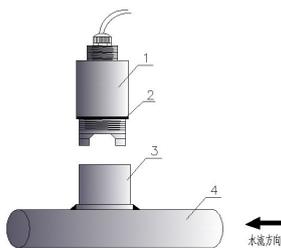
2、 Tighten the tube cap with mounting tube; Tighten the waterproof head, fix cable, prevent rain and other substances into the installing pipe.

◇ Installation

Set up the installed mounting tube of sensor on the fulcrum bracket of the sidewall of tank, and fixed them by 2 M6 bolts.

Notice: When connecting the sensor and the mounting tube, please rotating the mounting tube instead of rotating the sensor. Otherwise, the cable of sensor shall be damaged.

1.3.3.4 Plug-in installation



- 1.Sensor
- 2.Sealing ring
- 3.Special base
- 4.Pipeline

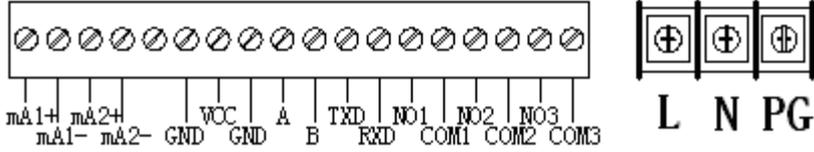
1. Open a $\phi 73$ round hole in a suitable location of the pipeline. Weld the special base on the hole in the pipe, the spot should be firm and full.

2. After wrapping raw tape at the thread of the bottom of the sensor, put the sensor into the base and tighten, and tighten the waterproof head, fixed cable, prevent rain and other substances to enter.

1.4. Electricity Connection

1.4.1 Pay attention about the Anti-static

1.4.2 The Terminal connection



No.	Terminal	Function	Remark
(1)	VCC	Signal Line	Sensor 1 red line
(2)	GND	Signal Line	Sensor 1 green line
(3)	PB1	Signal Shielded Wire	Sensor 1 shielded wire
(4)	SIG1A	Signal Line	Sensor 1 yellow line
(5)	SIG1B	Signal Line	Sensor 1 blue line
(6)	VCC	Signal Line	Sensor 2 red line
(7)	GND	Signal Line	Sensor 2 green line
(8)	PB2	Signal Shielded Wire	Sensor 2 shielded wire
(9)	SIG2A	Signal Line	Sensor 2 yellow line
(10)	SIG2B	Signal Line	Sensor 2 blue line
(11)	A	485 Output	485 Output
(12)	B	485Output	
(13)	MA2+	4~20mA Positive Output	Spare
(14)	MA2-	4~20mA Negative Output	
(15)	MA1+	4~20mA Positive Output	Current output
(16)	MA1-	4~20mA Negative Output	
(17)	NO1	Relay 1	Upper Limit alarm
(18)	COM1	Relay 1	
(19)	NC1	Relay 1	
(20)	NO2	Relay 2	Low Limit alarm
(21)	COM2	Relay 2	
(22)	NC2	Relay 2	
(23)	24V	DC Power 24V	DC24V
(24)	GND	DC Power GND	
(25)	L	AC Power input L	AC220V
(26)	N	AC Power input N	
(27)	PG	AC Power PGND	Ground

Do the operation sequence

1st. Connect the cable of sensor

2nd. relay & 4-20mA

GE-139 Turbidity Meter

3rd. 220V power cable

4th. Close the box

5th. Connect with AC 220V power

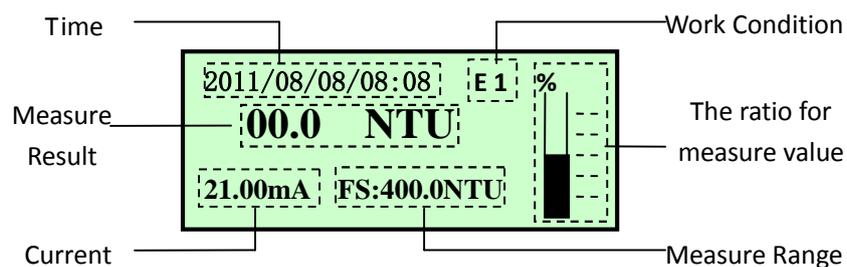
* Sensor Cable have 4 wire (black, blue, red, yellow) and one Shielded wire (Thick and Black)

