EPR5 Paddle Wheel Flow Meter Operation Manual

FineTek Co.,Ltd.

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08-EPR5-B0-CM,07/20/2023

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1. Operation manual use

- Thank you for purchasing this FineTek product. This operation manual describes the product features, operating principle, operation and maintenance methods, as well as precautionary measures that should be taken during the installation, operation or maintenance of this product. This manual is designed to prevent dangerous situations that can result in damage to the product or injury to an installer or operator.
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- Please read this operation manual completely and carefully before installing the product.
- Please contact FineTek if this operation manual does not answer your questions.
- The content of this operation manual may be updated from time to time. Updates are maintained on the FineTek website www.fine-tek.comfor your easy access.
- Do not disassemble or attempt to repair the product as this will void the product warranty.Please return the product to FineTek for repair and calibration if required.
- This manual may utilize warning symbols. An explanation of these symbols is as follows:
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Danger→this symbol indicates an incorrect operation will result in major accidents and death.

Note→this symbol an incorrect operation will result in injury to personnel and some damage to the product.

Electric shock→this symbol warns of a possible electric shock hazard.

Fire→this symbol warns of a possible fire hazard.

Prohibited→this symbol indicates the action is prohibited.

2. Product warranty

2.1 New product warranty

- Each FineTek EPR1 series paddlewheel flowmeter is backed by 1-year limited warranty. Should you experience a problem with one of our products deemed by our factory to be a product failure covered by our warranty, for a period of 1-yearfrom the delivery date we will repair the unit at our factory or provide you with a replacement unit or sub-assembly at our discretion. A return authorization number must be obtained from FineTek before returning any unit.
- If the EPR1 product failed to operate out-of-the-box, and this failure was not due to transportation, handling or incorrect Installation, then you can request a replacement unit within 7 days from the delivery date.
- When returning a product to the factory, return the entire device and do not disassemble the unit as previously mentioned. In addition, wherever possible please returning the device please ensure it is packed to avoid damage during transportation.
- The EPR1 product is designed for general use. Special applications, extraordinary use and overloading or operating beyond published specifications may void the warranty.
- The product is not warranted in the following situations or conditions, therefore charges will result for repair of product:
  - The product is beyond its warranty term.
  - The defect or damage to the product is caused by the incorrect operation or by not following the installation and operation instructions contained within the operation manual.
  - The product damage is a result of force majeure factors, including but not limited to natural disasters, floods, fires, earthquakes, lightning, severe weather conditions such as hurricanes, typhoons, tornadoes etc., human error such as use of improper voltage, high-humidity, water leakage, stains, corrosion, loss, improper storage etc. and other abnormal factors.
  - The damage is caused by installation, addition, expansion, modification and repair of parts not authorized specifically or certified by FineTek.
  - If the data label information on the product is incorrect or unclear so as to not be able to read or confirm the product serial number.

2.2 Repair warranty

Repaired product is warranted for 6 months from the delivery date. The warranty is limited to the part(s) replaced or repaired during the repair. If the repaired or replaced part is defective within this term the same part(s) will be repaired or replaced free of charge.

2.3 Service Network

Company	Address	Telephon	Fax
Taipei Headquarters (Taiwan)	No.16, Tzuchiang St., Tucheng Industrial Park, New Taipei City 23678	+886 2 2269 6789	+886 2 2268 6682
Taichung Sales office (Taiwan)		+886 4 2465 2820	+886 4 2463 9926
Kaohsiung Sales office (Taiwan)		+886 7 333 6968	+886 7 536 8758
Fine automation Co., Ltd. (China)	No. 451, Duhui Road, Zhuanqiao Township, Minhang District, Shanghai City 201109	+86 021 64907260	+86 021 6490 7276
Aplus FineTek (Sensor Inc.)	355 S. Lemon Ave, Suite D, Walnut, CA 91789	1 909 598 2488	1 909 598 3188
FineTek Pte Ltd. (Singapore Branch)	37 Kaki Bukit Place, Level 4 Singapore 416215	+65 6452 6340	+65 6734 1878
FineTek GmbH (Germany Branch)	Bei den Kämpen 26 21220 Seevetal-Ramelsloh, Germany	+49 (0) 4185 8083 12	+49 (0) 4185 8083 80
FineTek Co., Ltd. (Indonesia Branch)	PERGUDANGAN TUNAS BITUNG JL. Raya Serang KM. 13,8, Blok C3 No. 12&15, Bitung Cikupa, Tangerang 15710	+62 (21) 2923 1688	+62 (21) 2923 1988

3. Product description

3.1 Data label

The data label includes the following information: product model type, power supply voltage, output type, operation temperature/pressure and other specifications.

3.2 Contents of factory shipping carton

Verify and inspect the contents you have received to ensure it is what you ordered/requested.

A. Product (Paddle wheel flow meter)
B. M12, 8Pin electrical cable (With display)
C. Operation manual

3.3 Product introduction

The principle of operation of the paddlewheel flowmeter uses the paddlewheel blades rotation to measure the flow velocity, based on which the flowrate is calculated. The ERP5 paddlewheel flowmeter consists of the flow sensor/transmitter and the T fitting pipe. With its compact design, the unit is very easy to install. The sensor "K value" is determined during upon factory calibration with an accuracy of 3%. The paddlewheel flowmeter will provide good linearity within the units rated velocity range of 0.3~10 m/s (1.0~32 ft/s) at Plastic Blade or 0.5~8 m/s (1.6~26 ft/s) at Stainless Blade. The EPR1 paddlewheel flowmeter is available with or without a local display. The EPR1 with local display has built in memory to store the accumulated or totalized flow data so an operator or user may conveniently read this data.

3.4 Product applications

The Paddle Wheel Flow Meter is applicable to neutral or corrosive liquids that are non-granular or non-viscous. It connects with an analog output and pulse output signal to form a monitoring system, which can display instantaneous flow and accumulated flow. Moreover, it can form a control circuit to adjust the valve or operate the switch.

The ERP5 can be used in a variety of industries; food and beverage, water treatment, pharmaceutical, dyeing, chemicals, semi-conductor and PCB wet process control.

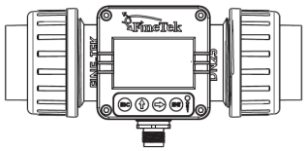
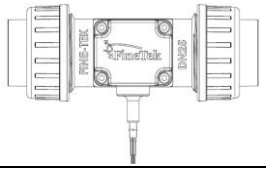
※The detected medium must not contain any iron filings, particles which will attached the rotary paddle wheel and affect the accuracy and also cause damage. If there is possibility to have iron filings, particles in the process or pump operation, please install the magnet scree n filters (please consider the Pressure loss) on upstream side for the minimum distance 15 times of pipe diameter.

3.5 Product features

a. Microprocessor-controlled, with complete functions that are easy to operate.
b. Analog signal 4-20mA current output or 0-5V voltage output
c. With communication interface RS485.
d. Analog output range increased by 10%: 4-21.6mA.
e. Simulation test output: 0-24mA.
f. Pulse wave output: 2 sets of NPN transistor output.
g. Simulation frequency output: 0-300Hz.
h. LCM display (Graphic 128x64 Dots).
i. Display has built-in cumulative flow FRAM flash memory.
j. Quick release design between display and sensor.
k. LED to indicate the alarm status.
l. Analog output flow rate and flow rate filtering setting: 0-400 segments.
m. LED display backlight with three modes: ON/OFF/ACTIVE operations.
n. Parameter settings (K factor, pipe diameter, device ID, baud rate).
o. Supports Traditional Chinese, Simplified Chinese, English, etc.

3.6 Types & specifications

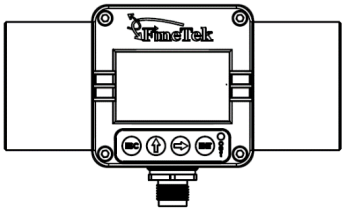
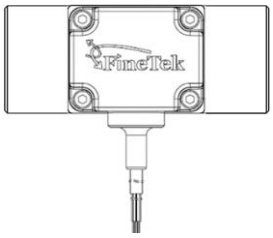
PVCPipe material & PP Blade

Model Type		
Specification	With display type	Without display type
Applicable pipe diameter	DN15、DN20、DN25、DN40、DN50	
Pipe material	PVC	
Flow rate range	0.3~10m/s	
Accuracy	Under standard K Factor ±3% F.S. (Flow velocity 6~10m/s reach ±0.5%)	
Repeatability	±0.4%	
Measurement principle	Magnetic sensing	
Viscosity range	300 cSt, max.	
Impurity range	Must be nonmagnetic, 1%，max.(Size of particles 0.5mm max.)	
Process temp.	-15℃~60℃ (5℉~140℉)	
Ambient humidity	＜80%, no-condensation	
Installation method	Transmitter +T-fitting	
Process pressure	10bar, max.	
IP rating	IP66, the connector shall be inserted and fastened.	IP65
Analog output	4~20mA (150Ω max.) or 0~5V (10KΩ min.)	
Pulse output	NPN Pulse output*2 /32Vdc Max	NPN Pulse output*1 /32Vdc Max
Frequency range	0~300Hz	N/A
Display	LCM，128*64，Back-light	N/A
Power supply voltage	10~32Vdc	
Power consumption	＜1.5VA	
Communication port	RS485, Modbus(Optional)	N/A
Accumulated flow storage device	16K, FRAM	NO

※1st NPN Pulse Output - Rotor Pulse Output

※2nd NPN Pulse Output - You can choose between "Unit Flow Pulse Output," "Accumulated Flow Alarm Output," or "Flow Rate Alarm Output."

