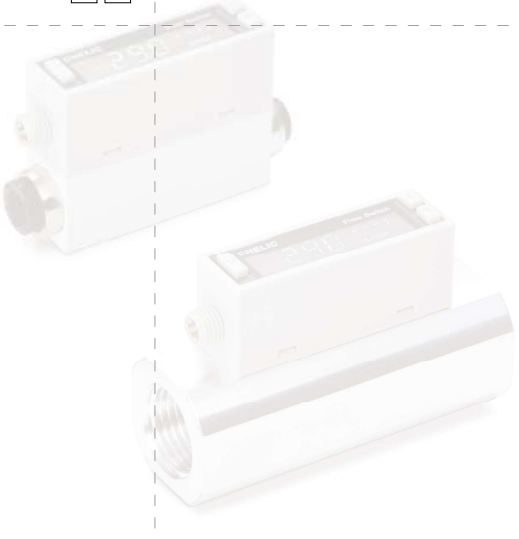




## FP 系列 數字式流量傳感器 差壓型 操作說明書

### FP Series - Differential Pressure Type Flow Switch

繁 En



## 使用安全事項與警告

使用安全警告與注意事項分為「危險」、「警告」、「注意」。

**危險** 表示如果進行操作，有可能導致死亡或重傷的危險內容並且危險發生時的緊急性(緊急程度)高的警告。

**警告** 表示如果進行錯誤操作，有可能導致死亡或重傷的危險內容。

**注意** 表示如果進行錯誤操作，有可能導致輕傷或財物損失的危險內容。

### 關於使用液體

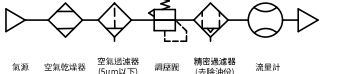
**危險** 嚴禁用於易燃性氣體

### 注意

- 請使用不含氯、硫、酸、鹼等腐蝕成分的乾燥氣體，且不含灰塵及油霧的乾淨氣體。
- 使用壓力範圍(請參考規格書之額定範圍內使用)否則會影響感測器的使用壽命。
- 含大量冷凝水的壓縮空氣會造成本產品或其他驅動元件不良的原因(請檢查後冷卻器-空氣乾燥器-冷凝水收集器等裝置)。
- 由於空壓機產生的過多碳粉會附着在本產品內部，成為動作不良的原因。
- 各系列的前壓不同，選擇時請多加注意。
- 請遵守測定流量、使用壓力。(使用規程以上的壓力會造成產品損壞)。
- 感測器的感測壓力與壓力有關，如果其流量計連接後，感測器流量計會因為誤差而數值會有誤差(屬於正常現象)。

### 警告

- 不能作為專用儀表使用。
- 不適用於計量法，因此請不要用於商業交易(請做為工業用檢測器使用)。
- 除適用液體之外的液體不能保證其精度(因此請不要使用)。
- 請先確認感測器調整後，再讓液體流動。(以免施加超過感測壓力的限制，導致損壞)。
- 感測器的一次使用時間時，請使用禁油規格的閘，否則可能因潤滑油飛濺造成感測器堵塞或破損。
- 使用腐蝕性液化氣體時，請務必氣化後使用(因為液化的氣體進入本產品可能導致產品破損)。
- 液體中可能含雜質物，請將感測器設置於前端(建議空氣管路)。



### 關於佈線

**危險** 電源電壓及輸出請使用規格電壓。(如加規程以上之電壓，則可能造成本產品受損或觸電，嚴重者可能會導致火災)

### 警告

- 請勿負載短路。(本產品具有自動保護功能，但無法保證所有錯誤配線，所以請多加注意配線)。
- 請確認配線上的絕緣性。
- 請勿把電線與動力線合為同一配線。(請採用不同配線以免包含開關的控制回路產生干擾而造成錯誤動作的原因)。
- 請勿在通電中進行配線。(以免造成接線器損壞或觸電風險)。
- 設置本產品及配線時，請遠離強電流電線等雜訊源，而加載於電源線的突波浪湧另外採取防浪對策，否則可能造成顯示或輸出變動)。
- 在流量計動作過程中，請勿碰觸端子或接座。(以免觸電、產生運作錯誤或損壞感測器)。
- 不穩定的電源有時超過穩定電壓，或導致本產品損壞，或導致本產品精度下降。

