Smart Flow Sensors Manual
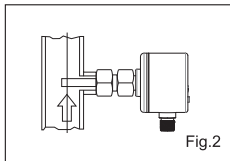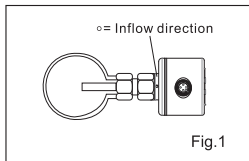
FL/FE Type

■ English

CE RoHS Ex NEPSI

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Installation

1. It is suggested to install the sensor in the horizontal pipe. (Fig.1)
   - In case of installing it on the bottom, the pipe should be cleaned From sediments.
   - You should pay attention to the capacity of the pipe and to the medium Itself.
2. In the vertical pipe, sensor should be installed where medium streams upwards.(Fig.2)

∘= Inflow direction

Fig.1

Fig.2

3. To avoid damage, minimum distance to curves, valves and crosssections should be considered(Fig.3):
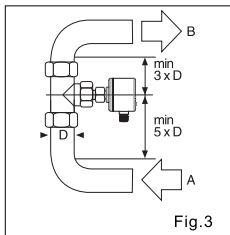   - Entrance (A)
   - Exit (B)
   - Diameter of the pipeline(D)
4. Choose the adaptor US0029 for low flow rate.
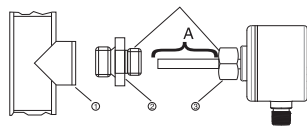5. When installing Ex-Proof wire, it is necessary to tighten it with wrench. Torque:1.5Nm
6. Please purchase ema qualified Ex-proof wire for this Ex-proof product as the requirement.
7. The housing of product in the pipe should be correctly connected with the equipotential grounding system.
8. Do not open when an explosive dust asmosphere is present.

B

min 3 x D

min 5 x D

D

A

Fig.3

Internal Thread M18x1.5

A

① ② ③

Fig.4

1. To screw the nut smoothly, please add the lubricant to nut ③ and threads. (Fig.4)
   Notice: It is disallowed to add lubricant on the probe.
2. Screw a suitable adapter ② to the joint ① . (Fig.4)
3. Insert the sensor to the adapter and then screw the nut ③
   The Max screwing torque: 50Nm. (Fig.4)
4. The insertion depth for the probe: The minimum insertion depth to the pipeline $\geqq$ 12mm. To ensure correct depth, the user can use ema adapter. (optional order)

Notice: The probe of sensor should not contact the pipe wall.

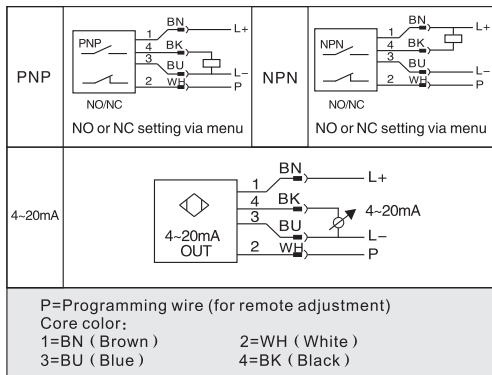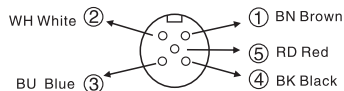| Mounting size M12 connector	Mounting size G1/4"connector	Mounting size G1/2''connector
13.5 27	13.5 27	21 35

Pinout & Connection

■ Pinout　　　　■ Pinout definition
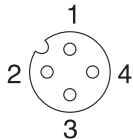
PIN1: L+,Positive pole（BN）
PIN2: P,Programming wire（WH）
PIN3: L-, Negative pole（BU）
PIN4: PNP/NPN output（BK）

■ 5 Pins

WH White ②
BU Blue ③
① BN Brown
⑤ RD Red
④ BK Black

■ 5 Pins definition

PIN1: L+,Positive pole（BN）
PIN2: Relay COM（WH）
PIN3: L–,Negative pole（BU）
PIN4: Relay NC（BK）
PIN5: Relay NO（RD）

■ Connection

PNP	
NPN	
4~20mA	

P=Programming wire (for remote adjustment)
Core color:
1=BN（Brown）　　2=WH（White）
3=BU（Blue）　　4=BK（Black）

■ Connection

| RELAY DC | |
| RELAY AC | |

EMA Core color:
1=BN（Brown）　2=WH（White）　5=RD（Red）
3=BU（Blue）　4=BK（Black）

❺　　　　　　　　❻

Menu setting and Calibration

■ Controls and visual indication

LED display

Setting buttons:
FL-Yellow
FE-Grey

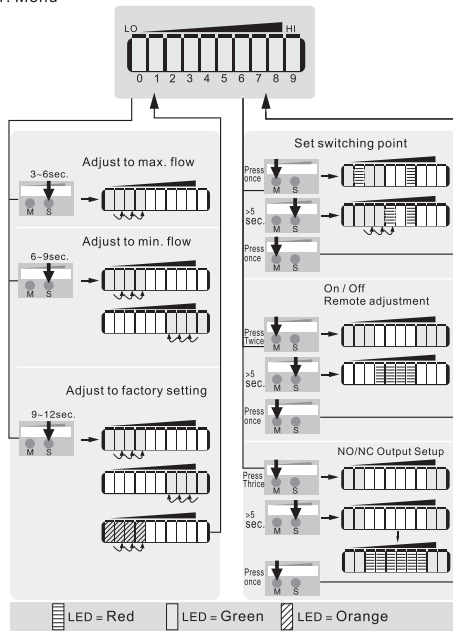### ■ Button definition

MODE/ENTER: Selection / Confirmation
LEARN/SET: Adjust to the maximum/minimum flow rate,value setting(Keep pressing button to scroll the display; Press button once to increase the value stepwise.)

■ Display (Operation)

The current flow rate is within the range of the display.
(LED bar Green)

The current flow rate exceeds the flow range
(LED 9 Flash)

The current flow is too low.
The indication of no flow in the pipe.
(LED 0 Flash)

Switching point display (SP):
LED Orange：Flow>SP; LED Red: Flow<SP

Parameter Setting

1. Menu

Adjust to max. flow

3~6sec.

Adjust to min. flow

6~9sec.

Adjust to factory setting

9~12sec.

Set switching point

Press once

>5 sec.

Press once

On / Off
Remote adjustment

Press Twice

>5 sec.

Press once

NO/NC Output Setup

Press Thrice

>5 sec.