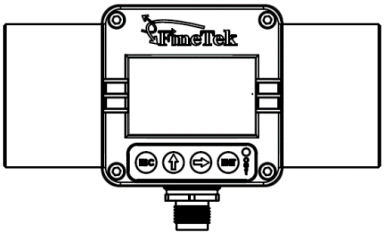
SUS Pipe material & PVDF Blade

Model Type		
Specification	With display type	Without display type
Applicable pipe diameter	DN20、DN25、DN40、DN50	
Pipe material	SUS304、SUS316、SUS316L	
Flow rate range	0.3~10 m/s	
Accuracy	Under standard K Factor ±3% F.S. (Flow velocity 6~10m/s reach ±0.5%)	
Repeatability	±0.4%	
Measurement principle	Magnetic sensing	
Viscosity range	300 cSt，max.	
Impurity range	Must be nonmagnetic, 1%，max.(Size of particles 0.5mm max.)	
Process temp.	-15 ˚C ~100 ˚C (5 ˚F ~212 ˚F)	
Ambient humidity	＜80%，no-condensation	
Installation method	Transmitter +T-fitting	
Process pressure	10 Bar，max.	
IP rating	IP66, the connector shall be inserted and fastened.	IP65
Analog output	4~20mA (150Ω max.) or 0~5V (10KΩ min.)	
Pulse output	NPN Pulse output*2 / 32Vdc Max	NPN Pulse output*1 / 32Vdc Max
Frequency range	0~300Hz	N/A
Display	LCM,128*64, Back-light	N/A
Power supply voltage	12~36Vdc	
Power consumption	＜1.5VA	
Communication port	RS485,Modbus(Optioned)	N/A
Accumulated flow storage device	16K,FRAM	NO

※1st NPN Pulse Output - Rotor Pulse Output

※2nd NPN Pulse Output - You can choose between "Unit Flow Pulse Output," "Accumulated Flow Alarm Output," or "Flow Rate Alarm Output."

SUS Pipe material & SUS316 Blade

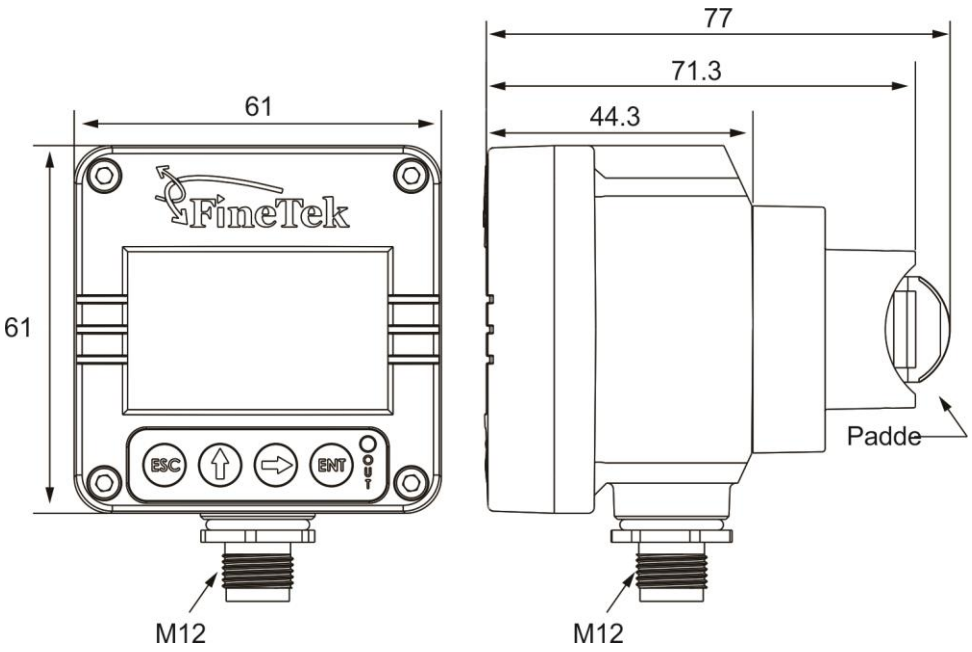
Model Type	
Specification	With display type
Applicable pipe diameter	DN25、DN40
Pipe material	SUS304、SUS316、SUS316L
Flow rate range	0.5~8 m/s
Accuracy	Under standard K Factor ±3% F.S.
Repeatability	±0.4%
Measurement principle	Magnetic sensing
Viscosity range	300 cSt，max.
Impurity range	Must be nonmagnetic, 1%，max.(Size of particles 0.5mm max.)
Process temp.	-15˚C ~100˚C (5˚F ~212˚F)
Ambient humidity	＜80%，no-condensation
Installation method	Transmitter + T-fitting
Process pressure	10 Bar，max.
IP rating	IP66，the connector shall be inserted and fastened.
Analog output	4~20mA (150Ω max.) or 0~5V (10KΩ min.)
Pulse output	NPN Pulse output*2 / 32Vdc Max
Frequency range	0~300Hz
Display	LCM,128*64, Back-light
Power supply voltage	10~32Vdc
Power consumption	＜1.5VA
Communication port	RS485, Modbus(Optioned)
Accumulated flow storage device	16K, FRAM

※1st NPN Pulse Output - Rotor Pulse Output

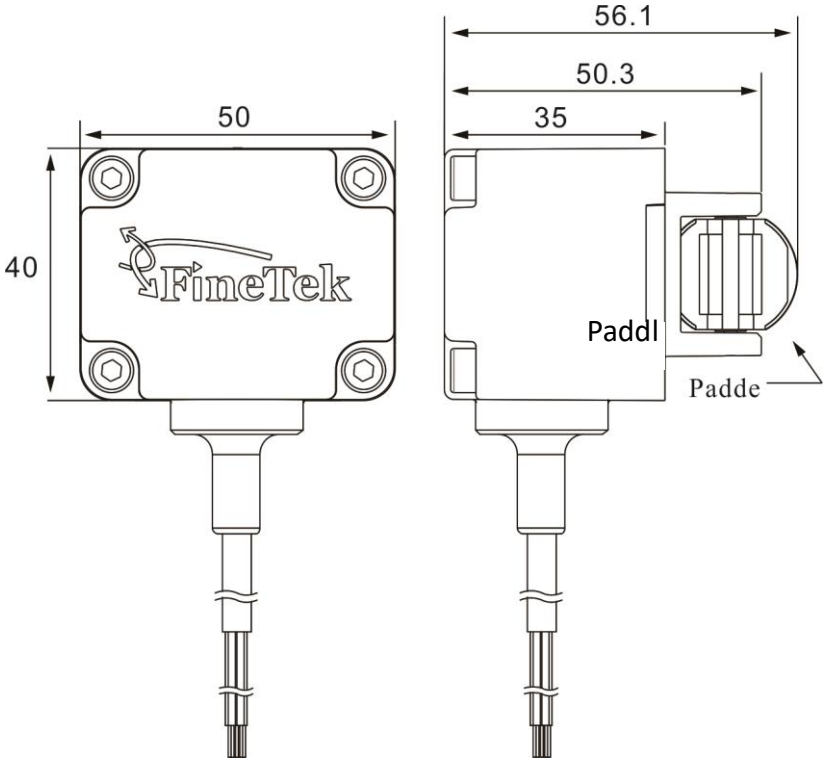
※2nd NPN Pulse Output - You can choose between "Unit Flow Pulse Output," "Accumulated Flow Alarm Output," or "Flow Rate Alarm Output."