### 注意

- 動作過程中如果發生異常，請立即切斷電源，停止使用本產品，並與銷售店聯繫。
- 本產品的流量請保持在額定流量範圍內。
- 超量輸出的設定值時，控制系統可能會自動動作，因此請停止異常運行後再變更輸出設定值。
- 請一年至少定期檢查一次本產品，確認本產品正常動作。
- 請不要拆卸本產品，否則可能會造成故障。
- 外殼材料為樹脂，去除污漬時請不要使用剝離、酒精、清洗劑等。
- 請注意斷電或感測器產生的感測電壓，取流量感測器時請將電源上連接含流量感測器的其他元件時，為確保控制器的輸入裝置動作，如果您將輸出線和電源線一併短路或切斷電源線一側，可能會在流量感測器的開關輸出迴路上產生反向電壓，造成流量感測器損壞。

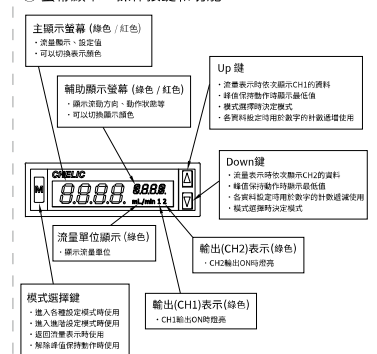
### 關於安裝

- 請注意液體的方向。(流動方向請依照本體所指示的前端方向)。
- 安裝前請再次清洗感測器為殘留的污垢。
- 請勿碰撞、拍打。(若施加過大的撞擊，有可能導致內部損壞)。
- 在安裝時，請勿拉扯電線，以免拉力過大導致故障。

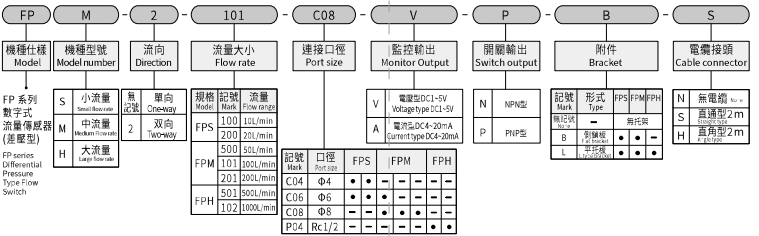
### 注意

- 本產品LCD顯示器之流量，可能因為角度不同會看不清楚的情況。
- 請使用適當的扭矩來擰緊流量計。
- 安裝前請先檢查沒有流量的情況下，先通電再通氣，以確保產品參數校正正確。
- 使用差壓式流量計，請確保提供穩定的壓力源。
- FPX系列大流量計，在工作壓力方面建議在5bar以上，若低於5bar則可量測的流量工作範圍會縮小。
- 本產品在斷電狀態由於差壓型，液體內含有壓力差導致數值不能瞬間歸零，建議將感測器排出可以瞬間恢復至零點。

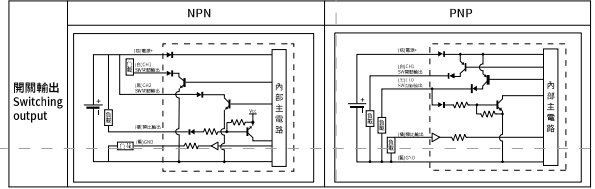
### ① 螢幕顯示、操作按鍵和功能



## FP 訂購稱呼代號 How to Order



## 輸出選擇 Output

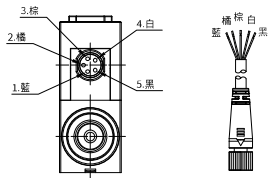


確認開關訊號NPN或PNP型，並依需求選擇

輸出訊號	電壓型 電流型	電阻
輸出電壓	DC1-5V = 流量全刻度0-100%L DC4-20mA = 流量全刻度0-100%L	50k Ω
輸出電阻		300 Ω

