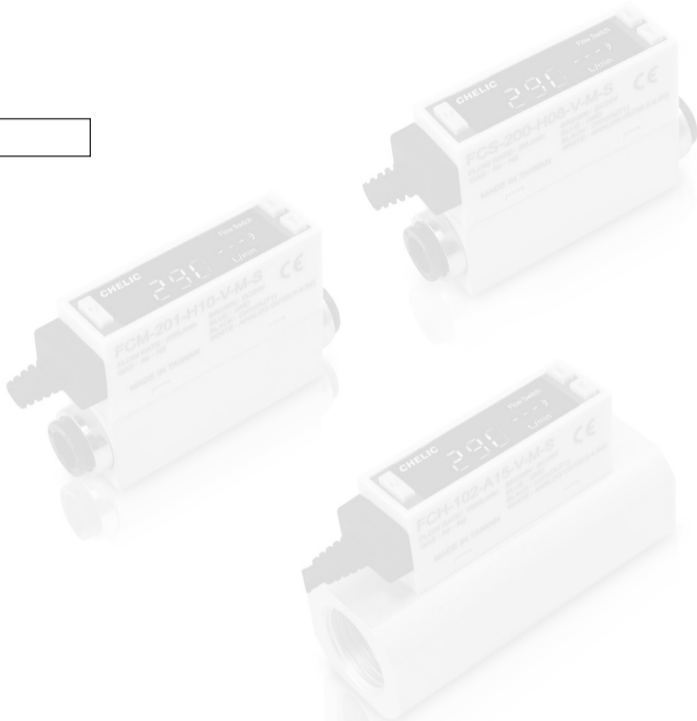




FC Series



FC 系列 - 數位式流量傳感器 操作說明書 FC Series - Flow Meter User Manual

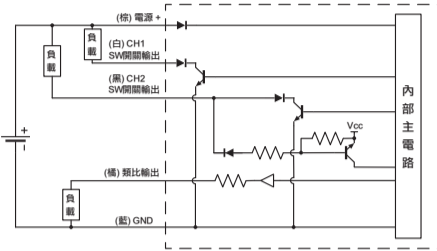
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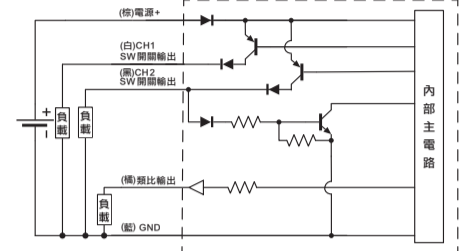
訂購稱呼代號

FC	S	020	C08			V	N	B	3
機種仕様	機種型號	流量大小	連接口徑			監控輸出	開關輸出	附件	纜線長度
FC系列 熱質式 流量傳感器	S 小流量 M 中流量 H 大流量	規格 記號 流量 005 500L/min 020 2L/min 100 10L/min 200 20L/min 500 50L/min FCM 101 100L/min 201 200L/min FCH 501 500L/min 102 1000L/min	記號 口徑 005 020 100 200 500 101 501 102 C04 04 C06 06 C08 08 P04 R1/2	FCS FCM FCH	V 電壓型0.5-4.5V A 電流型4-20mA	N NPN輸出 P PNP輸出	記號 形式 無記號 無托架 B 側鎖版 L 平托版	0 無電纜 1 1m 3 3m	

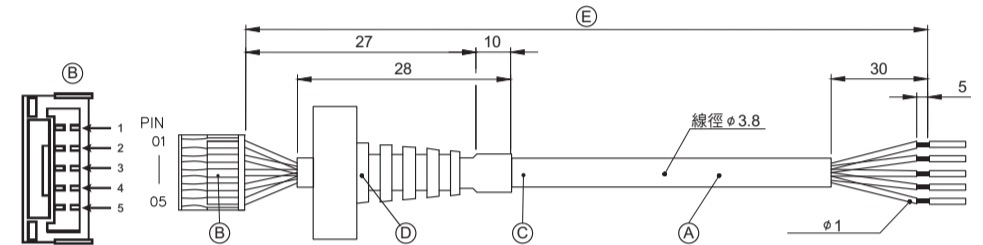
FC 系列 - NPN 型輸出電路



FC 系列 - PNP 型輸出電路



FC 系列 - 電線端子



PIN	線色 Wire color	內容 Content
01	棕	電源+ (電壓輸入:12~24V)
02	白	CH1 (開關輸出1 : max: 50mA)
03	黑	CH2 (開關輸出2 : max: 50mA)
04	橘	電壓輸出 : 0.5-4.5V 負荷阻抗50kΩ以上
05	藍	電源- (GND)