4. Dimensions

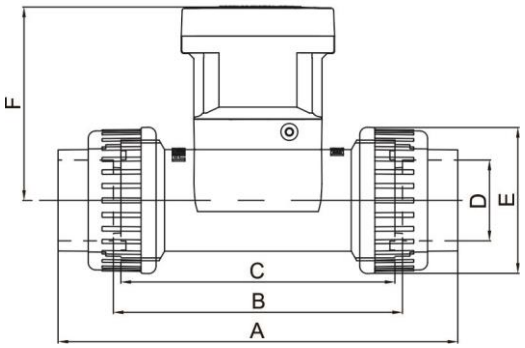
With display



Without display

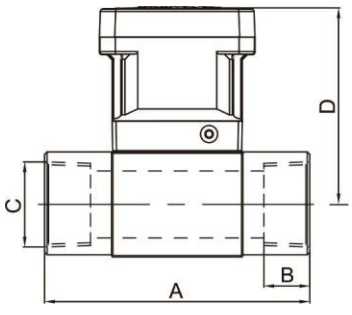


4.1 With Display (Engineering Plastics)



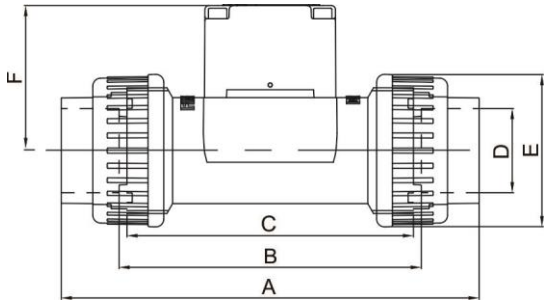
Diameter-DN (mm)	Pipe standards	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
15	DIN/ISO ASTM JIS	128	96	90	20 21.3 18.4	43	79.1
20	DIN/ISO ASTM JIS CNS.4053-1	144	106	100	25 26.7 26.45 26	53	76.3
25	DIN/ISO ASTM JIS	159.00	115.00	109.00	32.00 33.40 32.55	58.00	77
40	DIN/ISO ASTM JIS	189.00	125.00	119.00	50.00 48.30 48.70	83.00	83.9
50	DIN/ISO ASTM JIS CNS.4053-1	216	140	130	63 60.3 60.8 60	103	90

With Display (Stainless Steel)



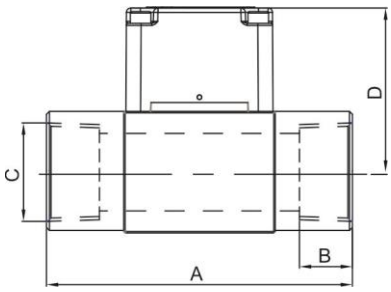
Diameter-DN (mm)	A (mm)	B (mm)	C (mm)	D (mm)
20	94	17 18.3 18.3	PF 3/4” PT 3/4” NPT 3/4”	77
25	104	23 18 18	PF 1” PT 1” NPT 1”	77
40	129	23 22 22	PF 1-1/2” PT 1-1/2” NPT 1-1/2”	83.4
50	148.5	27.5 24 24	PF 2” PT 2” NPT 2”	90

4.2 Without Display (Engineering Plastics)



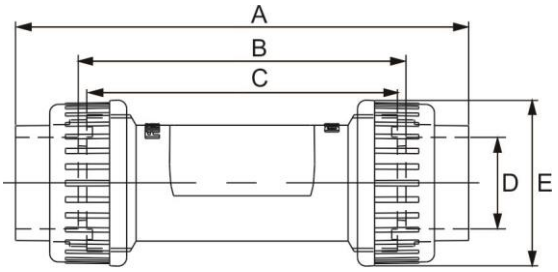
Diameter-DN (mm)	Pipe standards	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
15	DIN/ISO ASTM JIS	128	96	90	20 21.3 18.4	43	48.4
20	DIN/ISO ASTM JIS CNS.4053-1	144	106	100	25 26.7 26.45 26	53	54.8
25	DIN/ISO ASTM JIS	159.00	115.00	109.00	32.00 33.40 32.55	58.00	55.20
40	DIN/ISO ASTM JIS	189.00	125.00	119.00	50.00 48.30 48.70	83.00	62.00
50	DIN/ISO ASTM JIS CNS.4053-1	216	140	130	63 60.3 60.8 60	103	68.5

Without Display (Stainless Steel)



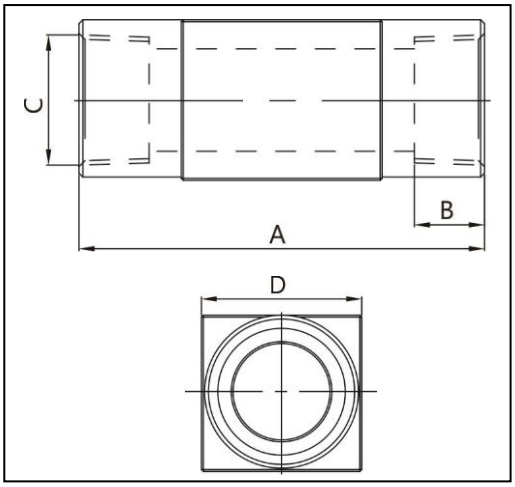
Diameter-DN (mm)	A (mm)	B (mm)	C (mm)	D (mm)
20	94	17 18.3 18.3	PF 3/4” PT 3/4” NPT 3/4”	55
25	104	23 18 18	PF 1” PT 1” NPT 1”	55.6
40	129	23 22 22	PF 1-1/2” PT 1-1/2” NPT 1-1/2”	62
50	148.5	27.5 24 24	PF 2” PT 2 NPT 2”	69

4.3 T-fitting (Engineering Plastics)



Diameter-DN (mm)	Pipe standards	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
15	DIN/ISO ASTM JIS	128	96	90	20 21.3 18.4	43
20	DIN/ISO ASTM JIS CNS.4053-1	144	106	100	25 26.7 26.45 26	53
25	DIN/ISO ASTM JIS	159.00	115.00	109.00	32.00 33.40 32.55	58.00
40	DIN/ISO ASTM JIS	189.00	125.00	119.00	50.00 48.30 48.70	83.00
50	DIN/ISO ASTM JIS CNS.4053-1	216	140	130	63 60.3 60.8 60	103

T-fitting (Stainless Steel)



Diameter-DN (mm)	A (mm)	B (mm)	C (mm)	D (mm)
20	94	17 18.3 18.3	PF 3/4” PT 3/4” NPT 3/4”	42
25	104	23 18 18	PF 1” PT 1” NPT 1”	55.6
40	129	23 22 22	PF 1-1/2” PT 1-1/2” NPT 1-1/2”	62
50	148.5	27.5 24 24	PF 2” PT 2 NPT 2”	72

4.4 Technical Parameter

Selecting Flow And Pipe Diameter

■ **Plastic Blade**

Material	Pipe diameter (mm)	Flow Range (m^3/h)	
		Flow velocity 0.3m/s (min)	Flow velocity 10m/s (max)
PVC Pipe material & PP Blade	15	0.19	6.36
	20	0.34	11.31
	25	0.53	17.67
	40	1.35	45.23
	50	2.12	70.68
SUS Pipe material & PVDF Blade	20	0.34	11.31
	25	0.53	17.67
	40	1.35	45.23
	50	2.12	70.68

■ **Stainless Blade**

Material	Pipe diameter (mm)	Flow Range (m^3/h)	
		Flow velocity 0.5m/s (min)	Flow velocity 8m/s (max)
SUS Pipe material & SUS316 Blade	25	0.89	14.13
	40	2.27	36.18

Relationship Between k Value And Fitting Diameter：

With Display

Material	Connection & Standard Type	K Factor (Pulse/Liter)				
		DN15	DN20	DN25	DN40	DN50
PVC Pipe material & PP Blade	DIN / ISO	114.8	74.5	50.5	16.85	9.7
	ASTM	114.8	74.5	50.5	16.85	9.7
	JIS	114.8	74.5	50.5	16.85	9.7
	CNS 4053-1	---	74.5	---	---	9.7
SUS Pipe material & PVDF Blade	Thread PF	114.8	74.5	50.5	16.85	9.7
	Thread PT	114.8	74.5	50.5	16.85	9.7
	Thread NPT	114.8	74.5	50.5	16.85	9.7
SUS Pipe material & SUS316 Blade	Thread PF	---	---	58	16.25	8.8
	Thread PT	---	---	58	16.25	8.8
	Thread NPT	---	---	58	16.25	8.8