輸出訊號具電壓及電流，請確認輸出訊號，並依需求選擇

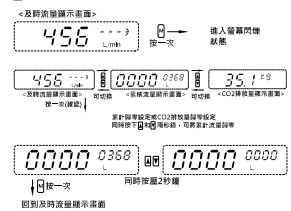
## FP電纜線材規格表 Specification



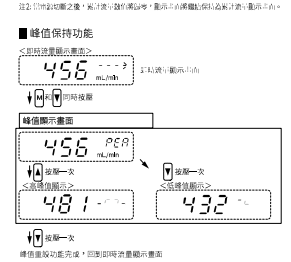
Pin 顏色	內容 Content
01 棕色	電源+Power (電壓輸入, 24V)
02 白色	CH1 (開關輸出1 switch output1 : max: 50mA)
03 藍色	CH2 (開關輸出2 switch output2 : max: 50mA)
04 橘色	電壓輸出 Voltage output: 1-5V 電流輸出 Load impedance: 4-20mA
05 藍/黑	電源 Power -(GND)

## 1 操作模式 / 一般模式

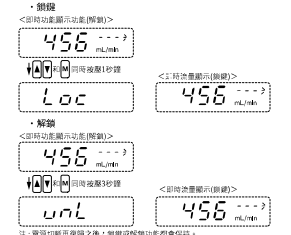
### ■ 累計流量顯示



### ■ 峰值保持功能



### ■ 鎖鍵功能

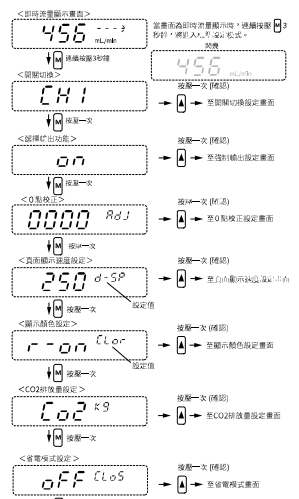


### ■ 解鎖

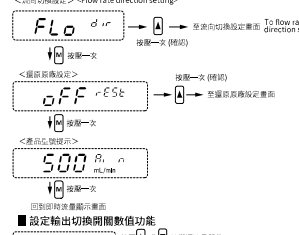


## 2 標準設定模式

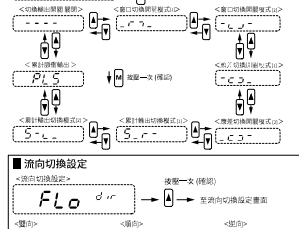
### ■ 如何進入標準設定模式



### ■ 設定輸出切換開關數值功能



### ■ 流向切換設定



### CH1 開啟/關閉數值設定

<下極限數值設定> → <上極限數值設定>

123 → 234

▲ 上動: 按壓一次可增加一個單位流量數值  
按壓後將會自動增加流量單位數值

▼ 下動: 按壓一次可減少一個單位流量數值  
連續按壓將會連續減少流量單位數值

按壓一次(確認)

### 開關動作說明

名稱	LCD顯示	動作說明
窗口開關模式1	- 7 -	在指定範圍內關閉輸出ON
窗口開關模式2	- 7 -	在指定範圍外關閉輸出ON
應差開關模式1	- 0 -	設定一個應差範圍,達到指定流量以上時,觸發輸出OFF
應差開關模式2	- 0 -	設定一個應差範圍,達到指定流量以上時,觸發輸出ON (顯示HHH值時亦將輸出ON)
累計輸出切換模式1	5 - r -	達到累計值以上時,觸發輸出ON
累計輸出切換模式2	5 - r -	達到累計值以上時,觸發輸出OFF
累計脈衝輸出	PLS	設定一個固定累計值,達到該累計值時,觸發一個脈衝輸出 (脈衝寬度約40ms)
切換輸入開關OFF	- - - -	開關動作OFF