編號	內容
(A)	電線 : 內 (AWG26/5條), 外皮 : 白色
(B)	5PIN接頭
(C)	熱縮套管 (黑)
(D)	FC系列 電子接頭防折套
(E)	線長 : L=1000mm±50 或 L=3000mm±50 (依據料號選定)

名稱	訂購型號	E
FC系列 PST2 電線端子組合 1.25Px5pin/1000mm/ 棕、白、黑、橘、藍/1000mm	FC-1L	1000mm±50
FC系列 PST2 電線端子組合 1.25Px5pin/3000mm/ 棕、白、黑、橘、藍/3000mm	FC-3L	3000mm±50

使用安全事項與警告

使用安全警告與注意事項分為三種「危險」、「警告」、「注意」。

- 危險：**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，並且危險發生時的緊急性（緊急程度）高的情況。
- 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。

關於使用流體

- 危險**
 - 請勿用於易燃性流體。
- 注意**
 - 使用不受溫度、壓力影響的品質流量測定本產品的流量。單位為 L/min。該單位為將品質流量換算為在 20C 1 氣壓 (101kPa) 的體積流量時的標記單位。
- 警告**
 - 不能作為商用儀錶使用。
 - 不適用於計量法，因此請不要用於商業交易。請作為工業用感測器使用。
 - 除適用流體之外的流體由於不能保證其精度，因此請不要使用。
 - 壓縮機輸出的壓縮空氣內含有汗物（水、氯化油、異物等），因此請在感測器的一次端（上端部）安裝節檢程式、空氣乾燥器及油霧節檢程式（細油微粒節檢程式）後使用。此外，感測器內的網眼（金屬網）用於調整配管中的流量，並不是用於除去異物的節檢程式，因此請務必設置節檢程式。
 - 感測器的一次端使用開關時，請使用禁油規格的開。否則，可能因潤滑油、油等飛濺造成感測器失靈或破損。
 - 使用碳酸氣等液化氣體時，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故障。

關於佈線

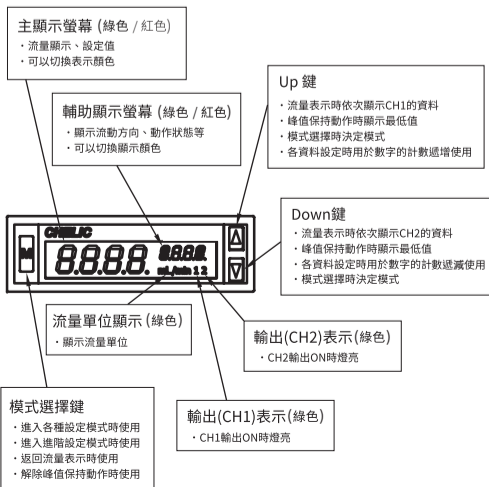
- 危險**
 - 電源電壓及輸出請使用規格電壓。
 - 施加規格電壓以上的電壓可能引起失靈、感測器破損及觸電或火災。
 - 此外，請不要使用超過輸出額定的負荷。因為可能導致感測器破損或火災。