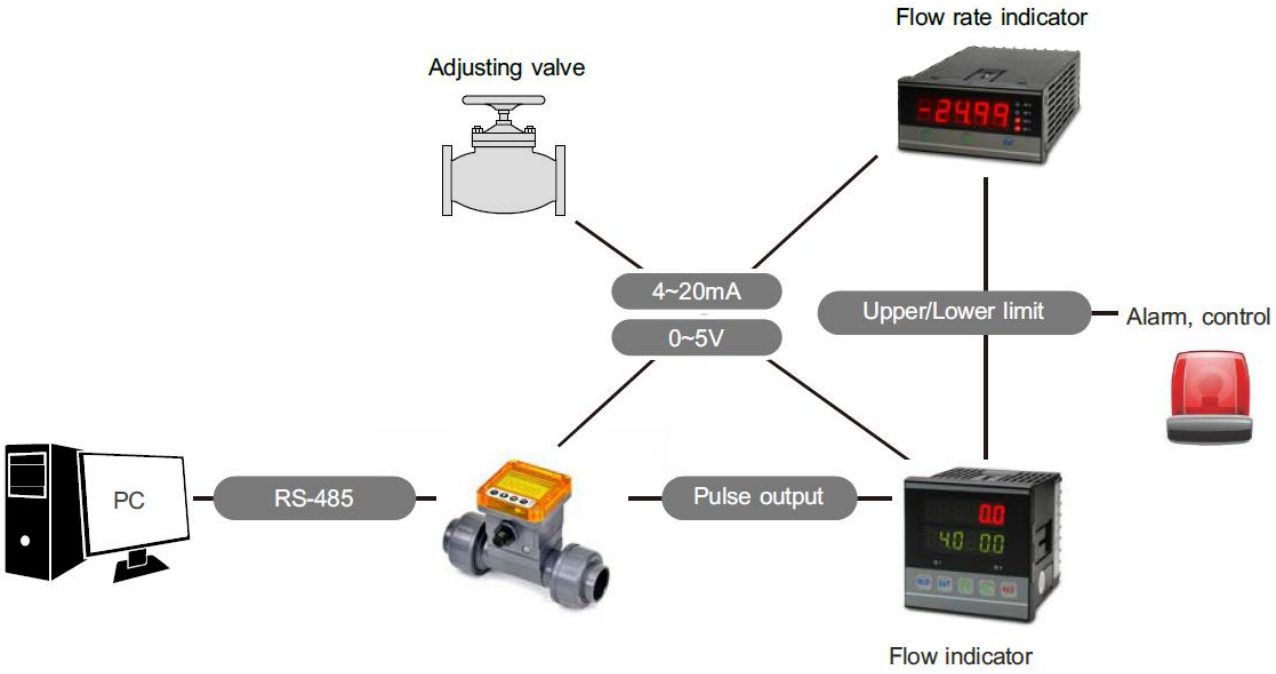
※ US: GL (Gallon) K factor = Pulse/Liter × 3.785; UK: GL (Gallon) K factor = Pulse/Liter × 4.546.

Without Display

Material	Connection & Standard Type	K Factor (Pulse/Liter)				
		DN15	DN20	DN25	DN40	DN50
PVC Pipe material & PP Blade	DIN / ISO	105.8	60.5	35.4	11.05	6.84
	ASTM	105.8	60.5	35.4	11.05	6.84
	JIS	105.8	60.5	35.4	11.05	6.84
	CNS 4053-1	---	60.5	---	---	6.84
SUS Pipe material & PVDF Blade	Thread PF	105.8	60.5	35.4	11.05	6.84
	Thread PT	105.8	60.5	35.4	11.05	6.84
	Thread NPT	105.8	60.5	35.4	11.05	6.84

※ US: GL (Gallon) K factor = Pulse/Liter × 3.785; UK: GL (Gallon) K factor = Pulse/Liter × 4.546.

■ Control System Diagram



4.5 Assembly Instructions

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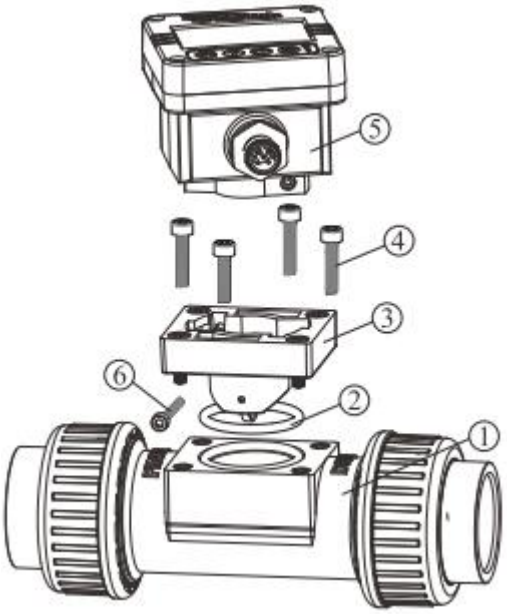
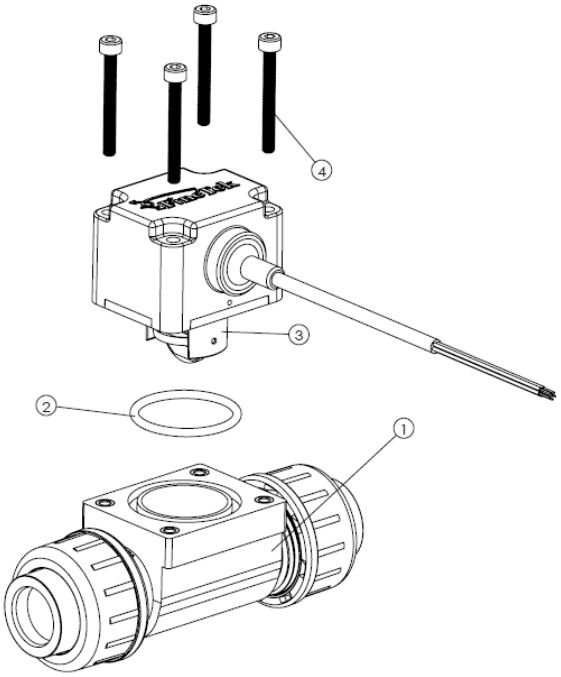
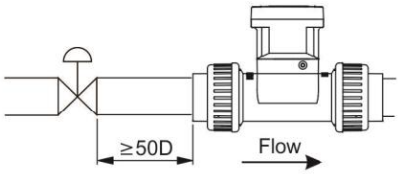
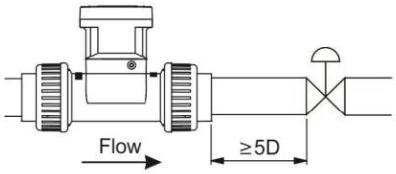
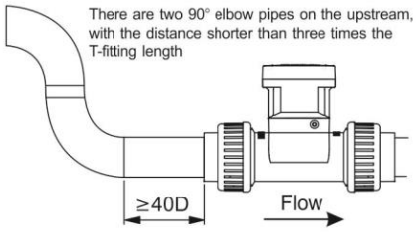
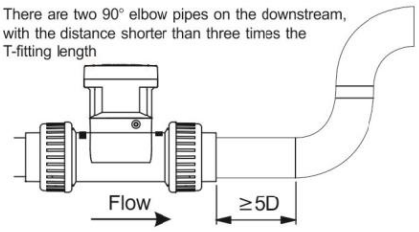
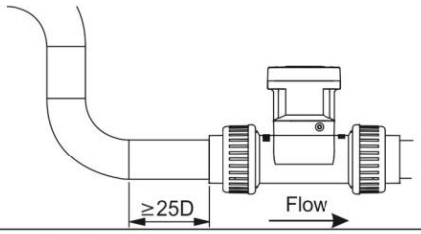
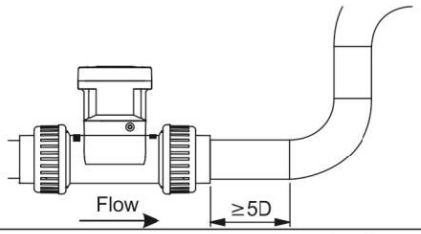
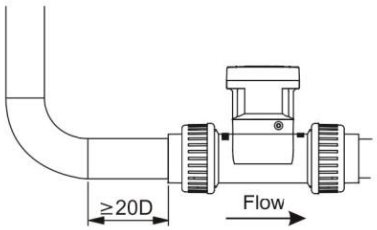
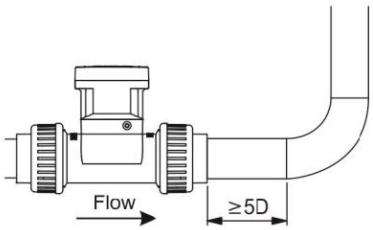
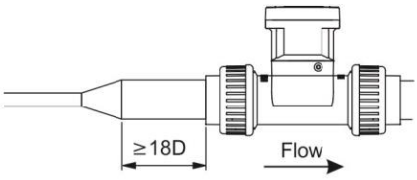
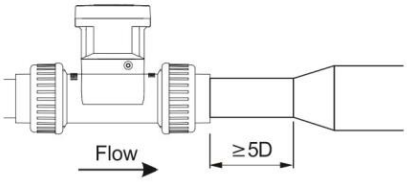
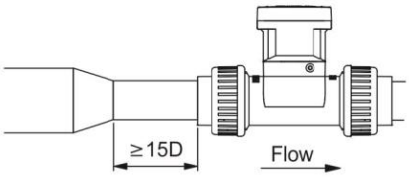
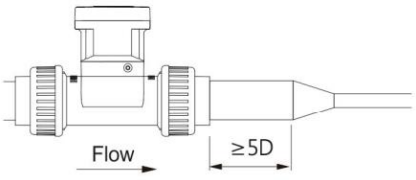
 