Press once
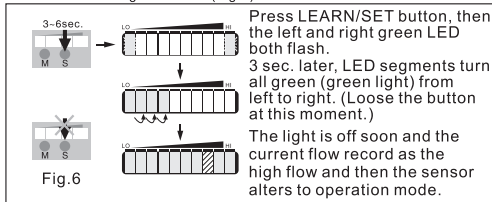
LED = Red   LED = Green   LED = Orange
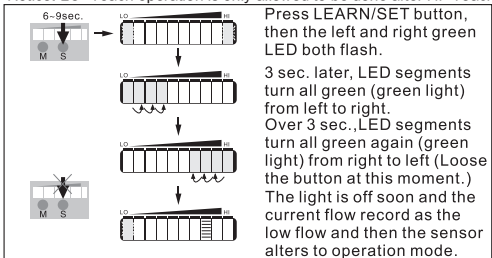
❼

❽

2. Sensing range setting

· Unlock the sensor before the setting

· Adjust to the max. flow (HI-Teach) Connect to the power. The sensor is ready to run after 8 sec., and then requires the highest rate of flow in the tube in order to run the learn-process successfully. The sensor detects the flow and sets it as the highest value. (Fig.6)

Press LEARN/SET button, then the left and right green LED both flash.

3 sec. later, LED segments turn all green (green light) from left to right. (Loose the button at this moment.)

The light is off soon and the current flow record as the high flow and then the sensor alters to operation mode.

Fig.6

· Adjust to the min. flow/flow stop. The sensor detects the current flow and sets the value as the smallest display value of LED. In the normal operation, the first green LED(LED 0) flashes when the flow lower than this value (or when the flow stops).

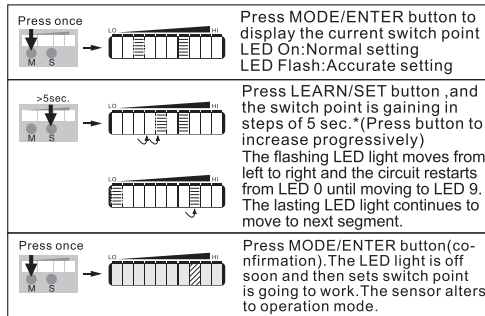Notice: LO-Teach operation is only allowed to be done after HI-Teach

Press LEARN/SET button, then the left and right green LED both flash.

3 sec. later, LED segments turn all green (green light) from left to right. Over 3 sec.,LED segments turn all green again (green light) from right to left (Loose the button at this moment.)

The light is off soon and the current flow record as the low flow and then the sensor alters to operation mode.

It is allowed the medium to pass the system or stop flow by the smallest flow required.

3. Configure switching point

Switching point (LED7), which efforts output response time, is set by factory setting.

· High switching point = Outputs at decreasing flow rate
· Low switching point = Outputs at increasing flow rate

Press MODE/ENTER button to display the current switch point
LED On:Normal setting
LED Flash:Accurate setting

Press LEARN/SET button ,and the switch point is gaining in steps of 5 sec.*(Press button to increase progressively)
The flashing LED light moves from left to right and the circuit restarts from LED 0 until moving to LED 9. The lasting LED light continues to move to next segment.

Press MODE/ENTER button(co-nfirmation).The LED light is off soon and then sets switch point is going to work.The sensor alters to operation mode.

* Decrease switch point: Move the flashing LED light to the highest setting value and then the circuit will restart from the lowest setting value.
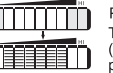** Beyond: If the flashing LED light moves over the highest setting value, the circuit will restart from the lowest setting value.

4. Start/Non-start remote adjustment

・On/off

| On | | 3 green LED lights flash in both left and right sides. |
| Off | | 4 red LED lights flash in the center. |

・Remote adjustment

Press MODE/ENTER button twice

 Press MODE/ENTER button twice to display the current point.

\> 5 sec.

 Press LEARN/SET button
The function changes in 5 sec. (The function is changing as press the LEARN/SET button.)

 Press MODE/ENTER button. (Confirmation) The display is off soon and then the sensor alters to operation mode.

After activating this function, connect PIN2 and L+ to run remote adjustment.
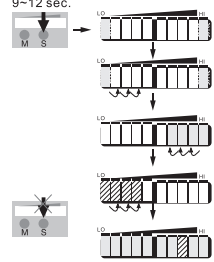
5. NO/NC Output Setup

・NO/NC

| NO | | 2 green LED lights flash in both left and right sides. |
| NC | | 6 red LED lights flash in the center. |

・NO/NC Setup

 Press MODE/ENTER button thrice to display the current setting.

 Press LEARN/SET button
The function changes in 5 sec. (The function is changing as press the LEARN/SET button.)

 Press MODE/ENTER button. (Confirmation) The display is off soon and then the sensor alters to operation mode.

6. Factory default

9~12 sec.

 Press LEARN/SET button and then the green LED lights flash in both left and right sides.

LED segments turns green from left to right within 3 sec.

More 3 sec., LED segments turn green again from right to left.

More 3 sec., LED segments turns orange from left to right. (Release the button at this moment.)

The display is off soon and all the setting return to factory default. The sensor alters to flow operation mode.

7. Remote adjustment

・Adjust to max. flow (HI-Teach):
connected to power, the sensor is ready to run after 8 seconds. and then requires the highest rate of flow in the tube in order to run the learning-process successfully. After that the sensor detects the flow and sets it as the highest value. Adjust wire (RED) to power L+,both left and right LED start flashing for 2-3 sec. LED segments turn all green (green light) from left to right. Loose the button during this procedure, the light is off soon and the current rate of flow record as the high flow and then this sensor alters to operation mode.

・Adjust to min.flow / flow stop (LO-Teach) :
The sensor detects the current flow and sets the value as the lowest display value of LED. In the normal operation, the first green LED (LED 0) flashes when the flow smaller than this value.(or when the flow stops)After connect remote adjust wire (RED) to power L+, both left and right LED start flashing for 2-3 sec. LED segments turn all green (green light) from left to right and then turn green again from left to right in 5-6sec. Loose the button during this procedure, the light is off soon and the current rate record as low flow and then this sensor alters to operation mode.

8. Lock/Unlock

This sensor can be locked electrically to avoid unintentional setting.The buttons are under lock while the units restant.
·Lock: This sensor owns automatic button lock function .When there is no button pressed in 2 minutes, the units locks automatically.Whenthe units lock,it is in running mode and gives signals as usual.
· Unlock：Press two buttons simultaneously and keep pressing for 10sec. The user can adjust relevant parameters by the buttons, while the 2 green LEDs in the center flash.

9. Hysteresis

When the flow increases and reaches the corresponding switching point (SPx), it outputs.
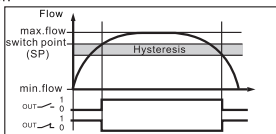When the flow decreases again and reaches the "SPx-hysteresis"
· Hysteresis is 2~4 cm/s (Suitable for water) when it is adjusted to high flow rate between 0~100 cm/s.
· The hysteresis increase as the flow gains when it is adjusted to high flow value which is over 100 cm/s.The normal output response time is 2 sec. and it is affected by the setting of LO-Teach and switching point.
· The lower of LO-Teach or of switching point, the faster to switch on the sensor.
· The higher of LO-Teach or of switching point, the faster to switch off the sensor.

