EPR1
Paddlewheel Flowmeter
Operation Manual

FineTek Co.,Ltd.
No.16, Tzuchiang St., Tucheng Industrial Park, New Taipei City 23678
Tel：886-2-22696789 Fax：886-2-22686682
Website：http://www.fine-tek.com E-mail:info@fine-tek.com

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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.

- 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.com for 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:

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-year from 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 (Paddlewheel flowmeter)
B. M12, 8Pin electrical cable (optional)
C. Documents
   - Operation manual
   - Inspection certificate for measuring accuracy (optional)

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 ERP1 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 ERP1 can be used in a variety of industries; food and beverage, water treatment, pharmaceutical, dyeing, chemicals, semi-conductor and PCB wet process control.

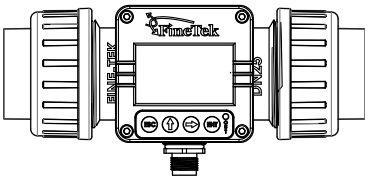
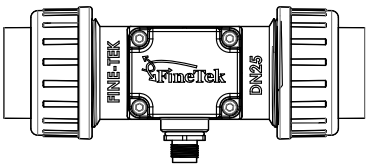
※ The detected medium must not contain any iron filings, particles which will attached the rotary paddle wheel and affect the accuracy and also cause damage. If there is possibility to have iron filings, particles in the process or pump operation, please install the magnet screen filters (please consider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

3.5 Product features

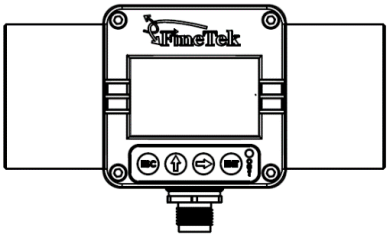
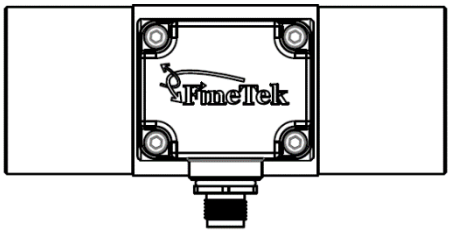
a. Microprocessor controlled, easy to operate and full featured
b. Local LCD display/keypad for convenient setup (option).
c. Totalization (displayed if unit so equipped; manual reset).
d. Multiple outputs; DC pulse, 4-20mA/20-4mA analog and RS485 MODBUS serial link are standard.
e. 12~36VDC power supply.
f. High endurance/low power FRAM non-volatile memory.
g. Simplified electrical connections with M12 connector and cable.
h. LED displays alarm and the ON/OFF status of the alarm output.
i. Upper limit setting of the analong output.
j. Flow rate, velocity and current output filter settings: 0-40 segments.
k. Three modes of back lighting for display.
l. RS485 digital communications serial port (MODBUS).
m. Parameter settings for K factor, pipe diameter, device ID, device connection packet rate, etc..
n. Three languages supported by the human-machine operation menus.

3.6 Types & specifications

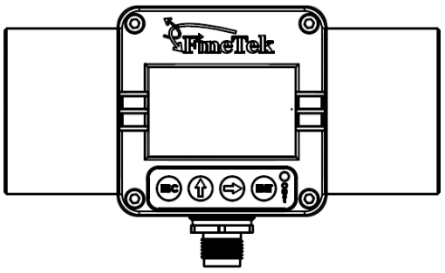
PVC Pipe material & PP Blade

Model Type			
Specification	Intelligent All-in-one model	Flow transmitter model	Pulse output mode
Applicable pipe diameter	DN15、DN20、DN25、DN40、DN50		
Pipe material	PVC		
Flow velocity range	0.3~10m/s		
Accuracy	Under standard K Factor ±3% F.S. (Flow velocity 6~10m/s reach±0.5%)		
Repeatability	±0.4%		
Measuring principle	Magnetic		
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%, non-condensing		
Installation method	Transmitter +T-fitting		
Process pressure	10bar，max.		
IP rating	IP66 , the connector shall be inserted and fastened		
Analog output	4~20mA		N/A
Impedance	1300Ω at 36Vdc, 1000Ωat 30Vdc, 700Ωat 24Vdc,450Ωat 18Vdc, 200Ωat 12Vdc		
Pulse output	NPN，PNP 200mA overcurrent protection		N/A
Frequency range	0~300Hz		N/A
Display	LCM,128*64 , Backlit	N/A	
Power supply voltage	12~36Vdc,±10%		
Power consumption	＜1.5VA		
Reverse protection of power supply	YES		
Communication port	RS485,Modbus		N/A
Accumulated flow storage device	16K,FRAM	NO	

SUS Pipe material & PVDF Blade

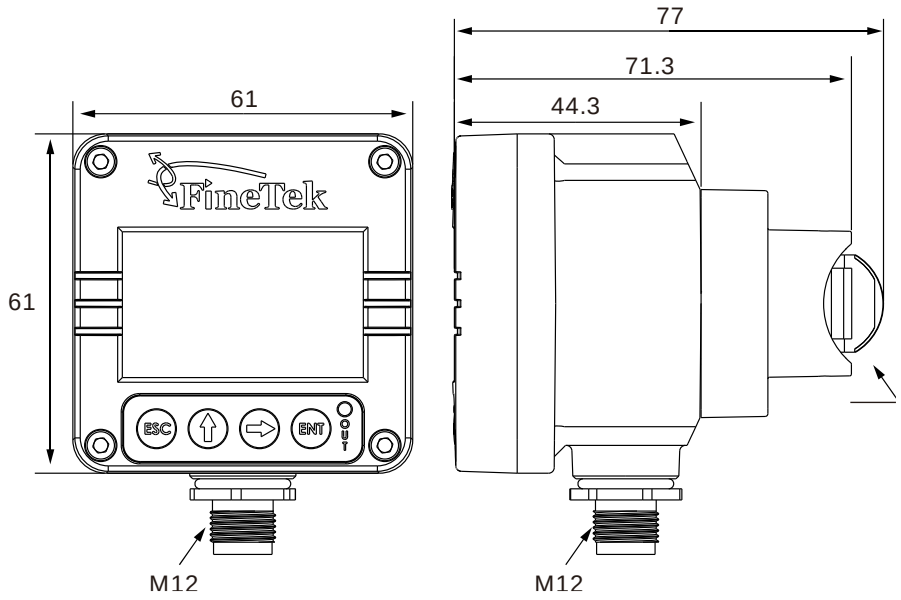
Model Type			
Specification	Intelligent All-in-one model	Flow transmitter model	Pulse output mode
Applicable pipe diameter	DN20、DN25、DN40、DN50		
Pipe material	SUS304、SUS316、SUS316L		
Flow velocity range	0.3~10m/s		
Accuracy	Under standard K Factor ±3% F.S. (Flow velocity 6~10m/s reach±0.5%)		
Repeatability	±0.4%		
Measuring principle	Magnetic		
Viscosity range	300 cSt，max.		
Impurity range	Must be nonmagnetic 1%，max.(Size of particles 0.5mm max.)		
Process temp.	-15℃~100℃ (5°F ~212°F)		
Ambient humidity	＜80%, non-condensing		
Installation method	Transmitter +T-fitting		
Process pressure	10bar，max.		
IP rating	IP66 , the connector shall be inserted and fastened		
Analog output	4~20mA		N/A
Impedance	1300Ω at 36Vdc, 1000Ωat 30Vdc, 700Ωat 24Vdc, 450Ωat 18Vdc, 200Ωat 12Vdc		
Pulse output	NPN，PNP 200mA overcurrent protection		N/A
Frequency range	0~300Hz		N/A
Display	LCM,128*64 , Backlit	N/A	
Power supply voltage	12~36Vdc,±10%		
Power consumption	＜1.5VA		
Reverse protection of power supply	YES		
Communication port	RS485,Modbus		N/A
Accumulated flow storage device	16K,FRAM	NO	