</td>
<td>1. Flow meter T-fitting.
2. Install the O-ring into the sealing groove and let it expand naturally.
3. Pass the film seat, facing downward, through the hole and the O-ring.
4. Install the screw X4; fasten them evenly and flatly.
*Locking torque:
Plastic blade = 8~10kgf-cm (0.784~0.98N.m)
SUS blade = 10~12kgf-cm (0.98~1.176N.m)
5. Point the M12 joint of the display towards yourself and insert into the recess at the precise angle. Attach flatly and turn clockwise till the edges are aligned.
6. Fasten 1 positioning screw and tighten it.
* Locking torque = 6~8kgf-cm (0.588~0.784N.m)
*Note: Perform Steps 1~6 for installation of the entire machine. If only the meter head is installed, please perform Steps 5 and 6.
Please install the screw locking torque in accordance with the prescribed range.</td>
</tr>
<tr>
<td>Without Display
 
</td>
<td>1. Flowmeter T-tube.
2. Install the O-ring into the sealing groove and let it expand naturally.
3. Pass the transmitter blade, facing downwards, through the hole and the O-ring and attach it flatly and in alignment.
4. Install 4x screws; fasten them evenly and flatly.
*Locking torque:
Plastic blade = 8~10kgf-cm (0.784~0.98N.m)
SUS blade = 10~12kgf-cm (0.98~1.176N.m)
*Note: Please install the screw locking torque in accordance with the prescribed range.</td>
</tr>
</table>

4.6 Troubleshooting

Error	Inspection	Solution
The pipe has fluidic while the display value hasn't changed	Please check if the blade is stuck by debris	Display Type: Please remove the one screws on the side of Fig. 6 above; then please counterclockwise remove the display of Fig. 5, and then loosen the four screws of Fig. 4 to clean the body blade of Fig. 3. Non-display Type: The body blade of Fig. 3 can be removed and cleaned by loosening the four screws of Fig. 4. (When cleaning the blade, a small brush adding some water for cleaning is recommended.)
Inaccurate measurement	Please check the parameters	Please check if the setting parameters and K value have been changed, and check if the flow display unit is correct.
No display or no signal	Please check the power supply and connector	Please check if the input power is DC10~32V and the quick connector is locked properly. If the above steps are executed, but problems cannot be solved, please contact the sales representative

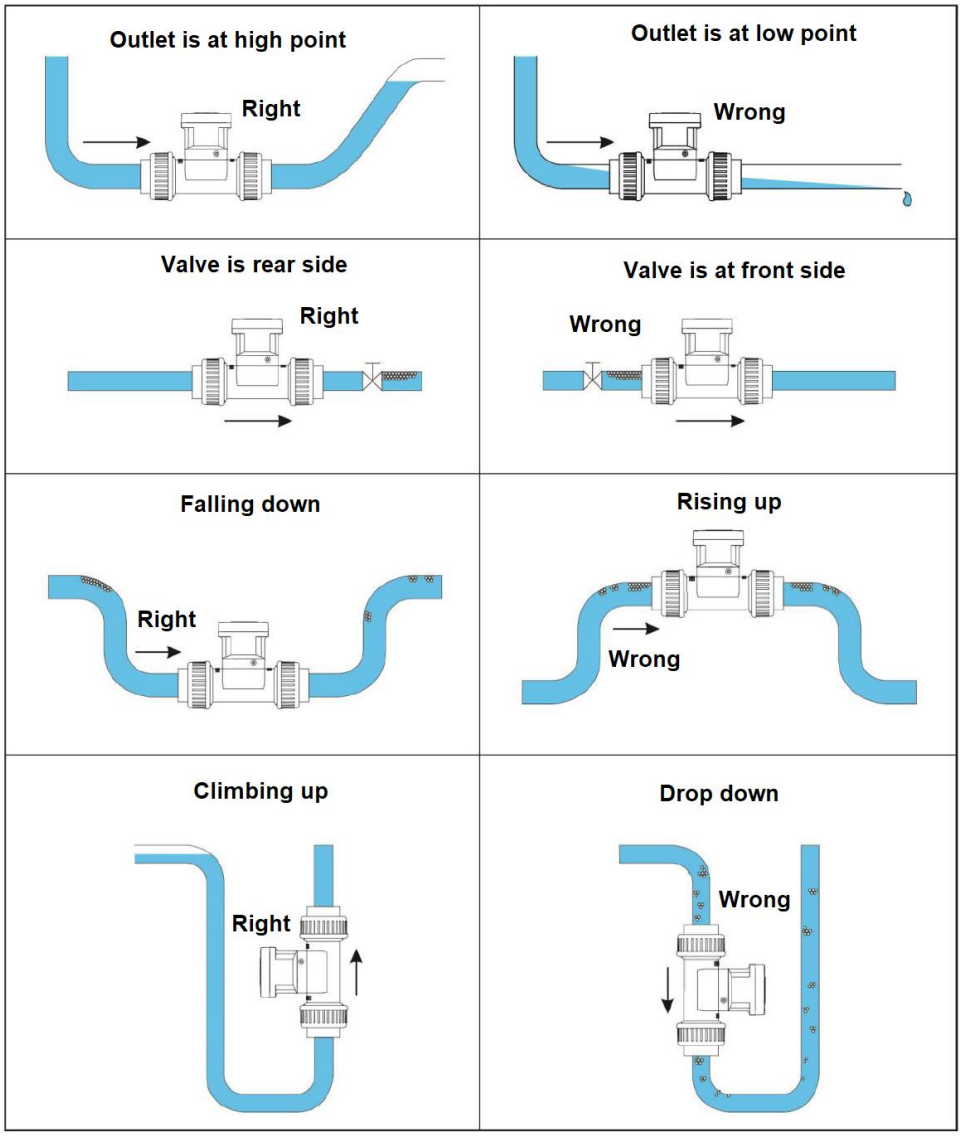
4.7 Mounting location

- The straight pipe must be long enough on the upstream side and downstream side where the flow meter is installed. This can obtain an evenly distributed and stable flow field so as to guarantee the measuring accuracy. When installing the flow meter, please choose optimal distance based on the pipe dimension and field environment. Generally, the longer the section of the straight pipe is, the better. The table below lists the minimum distance based on the times of D (D=pipe diameter).

Type	Length of Straight Pipe on the Upstream Side	Length of Straight Pipe on the Downstream Side
Regulating valve		
Keep the two elbow pipes close		
Dual elbow pipes		
Single elbow pipe		
Diverging pipe		
Convergin pipe		

■ The flow meter can be installed on a horizontal or vertical pipe, but the requirements below must be followed:

1. The flow meter must be in horizontal or vertical pipe.
2. Ensure the flow meter to keep a full pipe.
3. No air bulb or hole should be generated when getting close to the T-fitting area of the flow meter during the measurement. It will affect the accuracy of the flow measurement.



※Note：

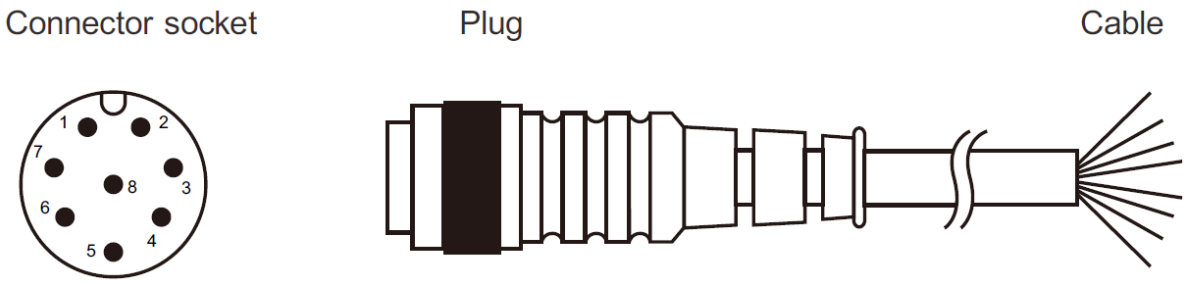
1. When installing the flow meter on the horizontal pipe, the sensor blade must face downward.
2. Appropriate material should be selected, and the specifications on pressure and temperature should be followed.
3. Moreover, appropriate pipe diameter should be chosen based on the flow/velocity/diameter.

