Multi-function Turbine Flowmeter

User Manual

(Version 21)

I. General

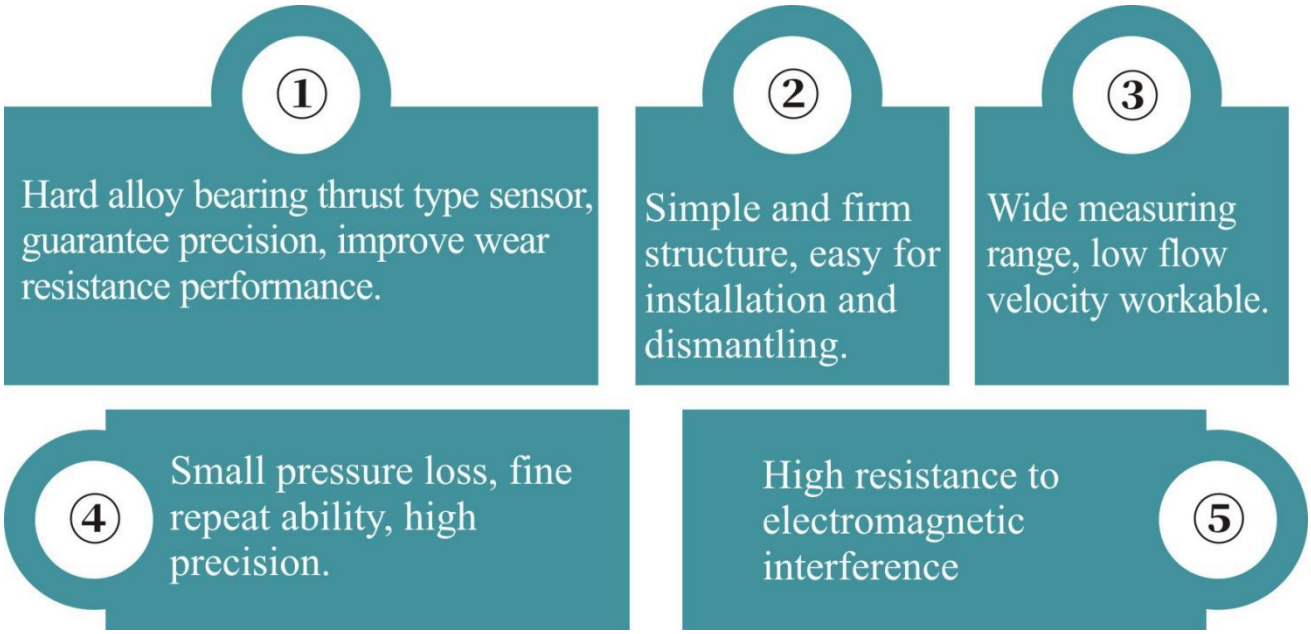
1.1 Introduction

LWGY turbine flow meter consists of turbine flow sensor and display instrument and it is made by us using foreign state-of-the-art technologies, which is an ideal gauge for measuring of liquid flow.

The flow meter is characterized by simple structure, high precision and easy installation and repair. the product can be used in a wide range of industries, including oil industry, chemical industry, metallurgy, water supply, paper-making, environment protection and food industry.

It is applicable in closed pipes to measure flow of liquid which will not erode stainless steel (1Cr18Ni9Ti), 2Cr13, Al2O3 and hard alloy and is free of impurities such as fiber and granules. if this product is used in association with display instruments with special functions, it can be used for purpose of automatic definite quantity control and alarming in case of excessive amount.

1.2 Product Features



1.3 Working Principle

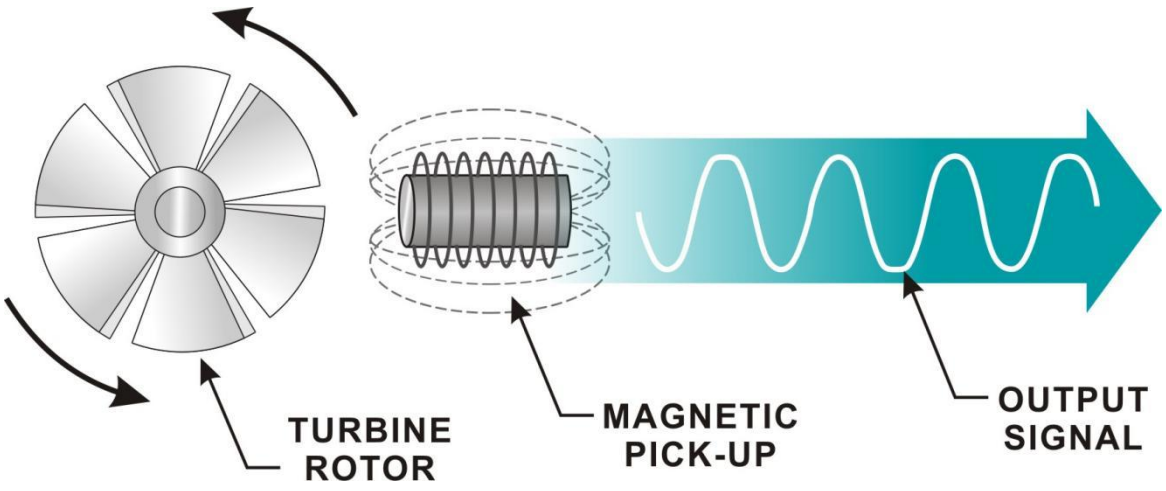
When liquid flows through the sensor, the impulse of fluid will provide the blade with a rotation moment as there is an angle between the blade of impeller and the flow direction. the blade will rotate as the friction moment and the fluid resistance