SUS Pipe material & SUS316 Blade

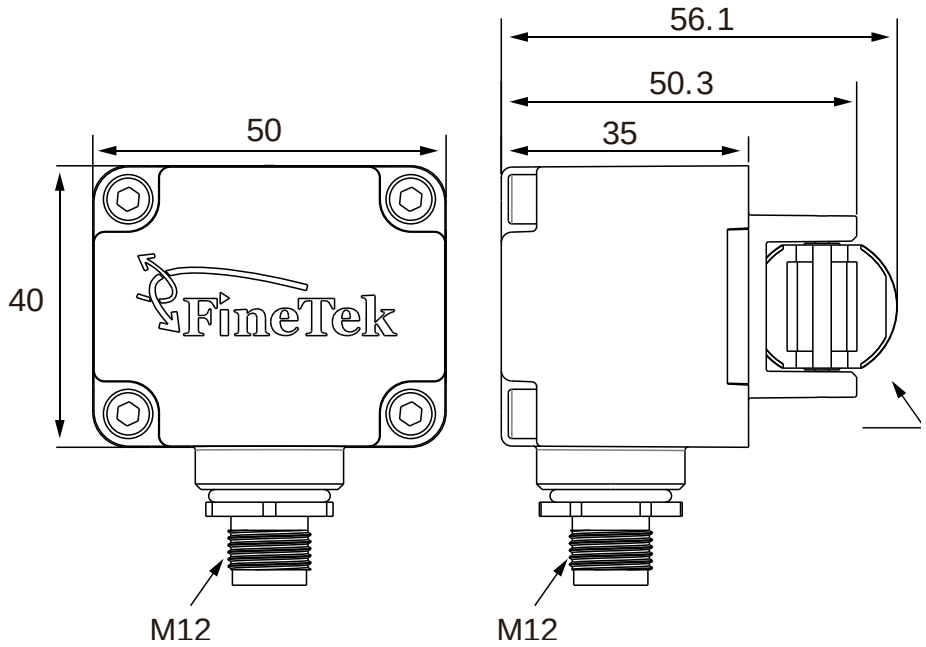
Model Type	
Specification	Intelligent All-in-one model
Applicable pipe diameter	DN25、DN40
Pipe material	SUS304、SUS316、SUS316L
Flow velocity range	0.5~8 m/s
Accuracy	Under standard K Factor ±3% F.S. (Flow velocity 6~8m/s reach±0.5%)
Repeatability	±0.4%
Measuring principle	Magnetic
Viscosity range	300 cSt，max.
Impurity range	Must be nonmagnetic 1%，max.(Size of particles 0.5mm max.)
Process temp.	-15℃~100℃ (5℉~212℉)
Ambient humidity	＜80%, non-condensing
Installation method	Transmitter +T-fitting
Process pressure	10bar，max.
IP rating	IP66 , the connector shall be inserted and fastened
Analog output	4~20mA
Impedance	1300Ω at 36Vdc, 1000Ωat 30Vdc,700Ωat 24Vdc, 450Ωat 18Vdc,200Ωat 12Vdc
Pulse output	NPN，PNP 200mA overcurrent protection
Frequency range	0~300Hz
Display	LCM,128*64 , Backlit
Power supply voltage	12~36Vdc,±10%
Power consumption	＜1.5VA
Reverse protection of power supply	YES
Communication port	RS485,Modbus
Accumulated flow storage device	16K,FRAM

4. Product Dimensions

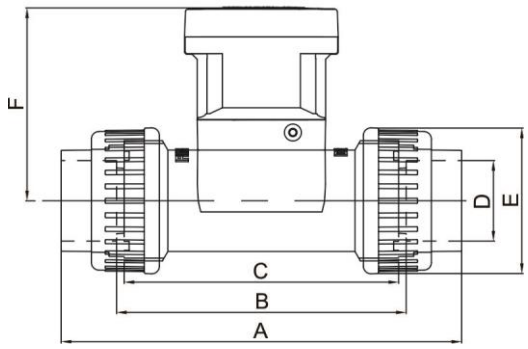
INTELLIGENT ALL-IN-ONE MODEL



FLOW TRANSMITTER MODEL & PULSE OUTPUT MODEL

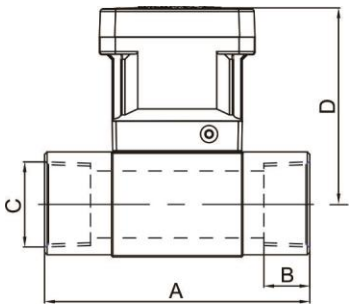


4.1 Intelligent all-in-one mode (Engineering plastics)



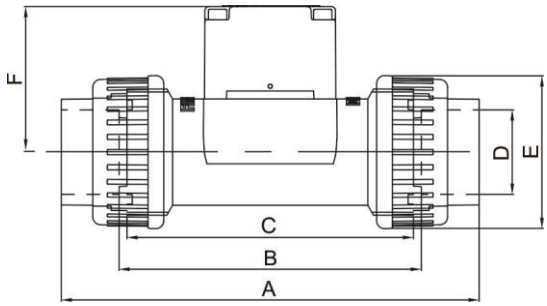
Diameter- DN (mm)	Standard	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
15	DIN/ISO ASTM JIS	128	96	90	20 21.3 18.4	43	79.1
20	DIN/ISO ASTM JIS CNS.4053-1	144	106	100	25 26.7 26.45 26	53	76.3
25	DIN/ISO ASTM JIS	159	115	109	32.00 33.40 32.55	58	77
40	DIN/ISO ASTM JIS	189	125	119	50.00 48.30 48.70	83.00	83.9
50	DIN/ISO ASTM JIS CNS.4053-1	216	140	130	63 60.3 60.8 60	103	90