2. Operation

2.1 Operation Face



It have a screen 192x64 LCD and 5 button, just look the above picture



* Time: It means the current time

* Measure Result: It display the turbidity value

* Current: it is for 4-20mA output value

* Measure Range: just the max value of the turbidity

* The Ratio: it means the measure result with the measure range

* Work Condition: E1 the communication is not work between transmitter and sensor

E2 The measure value is too small

E3 The measure value is too Big, overflow, more than the measure range

2.2 The Button

*  MODE key, press it, then could setup the parameter, Into the instrument menu items

*  SET Key, press it could change the parameter, press again, save the parameter

*  RUN Key, press it, exit the setup mode

*  “▼” “▲” key, change the page or the value of the parameter

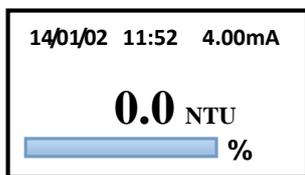
2.3 Measure Condition

This meter have 2 condition, one is Measure condition, the other is Setup Condition. Press RUN Key for Measure Condition; Press MODE key for Setup Condition

2.4 Setup Condition

When out the factory, we have setup all parameter, if the user need setup the special value, please contact with the supplier. You could find the direction for **common parameter setup** from the below:

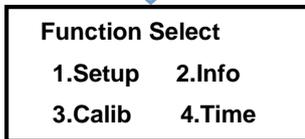
2.4.1 Unit value setup:



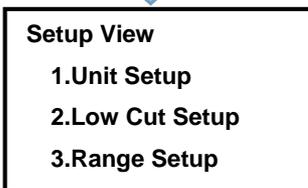
➤ Transmitter's main interface;



➤ Press MODE button, through UP and DOWN button , setup password 0088 , press SET button to save.



➤ Through DOWN button to move cursor and select "1.Setup", press SET button to enter;

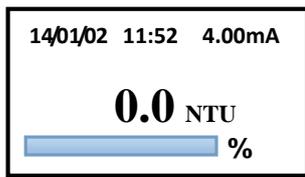


➤ Through DOWN button to move cursor and select "1.Setup", press SET button to enter;

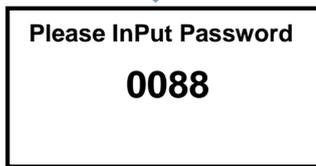


➤ Through UP and DOWN button, select unit, press SET button to save.

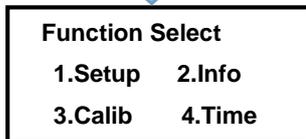
2.4.2 Low Cut Setup



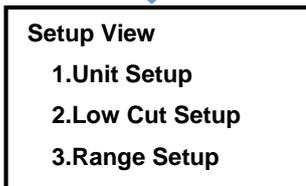
➤ Transmitter's main interface;



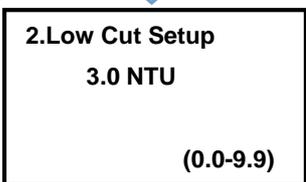
➤ Press MODE button, through UP and DOWN button, setup password 0088, press SET button to save.



➤ Through DOWN button to move cursor and select "1.Setup", press SET button to enter

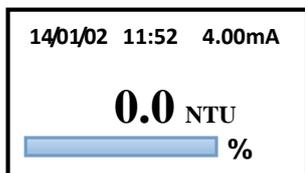


➤ Through DOWN button to move cursor and select "2. Low Cut Setup", press SET button to enter

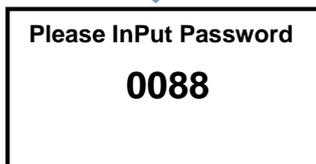


➤ Through UP and DOWN button, set numerical value, press SET button to save.