Technical parameters

Operating Voltage[V]	20...36DC
Max.current loading [mA]	400
Short–circuit protection	YES
Reverse polarity protection	YES
Overload protection	YES
The indication of no flow	YES
Voltage drop [V]	< 2.5

	Current consumption [mA]	< 80
	Temperature gradient [K/min]	300
	Pressure rating [bar]	300
	Accuracy[%]	± 2... ± 10cm/s Factory setting as 25℃ water
	Housing material	Stainless steel 316L
	Probe material	Stainless steel 316L Also titanium alloy for your choice
	Connection	M12 socket
Liquid	Temperature [℃/℉]	−25...+80/−13...+176
	Setting range [cm/s]	3...300
	Max.sensing range [cm/s]	3...100
Gas	Temperature [℃/℉]	−25...+80/−13...+176
	Setting range [cm/s]	200...3000
	Max.sensing range [cm/s]	200...800
	Switching point adjustment	Button
	Power-on delay times[s]	< 8
	Output response time[s]	> 2
	Protection classification	IP68 FE: IP67 (Protection/Enclosure Rating is IP68 for non−explosive area)
Ambient	Temperature [℃/℉]	−25...+80/−13...+176
	Humidity[%]	15...85
	Shock Resistance [g]	50
	Vibration Resistance [g]	20
storage	Temperature [℃/℉]	−25...+100/−13...+212
	Humidity[%]	15...95
	LED Display	3 colors LED x 10
	Certification	CE; RoHS; EX
	EX marking	FE: Ex nA IIC T4 Gc / Ex tD A21 IP67 T100℃

Supply voltage

	Electric design	PNP NO/NC,NPN NO/NC
switching	Operating Voltage[V]	20…36DC
Analogue	Electric design	4…20mA
	Operating Voltage[V]	20…36DC
Relay	Electric design	RELAY NO/NC
	Operating Voltage[V]	20…36DC,85…265AC

⚠ 1. Please confirm the purchasing item is switching or analogue or Relay output and install the product according to the operating voltage.
2. For AC RELAY sensor, add the fuse ≤5A (Fast action) or cable with shield.
3. Please purchase ema qualified Ex-proof product.

Dimension

ø 50 15.20
17.70
M12*P1.0
103
63
A22
Internal thread
M18*P1.5
43.50
ø 8.75
ø 8.75

Unit：mm
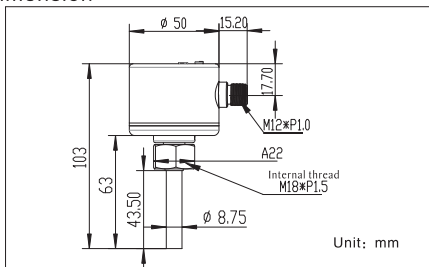
Note: Standard length of probe is about 45 mm, there is also extended length of probe 100/200 mm, and titanium alloy probe for corrosion protection for your choice.

Flow + Temperature Sensors Manual
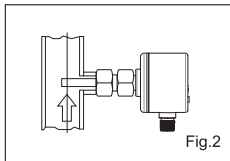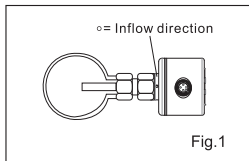
FL62/FE62 Type

■ English

CE RoHS Ex NEPSI

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Installation

1. It is suggested to install the sensor in the horizontal pipe. (Fig.1)
 · In case of installing it on the bottom,the pipe should be cleaned From sediments.
 · You should pay attention to the capacity of the pipe and to the medium Itself.
2. In the vertical pipe,sensor should be installed where medium streams upwards.(Fig.2)

Fig.1

Fig.2

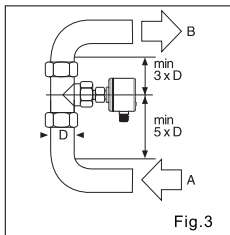3. To avoid damage, minimum distance to curves, valves and crosssections should be considered(Fig.3)：
 · Entrance (A)
 · Exit (B)
 · Diameter of the pipeline(D)
4. Choose the adaptor US0029 for low flow rate.
5. When installing Ex−Proof wire, it is necessary to tighten it with wrench. Torque:1.5Nm
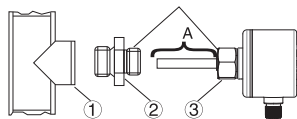6. Please purchase ema qualified Ex−proof wire for this Ex−proof product as the requirement.
7. The housing of product in the pipe should be correctly connected with the equipotential grounding system.
8. Do not open when an explosive dust asmosphere is present.
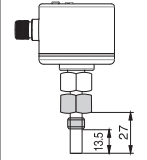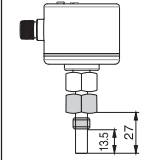

Fig.3

Internal Thread M18x1.5

Fig.4

1. To screw the nut smoothly, please add the lubricant to nut ③ and threads. (Fig.4)
   Notice: It is disallowed to add lubricant on the probe.
2. Screw a suitable adapter ② to the joint ① . (Fig.4)
3. Insert the sensor to the adapter and then screw the nut ③ The Max screwing torque: 50Nm. (Fig.4)
4. The insertion depth for the probe: The minimum insertion depth to the pipeline ≧ 12mm. To ensure correct depth, the user can use ema adapter. (optional order)

Notice: The probe of sensor should not contact the pipe wall.

Mounting size M12 connector	Mounting size G1/4"connector	Mounting size G1/2 ''connector

Pinout and Connection

PNP Connection
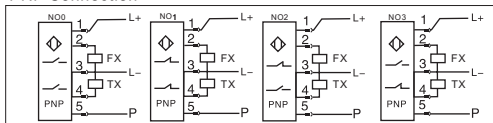
NPN Connection
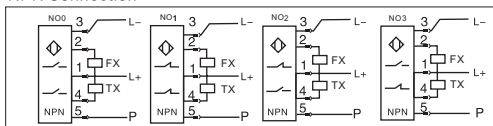
Relay and PNP output
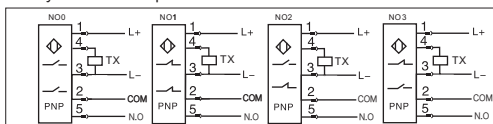
Relay and NPN output

Analogue output

■ Pinout

WH White ② ① BN Brown
BU Blue ③ ⑤ RD Red
④ BK Black
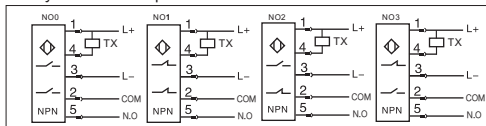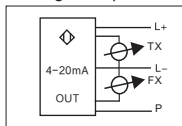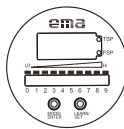
■ Pinout definition