Intelligent all-in-one mode
(stainles steel)



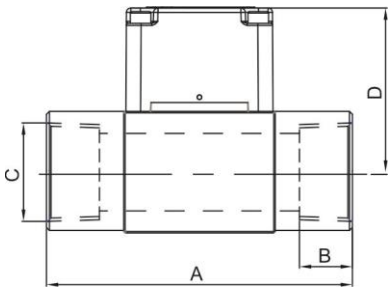
Diameter- DN (mm)	A (mm)	B (mm)	C (mm)	D (mm)
20	94	17 18.3 18.3	PF 3/4” PT 3/4” NPT 3/4”	77
25	104	23 18 18	PF 1” PT 1” NPT 1”	77
40	129	23 22 22	PF 1-1/2” PT 1-1/2” NPT 1-1/2”	83.4
50	148.5	27.5 24 24	PF 2” PT 2” NPT 2”	90

4.2 Low transmitter model & pulse output model (Engineering plastics)



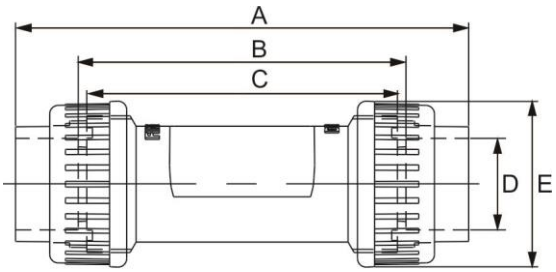
DN (mm)	Standard	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
15	DIN/ISO ASTM JIS	128	96	90	20 21.3 18.4	43	48.4
20	DIN/ISO ASTM JIS CNS.4053-1	144	106	100	25 26.7 26.45 26	53	54.8
25	DIN/ISO ASTM JIS	159	115	109	32.00 33.40 32.55	58	55.2
40	DIN/ISO ASTM JIS	189	125	119	50.00 48.30 48.70	83	62
50	DIN/ISO ASTM JIS CNS.4053-1	216	140	130	63 60.3 60.8 60	103	68.5

Flow transmitter model & pulse output model (stainless steel)



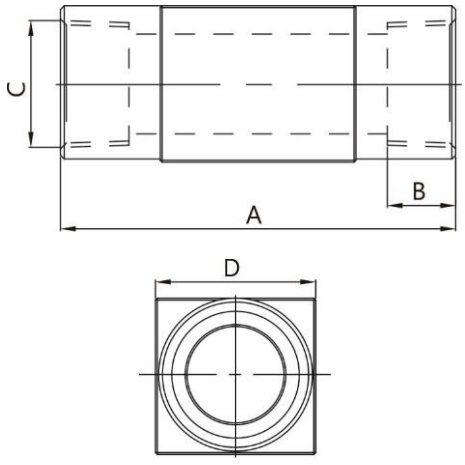
Diameter-DN (mm)	A (mm)	B (mm)	C (mm)	D (mm)
20	94	17 18.3 18.3	PF 3/4” PT 3/4” NPT 3/4”	55
25	104	23 18 18	PF 1” PT 1” NPT 1”	55.6
40	129	23 22 22	PF 1-1/2” PT 1-1/2” NPT 1-1/2”	62
50	148.5	27.5 24 24	PF 2” PT 2” NPT 2”	69

4.3 T-fitting(engineering plastics)



DN (mm)	Standard	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	115	109	32.00 33.40 32.55	58
40	DIN/ISO ASTM JIS	189	125	119	50.00 48.30 48.70	83
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 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

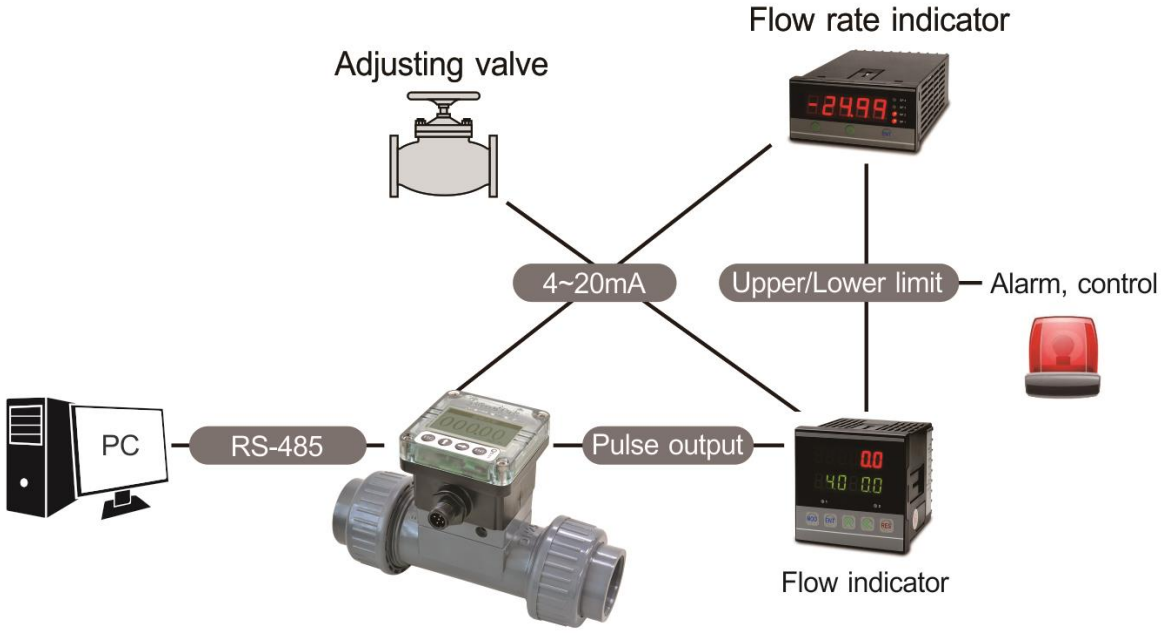
Material	Pipe diameter (mm)	Flow Range (m^3/h)	
		Flow velocity 0.5m/s(min)	Flow velocity 8m/s(max)
SUS Pipe material & SUS316 Blade	25	0.89	14.13
	40	2.27	36.18