2.4.3 Rang Setup

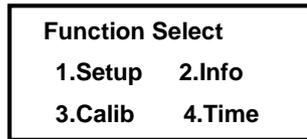


➤ Transmitter's main interface;

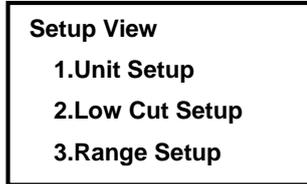


➤ Press MODE button, through UP and DOWN button, setup password 0088, press SET button to save.

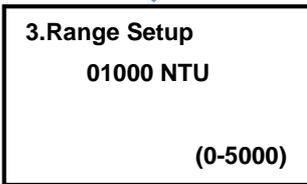




- Through DOWN button to move cursor and select "1.Setup", press SET button to enter



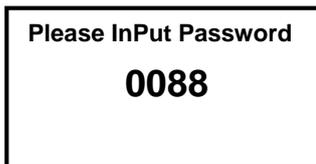
- Through DOWN button to move cursor and select "3. Range Setup", press SET button to enter



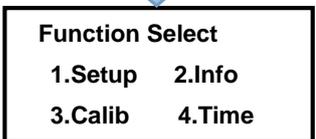
- Through UP and DOWN button, set numerical value, press SET button to save.

Note: The measuring principle corresponds to different range of instrument, above 1000NTU and below 1000NTU, when user changes the range, must carry out re-calibrations to instrument, otherwise the measured value is not right.

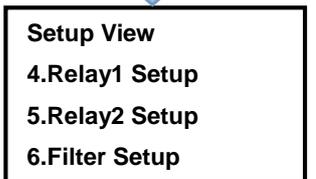
2.4.4 Relay1 Setup



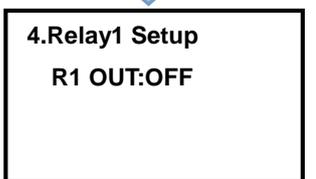
- Press MODE button, through UP and DOWN button, setup password 0088, press SET button to save.



- Through DOWN button to move cursor and select "1.Setup", press SET button to enter

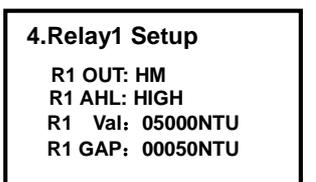


- Through DOWN button to move cursor and select "4. Relay1 Setup", press SET button to enter



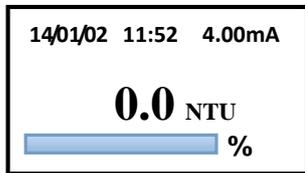
- Through UP and DOWN button, set numerical value, press SET button to save.

- Parameter Details:
AHL: High alarm/Low alarm
Val : Alarm value
CAP: Repeatability
OUT: Default CM, no need to modify

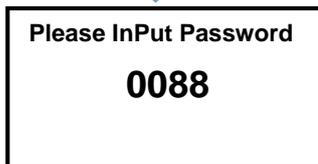


Relay2 Setup is same with Relay1 Setup

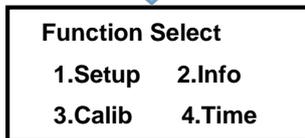
2.4.5 .Filter ID Setup



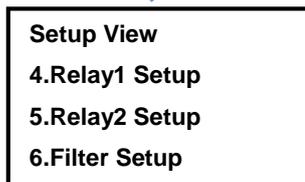
- Transmitter's main interface



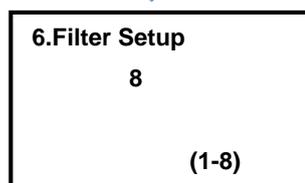
- Press MODE button, through UP and DOWN button , setup password 0088 , press SET button to save.



- Through DOWN button to move cursor and select "1.Setup", press SET button to enter

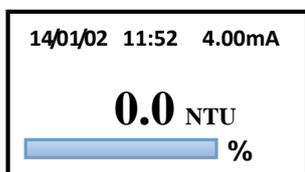


- Through DOWN button to move cursor and select "6. Filter ID Setup", press SET button to enter



- Through UP and DOWN button, set numerical value, press SET button to save.