are overcome and it will reach a stable speed when the moments are at balance. under certain conditions, the rotation speed of blade will be in direct proportion to the flow velocity. due to the magnetic conductivity of blade, when located in the magnetic field generated by signal detector (made of permanent magnet steel and coils), the rotating blade will cut the magnetic lines and periodically change the flux through the coil, thereby inducing electrical impulse signals at both ends of the coil. the induced signals, after amplified and rectified by amplifier, will form a continuous rectangular impulse wave with certain amplitude which may be remotely transmitted to display instrument indicating the instant flow and the cumulative flow of fluid. within a certain range of flow, the impulse frequency is in direct proportion to the instant flow of fluid flowing through the sensor, which is shown in the equation below:

Wherein:

f	Impulse frequency [Hz];
k	Instrument factor of sensor [1/m^3], which is given by checklist. [1/L] is used as the unit, the equation will be;
Q	Instant flow of liquid (in operation) [m^3/h];
3600	Conversion factor.

Instrument factor of each sensor will be filled out in verification certificate by the manufacturer. the instant flow and cumulative flow will be displayed when the value of k is loaded into associated display instrument.



Size- Flow Range- Connection

Size	Standard Flow Range(m3/h)	Extended Flow Range(m3/h)	Common Connection & Pressure	Customized Pressure
DN4	0.04-0.25	0.04-0.4	Thread/6.3MPa	4-42MPa
DN6	0.1-0.6	0.06-0.6	Thread/6.3MPa	
DN10	0.2-1.2	0.15-1.5	Thread/6.3MPa	
DN15	0.6-6	0.4-8	Thread/6.3MPa	
			Flange/4.0MPa	
DN20	0.8-8	0.45-9	Thread/6.3MPa	
			Flange/4.0MPa	
DN25	1-10	0.5-10	Thread/6.3MPa	
			Flange/4.0MPa	
DN32	1.5-15	0.75-15	Thread/6.3MPa	
			Flange/4.0MPa	
DN40	2-20	1-20	Thread/6.3MPa	
			Flange/4.0MPa	
DN50	4-40	2-40	Thread/6.3MPa	
			Flange/4.0MPa	
DN65	7-70	3.5-70	Thread/1.6MPa	
			Flange/1.6MPa	
DN80	10-100	5-100	Thread/1.6MPa	
			Flange/1.6MPa	
DN100	20-200	10-200	Thread/1.6MPa	
			Flange/1.6MPa	
DN125	25-250	12.5-250	Flange/1.6MPa	
DN150	30-300	15-300	Flange/1.6MPa	
DN200	80-800	40-800	Flange/1.6MPa	
Remark: Tri-clamp connection optional (Size DN4-DN80, pressure 1.6MPa)				

II. Installation Requirements

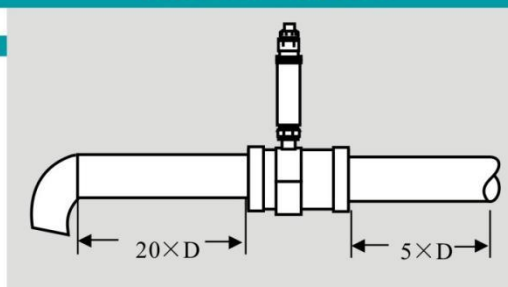
Flow meter may be installed horizontally or vertically. in the latter case the fluid shall be flowing from downward and fulfill the pipe to avoid bubbles; the flowing direction of liquid shall be consistent with the direction indicated by the arrow on casing of the sensor; as far as front and rear straight pipe sections are concerned , at upstream there shall be front straight pipe section at least 10 times of nominal drift diameter in length and at downstream no less than 5 times of nominal drift diameter in length. the internal wall of pipe sections shall be smooth and clean, free of defects such as indent, fouling and peeling. the pipe axis of the sensor shall be aligned with that of the neighboring pipe and the washers used for connection and sealing may not be embedded into depth of the pipe cavity; the sensors shall be kept away from foreign electric field and magnetic field, effective shielding measures shall be taken in case of necessity to avoid external interference.

In order that the normal transfer of liquid will not be affected by maintenance, it is recommended that bypass pipes be installed at position of sensor.