■ Relationship between k value and fitting diameter

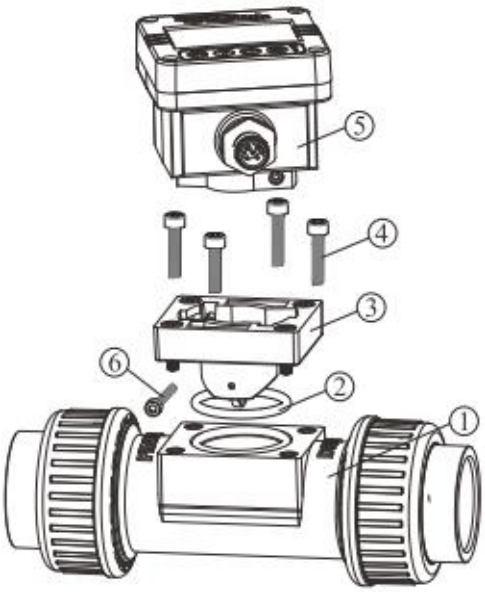
Material	Connection & Standard Type	K Factor (Pulse/Liter)				
		DN15	DN20	DN25	DN40	DN50
Intelligent All-in-One Model						
PVC Pipe material & PP Blade	DIN / ISO	114.8	70	49	17	9.2
	ASTM	114.8	70	49	17	9.2
	JIS	114.8	70	49	17	9.2
	CNS 4053-1	---	70	---	---	9.2
SUS Pipe material & PVDF Blade	Thread PF	---	70	49	17	9.2
	Thread PT	---	70	49	17	9.2
	Thread NPT	---	70	49	17	9.2
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
Flow transmitter type & Pulse Output type						
PVC Pipe material & PP Blade	DIN / ISO	105.8	56.5	30	8.3	5.92
	ASTM	105.8	56.5	30	8.3	5.92
	JIS	105.8	56.5	30	8.3	5.92
	CNS 4053-1	---	56.5	---	---	5.92
SUS Pipe material & PVDF Blade	Thread PF	---	56.5	30	8.3	5.92
	Thread PT	---	56.5	30	8.3	5.92
	Thread NPT	---	56.5	30	8.3	5.92

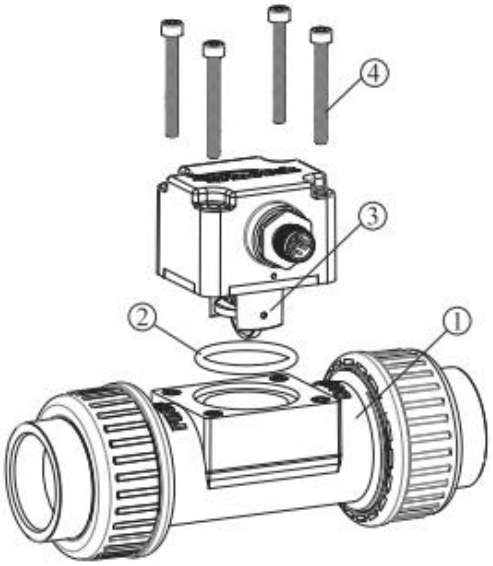
※US: GL (Gallon)K factor = Pulse/Liter x 3.785;
UK: GL (Gallon) K factor = Pulse/Liter x 4.546.

■ Control system diagram



4.5 Assembly instructions

With Keypad/display  	1. T-fitting of flow meter. 2. Place the O-shaped ring in the sealing tank, and unfold it naturally. 3. Make the blade holder face downward and go through the hole and O-shaped ring. Level and align it. 4. Fasten and align the 4 screws evenly. *Fastening torque： Plastic Blade = 8~10kgf-cm(0.784~0.98N.m) Stainless Blade = 0~12kgf-cm(0.98~1.176N.m) 5. Point the M12 connector of the display towards you, and insert it into the slot. Level it horizontally and rotate it clockwise to the edge for alignment. 6. Fasten the 2 fixing screws. *Fastening torque = 6~8kgf-cm(0.588~0.748N.m) ※Note: The above steps are for whole machine installation. To install the header only, please perform steps 5~6. Please apply the fastening torque on the screws as required.

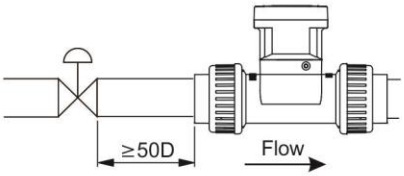
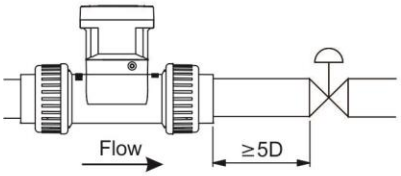
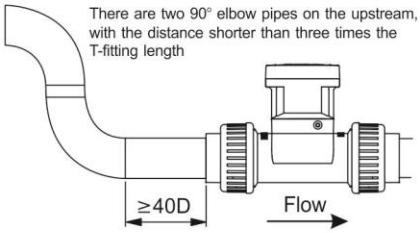
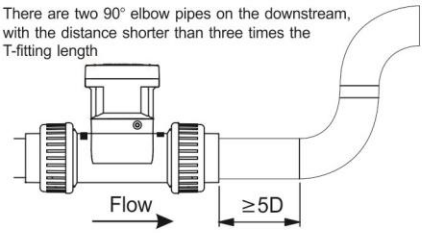
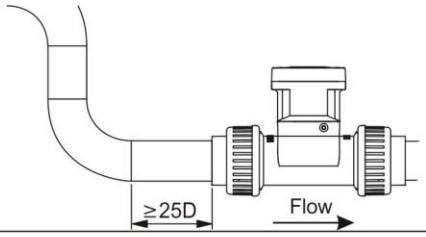
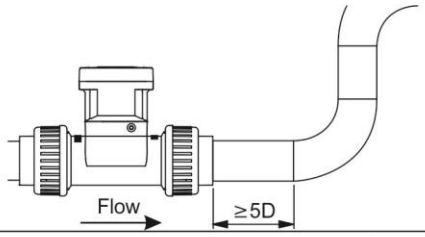
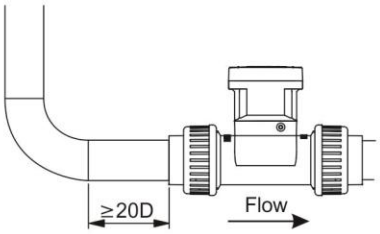
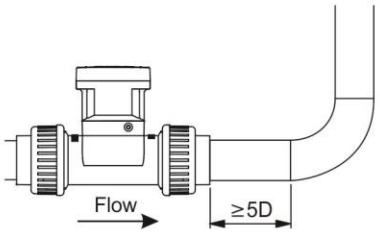
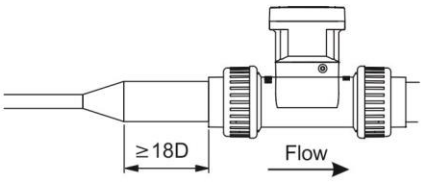
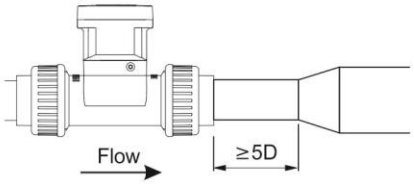
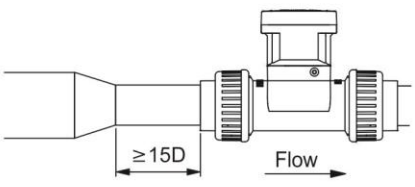
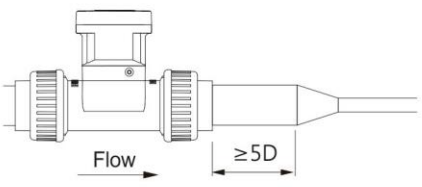
Without Keypad/Display  	1. T-fitting of flow meter. 2. Place the O-shaped ring in the sealing tank, and unfold it naturally. 3. Make the blade of the transmitter face downward and go through the hole and O-shaped ring. Level and align it. 4. Fasten and align the 4 screws evenly. * Fastening torque： Plastic Blade = 8~10kgf-cm(0.784~0.98N.m) Stainless Blade = 10~12kgf-cm(0.98~1.176N.m) ※Note: Please apply the fastening torque on the screws as required.