- 警告**
 - 佈線時請確認電線的顏色。錯誤佈線可能引起感測器損壞、故障或失靈，因此請參照使用說明書確認回路的顏色後再進行佈線。
 - 請確認配線的絕緣。
 - 請不要與其他回路接觸、接地或端子間絕緣不良。
 - 可能造成感測器流入過電流導致感測器損壞。
 - 本產品使用的電源請使用與交流電源絕緣的額定內 DC 穩定電源。沒有絕緣的電源可能導致觸電事故。
 - 不穩定的電源有時超過額定電源，或導致本產品損壞，或導致本產品精度下降。
 - 連接連接器後請務必安裝連接器防護罩。
 - 直接電纜的引出部位及連接器部不要形成壓力。
 - 請停止控制裝置、機械裝置後，在切斷電源的狀態下進行佈線。如果使裝置過快運行有時裝置會進行異常動作，這樣非常危險。請先使控制裝置、機械裝置保持停止狀態進行通電試驗，並進行開關資料設定。操作前、操作中請將人體、工具、裝置所帶的靜電充分放電後進行操作。活動部請使用類似機器人用線材的具有耐屈曲性能的線材進行連接佈線。
 - 請不要超過電源電壓範圍使用。如果施加超過使用範圍的電壓或交流電源，則可能導致本產品破裂或燒毀。
 - 本產品及佈線設置時請遠離強電線等噪音源。電源線產生的浪湧請

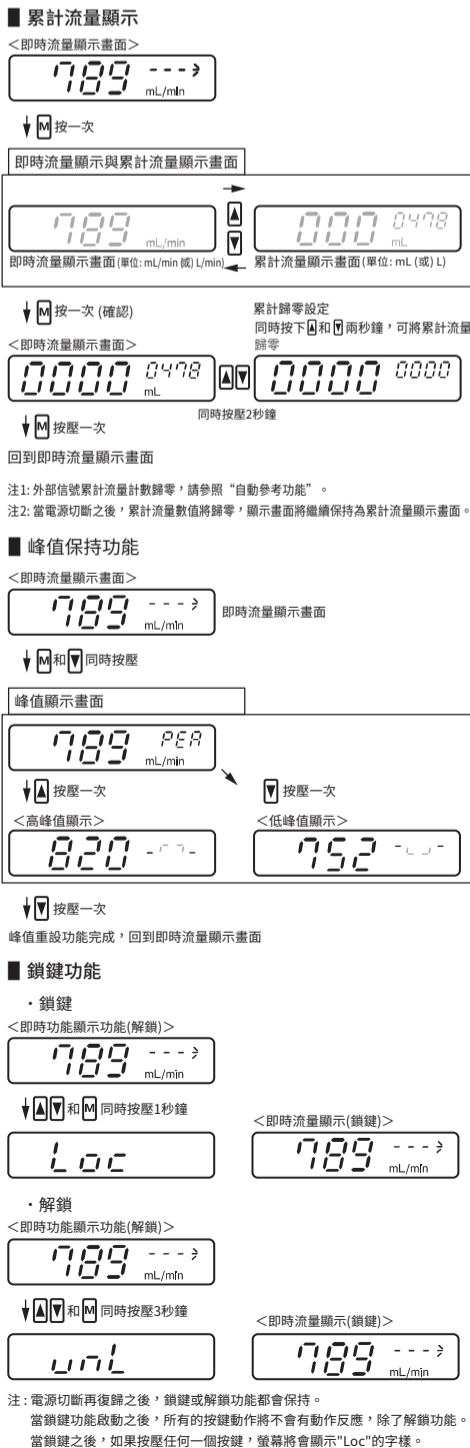
- 另行採取措施。有時顯示或輸出會有變動。
- 負荷請不要短路。因為可能導致本產品破裂或燒毀。
- 金屬主體（不銹鋼主體、鋁主體）型用電源請使用與交流一次端完全絕緣的 DC 穩定電源，F.G. 連接電源側的十側或一側的某一側後使用。為防止感測器的絕緣損壞，金屬主體型的內部電源回路和金屬主體之間連接有變阻器（限制電壓約 40V）。金屬主體型的內部電源回路和金屬主體之間不要實施耐電壓試驗和絕緣電阻試驗。需要實施這些試驗時請將佈線拆下後實施。電源和金屬主體之間的過大電位差會燒毀內部元件。此外，金屬主體型的本產品設置、連接、配線後，裝置、機架的電焊或短路事故的焊接電流或焊接時過渡性高電壓、浪湧電壓等會導致與連接上述元件間的回路、接地線或流體回路產生電壓洩露，最後使電線或元件損壞。請在全部拆去主機或電線 F.G. 連接後進行電焊等操作。
- 除溫度特性外，輸出精度還會受到因通電而本身發熱的影響。使用時請等待待機時間（通電 5 分鐘後）。
- 本產品在通電後由於自身診斷需要耗時約四秒鐘，這段時間內流量檢出開關不動作。通電後約四秒鐘請設置為無視訊號的控制回路、程式。