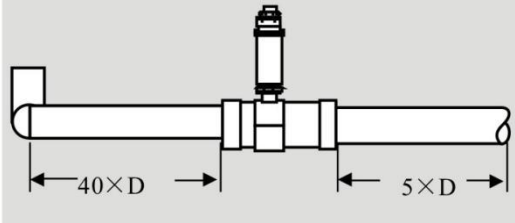
In case of open air installation, water proof measures shall be taken for purpose of amplifier and plug of the sensor. the wiring between sensor and display instrument is shown in Fig. as below.

When fluid contains impurities, filter shall be additionally installed. the number of filter screen meshes is determined in accordance with the flow and impurity, normally 20 to 60 meshes. when fluid is mixed with free gases, gas eliminator shall be additionally installed. the complete pipe system shall be well sealed. the user shall fully understand the erosion nature of the measured medium to protect the sensor from being eroded.

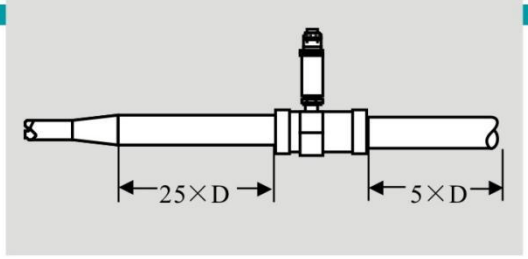
One 90° elbow



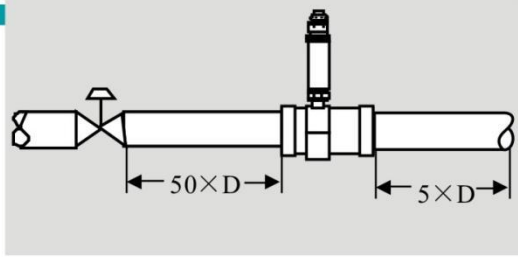
Two 90° elbows for two planes



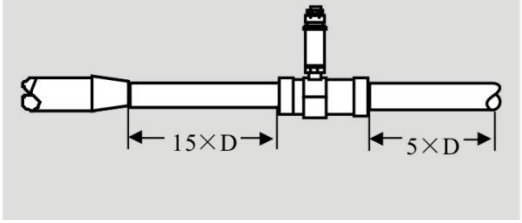
Concentric expander



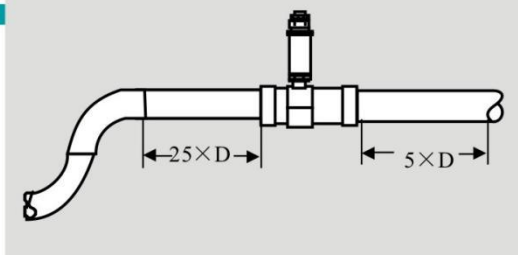
Control valve half-open



Concentric shrinkage wide open valve



Two 90° elbows for one plane



III. Operation

◆ When sensor is used, the liquid to be measured shall be clean and free of impurities such as fiber and granules.

◆ When sensor is used, it shall be at first slowly filled with liquid, then open the outlet valve (which should be installed behind the flow meter). it is prohibited to render the sensor under impact of high-velocity fluid when it is not filled with liquid.

◆ The maintenance interval for sensor is in general half a year. in case of maintenance and cleaning, attention shall be paid not to damage the parts in the measuring cavity, particularly the impeller. during assembly, watch carefully the positional relation between guide part and impeller.

◆ When the sensor will be out of service for a long time, the internal liquid shall be cleaned. after dried, the sensor shall be provided with protection sleeves at both ends to protect against dust and it shall be placed in dry conditions for storage.

◆ The associated filter shall be cleaned on regular basis and the internal liquid shall be cleaned when it is out of service for a long time. similar to sensor, the filter shall also be provided with dust protection and stored in dry conditions.

◆ The transmission wire of sensor may be overhead or buried (iron bushing shall be provided in the latter case).

◆ Prior to installation of sensor, the connection thereof with display instrument or oscilloscope shall be finished. then switch on the power, blow the impeller with

mouth or move the impeller with hand to make it rotate quickly, see if there is any reading. install the sensor if there is reading. in case of no reading, the related sections shall be inspected to eliminate any fault.

1. Parameters

C / 30mA (-20% ~ +15%);

3.6V Lithium battery powered (optional)

01 Three line 4 ~ 20 mA output current linear correction (Iout and GND circuit l oad 600 Ω @ 24 V or less).

02 Programmed pulse output: high level ≥9V (supply voltage -1V);
Low level < 0.5V; NPN open collector output with 2K pull-up resistance.

03 Communication supports RS485 communication of Modbus-RTU protocol.

2. Circuit Description

Multi-function turbine flowmeter circuit, whose signal measuring circuit is an adjustable gain amplifying circuit, can cope with a variety of sensors and complex field environment. the filter and protection of the power input are added, and the reliability and anti-power noise capability are improved.
Various parameters can be selected by Chinese/English prompt software menu. after data processing by LCD12864. signal far - transmission circuit can be three - wire 4-20mA output current signal. in addition, a multi-purpose programmable pulse output signal, can be set for a variety of output modes. RS485 communication is also available.