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 two 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 DC24V and the quick connector is locked properly. If the above steps are executed, but problems cannot be solved, please contact the sales representative

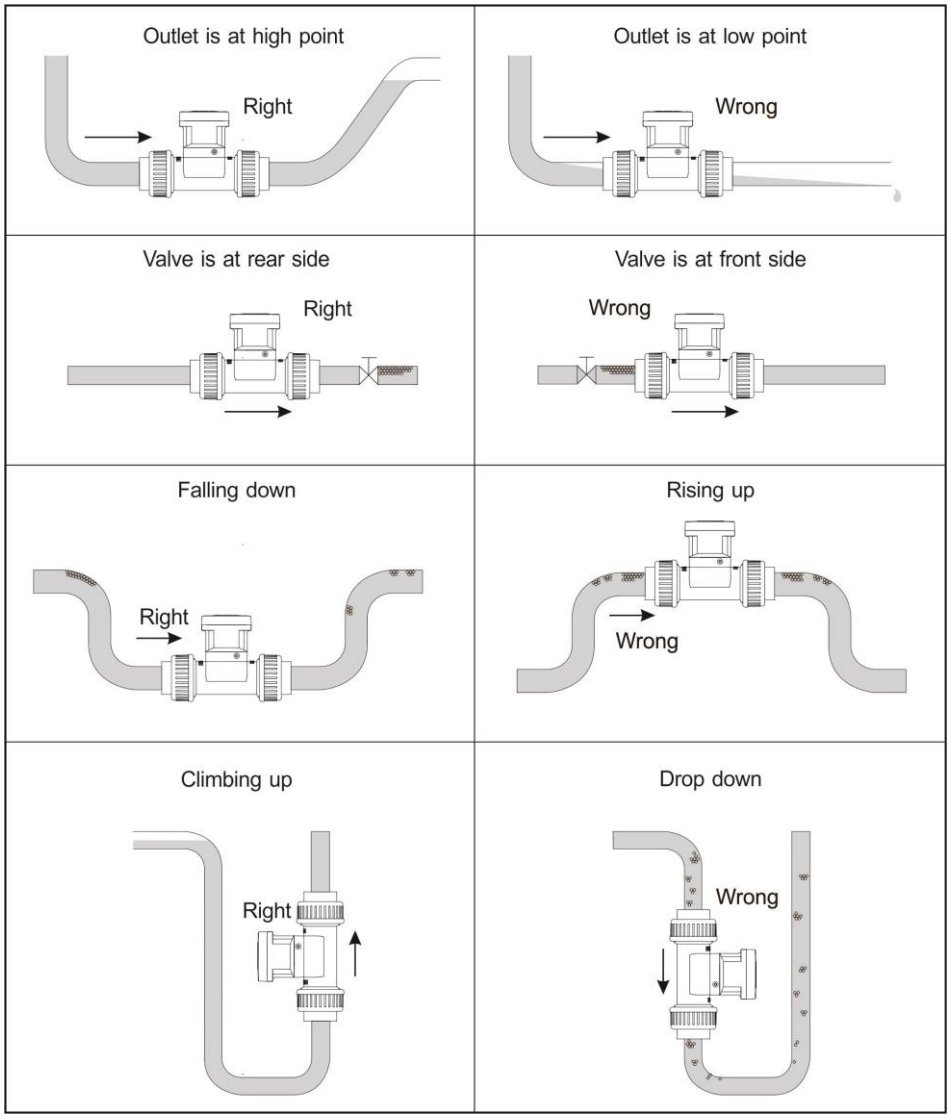
4.7 Mounting location

■ 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 paddlewheel flowmeter can be installed in either a vertical or horizontal orientation. The following requirements must be adhered to:

1. For horizontal installations the paddlewheel flowmeter must always be installed level and not on an incline.
2. For vertical orientations the paddlewheel flowmeter should always be installed “plumb” and not on a slope or incline.
3. The paddlewheel flowmeter should only be used in full pipe conditions.
4. Eliminate entrained air within the fluid flow as this may affect the measurement accuracy of the paddlewheel flowmeter.



※Notes：

※ Installation in the horizontal orientation must have the paddlewheel blade hanging “down” into the T-fitting, NOT mounted with the blade pointing up into the T-fitting..

※ Ensure that the installation is within the paddlewheel flowmeter specifications for materials of construction, pressure and temperature.

※ Select the appropriate pipe diameter based on the flow/velocity/pipe diameter.

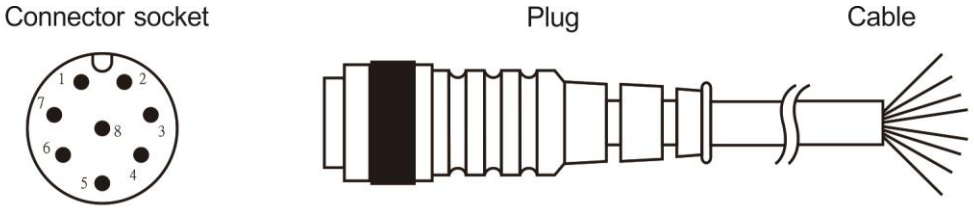
5. Wiring instructions

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.