2.4.6 .ModBus ID SetupRS485 Communication Address Setup

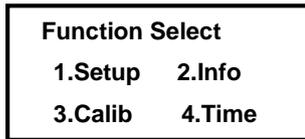


- Transmitter's main interface

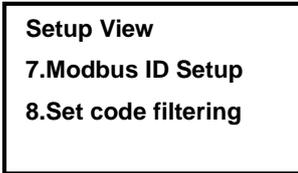


- Press MODE button, through UP and DOWN button , setup password 0088 , press SET button to save.

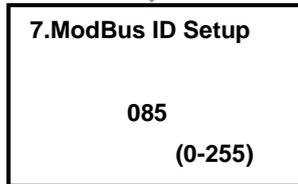




- Through DOWN button to move cursor and select "1.Setup", press SET button to enter

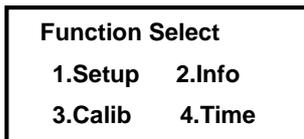


- Through DOWN button to move cursor and select "7. Modbus ID Setup", press SET button to enter

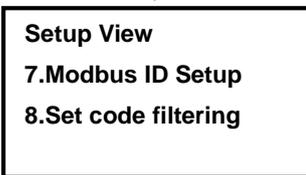


- Through UP and DOWN button, set numerical value, press SET button to save.

2.4.7 .Set code filtering



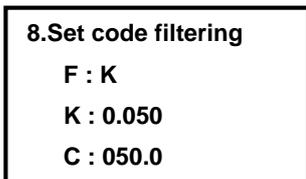
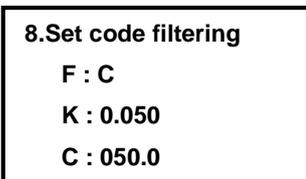
- Through DOWN button to move cursor and select "1.Setup", press SET button to enter



- Through DOWN button to move cursor and select "8. Set code filtering", press SET button to enter

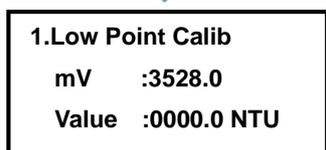
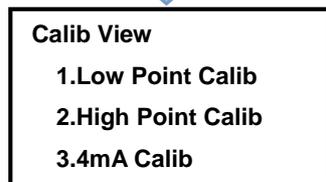
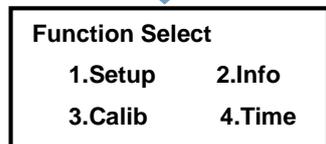
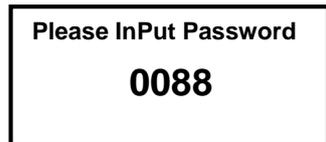
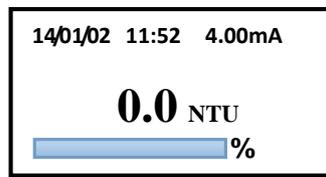


- Through UP and DOWN button, set numerical value, press SET button to save.



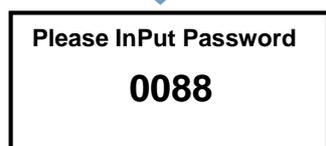
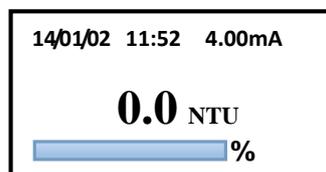
2.5 Calibration Setup