2.1 Pulse Output Mode:

A Signal frequency output: direct real-time output of the probe signal frequency, usually used for instrument calibration.

B Calibration frequency output: the output of the real-time monitoring signal after correction according to the flow coefficient.

C Frequency output: the frequency after the conversion is output, and the frequency value is calculated linearly according to the 1000Hz output of the

full-degree flow.

D Pulse output: output converted pulse, the number of Pulse is calculated according to the cumulative flow of each calculation cycle divided by the pulse equivalent, the maximum of each calculation cycle is allowed to output only 1000 pulses, if the actual number of pulses in the calculation cycle is greater than 1000, the automatic accumulation to the next calculation cycle output; at the minimum, only 4 pulses are allowed to be output per cycle. if the actual number of pulses in the calculation period is less than 4 pulses, it will be automatically accumulated to the output of the next calculation cycle. the effective level of the output pulse is high. Note: the engineer should set the appropriate pulse equivalent factor according to the current applicable object.

E Upper limit alarm output:higher than the set alarm flow output, when the alarm output transistor leads to the ground is low level; when output transistor is cut off, the pull-up resistance makes the terminal high.

F Lower limit alarm output： lower than the set alarm flow output, when the alarm output transistor conduction to the ground is low level; when the output transistor is cut off, the pull-up resistance makes the terminal high.

2.2 Current output:

The current is linear from Iout output 4-20mA to GND, and the output range is [4-22.4]mA. when the instantaneous flow is less than or equal to the lower cut flow, or when the signal frequency is 0, the 4mA current is output. in other cases, the output current value is calculated linearly according to the cut flow output of 4mA and the full flow output of 20mA. if the calculated current value exceeds 22.4mA, the maximum output is 22.4mA.

2.3 Modbus communication function:

The transmitter supports communication with Modbus 4800 and 9600 baud rates. through the No.03 command of Modbus-RTU protocol (read and maintain register), the transmitter dynamically reads various parameters of real-time operation of the instrument, and the response time is within 50mS. Modbus continuous command interval minimum 100mS;

2.4 Operating environment:

Due to different ambient temperatures, the display response speed of LCD screen also changes. if the LCD refresh speed is too fast at low temperature, the display will not be clear. using the “ambient temperature” option in the engineer menu, set

and select the refresh speed of the LCD screen to refresh down to 8 seconds, which can be used at low temperature. -20℃

3. Wiring

Warning:
Before wiring,cut off the external power.Wiring with electric is strongly prohibit.

3.1 TB3WE Three-Wire System Electric Wiring

1.Main power supply and output signal terminals
(3-digit under-hang spinning terminals in the left).

Fout	-	+

“Fout”	Pulse Signal Output Terminal
“-”	is the power supply “-” or current flow terminal
“+”	is external 12-24VDC power “+”
When “+” “-” connect (or battery type power on),pulse output from “Fout”.	

2.Auxiliary Wire(small terminal)
The three-wire between main terminal and auxiliary terminal are pulse output switch.
If insert into the outside F0,there will be pulse output.
If insert into the inside NC,then no pulse output.
For two wire current type,only insert outside F0 while testing.
If use current,must insert inside NC to disconnect pulse output. Or else,the current will not be accuracy.

3.Battery Powered Type

+3V6	3V6-	B-	A+

1).Battery Wiring(the right side 1 and 2 in small terminal)

“+3V6”	Connect 3.6V battery “+”

“3V6-”	Connect 3.6V battery “-”

2)Communication Wiring
(the left side 3 and 4 in small terminal, if without RS485,no terminal here)

“B-”	Connect RS485 “B-”
“A+”	Connect RS485” A+”

3.2 TB2WE Two-Wire System Electric Wiring

1.Main power supply and output signal terminals

Fout	-	+

“-”	4-20mA output terminal
“+”	15-24V power “+” terminal

“+” Connect with +24V external power, current output from “-” to computer/sample resistance of the display. After flow through some load resistance like sample resistance,then back to power “-”.

2.Auxiliary Wire(3-digit small terminal)
4-20mA current output type with no auxiliary small terminals.
Fout: Pulse output terminal
When “+” “-” connect with external power then work,pulse output from “Fout”.
The three-wire near main terminal are pulse output switch.
If connect to the outside F0,there will be pulse output.
If connect to the inside,then no pulse output.
For two wire current type,only insert outside while testing.
If use current,must insert inside NC to disconnect pulse output. Or else,the current will not be accuracy.
This pulse is origin pulse without any modify,usually use while doing calibration; Output signal is the open-collector output include 2K7 pull-up resistor.