- 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量程內。
 - 本產品請在使用壓力範圍內使用。
 - 變更輸出的設定值時，控制系統可能會自動動作，因此請停止裝置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。
 - 請不要拆解或改造本產品，否則可能造成故障。
 - 外殼材質為樹脂。除去污漬時請不要使用溶劑、酒精、清洗劑等。因為這些材料可能對樹脂有損傷。
 - 將粘有稀薄中性洗滌劑的毛巾等擰乾後擦拭外殼。
 - 請注意斷線或配線電阻產生的逆向電流。與流量感測器相同的電源上連接含流量感測器的其他元件時，為確認控制盤的輸入裝置動作，如果使開關輸出線和電源線一極短路或者切斷電源線一側，可能會在流量感測器的開關輸出回路上產生逆向電流，造成流量感測器損壞。

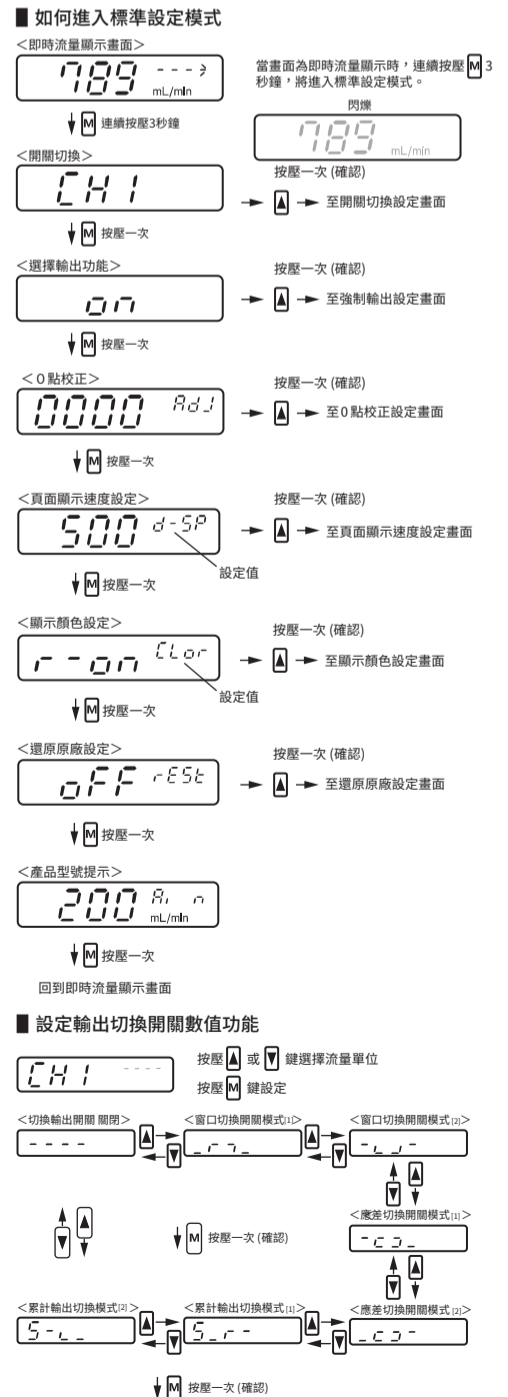
① 螢幕顯示、操作按鍵和功能



操作模式 / 一般模式



標準設定模式



CH1 開啟/關閉數值設定

<下極限數值設定> → <上極限數值設定>

調整數值顯示

同時按壓 (調整數值讀取)

按壓一次 (確認)

回到即時流量顯示畫面

按壓一次 (確認)

CH2 操作模式轉換 (與CH1設定方式相同)

按壓一次 (確認)

CH2 開啟/關閉數值設定 (與CH1設定方式相同)

按壓一次 (確認)

回到即時流量顯示畫面

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

按壓一次 (確認)