2.5.1 Zero-point Calibration:

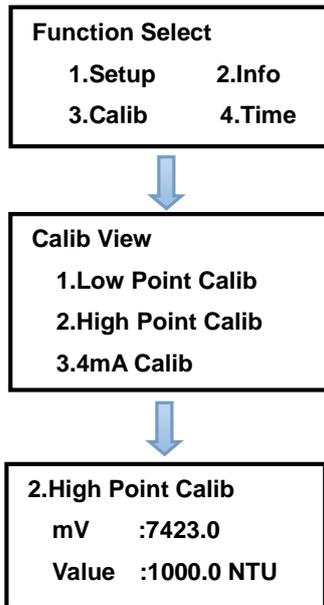


- ◆ Clean the sensor, remove surface's dirt
- ◆ Immerge the sensor in the central location of the container filled with distilled water, should use dark colored container(preferably black), the bottom of the sensor from the bottom of the barrel at least 10cm, avoid direct sunlight;
- ◆ 15 minutes later, press the MODE button in the main menu, the screen prompts for a password, adjust through UP button(password is 0088) and press the SET button to confirm;
- ◆ Through DOWN button to move cursor, select "3.Calib", press the SET button to enter
- ◆ Through DOWN button to move cursor, select "1.Low Point Calib", press the SET button to enter
- ◆ After mV value keeps stable and check the value, it should be 0000.0, if not, through the UP button and DOWN button to change as 0000.0, then press the SET button to confirm, and then the meter calibration has been recorded the calibrated value. If misuse, press the RUN button to exit the menu.

2.5.2 High-point Calibration:

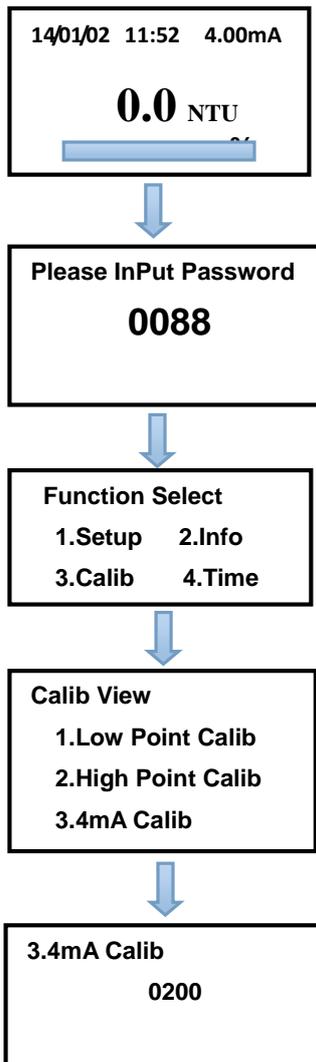


- ◆ Clean the sensor, remove surface's dirt
- ◆ Immerge the sensor in the high-standard solution or the standard solution of practical applications, 15 minutes later, enter the function selection interface;
- ◆ press the MODE button in the main menu, the screen prompts for a password, adjust through UP button(password is 0088) and press the SET button to confirm;



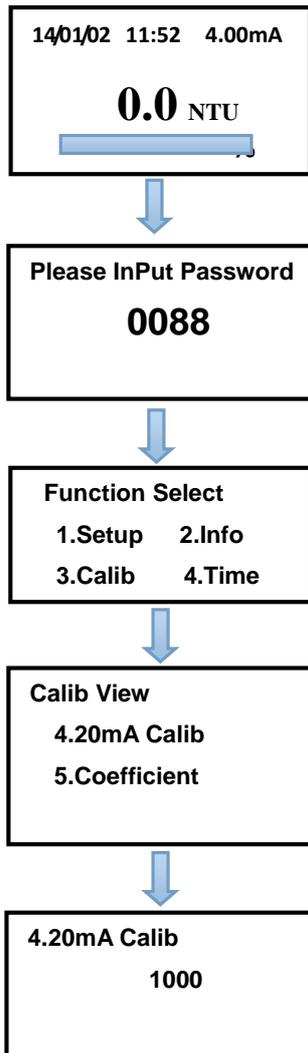
- ◆ Through DOWN button to move cursor, select “3.Calib”, press the SET button to enter;
- ◆ Through DOWN button to move cursor, select “2.High Point Calib”, press the SET button to enter
- ◆ After mV value keeps stable and check the value, it should be standard solution value, through the UP button and DOWN button to change the needed standard solution value, then press the SET button to confirm, and then the meter calibration has been recorded the calibrated value. If misuse, press the RUN button to exit the menu.