System wiring please refer to the appendix “TB3WE three wire” and “TB2WE Two

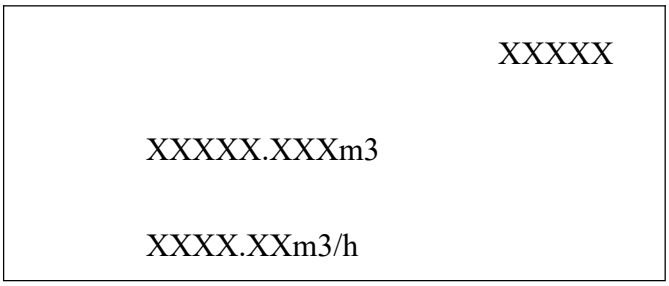
Wire".

4. Local LCD Operation Instruction

4.1 User Menu Operation

(1)Working Menu

After power-on,meter will be self-checking first,after then it will enter into LCD(figure 1)working display status.



The first line: High level of Accumulative flow; 5 fixed integer part number. If no,it'll display as "0".
The second line: Low level of Accumulative flow;3 decimals part number after the 5 fixed integer number. The unit is the same with instant flow non-time part.

The third line:Instantaneous Flow; 5 or 6 integers and automatic keep 2 or 1 decimals.
The unit can be set.

Press "<" or "+" to change the screen from Working Screen 1 and 2

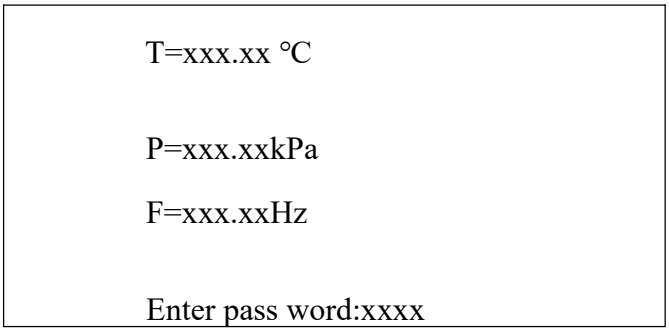


Chart 2 TB3WE Three-wire System working screen (Figure Two,Sub Screen)

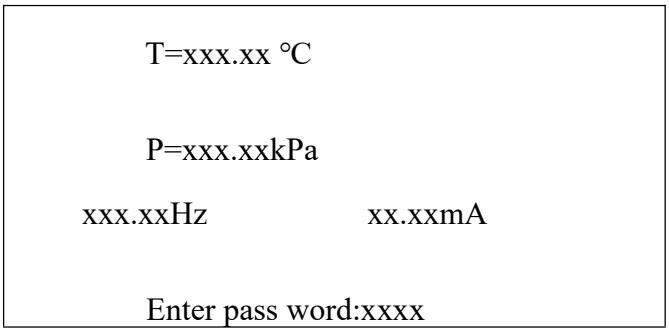


Chart 3 TB2WE Three-wire System working screen (Figure Two,Sub Screen)

From Up to Down:

The first line:Temperature value setting for temperature compensation calculation,shows"T≡999.9℃",reserving 1 decimal.

The second line:Pressure value setting for pressure compensation calculation,,shows"P≡99999.99kPa",reserving 2 decimals.

The third line:For TB3WE is frequency value.

For TB2WE is frequency value(left side) and current output(right side)

The four line:password entering set state.

Press the enter key of "<"(about 1.2seconds) to enter password initial input state.

Press the key of "+"(about

1.2seconds) to cancel entering state and return to figure two Subsidiary LCD.

Press "+"key in the input state to change the value of cursor circularly.

Press the shift key"<" to change the position of input cursor.

Press "<"key (about 1.2seconds) at the input state to submit the password.

If right,enter to menu.if incorrect,return to initial input state.

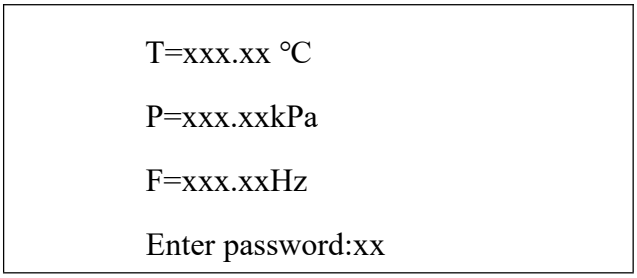


Chart 4 Password Initial Input State

Password:User menu password 2010

4.2 User's Data Setting

1.Input operation

In the input state:
Pree "+"key in a long time to exit the input state.
Pree "<"key to confirm and save the input.
Press "+"key in the input state to change the value or symbol of cursor circularly.
Press "<"key to move the current cursor one position towards the right.
Max.8 digits inputting is allowed.(including the symbol,decimal).

2.Menu Operation

In the menu browse:
Press "+" key for page down;
Press"<"key for page up;
Long Press"<"key for entering into the sub-menu;
Long press "+" key for returning to the working screen figure 2;

In the sub-menu,long press "+" key to quit out;long press "<"key to enter into modified state;In the modified state,press "+" key for downward selecting;press "<"for upward selecting;long press "<"key for confirmation and saving.

Attention:When the parameter setting,it should long press "<"key for saving the displaying.Otherwise,the setting is invalid.