PNP/NPN output	RELAY / PNP output	Analogue output
PIN1:L+ Positive pole (BN)	PIN1:L+ Positive pole (BN)	PIN1:L+ Positive pole (BN)
PIN2:Flow, PNP/NPN (WH)	PIN2:Flow, Relay COM (WH)	PIN2:Flow, 4...20 mA (WH)
PIN3:L- Negative pole (BU)	PIN3:L- Negative pole (BU)	PIN3:L- Negative pole (BU)
PIN4:Temp., PNP/NPN (BK)	PIN4:Temp., PNP/NPN (BK)	PIN4:Temp., 4...20 mA (BK)
PIN5:P, Programming wire (RD)	PIN5:Flow, Relay NO (RD)	PIN5:P, Programming wire (RD)

Menu

Menu	Function		Range	Segment	Notice
SP1	Switching point		−39.5°C ~ +150°C	0.5	
			−39°F ~ +302°F	1	
RP1	Hysteresis		−40°C ~ +149.5°C	0.5	Temperature
			−40°F ~ +301°F	1	
ASP	Analogue output Start point		−40°C ~ +140°C	0.5	Temperature
			−40°F ~ +284°F	1	
AEP	Analogue output End point		−30°C ~ +150°C	0.5	
			−22°F ~ +302°F	1	
dIS	Mode display		°C		Temperature
			°F		
OUT	Switching output	No0	NO for both		Temperature Flow
		No1	NC for both		
		No2	NO for Temperature, NC for Flow		
		No3	NC for Temperature, NO for Flow		
CAL	Adjustment		−9.9°C ~ +9.9°C	0.1	Temperature
			−17.5°F ~ +17.5°F	0.5	
HI	Highest temperature record				
LO	Lowest temperature record				Temperature
SP	Flow switching point		1.0 ~ 10.0	0.1	Flow
rE	Remote adjustment		EN	Enable	
			dEN	Disable	
HIF	High point learning				
LOF	Low point learning				
FRC	Reset(Factory default)				

Controls and visual indication

Button definition

MODE/ENTER: Selection / Confirmation
LEARN/SET: Adjust to the maximum/ minimum flow ,the tempterature SP (display, output, calibration of temp– erature, flow SP, and remote control)

Display (Operation)

The current flow rate is within the range of the display. (LED bar Green)

The current flow rate exceeds the flow range (LED 9 Flash)

The current flow is too low. The indication of no flow in the pipe. (LED 0 Flash)

Switching point display (SP) :
LED Orange: Flow>SP; LED Red: Flow<SP

Menu setting

· Unlock the sensor before the setting

(1) $SP1$：Temperature SP setting

Adjust MODE/Enter button to SP1 in menu, and then press LEA-RN/SET shortly. The menu would show the SP value of current temperature. Keep pressing LEARN/SET button for 2–3 sec.The display starts rolling to show SP value.

When the SP value is enough, loose the button and then press MODE/ENTER button again for confirmation.

(2) $RP1$：Temperature hysteresis setting

Hysteresis

Under NO,it outputs when the temperature reaches to or above that of SP1 (Under NC,it is reverse)

Under NO,it stops outputting when the temperaturer eaches to or below that of RP1.(Under NC,it is reverse)

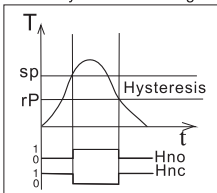Notice: The value of RP1 should be set smaller than SP1. It's usually smaller than 0.5°C

(3) DIS：Temperature display type setting

Adjust MODE/ENTER button to DIS in menu, and then press LEARN/SET button shortly. The menu shows the current temperature.

Keep pressing LEARN/SET button for 2–3 sec.When the menu alters to another display mode, press MODE/ENTER button for confirmation. Subsequently corresponding indicator varies.

(4) OUt：Temperature and Flow Output setting

Adjust MODE/ENTER button to OUt in menu, and then press LEARN/SET button shortly. The menu shows the current outputs of temperature and flow. (The following drawing) Keep pressing LEARN/SET button for 2–3 sec. When the menu varies, select the output required and then press MODE/ENTER button for confirmation.

	Temperature	Flow	
$n00$	NO ⁓—	NO ⁓—	Temperature and Flow are both NO
$n01$	NC ⌐—	NC ⌐—	Temperature and Flow are both NC
$n02$	NO ⁓—	NC ⌐—	Temperature is NO, Flow is NC
$n03$	NC ⌐—	NO ⁓—	Temperature is NC, Flow is NO

(5) CAL：Calibration of temperature

Adjust MODE/ENTER button to CAL in menu, and then press LEARN/SET button shortly. The menu would show the current adjusted value (0.0)of temperature. Keep pressing LEARN/SET button for 2–3 sec. When the value rolls to the required one, press MODE/ENTER for confirmation.

(6) Hi：Temperature high point record setting

This menu shows the highest temperature in the history record.Adjust MODE/ENTER button to H in menu and then press LEARN/SET button once for the record check ;press LEARN/SET button continuously for the record clear.

(7) LO：Temperature low point record setting

This menu shows the highest temperature in the history record. Adjust MODE/ENTER button to H in menu and then press LEARN/SET button once for the record check ;press LEARN/SET button continuously for the record clear.

(8) SP：Flow SP setting

Switching point (LED7) is factory set and the setting effects the response time.

High switching point = Response quickly when the flow decreases.

Low switching point = Response quickly when the flow increases.

Adjust MODE/ENTER button to SP in menu, and then press LEARN/SET button shortly. The menu shows the current switching point. Keep pressing LEARN/SET button for 2–3 sec. The value of SP circuits between 0–10 and loose the button when the value of SP reaches the required one. Finally, press MODE/ENTER button for confirmation and the adjusted value of SP is displayed in the row of LED segments accordingly.

(9) ⌐E： Flow remote adjustment

If this function operates, the sensor can remotely adjust HIF and LOF as long as connect power to PIN5. Adjust MODE/ENTER button to ⌐E in menu, and then press LEARN/SET button shortly. The menu would show whether it operates.

En： Remote adjustment activate

dEN： Remote adjustment inactivate.

To switch the display states, press LEARN/SET button for 2-3 sec. And then press MODE/ENTER button for confirmation.

(10) HIF： Flow high point setting

Adjust to highest flow（HI-Teach）

Connect to the power. The sensor is ready to run after 8 sec.,and then make the highest flow required by the medium pass the system. Adjust MODE/ENTER button to HIF in menu, and then press LEARN/SET for 2-3 sec. LED segments turn all green (green light) from left to right. Loose the button during this procedure, the light is extinct soon and the current rate of flow record as high flow and then this sensor alters to operation mode.