### 輸出選擇模式

<輸出選擇模式設定畫面>

CH1 CH2 → 回到即時流量顯示畫面

<按壓輸入(CH1輸出開關)>

CH1 CH2

<按壓輸入(CH2輸出開關)>

CH1 CH2

<按壓輸入(CH1和CH2輸出開關)>

CH1 CH2

### 0點校正模式 - 頁面設定

同時按壓 (調整數值讀取) 調整數值顯示

0000 Adj → 0001 Adj

按壓一次(確認)

→ 回到即時流量顯示畫面

## 1 How to operate - Normal mode

### Displaying the integrated flow

<Instantaneous flow rate display>

456 L/min

Press once → Display unit selection

Switchable: 456 L/min, 0000 0368 L, 35.1 x 9 CO2

Integration or CO2 reset integration is reset when the And keys are held down for 2 sec.

0000 0368 L, 0000 0000 L

### Peak hold function

<Instantaneous flow rate display>

456 L/min

Display unit selection

Peak hold display

456 PER L/min

Being held down / Being held down

Peak value displayed: 481 L/min

Bottom value displayed: 432 L/min

Reset peak hold function. To instantaneous flow rate display

### Key lock function

Key lock

<Instantaneous flow rate display (key lock)>

456 L/min

Being held down (CH1 output ON) → CH1 CH2

Being held down (CH2 output ON) → CH1 CH2

Being held down (CH1 and CH2 output ON) → CH1 CH2 12

Key unlock

<Instantaneous flow rate display (key lock)>

456 L/min

Being held down (CH1 output ON) → CH1 CH2

Being held down (CH2 output ON) → CH1 CH2

Being held down (CH1 and CH2 output ON) → CH1 CH2 12

### 畫面顯示速度設定

按壓 或 設定選擇流量單位

畫面顯示速度設定

250 500 1000

<250ms> <500ms> <1000ms>

按壓一次(確認) 回到即時流量顯示畫面

### 顯示顏色設定

顯示顏色設定畫面

按壓 或 設定選擇流量單位

按壓 設定

紅色為開啟 紅色為關閉 常紅 常綠

綠色為開啟 綠色為關閉 常紅 常綠

按壓一次(確認) 回到即時流量顯示畫面

### CO2排放量設定

CO2排放量設定

Lo2 x 9

按壓 或 設定選擇CO2排放量設定

<電力設定>

0.20 kV → 100 5Bar

<流量設定>

100 L/min → 0000

按壓 或 設定選擇流量單位

<省電模式設定>

on CloS → off CloS

按壓 或 設定選擇省電模式

### 還原原廠設定

還原原廠設定畫面

還原設定未執行

OFF rESt → ON rESt

按壓一次(確認) 回到即時流量顯示畫面

### 產品型號顯示

產品型號顯示

<產品型號顯示> 最大測量流量

500 L/min

<測量選擇> <輸出模式>

Ai: Air N: NPN輸出 P: PNP輸出

## 2 Standard setting mode

### How to enter to standard setting mode

Instantaneous flow rate display: 456 L/min

At instantaneous flow rate display, press key for 3 sec. to enter to standard setting mode.

Flash: 456 L/min

CH1

Press once → To switch output setting display

Press once → To force to output setting display

Press once → To 0 point adjustment setting display

Press once → To display speed setting display

Setting value: r-on CloS

Press once → To displayed color setting display

Setting value: Lo2 x 9

Press once → To CO2 discharge amount calculation setting display

Press once → To sleep mode setting display

Press once → To reset setting display

Press once → To model number display

### Data setting of switch output function

Press 或 key to select flow rate unit

Press key to set.

CH1

Press once (determination)

CH1 CH2

Press once (determination)

CH1 CH2

Press once (determination)

CH1 CH2 12

Press once (determination)

CH1 CH2

Press once (determination)

CH1 CH2

## Safety Precautions

The safety cautions are ranked as DANGER, WARNING and CAUTION in the following order.

**DANGER:** When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, or when there is a high degree of emergency to a warning.