2.5.3 4mA Calibration:



- Transmitter’s main interface
- Press MODE button, through UP and DOWN button, setup password 0088, press SET button to save
- ◆ Through DOWN button to move cursor, select “3.Calib”, press the SET button to enter;
- Through DOWN button to move cursor, select “3.4mA Calib”, press the SET button to enter; measure the current output terminal with the multimeter MA1+, MA1-, press the SET button to enter;
- LCD screen will display a number (0200), no need to modify if the multimeter displays 4mA , if less than 4mA ,need to increase the numerical value of the current menu(the default value is 200, the proposed increments of 1)For example: The current measured current is 3.99mA , the numerical value is 200, if adjust the numerical value as 201, the multimeter shall display 4mA , then press the SET button at this time and remove the multimeter.

2.5.4 20mA Calibration:



- Transmitter’s main interface
- Press MODE button, through UP and DOWN button, setup password 0088, press SET button to save
- Through DOWN button to move cursor, select “3.Calib”, press the SET button to enter;
- Through DOWN button to move cursor, select “4.20mA Calib”, press the SET button to enter; measure the current output terminal with the multimeter MA1+, MA1-, press the SET button to enter;
- LCD screen will display a number (1000), no need to modify if the multimeter displays 20mA , if less than 20mA ,need to increase the numerical value of the current menu(the default value is 1000, the proposed increments of 1)For example: The current measured current is 19.99mA , the numerical value is 1000, if adjust the numerical value as 1001, the multimeter shall display 20mA , then press the SET button at this time and remove the multimeter.

2.5.5 Standard solution preparation:

This instrument turbidity standard, executive GB5750-85 "drinking water standards test", Section 6.2.4, and "drinking water health standards" Section 5.1.3.

Configuration is as follows

- 1、 Configuration 0 NTU standard solution
Distilled water passed through a 0.2 um membrane filter.
- 2、 Configuration 800 NTU standard solution
Hydrazine sulfate with standard sample weighed 2.0000 g, dissolve with DI water to 100ML flask. Weigh 20.000 g hexamethylenetetramine, dissolve with DI water to 100ML flask. Take the two standard solution each 5ML with 5ML pipette into 100ML flask and at room temperature (preferably 25 °) for 24 hours, then constant the volume.

3. Maintenance

3.1 Maintenance of Transmitter

The installation location and work situation is complex according to the using requirements. In order to make the transmitter to work, the maintenance personnel need to carry out regular maintenance to transmitter and please note the following matters:

- * When the transmitter is installed outdoors, please check the installed box of converter if leak;
- * Check the work environment of transmitter, if the temperature exceeds the operating range of the transmitter, take appropriate measures to prevent making damage or reducing the using life of the transmitter ;
- * The transmitter's shell is plastic, do not scratch with a hard object and use a soft cloth and a mild detergent to clean the case, be careful not to allow moisture to enter the internal transmitter;
- * Check the transmitter's displayed data if normal;
- * Check the connections on transmitter's terminal if firm, cut off the 220V AC power before removing the terminal cover

3.2 Maintenance of Sensor

- * In order to get a better measurement results, the sensors need regular maintenance, please note the following matters:
- * Two windows on the sensor all need cleaning, please the maintenance personnel clean the sensor regularly according to experience, make sure the both windows in clean condition.
- * Check the cable of sensor, the cable should not be taut during normal operation, otherwise it is easy to break the cable wires inside and cause the sensor not work.
- * Check sensor's shell if be damaged due to corrosion or other reasons;

Circulation Sensor:

- * Clean the sensor once a month, the method : remove the core of sensor and scrub all parts with water that sensor contacts water sample, sewage discharged by the sensor's drain valve. Scrub and rinse optical window with pure water and soft cloth that not afford fiber, if the contamination is serious, can add household detergent to clean. Note that this operation must be careful, don't touch or break optical window, don't make water to seep inside the movement.

4. Communication Function

Instrument provides serial asynchronous half-duplex RS485 communication, using MODBUS-RTU protocol, all the measurement data can be read out, each instrument can be set mailing address, communication links should use shielded twisted pair with copper mesh, diameter not less than 0.5mm². When wiring, make the communication line wiring away from power cables or other strong electric field environment. Recommend using the T-network connection, not star or other connections.