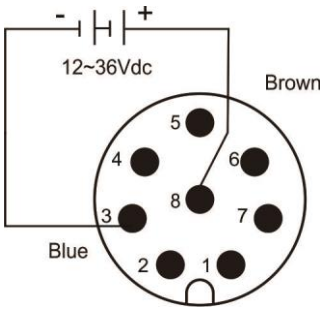
5.2 M12 Electrical connection cable

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

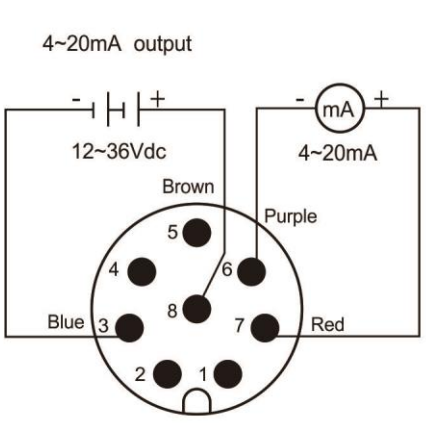


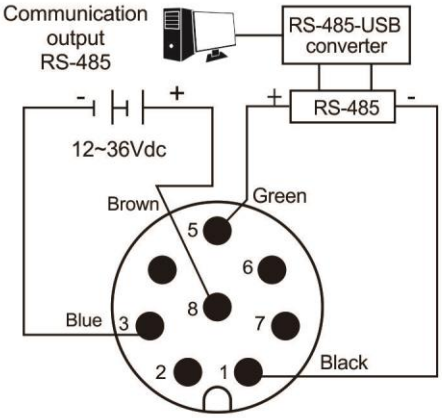
M12 Socket Pin No.	Function	Cable Color
1	Communication output RS485 -	Black
2	Pulse output Pulse -	Yellow
3	Power supply input DC 0V -	Blue
4	Pulse output Pulse +	Pink
5	Communication output RS485 +	Green
6	Analog output 4~20mA -	Purple
7	Analog output 4~20mA +	Red
8	Power supply input DC12~36V +	Brown

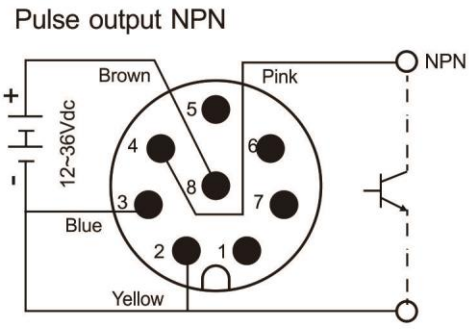
5.3 Power supply description

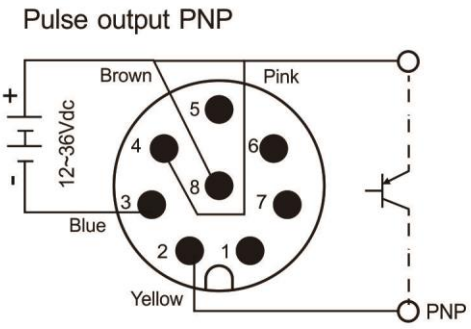


5.4 Wiring



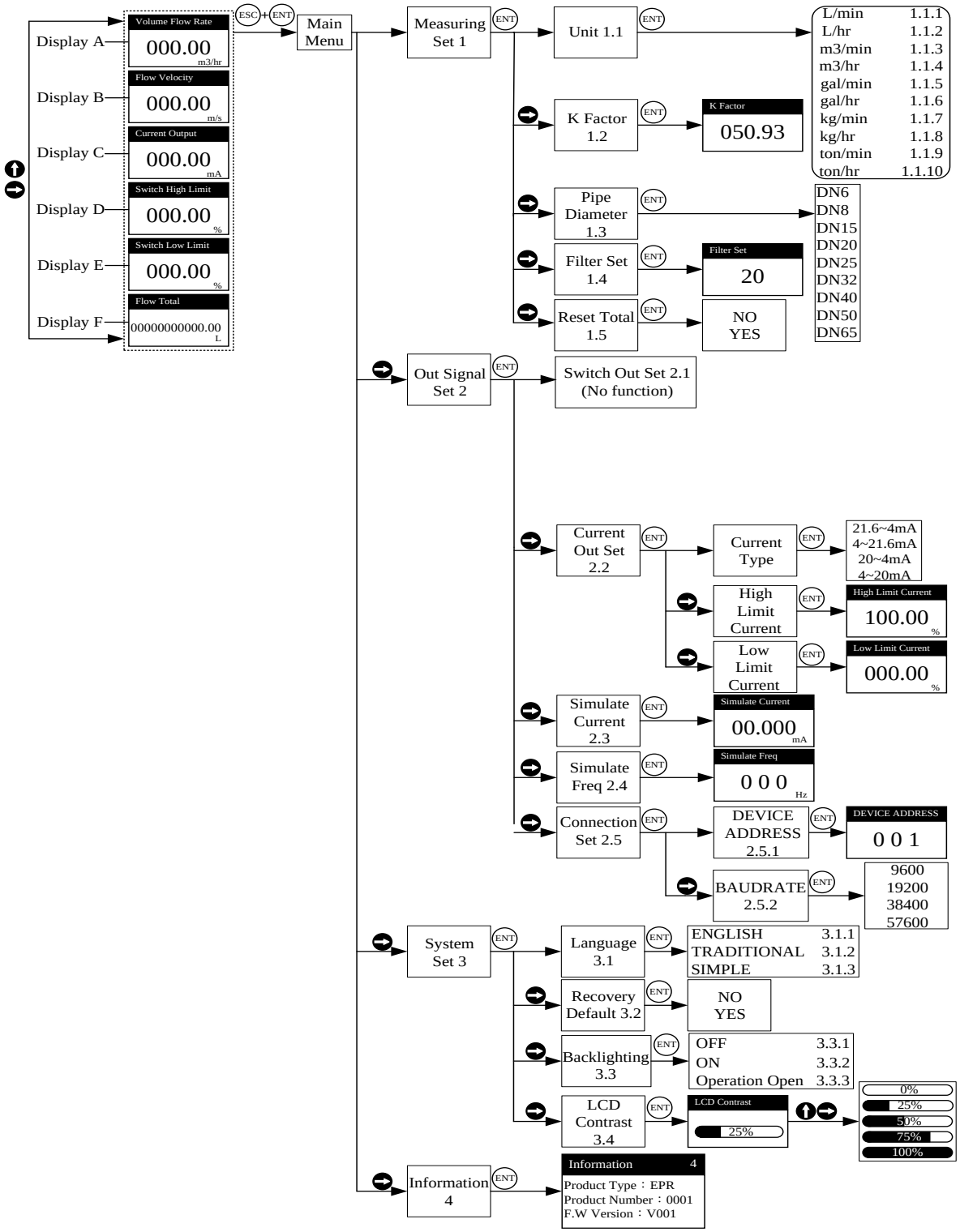




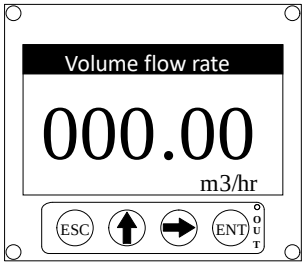


6. EPR13 Settings

6.1 Operation Flowchart

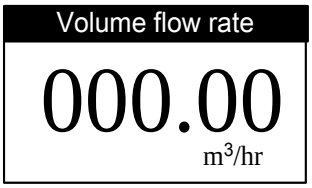


6.2 Button Operations



Button	Function
ESC	Return to the previous menu
^	Move up the cursor/Set parameter values
>	Move up the cursor/Select the numbers for the parameter value
ENT	Enter the selected item/Confirm the operation
ESC + ENT (Press the two buttons)	Enter the Main Menu
OUT	1.Green light ON indicates Relay output status 2.Red light ON indicates alarm