**WARNING:** When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries.

**CAUTION:** When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

## Working fluid

**DANGER**

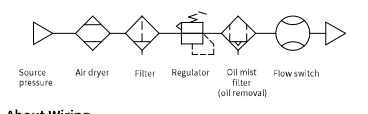
- Do not use this product with flammable fluids.

**CAUTION**

- Phase use dry air without chlorine, sulfur, acid and other corrosive content fluid, also clean air without dust and oil mist.
- Please refer to the ambient pressure range in the operating pressure ranges specification or it will affect the life of the sensing component.
- Compressed air containing condensing water will cause defects in this product or other pneumatic components. Please install the cooler machine, air dryer, condensate collector or other countermeasures.
- Excessive toner generated by the air compressor will adhere to the inside of the product and cause malfunctions.
- Please check before purchasing, the pressure resistance of each series are different.
- Please observe the measured flow rate and operating pressure. (Using pressure above the specification will cause product damage)

**WARNING**

- This product cannot be used as a business meter.
- This product does not conform to measurement laws, and cannot be used for commercial purposes. Use this for factory applications.
- Do not use fluids other than the applicable fluid because accuracy cannot be guaranteed.
- Please confirm the adjustment of the pressure regulator before allowing fluid to flow. (Don't impose a limit that exceeds the rated pressure and cause damage)
- When using a valve on the primary side of this product, use only an oil-prohibited specification valve. This sensor could malfunction or fail if exposed to splattering grease, oil, etc. Also, there is a risk of abrasion dust entering the sensor depending on the valve. Install a filter to prevent the dust from entering the sensor.
- Vaporize liquids gas before use. Entry of liquidities gas into this product will result in damage.
- Foreign matter may be mixed in the fluid, please install the filter at the front end. (Recommended circuit)



## About Wiring

**DANGER**

- Use power voltage; and output within the specified voltage. If voltage exceeding the specified voltage is applied, the sensor could malfunction or be damaged, or electrical shock or fire could occur. Do not use a load exceeding the output rating. Failure to observe this could result in damage to the output or fire.

**WARNING**

- Do not short-circuit the load.
- This product is equipped with overload protection but it cannot protect all wrong wiring, so please pay more attention to wiring.
- Please confirm the insulation while wiring.
- Do not mix with other circuits to cause over-current, which may cause damage.
- Do not combine electric wire and power wire together while proceeding wiring. (Please use different wiring to avoid interference caused by the control circuit containing the switch effect wrong operation.)
- Do not process wiring while power-on.
- (Avoid the damage to the connector or risk of electric shock.)
- Please keep away from sources of noise such as high-current wires when install and wiring this product. Take additional protective measures against surges loaded on the power line or the display or output could fluctuate.
- Do not touch the connectors or sockets during the operation of the flowmeter. To avoid electric shock, operation error or switch damage.
- If power is not stabilized, the peak value could be exceeded. This could damage the product or impair accuracy.

- Stop the control device and machine device, and turn the power off before wiring. Starting operation suddenly could result in unpredictable operation and hazards. Conduct an energized test with control devices and machine devices stopped, and set target status. Discharge electrostatic accumulated in personnel or tools before and during work. Connect wire bend-resistant material, such as robot wire material, for movable sections.
- Do not short-circuit the load. This product could rupture or burn.
- The cable connector of this product contains a connector with a protective sleeve. If the connector of this product is not used, please protect the connector to prevent unfavorable factors such as impurities from causing problems.
- When wiring, please confirm the wiring color and terminal number. (Wrong wiring could cause damage to the switch, malfunctions and errors.)
- Therefore, before wiring, please confirm the wiring color and terminal number in the instruction manual before wiring, and use a DC power supply with sufficient capacity and small fluctuations.
- The product after power-on, it takes 4 seconds detections, within 4 seconds the switch is no movement while flow rate working and take it as signal program setting.