回到即時流量顯示畫面

畫面顯示速度設定

按壓或 鍵選擇流量單位

按壓 鍵設定

畫面顯示速度設定

<250msec> <500msec> <1000msec>

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 鍵選擇流量單位

按壓 鍵設定

紅色為開啟 紅色為關閉 綠色為開啟 綠色為關閉 常紅 常綠

按壓一次

回到即時流量顯示畫面

還原原廠設定

按壓或 鍵選擇流量單位

按壓 鍵設定

還原原廠設定畫面

<還原設定未執行> <還原設定執行>

按壓一次

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> 最大量測流量

<量測液體> <輸出模式>

AI: Air N: NPN輸出 P: PNP輸出

開關動作說明

名稱	LCD顯示	動作說明
窗口開關模式1	- r -	在指定範圍內開關輸出ON
窗口開關模式2	- L -	在指定範圍外開關輸出ON
應差開關模式1	- C -	設定一個應差範圍, 達到指定流量以上時, 開關輸出OFF
應差開關模式2	- C -	設定一個應差範圍, 達到指定流量以上時, 開關輸出ON (顯示HHH值亦維持輸出)
累計輸出切換模式1	S - r -	達到累計值以上時, 開關輸出ON
累計輸出切換模式2	S - r -	達到累計值以上時, 開關輸出OFF
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>

按壓一次 (確認)

回到即時流量量實畫面

<按壓進入(CH1輸出開啟)>

<按壓進入(CH2輸出開啟)>

<按壓進入(CH1和CH2輸出開啟)>

Warning / Caution to secure safety

Safety caution are ranked by the safety caution as <DANGER>, <WARNING>, <CAUTION>

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

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 damages.

Flow unit

DANGER

Do not use this product with flammable fluids.

CAUTION

This product's flow rate is measured at a mass flow unaffected by temperature or pressure. The unit is l/min, but this is the display when the mass flow is converted to volumetric flow at 20°C 1 barometric pressure (101 kPa)

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 sensor for factory applications.

Do not use fluids other than the applicable fluid because accuracy cannot be guaranteed.

Compressed air from the compressor contains drainage (water, oxidized oil, foreign substances, etc.), so install a filter, air dryer, and oil mist filter (microlescer) on the primary side (upstream) of the sensor. The sensor's meshing rectifies flow in the pipe. It does not filter out foreign substances, so provide a filter.

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 liquidified gas before use. Entry of liquidified gas into this product will result in damage.

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

Check wire colors when wiring. Incorrect wiring connections could result in sensor damage, problems, and malfunctions. Check wiring insulation. Check that wires do not contact other circuits and that there are no ground faults or insulation faults across terminals. An over current could flow in and damage the sensor. Use a DC stabilized power supply, within the specified rating, insulated from the AC power supply. Failure to insulate the power supply could result in electrical shock. If power is not stabilized, the peak value could be exceeded. This could damage the product or impair accuracy. Attach a connector cover after connecting connectors. Check that stress is not directly applied to cable leadout or connector stresses. Stop the control device and machine devices, 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 switch data. Discharge electrostatic accumulated in personnel or tools before and during work. Connect and wire bend-resistant material, such as robot wire material, for movable sections. Do not use this product at levels exceeding the power voltage range. If voltage exceeding this range is applied or if AC power is applied, the controller could rupture or burn. Separate this product and its wiring as far away as possible from sources of noise such as high-voltage lines. Provide separate measures for surge applied to the power cable. The display or output could fluctuate.

Do not short-circuit the load. This product could rupture or burn. Connect either the plus or minus side of the power supply to the F.G. For metal body (stainless steel, aluminum) power supplies, use DC-stabilized power separated from the AC primary side. A varistor (limit voltage 40 V) is connected between the metal body internal power circuit and metal body to prevent dielectric breakdown of the sensor. Do not conduct a withstand voltage test or insulation resistance test between the internal power circuit and metal body. Disconnect wiring if this testing is required. An excessive potential difference between power and metal body will burn internal parts. After installation, connecting and wiring the metal body, electrical welding of the device or frame, or short circuit accidents, etc., could cause welding current, excessive high voltage caused by welding, or surge voltage, etc., to run through wiring or ground line connected between such devices, damaging lines or devices. Conduct work such as electric welding after removing this product and F.C connection of the wiring.