(11) LOF： Flow low point setting

The sensor detects the current flow and sets the value as the lowest display value of LED. In the normal operation, the first green LED (LED 0) flashes when the flow smaller than this value.(or when the flow stops) Adjust MODE/ENTER button to LOF in menu, and then press LEARN/SET for 2-3 sec. LED segments turn all green (green light) from left to right. Loose the button during this procedure, the light is extinct soon and the current rate of flow record as the low flow and then this sensor alters to operation model.

Notice: LO-Teach operation is only allowed to be done after HI-Teach.

(12) FRC： Reset (Factory default)

Adjust MODE/ENTER button to FAC in menu, and then press LEARN/SET for 2-3sec. LED segments turn all orange (orange light) from left to right. Loose the button during this procedure, the light extinct soon and all settings return to factory setting and then this sensor alters to operation mode.

(13) Remote adjustment

Adjust to highest flow (HI-Teach): connected to power,the sensor is ready to run after 8 sec. and allowed the highest flow required by medium to pass the system. After connect remote wire (RED) to power L+,both left and right LED start flashing for 2-3 sec. LED segments turn all green (green light) from left to right. Loose the button during this procedure, the light extinct soon and the current rate of flow will be record as the high flow and then this sensor alters to operation mode.

Adjust to lowest flow / flow stop（LO-Teach）：

The sensor detects the current flow and sets the value as the lowest display value of LED. In the normal operation, the first green LED (LED 0) flashes when the flow smaller than this value.(or when the flow stops)After connect remote wire (RED) to power L+, both left and right LED start flashing for 2-3 sec. LED segments turn all green (green light) from left to right and then turn green again from left to right in 5-6sec. Loose the button during this procedure, the light is extinct soon and the current rate of flow record as low flow and then this sensor alters to operation mode.

(14) Lock/ Unlock

Lock： This sensor owns automatic button lock function. When there is no button pressed in 2 minutes, the units lock automatically .When the units lock, it is in running mode and gives signals as usual.

Unlock： Press two buttons simultaneously and keep pressing for 10sec. The user can adjust relevant parameters by the buttons.

(15) Flow hysteresis

When the flow increases and reaches the corresponding switching point (SPx), it outputs.

When the flow decreases again and reaches the "SPx-hysteresis"

· Hysteresis is 2~4 cm/s (Suitable for water) when it is adjusted to high flow rate between 0~100 cm/s.

· The hysteresis increase as the flow gains when adjust to high flow value which is over 100 cm/s.The normal response time is 3-8 sec. and it is affected by the setting of LO-Teach and switching point.

· The lower the setting of LO-Teach or of switching point, the faster to switch on the sensor.

· The higher the setting of LO-Teach or of switching point, the faster to switch off the sensor.
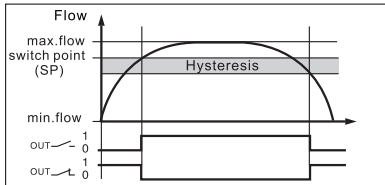
Technical parameters

Parameter	Flow + Temperature Sensor
Operating Voltage[V]	20…36V DC
Current loading[mA]	2 × 400
Short-circuit protection	YES
Reverse polarity protection	YES
Overload protection	YES
The indication of no flow	YES
Voltage drop[V]	< 2.5
Output setting	NO0…NO3
Current consumption[mA]	< 100
Max. temperature gradient [K/min]	300
Temperature sensing range[℃/℉]	-40…+150/-40…+302
Temperature display accuracy[℃/℉]	0.5/33
Liquid	Temperature [℃/℉]	−25…+80/−13…+176 (Flow)
	Setting range [cm/s]	3…300
	Max. sensing range [cm/s]	3…100
Gas	Temperature [℃/℉]	−25…+80/−13…+176 (Flow)
	Setting range [cm/s]	200…3000
	Max. sensing range [cm/s]	200…800

Pressure rating[bar]		300
Power-on delay time [s]		<8
Output response time[s]		<2
Protection classification		IP68 FE: IP67 (Protection/Enclosure Rating is IP68 for non−explosive area)
Ambient	Temperature [℃/℉]	-20...+80 /-13...+176
	Humidity[%]	15-85
	Shock Resistance [g]	50
	Vibration Resistance [g]	20
Housing material		Stainless steel 316L
Probe material		Stainless steel 316L
LED Display		3-color LED × 10; 7-segment display × 3
Certification		CE; RoHS; EX
EX marking		FE: Ex nA IIC T4 Gc / Ex tD A21 IP67 T100℃

Notice:

1. It must be installed by technicial engineer.
2. It must be follow domestic and international instructions about electrical equipment.
3. Power must be off before connecting the equipment.

Dimension

Unit：mm

ema®
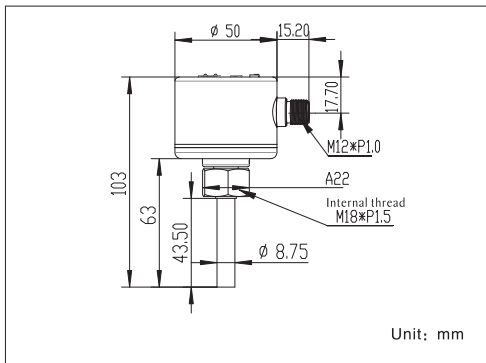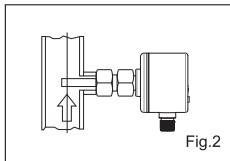
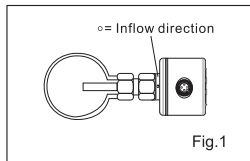## Potentiometer Flow Sensors Manual
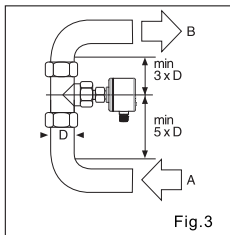
FL63/FE63 Type

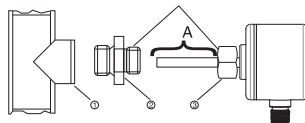■ English

CE RoHS

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Installation

1. It is suggested to install the sensor in the horizontal pipe. (Fig.1)
 · In case of installing it on the bottom,the pipe should be cleaned From sediments.
 · You should pay attention to the capacity of the pipe and to the medium Itself.
2. In the vertical pipe,sensor should be installed where medium streams upwards.(Fig.2)

Fig.1

Fig.2

3. To avoid damage, minimum distance to curves, valves and crosssections should be considered(Fig.3):
 · Entrance (A)
 · Exit (B)
 · Diameter of the pipeline(D)
4. Choose the adaptor US0029 for low flow rate.
5. When installing Ex−Proof wire, it is necessary to tighten it with wrench. Torque:1.5Nm
6. Please purchase ema qualified Ex−proof wire for this Ex−proof product as the requirement.
7. The housing of product in the pipe should be correctly connected with the equipotential grounding system.
8. Do not open when an explosive dust asmosphere is present.