User Parameter Setting Menu

Sub-menu Series#	Display of menu	Definition	Alternative options or range of value
1	Flow Unit select	Flow Unit select (default 0)	0：m^3/h　　1：m^3/m 2：l/h　　3：l/m 4：t/h　　5：t/m 6：kg/h　　7：kg/m
2	Algorithm Selection	Algorithm Selection （default 0）	00:Conventional Volume flow 01:Conventional mass flow 02:Volume flow of conventional gases 03:Mass flow of conventional gases

3	Flow Coefficient	Flow Coefficient (default 3600)	Set the meter coefficient with the unit of P/m3
4	Maximum Output Flow	Max. Flow (default 1000)	When the meter outputs 4~20mA analog signal, must set the value and the value cannot be zero,the unit should be accordance with the flow unit.
5	Density setting	Density setting (default 1.0)	When Algorithm Selection is setting to mass flow(01,03),it must set this item,the unit is kg/m^3
6	Temperature Setting	Temperature Setting (default 0.0)	Setting the temperature calculated value,when choose 02,03,04,06 algorithm,it must set this item,the unit is Celsius degree.
7	Absolute pressure setting	Gas Absolute pressure set （default 101.325）	Setting the absolute pressure of gas,when choose 02,03 algorithm,it must set this item,the unit is Kpa.(when vacuum is 0.0,it will cause the flow is 0)
8	Low flow cut off	Set percentage of resection pulse input (Default 1%)	The value is between 0~100
9	485 Address	Set RS485 communication No. (Default 1)	For three-wire system TB3WE only.The meter uses RS485 communication should set this item,and should not equal to other equipment in the same system,the range is 0~255.
10	Damping time	Set current output damping time (Default 4s)	Setting current and displaying damping time,it is for avoiding the current's fluctuation too big along with the flow rate.The range is 2~32.
11	Reset Cumulant	Reset cumulant	If need to Reset cumulant,choose YES and press "E" key.

5. Flowmeter Parameter Setting Menu

The flow meter menu includes four groups: user menu, engineer menu, product menu, and setting menu. among them, the engineer menu must be set by the operator with professional knowledge to set the menu content. the setup menu and product menu are set and calibrated by the factory when the flow meter goes the field. after leaving the factory, this type of parameter setting must bemodified under the condition of the corresponding equipment, otherwise it will cause the flow meter to measure errors or become invalid.
In the menu, press the right button few seconds to enter the parameter modification state of the selected item, if it is a numeric input type parameter, enter the number through the left button, and move the cursor position with the right button. after the input is completed long press the right button to confirm the input, and the transmitter will automatically update the setting parameters and store them. if the parameter is an option type, scroll up and down the option through left button or right button, after selecting the content long press the right button to confirm, the transmitter will automatically update the setting parameters and store them.

5.1 Enter the password "22" in the user menu to enter the user menu. the functions and parameters of each menu are as follows

Number	The name of the menu	Functional specifications
1	Q Unit m3/h	Set the instantaneous flow unit and select it according to the type of flow algorithm Optional: volume: m3/h; m3/m; L/h; L/m;SG/h; SG/m Quality: t/h; t/m;Kg/h;Kg/m;lb/h;lb/m
2	Q Mode Qvw actual	The flow algorithm is set and the meter compensates the instantaneous flow according to the algorithm Optional: Qvw actual: Conventional volume flow (flow rate in liquid conditions) Qm: Conventional mass flow (operating condition density must be set) Special Mode: (for user customization)

3	K Factor default is 3600.0	The flow meter coefficient required when calculating the flow rate. the unit is P/m3, (pulse/square)
4	Density [kg/m3] default is 1000.0	Suppose the density value of the fluid, unit kg/m3(0 is not allowed)
5	20mA default is 1000.0	Set the instantaneous flow corresponding to the 20mA current output (not allowed to be set to 0). the units are the same as those selected flow unit.
6	Q cut-Zero default is 0.0%	Set the percentage of full-scale flow occupied by the cut-off flow. when the measured flow rate is lower than this percentage value, the calculated flow rate will be 0 and a 4mA current will be output.
7	Q Up Al m3/h default is 990.0	Set the upper limit of alarm flow threshold, when the flow is higher than this value, the output alarm. The unit is the same as the selected unit.
8	Q Dn Al m3/h default is 10.0	Set the lower limit of alarm flow threshold, when the flow is lower than this value, the output alarm. the unit is the same as the selected unit.
9	Damp S [S] default is 4	Value of 2~32 seconds for display and current output smoothing. the default value is: 4 seconds
10	Comm Address default is 0	Set the device address of the Modbus RTU RS485. the default value of range 0-254, the default setting is 0.
11	Clear Q Enter	Clear the accumulative amount to 0, and the password is: “70”

5.2 Engineer Menu:

Password input state, enter “33” password to enter the engineer menu. the function and parameter meanings of each menu are as follows:

Number	The name of the	Functional specifications
1	Language ENGLISH	Set the instrument language type Optional: Chinese; English
2	Pulse Type F_bas	Select the output type according to the requirements, each output detail key main interface explanation. Optional: F_bas: The signal frequency of the measuring sensor (unmodified) F_adj: Frequency output after correction by 5 point coefficient F_out: Output linear frequency of 0-1000Hz accordin to flow range Pulse: Accumulates the pulse with output flow of selected pulse factor H-AL: Press the upper limit of alarm to output the signal of alarm switch L-AL: Press lower limit to output alarm switch signal
3	Pulse Factor default is 0.01	Valid only for equivalent pulse outputs, meaning how many cumulative flow units per pulse represents Optional: 0.00001; 0.0001; 0.001; 0.01; 0.1; 1.0; 10.0; 100.0
4	Comm Param default is 9600,No	Modbus RTU RS485 baud rate. Optional: 4800 Odd; 4800 Even; 4800 No; 9600 Odd; 9600 Even; 9600 No;
5	Comm. Switch default is on	Set whether Modbus communication function is enabled. Optional: OFF; ON

6	P_display default is OFF	Sets whether the fluid pressure is displayed. Optional: Measure: shows the pressure value by the measured pressure signal Deft: "P≡" displays the value of the default pressure item set in the following menu and is used for calculation Calculate: "P≈" shows the pressure of the calculated value Off: no pressure item is displayed
7	P0-Ref P0=[kPa] default is 101.32	Set the pressure value at the reference end, which is used for the high-altitude correction when the gauge pressure sensor calculates the absolute pressure. The absolute pressure sensor should be set to 0.0KPa
8	Tn [℃] default is 0.0℃	Set the calculation value of the standard temperature. Optional: 0℃; 20℃
9	Environ-T default is -10℃	For different environments to select the LCD refresh rate. Optional: -10℃: when "-10℃" is selected in normal environment the working interface will refresh every 1.2 seconds -20℃: when the low temperature environment is set "-20℃", the working interface will refresh every 6 seconds
10	Flow correction factor, default C is 1.00	Flow percentage Qi range 0~120%; flow coefficient Ci range 0.8~1.2 (Ci= standard flow/measured flow) Note: 5 point correction, when making the traffic correction each percentage point increases, and can only occur once, Ci default to 1.0

Table 1 Function Description of Engineer Menu

5.3 Modbus Communication

According to MODBUS-RTU communication protocol, the three-wire transmitter can quickly read the operation parameters in the maintenance register. the Modbus command that reads and maintains the register value is command No.03. Only 4800 and 9600 baud rates are supported, and the response time is within 50mS. Modbus continuous command interval minimum 100 mS.

Table 2 is the offset address and data format of each value in the Modbus

Address Offset	Action Object	Data Format	The Number of Data Bytes
0	The instantaneous flow	Floating point type	4
4	Flow at working condition	Floating point type	4
8	Accumulator low	Integer type	4
12	Accumulator high	Integer type	4
16	Fluid temperature	Floating point type	4
20	Fluid pressure	Floating point type	4
24	Measure frequency	Floating point type	4
28	Output current	Floating point type	4
32	Instantaneous flow unit code	Short integer type	2

Table 2 Modbus Read Hold register Command Resolution

As for the cumulant, the cumulant consists of high and low parts. the low part of the cumulant is a fixed-point integer. after the data is converted to base 10, the high part of the cumulant is the integer value of the cumulant divided by the quotient of 1000,000. the calculation formula is:

Cumulant (floating point) = high cumulant (integer) * 1000000.0 + low cumulant

(integer) / 1000.0
The accumulative flow unit is the instantaneous flow unit.
For the flow unit code, the flow unit is the physical unit obtained by the flow unit code value with 0-7 or 0-11.
For details of Modbus command and message format, please refer to protocol specification such as Modbus white paper.

5.4 FAQ

5.4.1 Flow correction coefficient and flow coefficient correction:

Flow correction coefficient is in the flow calculation according to the basic formula to calculate the working condition of the flow by the flow correction coefficient to calculate the correction. the correction coefficient is usually set as the percentage of the target relative to the full-degree flow. correction coefficient C= standard flow/measured flow value without correction. the points are interpolated linearly. without correction, C=1, and the correction value is limited to the range of 0.8-1.2. Only for flow and linear frequency and current.
Flow coefficient correction is the linear correction calculation of flow meter coefficient. the correction usually first sets the average instrument coefficient K in the user menu, and then sets the frequency point to the calibration frequency of the instrument according to the standard fixed point. input the flow coefficient of the corresponding frequency point. the points are normalized to the average instrument coefficient by linear interpolation. set “off” when not corrected. effective for correction of frequency and flow and linear frequency and current.

5.4.2 Pulse output type and usage:

The signal pulse in the pulse output type is to track the output of the original signal pulse and is usually used for initial calibration. the correction frequency is the corrected signal frequency output linearly corrected according to the flow coefficient. the linear frequency output of 0-1000hz is the output frequency corresponding to the instantaneous flow rate, and the output frequency is 1000Hz at the full flow rate. the correction coefficient C value linear correction and compensation calculation are effective for the frequency output, which is usually used to measure the computer channel of frequency input. the pulse output is calculated according to the cumulative flow, and there are maximum and minimum limits on the output value of each calculation period.