5. Wiring instructions

5.1 Safety

1. Ensure that power to the paddlewheel flowmeter is disconnected so wiring is performed only in power off status.
2. Check to make sure that the power supply meets the power supply voltage requirement specifications of the paddlewheel flowmeter.
3. If it is possible that the input power voltage might exceed the paddlewheel flowmeter specification voltage please install an overvoltage protection device to protect the paddlewheel flowmeter.

5.2 With Display M12 Connector



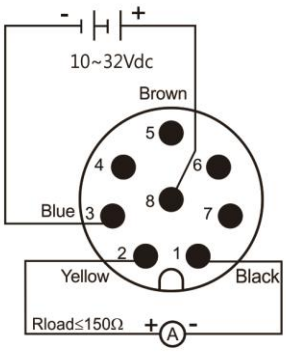
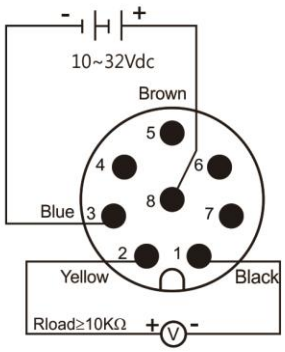
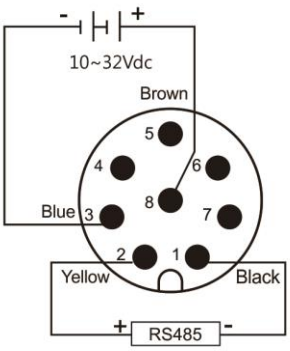
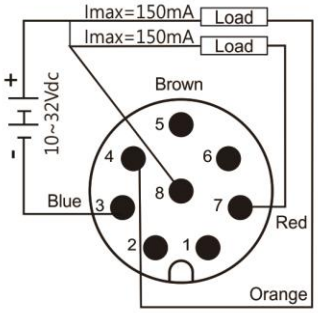
The wire colors and M12 connector pins are defined in the below table:

Cable No..	Function	Cable Color
1	Analog output 4~20mA or analog output 0~5V - or communication output RS485 -	Black
2	Analog output 4~20mA + or analog output 0~5V + or communication output RS485 +	Yellow
3	Power input DC 0V -	Blue
4	Pulse Out 1	Orange
5	--	Green
6	--	Purple
7	Pulse Out 2	Red
8	Power input DC 10~32V +	Brown

※ Pulse out1 : Orange line “Rotor pulse output”.

※ Pulse out2 : For the red line, “unit flow pulse output,”、“accumulated flow alarm output” or“ flow rate alarm output” can be selected.

5.3 With Display Wiring

Analog output 4~20mA	Analog output 0~5V	Communication output RS485	Pulse out
			

5.4 Without Display Connector

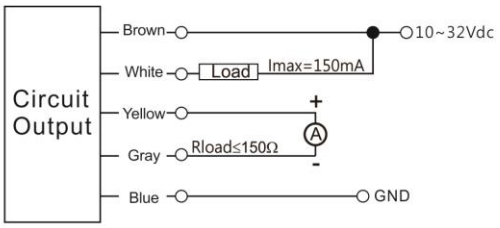
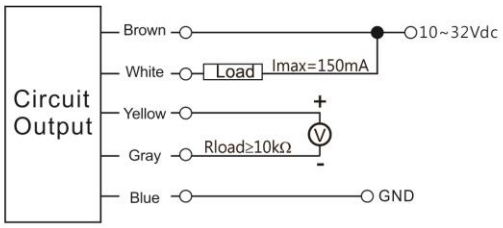
WITHOUT DISPLAY

The colors of cables are defined as shown in the table:

Cable No.	Functional position	Wire color
1	Power input DC 10~32V +	Brow
2	Power input DC 0 V -	Blue
3	Analog output 4~20mA + or analog output 0~5V +	Yellow
4	Analog output 4~20mA - or analog output 0~5V -	Gray
5	Pulse Out	White

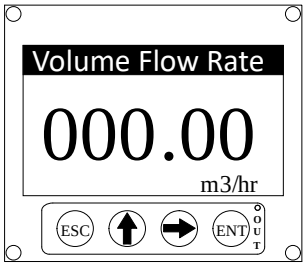
※ Pulse out : White line "rotor pulse output"

5.5 Without Display Wiring

Analog output 4~20mA	Analog output 0~5V
	

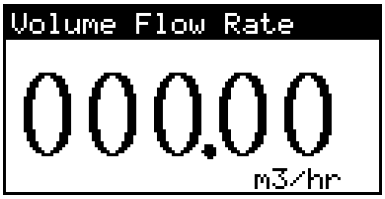
6. Display Module Adjustment and Setting

6.1 Button Operations



Button	Function
ESC	Return to the previous menu
^	Move up the cursor/Set parameter values
>	Move down the cursor/Select the numbers for the parameter value
ENT	Enter the selected item/Confirm the operation
ENT (Long Press)	Enter the Main Menu
◯OUT	Red light ON indicates alarm

6.2 Start Screen



Use ^ and > buttons to switch between the available options as described below:

1、Volume Flow Rate：In the unit of m3/hr.

2、Flow Velocity：In the unit of m/s.

3、Current Output：In the unit of mA.

4、Switch High Limit：In the unit of %.

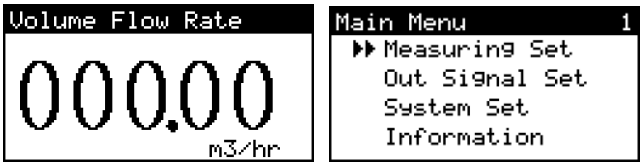
5、Switch Low Limit：In the unit of %.

6、 Flow Total：13numbers in the unit of L.

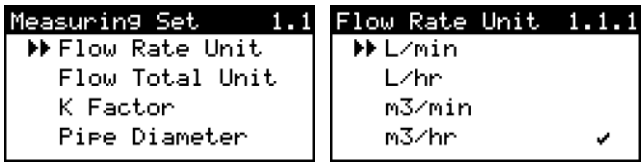
6.3 Measuring Set

Measuring Set：Set measurement parameters such as unit, flow coefficient K, pipe diameter, filter settings, etc.

To enter the main menu from the measurement screen, press ENT and hold.

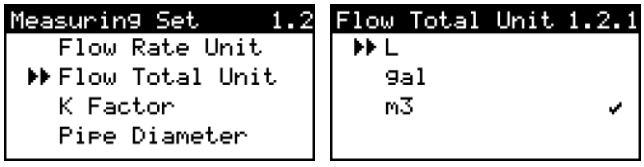


6.3.1 Flow Rate Unit



The measuring setting value can be in the unit of L/minutes, L/hour, m3/minute, m3/hour, gal/minute, gal/hour, kg/minute, kg/hour, ton/minute, and ton/hour. In the Measuring Set option, select Unit and press ENT button to enter the setting.

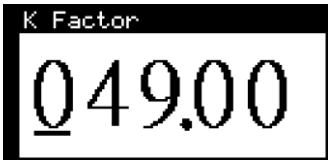
6.3.2 Flow Total Unit



Measurement settings: select display value units such as litres, gallons, and cubic meters. Select the cumulative quantity unit in the measurement settings menu.

Press the ENT key to enter.

6.3.3 K Factor

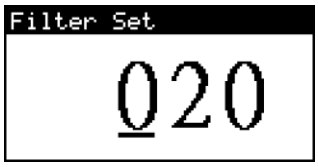


Adjust the value of the flow coefficient K, corresponding to the change in the flow rate. You can adjust the parameter value by pressing the ^ 、 > keys. Press the ENT key to confirm.

6.3.4 **Pipe Diameter**

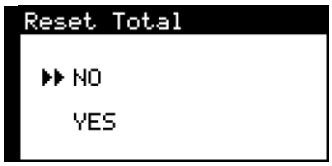
According to the pipe diameter and size, use the ^ 、 > keys to switch options; press the ENT key to confirm.

6.3.5 **Filter Set**



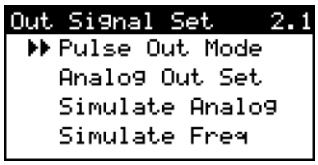
The flow rate and analog output reaction time can be adjusted with the ^ 、 > keys. The parameter values can be confirmed by pressing the ENT key.

6.3.6 Reset Total



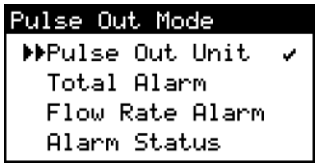
Use ^ and > buttons to adjust the parameter value and press ENT button to confirm it.

6.4 Output Signal Settings



Output Signal Set：You can set the pulse output mode (Pulse Out2), the current output type, the analog and analog output parameters, the analog frequency output parameters, the connection setting and speed, etc.