Fig.3

Internal Thread M18x1.5

Fig.4

1. To screw the nut smoothly, please add the lubricant to nut ③ and threads. (Fig.4)
   Notice: It is disallowed to add lubricant on the probe.
2. Screw a suitable adapter ② to the joint ① . (Fig.4)
3. Insert the sensor to the adapter and then screw the nut ③ The Max screwing torque: 50Nm. (Fig.4)
4. The insertion depth for the probe: The minimum insertion depth to the pipeline ≧ 12mm. To ensure correct depth, the user can use ema adapter. (optional order)

Notice: The probe of sensor should not contact the pipe wall.

Pinout and Connection

■ Pinout
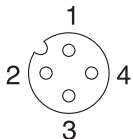
■ Definition of 4 colors wire
BN(brown) : L+ ,Positive pole
BU(blue) : L- , Negative pole
WH(white): PNP NO/NC overload output
BK(black): NPN NO/NC overload output

■ Connection

Menu setting and calibration

■ Control panel
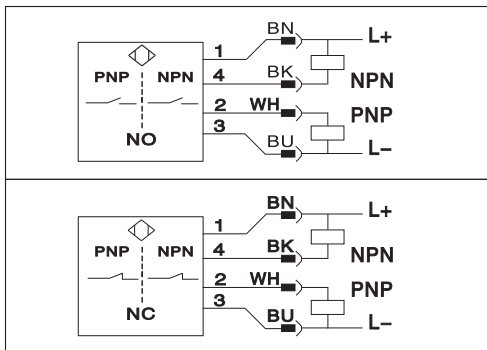
LED display

Potentiometer setting:
FL−Yellow
FE−Grey
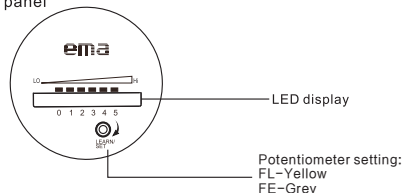
■ Definition of potentiometer setting

SP setting: Rotate in anticlockwise direction,LED increase
Rotate in clockwise direction,LED decrease

■ Display function (Operation mode)

	Current flow is too low (LED flashes)
	SP setting (LED 1 display)
	Current flow in display range (LED bar green)
	Exceed flow range (LED full display)

LED = Red	LED = Green

■ Function and parameter setting

SP setting

Calibrated the flow to requested value, it is ready to operate after 8 seconds once power is connected.It is allowed that the medium flow through the system with max.flow. Measuring current flow and set the value as SP setting value.

LO ————— HI

0 1 2 3 4 5

Calibrating potentiometer in anticlockwise direction until LED 1(Red light) flashes

LO ————— HI

0 1 2 3 4 5

Notice:

1.It must be installed by technicial engineer.
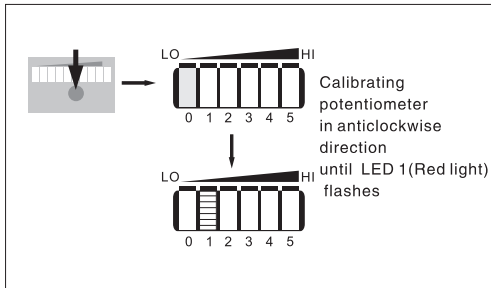2.It must be follow domestic and international instructions about electrical equipment.
3.Power must be off before connecting the equipment.
4.Please purchase ema qualified Ex-proof wire for this Ex-proof product.

■ Techinical parameters

Application	Liquid and gas
Operation voliage[v]	20…36DC
Output function	PNP/NPN NO,PNP/NPN NC
Max.overload current [mA]	400
Reverse Polarity protection	Yes
Overload protection	Yes
Short−circuit protection	Yes
The indication of no flow	Yes
Voltage Drop[V]	<3.5
Current consumption [mA]	<40
Max. temperature grdaient [K/min]	300
Pressure resistance	300
Liquid temperature[℃/℉]	−25…+80/−13…+176
Liquid setting range[cm/s]	3…300
Max.setting range[cm/s]	3…60
Liquid SP setting	By potentiometer (Factory setting is 15)
Gas temparature[℃/℉]	−25…+80/−13….+176
Gas setting range[cm/s]	200…3000
Max.setting range[cm/s]	200…800
Gas SP setting	By potentiometer (Factory setting is 150)
Startup time[s]	≤ 8
Output response time[s]	< 2

■ Techinical parameters

Protection classfication	IP68 FE: IP67 (Protection/Enclosure Rating is IP68 for non−explosive area)
Shock resistance[g]	50
Vibration resistance[g]	20
Housing material	stainless steel 316L
Probe material	stainless steel 316L
Connection	M12 socket
Certification	CE; RoHS; EX
EX marking	FE: Ex nA IIC T4 Gc / Ex tD A21 IP67 T100℃

Dimension

Unit:mm
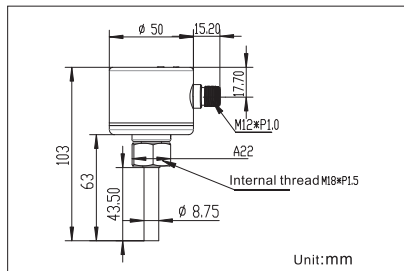
Flow Sensors With Remote Probe & Cable Manual

■ English

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Installation

1. It is suggested to install the sensor in the horizontal pipe. (Fig.1)
  · In case of installing it on the bottom,the pipe should be cleaned From sediments.
  · You should pay attention to the capacity of the pipe and to the medium Itself.
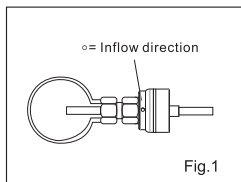2. In the vertical pipe,sensor should be installed where medium streams upwards.(Fig.2)

Fig.1
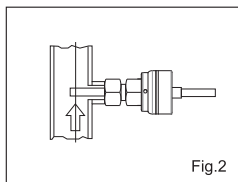
Fig.2

3. To avoid damage, minimum distance to curves, valves and crosssections should be considered(Fig.3):
  · Entrance (A)
  · Exit (B)
  · Diameter of the pipeline(D)

4. Choose the adaptor US0029 for low flow rate.

Fig.3

Internal Thread M18x1.5

Fig.4

1. To screw the nut smoothly, please add the lubricant to nut ③ and threads. (Fig.4)
   Notice: It is disallowed to add lubricant on the probe.
2. Screw a suitable adapter ② to the joint ① . (Fig.4)
3. Insert the sensor to the adapter and then screw the nut ③ The Max screwing torque: 50Nm. (Fig.4)
4. The insertion depth for the probe: The minimum insertion depth to the pipeline ≧ 12mm. To ensure correct depth, the user can use ema adapter. (optional order)

Notice: The probe of sensor should not contact the pipe wall.