5.4.3 Pulse equivalent:

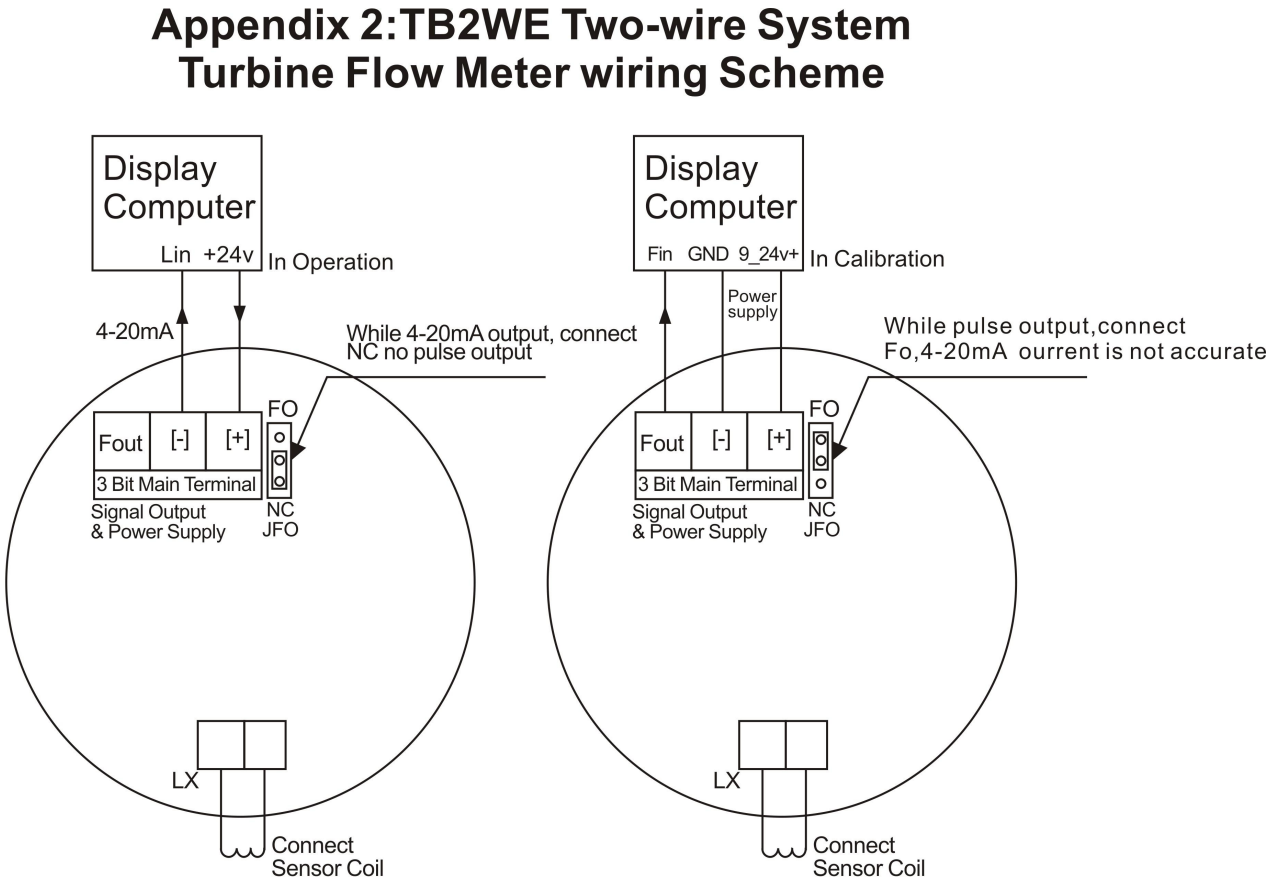
The pulse equivalent is the output factor and its value is the flow unit/pulse. that is, how many units of flow does each pulse represent? Its value must be kept within

1000 pulses per measurement period.

5.4.4 Selection of ambient temperature:
Due to the LCD screen responds slowly at low temperatures, it can't be seen clearly, so when the environment is lower -10℃, you can choose -20℃ to make the screen update about 6 seconds, so that the low temperature can see the data. at higher -10℃ you can optionally -10℃ restore the display to the normal update interval of 2 seconds.

5.4.5 Calibration of output current:
For the calibration of output current, the standard ammeter shall be connected to the current circuit in series. after the corresponding mA item is confirmed by pressing the “E” key, the current output of approximate value shall be obtained. at this time, the calibration shall be completed after the actual display value of ammeter is input and confirmed. 4/12/20 Usually three calibration points should be carried out each time.

6. Wiring Diagram



Appendix 3:TB3WE Three-wire System Turbine Flow Meter wiring Scheme