6.3 Start Screen

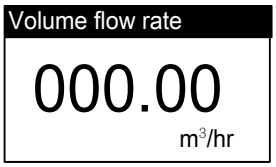


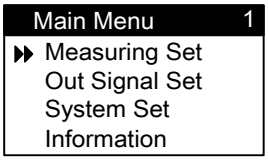
Use ^ and > buttons to switch between the available options as described below:

1、Volume Flow Rate：In the unit of m^3/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.

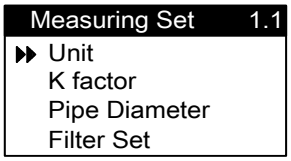
6.4 Measuring Set

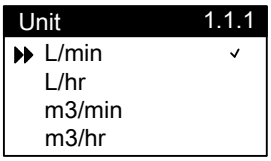
Measuring Set: It is provided to set the measuring parameters, such as unit, K factor of flow, pipe diameter, and filter setting. To enter the Main Menu from the measuring screen, please press ENT and ESC simultaneously





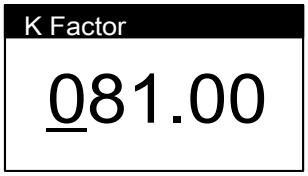
6.4.1 Unit





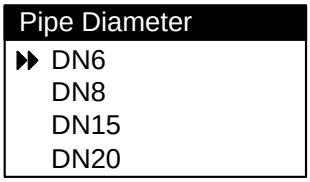
The measuring setting value can be in the unit of L/minutes, L/hour, m^3/minute, m^3/hour, gal/minute, gal/hour, kg/minute, kg/hour, ton/minute, and ton/hour. In the Measuring Set option, select Unit and press ENT button to enter the setting.

6.4.2 K Factor



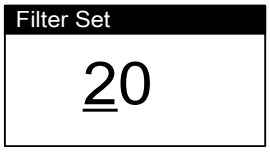
Use ^ and > buttons to adjust the parameter value, and press ENT button to confirm it.

6.4.3 Pipe Diameter



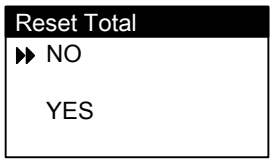
Use ^ and > buttons to switch, between the available options are DN6、DN8、DN8、DN15、DN20、DN25、DN32、DN40、DN50、DN65, and press button to confirm it.

6.4.4 Filter Set



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

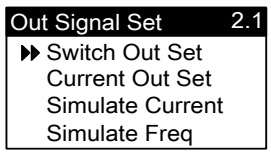
6.4.5 Reset Total



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

6.5 Output Signal Settings

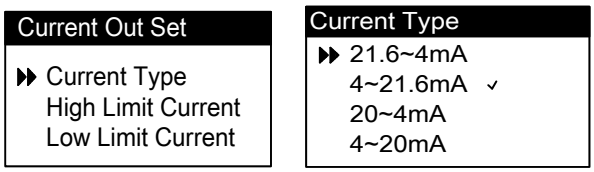
Output Signal Settings: It allows you to set the current output type,
simulated current output parameters, connection address and speed, etc.



6.5.1 Switch Output Settings

※ There is no function available for this menu at present, no operation is req.

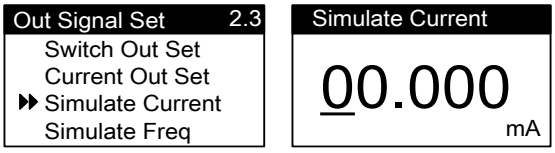
6.5.2 Current output settings



Press [^] button in the Current Output Settings to enter Current Type Settings. A total of 4 current output types are available: 21.6mA~4mA, 4~21.6mA, 20~4mA and 4~20mA. Finally, press [ENT] button to save.

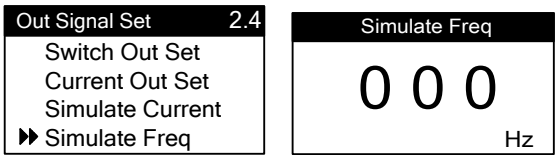
Press [ENT] button in the Current Output Settings to enter Current Upper Limit or Current Lower Limit. Use [^] and [>] buttons to adjust the parameter value, and press [ENT] button to save.

6.5.3 Simulated Current Output



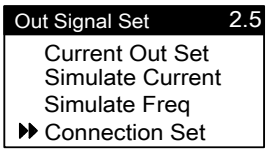
Press [ENT] button in the Output Signal Settings to enter Simulated Current Output. Use [^] and [>] buttons to adjust the parameter value, and press [ENT] button to save.

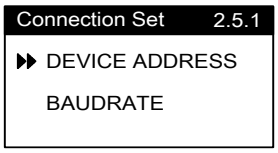
6.5.4 Simulated Frequency Output



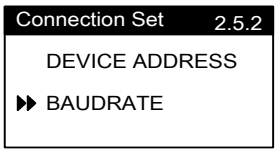
Press [ENT] button in the Output Signal Settings to enter Simulated Frequency Output. Use [^] and [>] buttons to adjust the parameter value, and press [ENT] button to save.

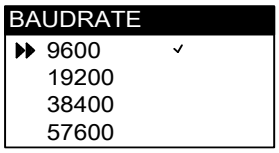
6.5.5 Connection Settings





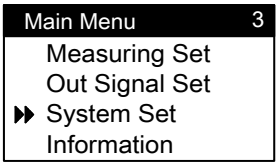
To connect with the computer successfully, it requires the same speed of the device, which is 9600bps by default. Use [^] and [>] buttons to switch between options, and press [ENT] button to confirm it.