6.4.1 **Pulse Out Mode**

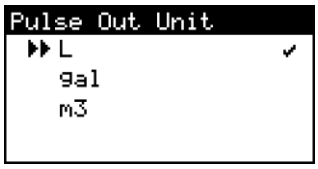


The pulse output mode can be selected from the following three options:

1. Unit Flow Pulse Output : Set the pulse output corresponding to the unit flow rate.
2. Accumulated Flow Alarm Output : Set the cumulative quantity alarm and reset status.
3. Flow Rate Alarm Output : Set the flow rate alarm function and flow rate alarm type.

6.4.1.1 **Pulse Out Unit**

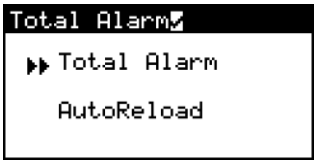
Selectable units: liters, gallons, cubic meters.

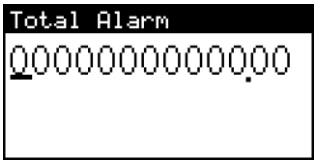


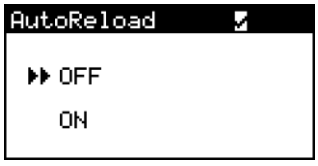
6.4.1.2 **Total Alarm**

「Cumulative Alarm Output」→Set the cumulative alarm value range 0~9999999999.99。

「Automatic Return of Cumulative Value」→ The max setting of the cumulative alarm value is reached.



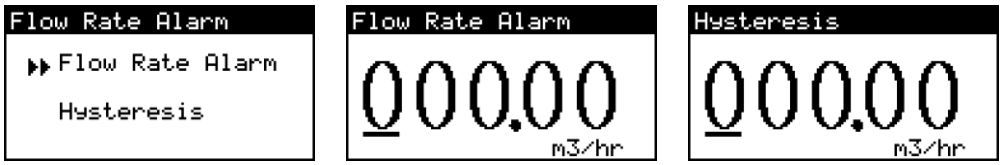




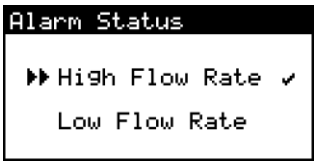
6.4.1.3 **Flow Rate Alarm**

「Flow rate alarm output」→ Set the alarm flow rate value.

「Flow rate alarm (Hysteresis)」→ Set the flow rate hysteresis value.

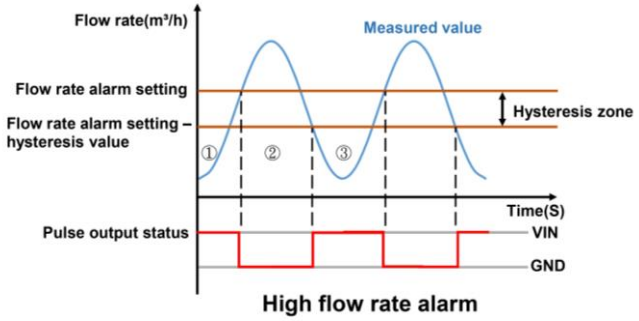


6.4.1.4 **Alarm Status**

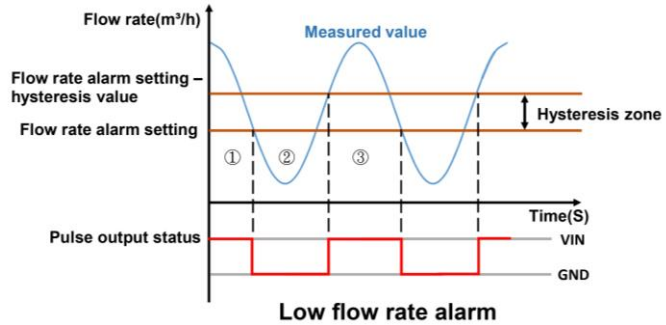


High flow rate alarm: when the measured value is higher than the “flow rate alarm set value”, it changes from High (lower left picture ①) to Low (lower left picture②). After the measured value drops below the “flow rate alarm set value – hysteresis value”, it changes from Low to High (lower left picture③)

Low flow rate alarm: when the measured value is below the “flow rate alarm set value”, it changes from High (lower right picture ①) to Low (lower right picture②). After the measured value rises to the “flow rate alarm set value – hysteresis value”, output changes from Low to High (lower right picture③).

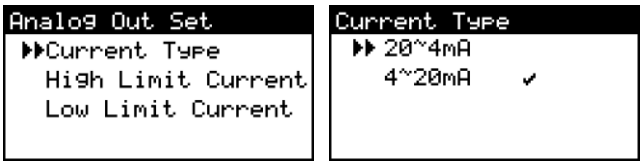


High flow rate alarm



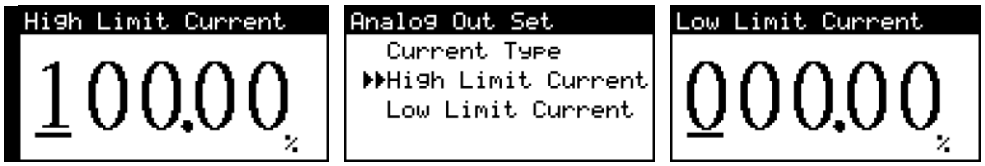
Low flow rate alarm

6.4.2 **Analog Output Setting**



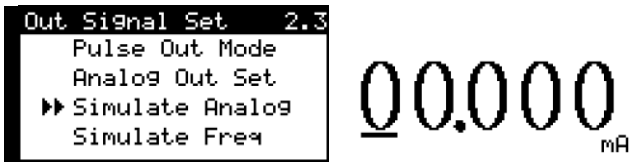
Press [ENT] to enter the current type in the current output setting.
There are 2 kinds of current outputs to choose from, 20mA~4mA, 4~20mA.
Press the [ENT] key to store after completion.

※ Only analog output 4~20mA has this setting. RS-485 and 0~5V do not.



In the current output setting, press [ENT] to enter the upper or lower current limits, and adjust the parameter values by pressing the [>]、[^] keys. Press the [ENT] key to save.

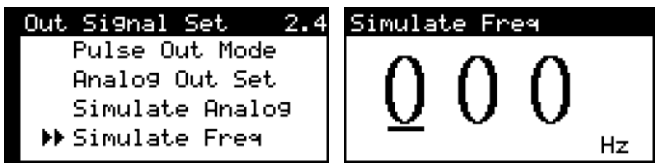
6.4.3 Simulate Analog



Press [ENT] to enter the analog-to-analog output in the output signal setting. The parameter values can be adjusted by the [^] 、[>] keys. Press the [ENT] key to confirm.

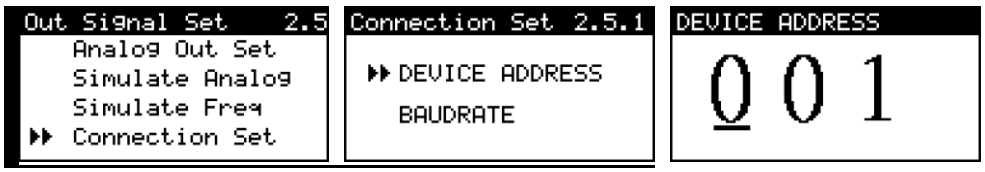
※ Only the analog output 4~20mA and 0~5V have this setting. RS-485 does not.

6.4.4 Simulate Frequency



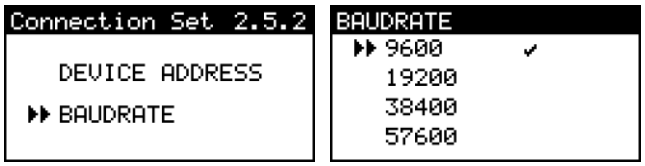
Press [ENT] to enter the analog frequency output in the output signal setting. The parameter values can be adjusted by the [^]、[>] keys. Press the [ENT] key to confirm.

6.4.5 Connection Set



When connecting to a computer, you must have the same address as the local device to connect successfully. The default value is 001.

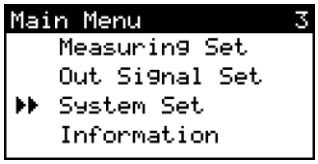
The parameter values can be adjusted by the ^ 、 > keys. Press the ENT key to confirm.



When connecting to a computer, the connection speed must be the same as the connection speed of this machine to connect successfully. The default value is 9600bps.

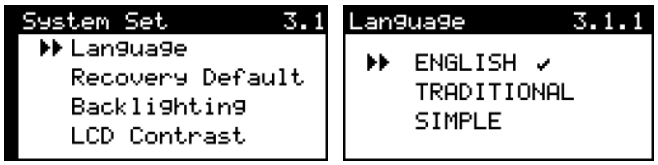
Press ^ 、 > to switch options. Press ENT to confirm.