**CAUTION**

- If a problem occurs during operation, turn off power and stop using. Then contact your dealer immediately for the issue or question.
- Keep this product flow switch within the rated flow range.
- If the output setting value is change, control system devices could operate unintentionally. Stop devices before changing settings.
- Regularly inspect the product at least once a year or more, and confirm that this is operating correctly.
- Do not disassemble or modify this product. Doing so could result in faults.
- This case is made of resin. Do not use solvent, alcohol or any other detergent in cleaning to remove contamination, etc.
- Check backflow currents caused by broken wiring or wiring resistance. If other devices, including a flow sensor, and the switch output wire and power line's minus side are temporarily short circuited to check the operation of the control panel's input unit, or if the power line's minus side is broken, a backflow current could flow to and damage the flow sensor switch output circuit.

### Installation Adjustment

**WARNING**

- Note the direction of the fluid. (The flow direction should follow the direction of the arrow indicated by the body)
- Before installation, blow off the dirt remaining in the piping.
- Do not drop or beat. (If an excessive impact is applied, it may cause internal damage.)
- During installation, please do not pull the power cord to avoid damage caused by excessive tension.

**CAUTION**

- The flow rate of the LCD display of this product may be unclear due to different angles.
- Please use proper torque to lock the flowmeter.
- When using this product, please turn on the power and then ventilate when there is no flow to ensure that the zero point calibration of the product is correct.
- When using a differential pressure flow meter, make sure to provide a stable pressure source.
- For the FPX series, the working pressure is recommended to be above 5bar. If it is lower than 5bar, the working range of the measurable flow will be reduced.
- Due to the differential pressure characteristics of this product in the saturated state, the gas cannot be returned to zero instantaneously due to the pressure difference in the flow channel. It is recommended that the gas be discharged to instantly return to zero.

### Names and Functions of Each Parts

Main display (Green/Red): Display flow rate and selected settings. Indication color is selectable.

Up key: Press any key to display -> Display the CH2 data. During sleep hold operation -> Select the maximum value. When selecting a mode -> Set the mode. When setting ends data -> Increase the value, etc.

Sub-display (Green/Red): Display the maximum value. When selecting a mode -> Set the mode. When setting ends data -> Increase the value, etc.

Down key: Press any key to display -> Display the CH2 data. During sleep hold operation -> Display the maximum value. When selecting a mode -> Set the mode. When setting ends data -> Increase the value, etc.

Unit display (Green): Display flow rate unit.

Switch output indicator (CH2): Light when switch output (CH2) turns on.

Mode key: Press to enter each setting mode. Press to return to flow rate display. Press to cancel peak hold operation.

## Setting of display speed

Display setting of display speed

250 500 1000

Press or key to select response time

Press key to set.

Press once (determination)

To instantaneous flow rate display

### Setting of display color

Display color setting display

r-on CloS

Press or key to select response time

Press key to set.

Red when ON / Red when OFF / Green when OFF / Green when ON / Always red / Always green

Press once (determination)

To instantaneous flow rate display

456 L/min

Sub display shows the state of CH2

Main display shows the state of CH1.

### CO2 discharge amount setting

<CO2 discharge amount setting>

Lo2 x 9

Press or to select CO2 discharge amount setting

<Power input> <discharge pressure>

0.20 kV → 100 5Bar

<discharge flow rate> <CO2 conversion>

100 L/min → 0000

Press any key to increase by one figure and press continuously to keep set figure increased. (see ver2)

Press once (determination)

To sleep mode setting display

### Sleep mode setting

<Sleep mode-ON> <Sleep mode-OFF>

on CloS → off CloS

Press or key to select sleep mode setting.

Press key to set.

Note: Press any key in power saving mode and the display resume lighting up.

Note: The power saving mode will last for 1 minute each time.

Note: The control functions remains intact in power saving mode.

### Reset to the initial setting

Reset setting

Press or key to select response time

Press key to set.

Reset is not executed / Reset is executed

off rESt → on rESt

Press once (determination)

To instantaneous flow rate display

### Model number display

Model number display

Full scale flow rate

500 L/min

<Working fluid> <Switch output>

Ai: Air N: NPN output P: PNP output