Mounting size M12 connector	Mounting size G1/4"connector	Mounting size G1/2 ''connector

Pinout and Connection

■ Pinout

■ Pinout definition

PIN1:L+, Positive pole (BN)
PIN2: P,Programming wire (WH)
PIN3: L-,Negative pole (BU)
PIN4: PNP/NPN output (BK)

■ Connection

PNP	PNP NO/NC NO/NC setting via menu	NPN	NPN NO/NC NO/NC setting via menu
4~20mA	4~20mA OUT		

P=Programming wire (for remote adjustment)
Core color:
1=BN (Brown)   2=WH (White)
3=BU (Blue)   4=BK (Black)

■ Pinout (RELAY)

WH White ②   ① BN Brown
                ⑤ RD Red
BU Blue ③   ④ BK Black
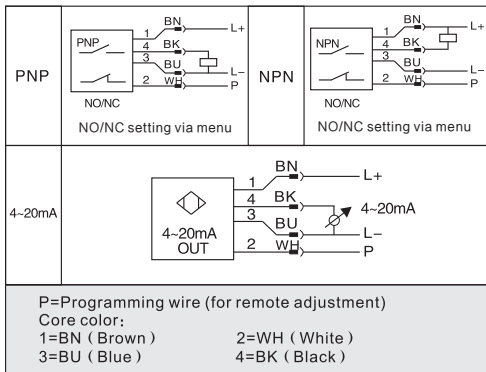
■ Pinout definition

PIN1: L+,Positive pole(BN)
PIN2: PNP/NPN output for Flow (WH)
PIN3: L–,Negative pole (BU)
PIN4: PNP/NPN output for Temperature (BK)
PIN5: P ,Programming wire (RD)

■ Connection

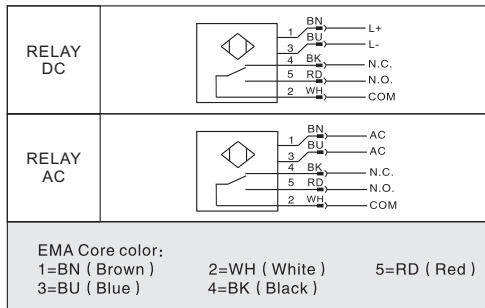| RELAY DC		L+ L- N.C. N.O. COM
RELAY AC		AC AC N.C. N.O. COM

EMA Core color:
1=BN (Brown)   2=WH (White)   5=RD (Red)
3=BU (Blue)   4=BK (Black)

Menu setting and calibration

■ Controls and visual indication

LED display

Setting buttons

■ Button definition

MODE/ENTER: Selection / Confirmation
LEARN/SET: Adjust to the maximum/minimum flow rate,value setting(Keep pressing button to scroll the display; Press button once to increase the value stepwise.)

■ Display (Operation)

The current flow rate is within the range of the display. (LED bar Green)

The current flow rate exceeds the flow range (LED 9 Flash)

The current flow is too low. The indication of no flow in the pipe. (LED 0 Flash)

Switching point display (SP) :
LED Orange: Flow>SP; LED Red: Flow<SP

Parameter Setting

1. Menu

Adjust to max. flow
3~6sec.

Adjust to min. flow
6~9sec.

Adjust to factory setting
9~12sec.

Set switching point
Press once
>5 sec.
Press once

On / Off
Remote adjustment
Press Twice
>5 sec.
Press once

NO/NC Output Setup
Press Thrice
>5 sec.
Press once

▤ LED = Red   ▢ LED = Green   ▨ LED = Orange

44

2. Sensing range setting

· Unlock the sensor before the setting
· Adjust to the max. flow (HI-Teach) Connect to the power. The sensor is ready to run after 8 sec., and then requires the highest rate of flow in the tube in order to run the learn–process successfully. The sensor detects the flow and sets it as the highest value. (Fig.6)

Press LEARN/SET button, then the left and right green LED both flash.

3 sec. later, LED segments turn all green (green light) from left to right. (Loose the button at this moment.)

The light is off soon and the current flow record as the high flow and then the sensor alters to operation mode.

Fig.6

· Adjust to the min. flow/flow stop. The sensor detects the current flow and sets the value as the smallest display value of LED. In the normal operation, the first green LED(LED 0) flashes when the flow lower than this value (or when the flow stops).
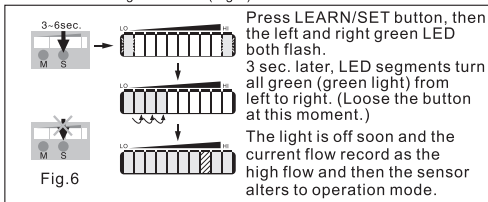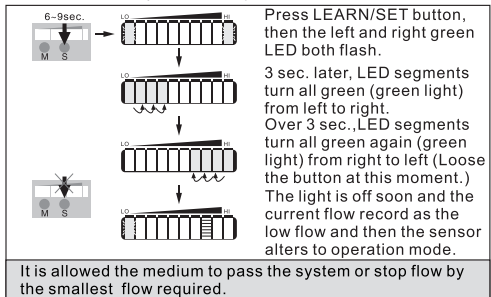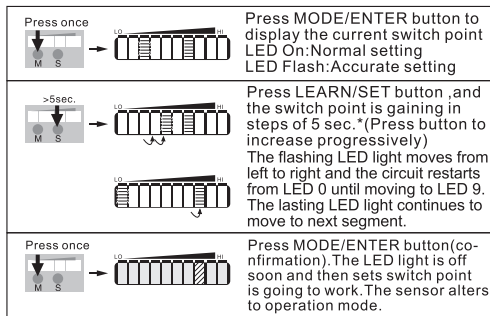Notice: LO-Teach operation is only allowed to be done after HI-Teach

Press LEARN/SET button, then the left and right green LED both flash.

3 sec. later, LED segments turn all green (green light) from left to right.
Over 3 sec.,LED segments turn all green again (green light) from right to left (Loose the button at this moment.)

The light is off soon and the current flow record as the low flow and then the sensor alters to operation mode.

It is allowed the medium to pass the system or stop flow by the smallest flow required.

3. Configure switching point

Switching point (LED7), which efforts output response time, is set by factory setting.
· High switching point = Outputs at decreasing flow rate
· Low switching point = Outputs at increasing flow rate

Press MODE/ENTER button to display the current switch point
LED On:Normal setting
LED Flash:Accurate setting

Press LEARN/SET button ,and the switch point is gaining in steps of 5 sec.*(Press button to increase progressively)
The flashing LED light moves from left to right and the circuit restarts from LED 0 until moving to LED 9. The lasting LED light continues to move to next segment.