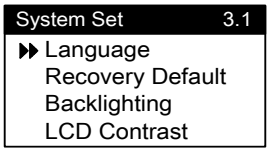
To connect with the computer successfully, it requires the same address of the device, which is 001 by default. Use [^] and [>] buttons to adjust the parameter value, and press [ENT] button to confirm it.

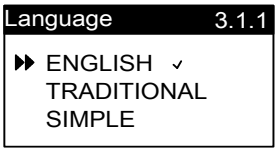
6.6 System Settings



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.

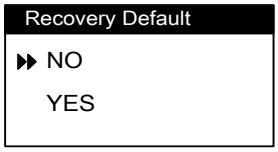
6.6.1 System Language





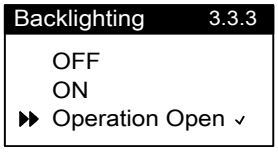
Press [ENT] button to enter System Language with options of English, Traditional Chinese and Simplified Chinese.

6.6.2 Restore Default Settings



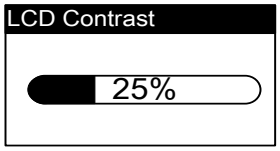
Press ENT button to confirm the selection. All will be reset to the factory settings.

6.6.3 Backlighting Settings



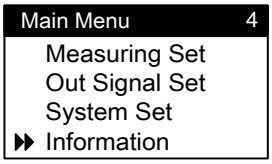
Select the backlighting status based on user's habits, and press ENT button to save.

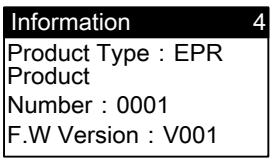
6.6.4 LCD Contrast



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

6.7 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
Unit (Please refer to 6.4.1)	Set the unit of volume flow rate.
K Factor (Please refer to 6.4.2)	Set K factor of flow (0~999.99).
Pipe Diameter (Please refer to 6.4.3)	Select pipe diameter.
Filter Settings (Please refer to 6.4.4)	Set filter parameters (1~40).
Reset Total (Please refer to 6.4.5)	Reset the accumulated flow in the Total Flow Page.
Switch Output Settings (Please refer to 6.5.1)	1. Set switch type (Switch NO / Switch NC). 2. Set switch upper limit (0~100%). 3. Set switch lower limit (0~100%).
Current Output Settings (Please refer to 6.5.2)	1. Set current type (21.6~4mA/4~21.6mA / 20~4mA/4~20mA). 4~20mA is for 0~10m/s. 4~21.6mA is for 0~11m/s. 2. Set current upper limit (0~100%). 3. Set current lower limit (0~100%).
Simulate Current Output (Please refer to 6.5.3)	Set parameters for simulated current output (0~24mA).
Simulate Frequency Output (Please refer to 6.5.4)	Set parameters for simulated frequency output (0~300Hz).
Connection Settings (Please refer to 6.5.5)	Set device address (1~255) and connection speed (9600~57600 Baud Rate).
System Language (Please refer to 6.6.1)	Switch language between English/Traditional Chinese/Simplified Chinese.
Recovery Default (Please refer to 6.6.2)	Reset to factory settings/initialization.
Backlighting Setting (Please refer to 6.6.3)	Select backlighting mode, ON/OFF/Operation ON.
LCD Contrast (Please refer to 6.6.4)	Adjust the contrast of the LCD screen.
Product Information(Please refer to 6.7)	Show product information.

8. Digital Communication Protocol

8.1 Communication Protocol Table

	Name	Address (Dec)	Types	Definition	default	Range	Unit
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	4134	FLOAT32	Read	4	4~21.6	mA
5	Display output current filter	4136	FLOAT32	Read	4	4~21.6	mA
6	Modbus ID	4138	UINT16	Read/Write	1	1~255	
7	Modbus baudrate	4139	UINT16	Read/Write	9600	9600 , 19200 , 38400 , 57600	
8	Save system var to EEPROM	4148	UINT16	Read/Write	0	0,1	
9	Save calibration setting	4151	UINT16	Read/Write	0	0,1	
10	Basic set K factor	4160	FLOAT32	Read/Write	49.5	0~999.99	pulse/litre
11	Basic set pipe diameter	4162	FLOAT32	Read/Write	25	6,8,15,20,25,32,40,50, 65	mm
12	Basic set flow rate unit	4164	UINT16	Read/Write	3	0~9	
13	Current filter number	4165	FLOAT32	Read/Write	20	1~40	
14	Display switch high limit	4208	FLOAT32	Read/Write	100	0~100	%
15	Display switch low limit	4210	FLOAT32	Read/Write	0	0~100	%
16	Display current high limit	4212	FLOAT32	Read/Write	100	0~100	%
17	Display current low limit	4214	FLOAT32	Read/Write	0	0~100	%
18	Simulate frequency value	4224	FLOAT32	Read/Write	0	0~300	Hz
19	Simulate current value	4226	FLOAT32	Read/Write	0	0~24	mA
20	Frequency avg flag	4230	UINT16	Read/Write	1	0,1	
21	Language	4231	UINT16	Read/Write	0	0~2	
22	Background mode	4233	UINT16	Read/Write	1	0,1	
23	Switch top bottom	4234	UINT16	Read/Write	1	0,1	

24	Current top bottom	4235	UINT16	Read/Write	1	0,1	
25	Flow Total Value	4237	FLOAT64	Read/Write			L
26	Flow Total Value High Bytes	4241	UINT32	Read			L
27	Flow Total Value Low Bytes	4243	UINT32	Read			L
28	Reset Total	4245	UINT16	Read/Write	0	0,1	

※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 Flow Rate 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 Current Filter and Output Delay Parameter Status Table

Current filter number		
Current Filter	Delay(s)	
1	0.05	
5	0.25	
10	0.5	
15	0.75	
20	1	default
25	1.25	
30	1.5	
35	1.75	
40	2	

8.1.3 Internal EEPROM Saving Table

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

8.1.4 Internal Parameter Saving Status Table

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

8.1.5 Output Frequency Status Table

Frequency lock flag		
Frequency lock flag	0	
Frequency lock flag	1	Current filter number value = 1~40

8.1.6 Language Settings Status Table

Current lock flag		
Language	0	English
Language	1	Traditional
Language	2	Simple

8.1.7 Backlighting Settings Status Table

Frequency flag		
Background mode	0	OFF
Background mode	1	ON

8.1.8 Output Switch Status Table

Language		
Switch top bottom	0	NO, Switch NO (inverse)
Switch top bottom	1	NC, Switch NC

8.1.9

Current Output Status Table

Background mode		
Current top bottom	0	21.6~4mA
Current top bottom	1	4~21.6mA
Current top bottom	2	20~4mA
Current top bottom	3	4~20mA

8.1.10 Reset Total table

Switch top bottom		
Reset Total	0	
Reset Total	1	Reset