6.5 System Settings



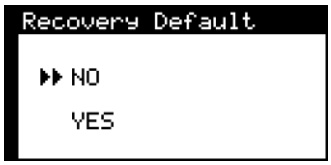
System Settings is provided to set System Language, Restore Default, Backlighting Setting, and LCD Contrast. Select System Setting in the Main Menu, and press ENT button to edit the settings.

6.5.1 System Language



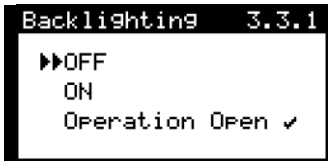
Press ENT button to enter System Language with options of English, Traditional Chinese and Simplified Chinese.

6.5.2 Restore Default Settings



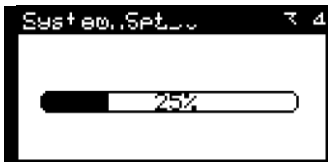
Press ENT button to confirm the selection. All will be reset to the factory settings.

6.5.3 Backlighting Settings



Select the backlighting status based on user's habits, and press ENT button to save.

6.5.4 LCD Contrast



Use ^ and > buttons to increase/decrease the contrast, and press ENT button to save.

6.5 Product Information

Select Product Information in the Main Menu, and press ENT button to view the product number and firmware version.

7. Settings

Function	Description
Flow Rate Unit (Please refer to 6.3.1)	Set the unit of volume flow rate.
Flow Total Unit (Please refer to 6.3.2)	Set the cumulative quantity unit.
K Factor (Please refer to 6.3.3)	Set K factor of flow (0~999.99)。
Pipe Diameter (Please refer to 6.3.4)	Select pipe diameter.
Filter Settings (Please refer to 6.3.5)	Set filter parameters (1~400)。
Reset Total (Please refer to 6.3.6)	Reset the accumulated flow in the Total Flow Page.
Pulse Output Mode (Please refer to 6.4.1)	Set the pulse output 2 function and parameter setting.
Analog Output Settings (Please refer to 6.4.2)	1. Set current type (20~4mA/4~20mA)。 4~20mA is for 0~10m/s。 2. Set current upper limit (0~100%)。 3. Set current lower limit (0~100%)。
Simulate Analog output (Please refer to 6.4.3)	Set parameters for simulated current output (0~24mA)。 Set parameters for simulated Voltage output (0~5V)。
Simulate Frequency Output (Please refer to 6.4.4)	Set parameters for simulated frequency output (0~300Hz)。
Connection Settings (Please refer to 6.4.5)	Set device address (1~255) and connection speed (9600~57600 Baud Rate)。
System Language (Please refer to 6.5.1)	Switch language between English/Traditional Chinese/Simplified Chinese。
Recovery Default (Please refer to 6.5.2)	Reset to factory settings/initialization。
Backlighting Setting (Please refer to 6.5.3)	Select backlighting mode, ON/OFF/ Operation ON。
LCD Contrast (Please refer to 6.5.4)	Adjust the contrast of the LCD screen。
Product Information (Please refer to 6.6)	Show product information。

8. Digital Communication Protocol

8.1 Communication Protocol Table

	Name	Address (Dec)	Types	Definition	default	Range	Unit	Reference
1	Display flow speed	4128	FLOAT32	Read	0	0~11	m/s	
2	Display flow rate	4130	FLOAT32	Read	0	0~19.44	m^3/hr	
3	Display frequency value	4132	FLOAT32	Read	0	0~275	Hz	
4	Display output current / Voltage	4136	FLOAT32	Read	4	4~20 / 0~5	mA/V	
5	Modbus ID	4138	UINT16	Read/Write	1	1~255		
6	Modbus baud rate	4139	UINT16	Read/Write	9600	9600 , 19200 , 38400 , 57600		
7	Save system var to EEPROM	4148	UINT16	Read/Write	0	0,1		(Please refer to 8.1.4)
8	Save calibration setting	4151	UINT16	Read/Write	0	0,1		(Please refer to 8.1.5)
9	Basic set K factor	4160	FLOAT32	Read/Write	49.5	0~999.99	pulse/liter	
10	Basic set pipe diameter	4162	FLOAT32	Read/Write	25	6,8,15,20,25,32, 40,50,65	mm	
11	Basic set flow rate unit	4164	UINT16	Read/Write	3	0~9		(Please refer to 8.1.1)
12	Setting Parameters	4165	UINT16	Read/Write	20	1~400		(Please refer to 8.1.3)
13	Display current high limit	4212	FLOAT32	Read/Write	100	0~100	%	
14	Display current low limit	4214	FLOAT32	Read/Write	0	0~100	%	

15	Simulate frequency value	4224	FLOAT32	Read/Write	0	0~300	Hz	
16	Analog output value	4226	FLOAT32	Read/Write	0	0~24/0~2500	mA/2*mV	
17	Analog output setting	4228	UINT16	Read/Write	1	0,1,2,3		(Please refer to 8.1.11)
18	Analog output filter switch	4230	UINT16	Read/Write	1	0,1		
19	Language	4231	UINT16	Read/Write	0	0~2		(Please refer to 8.1.6)
20	Background mode	4233	UINT16	Read/Write	1	0,1,2		(Please refer to 8.1.7)
21	Current Type	4235	UINT16	Read/Write	3	2,3		(Please refer to 8.1.8)
22	Set Cumulative Unit	4236	UINT16	Read/Write	2	0~2		(Please refer to 8.1.2)
23	Flow Total Value	4237	FLOAT64	Read/Write			L	
24	Reset Total	4245	UINT16	Read/Write	0	0,1		(Please refer to 8.1.9)
25	Set Flow Rate, Alarm Hysteresis	4248	FLOAT32	Read/Write				
26	Flow Rate Alarm Type	4250	UINT16	Read/Write	0	0,1		
27	Pulse Output 2 Types	4250	UINT16	Read/Write	0	0~5		(Please refer to 8.1.10)

※Remarks：The cumulative quantity is [(Cumulative highs*10^{9})+Cumulative low bit]*10^{-2}。
example：4241 read 1234，4243 read 567891234，The cumulative quantity is marked as [(1234*10^{9})+567891234]*10^{-2}=12345678912.34L

8.1.1 Volumetric Flow Rate per Unit: Status Table

Flow rate unit		
Flow unit L / min	0	
Flow unit L / hr	1	
Flow unit m^3 / min	2	
Flow unit m^3 / hr	3	default
Flow unit gal / min	4	
Flow unit gal / hr	5	
Flow unit kg / min	6	
Flow unit kg / hr	7	
Flow unit ton / min	8	
Flow unit ton / hr	9	

8.1.2 Cumulative unit: status table

Cumulative Unit		
Fluid unit: liters	0	
Fluid unit: gallon	1	
Fluid unit: cubic meters	2	default

8.1.3 Flow rate, analog output, filter setting, delay parameter: Status Table

Filter setting parameters		
Filter setting	Delay (seconds)	
1	0.0625	
20	1.25	default
100	6.25	
200	12.5	
300	18.75	
400	25	

8.1.4 Internal EEPROM saving table

Save system var to EEPROM		
Save system var to EEPROM	0	
Save system var to EEPROM	1	Save setting

8.1.5 Internal parameter saving status table

Save calibration setting		
Save calibration setting	0	
Save calibration setting	1	Save setting

8.1.6 Language settings status table

Language		
Language	0	English
Language	1	Traditional
Language	2	Simple

8.1.7 Backlighting settings status table

Backlight Mode		
Background mode	0	OFF
Background mode	1	ON
Background mode	2	Operation Open

8.1.8 Current output status table

Switch Type		
Current top bottom	2	20~4mA
Current top bottom	3	4~20mA

8.1.9 Reset Total table

Cumulative Reset Setting		
Reset Total	0	
Reset Total	1	Reset

8.1.10 Pulse output mode: status table

Pulse Output: 2 Types		
Pulse Out Mode	0	Pulse Output Flow Unit: Liter/Pulse
Pulse Out Mode	1	Pulse Output Flow Unit: Gal/Pulse
Pulse Out Mode	2	Pulse Output Flow Unit: m^3/Pulse
Pulse Out Mode	3	Alarm output cumulative value, automatic reset: off
Pulse Out Mode	4	Alarm output cumulative value, automatic reset: off
Pulse Out Mode	5	Alarm output flow rate

8.1.11 Analog output setting: status table

Analog Output Setting		
Simulate Analog Lock Offset	0	The current flow rate corresponds to the output value.
Simulate Analog Lock Offset	1	Minimum analog output value.
Simulate Analog Lock Offset	2	Maximum analog output value.
Simulate Analog Lock Offset	3	Customized analog output value.