Press MODE/ENTER button(confirmation).The LED light is off soon and then sets switch point is going to work.The sensor alters to operation mode.

* Decrease switch point: Move the flashing LED light to the highest setting value and then the circuit will restart from the lowest setting value.
** Beyond: If the flashing LED light moves over the highest setting value, the circuit will restart from the lowest setting value.

4. Start/Non-start remote adjustment

・On/off

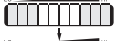|		
On		3 green LED lights flash in both left and right sides.
Off		4 red LED lights flash in the center.

・Remote adjustment

Press MODE/ENTER button twice

 Press MODE/ENTER button twice to display the current point.

> 5 sec.

 Press LEARN/SET button
The function changes in 5 sec. (The function is changing as press the LEARN/SET button.)

 Press MODE/ENTER button. (Confirmation) The display is off soon and then the sensor alters to operation mode.

After activating this function, connect PIN2 and L+ to run remote adjustment.

5. NO/NC Output Setup

・NO/NC

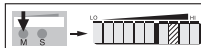|		
NO		2 green LED lights flash in both left and right sides.
NC		6 red LED lights flash in the center.

・NO/NC Setup

 Press MODE/ENTER button thrice to display the current setting.

 Press LEARN/SET button
The function changes in 5 sec. (The function is changing as press the LEARN/SET button.)

 Press MODE/ENTER button. (Confirmation) The display is off soon and then the sensor alters to operation mode.

6. Factory default

9~12 sec.

 Press LEARN/SET button and then the green LED lights flash in both left and right sides.

LED segments turns green from left to right within 3 sec.

More 3 sec., LED segments turn green again from right to left.

More 3 sec., LED segments turns orange from left to right. (Release the button at this moment.)

The display is off soon and all the setting return to factory default. The sensor alters to flow operation mode.

7. Remote adjustment

・Adjust to max. flow (HI-Teach):

connected to power, the sensor is ready to run after 8 seconds. and then requires the highest rate of flow in the tube in order to run the learning-process successfully. After that the sensor detects the flow and sets it as the highest value. Adjust wire (RED) to power L+,both left and right LED start flashing for 2-3 sec. LED segments turn all green (green light) from left to right. Loose the button during this pro-cedure, the light is off soon and the current rate of flow record as the high flow and then this sensor alters to operation mode.

・Adjust to min.flow / flow stop (LO-Teach) :

The sensor detects the current flow and sets the value as the lowest display value of LED. In the normal operation, the first green LED (LED 0) flashes when the flow smaller than this value.(or when the flow stops)After connect remote adjust wire (RED) to power L+, both left and right LED start flashing for 2-3 sec. LED segments turn all green (green light) from left to right and then turn green again from left to right in 5-6sec. Loose the button during this procedure, the light is off soon and the current rate record as low flow and then this sensor alters to operation mode.

8. Lock/Unlock

This sensor can be locked electrically to avoid unintentional setting.The buttons are under lock while the units restant.
·Lock: This sensor owns automatic button lock function .When there is no button pressed in 2 minutes, the units locks automatically.Whenthe units lock,it is in running mode and gives signals as usual.
·Unlock：Press two buttons simultaneously and keep pressing for 10sec. The user can adjust relevant parameters by the buttons, while the 2 green LEDs in the center flash.
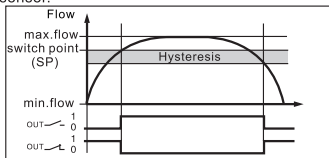
9. Hysteresis

When the flow increases and reaches the corresponding switching point (SPx), it outputs.
When the flow decreases again and reaches the "SPx-hysteresis"
·Hysteresis is 2~4 cm/s (Suitable for water) when it is adjusted to high flow rate between 0~100 cm/s.
·The hysteresis increase as the flow gains when it is adjusted to high flow value which is over 100 cm/s.The normal output response time is 2 sec. and it is affected by the setting of LO-Teach and switching point.
·The lower of LO-Teach or of switching point, the faster to switch on the sensor.
·The higher of LO-Teach or of switching point, the faster to switch off the sensor.

Technical parameters

Operating Voltage[V]	20...36DC
Max.current loading [mA]	400
Short−circuit protection	YES
Reverse polarity protection	YES
Overload protection	YES
The indication of no flow	YES

	Voltage drop [V]	< 2.5
	Current consumption [mA]	< 80
	Temperature gradient [K/min]	300
	Pressure rating [bar]	300
	Accuracy[%]	± 2... ± 10cm/s Factory setting as 25℃ water
	Housing material	Stainless steel 316L
	Probe material	Stainless steel 316L
	Connection	M12 socket
Liquid medium	Temperature [℃/°F]	−25...+80/−13...+176
	Setting range [cm/s]	3...300
	Max.sensing range [cm/s]	3...100
Gas medium	Temperature [℃/°F]	−25...+80/−13...+176
	Setting range [cm/s]	200...3000
	Max.sensing range [cm/s]	200...800
	Switching point adjustment	Button
	Power−on delay time[S]	< 8
	Output response time[S]	> 2
	Protection classification	IP68
Ambient	Temperature [℃/°F]	−25...+80/−13...+176
	Humidity[%]	15...85
	Shock Resistance [g]	50
	Vibration Resistance [g]	20
Storage	Temperature [℃/°F]	−25...+80/−13...+176
	Humidity[%]	15...95
	LED Display	3 colors LED x 10
	Certification	CE; RoHS

Supply Voltage

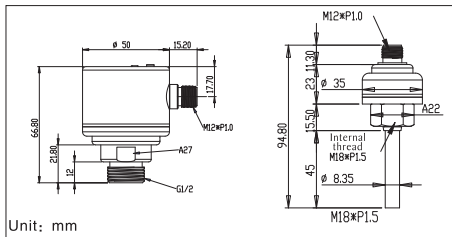|		
switching	Electric design	PNP NO/NC,NPN NO/NC
	Operating Voltage[V]	20…36DC
Relay	Electric design	RELAY NO/NC
	Operating Voltage[V]	20…36DC,85…265AC

⚠ 1. Please confirm the purchasing item is switching or Relay output and install the product according to the operating voltage.
2. For AC RELAY sensor, add the fuse ≤5A (Fast action) or cable with shield.

Notice:
⚡ 1.It must be installed by technicial engineer.
2.It must be follow domestic and international instructions about electrical equipment.
3.Power must be off before connecting the equipment.

Dimension

Unit：mm

Instruction(The following figure)

① Control Unit

② Cable

③ Remote Probe