MODBUS_RTU communication protocol: MODBUS protocol uses the communication connections of master-slave response mode on one communication line. First, the host computer's signal finds the terminal device (slave) with unique address, then the terminal device emits response signal to the host in the opposite direction, i.e. signal transmits all communication data streams along two opposite directions in a separate communication line (half duplex mode).

MODBUS protocol only allows communication between the host (PC, PLC, etc.) and terminal equipment, not allow the exchange of data between separate terminals, so that each terminal device does not occupy the communication line when they initialized, and is limited to reach to the inquiry signal of the host. Host Query: query message frame includes device address, function code, data code, checksum

Address code: indicates the selecting slave device;

Function code: indicates the selected slave device to perform what functions;
Data segment: contains any additional information about the slave device to perform the function.

Checksum: used to test the accuracy of the frame's information, using CRC16 calibration rules.

Slave response: If a normal response generated from the equipment, There is the slave address code, function code, data code and CRC16 checksum in the response message. Data code includes data collected from the device, such as parameter measurements.

Hardware connection: Connect the signal line to the A and B terminals of the meter

Communication settings: Instrument requires the communication format for the 9600, N81 (1 start bit, 8 data bits, no parity, 1 stop bit), the response rate was 0.015S.

Communication Command: Function code 03 - used to read data

Byte	Send	Example	Respond	Example
0	Address	0x55	Address	0x55
1	Function code	0x03	Function code	0x03
2	Data initial address high	0x00	Transmitting data bytes	0x0E
3	Data initial address low	0x00	Turbidity value high	0x00
4	Data length high	0x00	Turbidity value hypo-high	0x00
5	Data length low	0x0E	Turbidity value hypo-low	0x00
6	CRC Checksum low	0xDA	Turbidity value low	0x00
7	CRC Checksum high	0xC9	The percentage of turbidity values accounting in the range high	0x00
8			The percentage of turbidity values accounting in the range hypo-high	0x00
9			The percentage of turbidity values accounting in the range hypo-low	0x00
10			The percentage of turbidity values accounting in the range low	0x00
11			Year	0x13
12			Month	0x08
13			Date	0x09
14			Hour	0x15
15			Minute	0x03
16			Second	0x04
17			CRC Checksum low	0x18
18			CRC Checksum high	0xAE

GE-139 Turbidity Meter

The address information table of Modbus communication protocol:

Address	Description of parameter	Data type	Explanation
00-03	Turbidity	Float	Unit: mg/L
04-07	The percentage of turbidity values accounting in the range	Float	%
08	Year	char	
09	Month	char	
10	Date	char	
11	Hour	char	
12	Minute	char	
13	Second	char	

Example: PC Host sends: 55 03 00 00 00 0E DA C9

Transmitter returns: 55 03 0E 00 00 00 00 00 00 00 13 08 09 15 03 04
18 AE

Current turbidity value measured by the meter is 0.0, Percentage of turbidity value accounting in the range is 0%, means the current time of the meter is 2013-August-9, 15-3-4 (Year, Month, Date, Hour, Minute, Second)

(The default of Year's century-bit is 20)。

5. Problem & Question

No.	Phenomenon	Possible Reasons	Solution
1	LCD not light	Instrument or LCD screen in power failure	Check the power if connected, check the power line of sensor if reversed
2	No current output	Current modules may be faulty or wiring fault	Please check the current output wiring if correct. Please refer to the terminal diagram of the instructions
3	The output current of transmitter does not comply with the displayed current	Current output may not be correctly calibrated	Please make re-calibration to the output of 4mA and 20mA. Please refer to the current calibration of menu setting.
4	Meter displays “E1”	The communication between transmitter and sensor is not normal	Please check the signal line of the sensor if correct. Please refer to the terminal diagram of instruction.
5	Meter displays “E3”	Calculation result overflows	Out of the measuring range of the meter
6	Measurement displays the result with full-scale	Sensors may be dirt, damage or turbidity value exceeds the range	Put the sensor in the low turbidity medium, observe the instrument if work properly, if the meter is working properly, then means that the turbidity of the measuring medium may be out of range.
7	Displayed measurement result with big fluctuations	Sensor wiring error or filter coefficients setting is small	Check the wiring or increase the filter coefficients.