WARNING

Analog output accuracy is also affected by self generation of heat cause by energizing in addition to temperature characteristics. Provide enough stand-by time (5minutes and over after energizing) before starting operation. This product does not use speed control for four seconds after power is turned on to complete self-diagnostics. Provide a control circuit and program that ignore signals for four seconds after power is turned on.

CAUTION

If a problem occurs during operation, immediately turn power off, stop use, and contact your dealer. Keep this product's flow within the rated flow range. Use this product within the working pressure range. If the output setting value is changed, 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 it 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. This may damage the resin. Wipe off dirt with a rag soaked in a diluted neutral detergent solution and wrung out well. Check backflow currents caused by broken wiring or wiring resistance. If other devices, including a flow sensor, are connected to the same power as the 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.

Names and Functions of Each Parts

Main display (Green/Red)
Displays flow rate, various switch settings. Indication color is selectable

Sub-display (Green/Red)
Displays flow direction, machine status. Indication color is selectable

Up key
When flow rate is displayed = Displays the CH1 data
During peak hold operation = Displays the maximum value
When selecting a mode = Sets the mode
When setting each data = Increases the value, etc.

Down key
When flow rate is displayed = Displays the CH2 data
During peak hold operation = Displays the maximum value
When setting each data = Increases the value, etc.

Unit display (Green)
Displays flow rate unit

Switch output indicator (CH2)
Lights when switch output (CH2) turns on.

Switch output indicator (CH 1)
Lights when switch output (CH1) turns on.

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

How to operate - Normal mode

Displaying the integrated flow

<Instantaneous flow rate display>

Press once

Display unit selection

Instantaneous flow rate display (unit : mL/min (or) L/min)

Integrated flow display (unit : mL (or) L)

Press once (determination).

Integration reset
Integration is reset when the and keys are held down for 2 sec.

Press simultaneously for 2 sec.

Press once

To instantaneous flow rate display

Peak hold function

<Instantaneous flow rate display>

Display unit selection

and press simultaneously

Peak hold display

Being held down

Being held down

<Peak value displayed>

<Bottom value displayed>

Press once

Reset peak hold function. To instantaneous flow rate display

Key lock function

Key lock

<Instantaneous flow rate display (key unlock)>

and press simultaneously for 1 sec.

<Instantaneous flow rate display (key lock)>

Key unlock

<Instantaneous flow rate display (key lock)>

and press simultaneously for 3 sec.

<Instantaneous flow rate display (key lock)>

Note: Keys are unlocked when the controller is shipped. Lock keys if necessary. The key lock/unlock state is held even if power is turned OFF. While key lock, all the operations are not accepted excluding the key lock release operation. While key lock, if the key is operated, it becomes a "Loc" display.

Standard setting mode

How to enter to standard setting mode

<Instantaneous flow rate display>

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

Flash

Press once (determination)

To switch output setting display

Press once

To forcible output setting display

Press once (determination)

To 0 point adjustment setting display

Press once (determination)

To display speed setting display

Setting value.

Press once (determination)

To displayed color setting display

Setting value.

Press once (determination)

To reset setting display

Press once

To instantaneous flow rate display

Data setting of switch output function

Press or key to select flow rate unit

Press key to set.

<Switch output OFF>

<Window operation (1)>

<Window operation (2)>

Press once (determination)

<Hysteresis operation (1)>

Press once (determination)

<Integrated output (2)>

<Integrated output (1)>

<Hysteresis operation (2)>

Press once (determination)

CH1 ON/OFF data setting

<Lower limit data setting>

<Upper limit data setting>

Count UP Press key once to increase by one figure and press it continuously to keep set figure increased.

Count down Press key once to decrease by one figure and press it continuously to keep set figure decreased.

Press once. (determination)

CH2 operation mode change (Set same as CH1)

Press once. (determination)

CH2 ON/OFF data setting (Set same as CH1)

Press once. (determination)

To instantaneous flow rate display

Switch action description

Mode	LCD display	Action description
Window operation 1	- r -	Switch output ONwithin the specified range
Window operation 2	- L -	Switch output ONoutside the specified range
Hysteresis operation 1	- C -	Set a hysteresis range, when it reaches the specified flow rate or more, the switch output is OFF.
Hysteresis operation 2	- C -	Set a hysteresis range, when it reaches the specified flow rate or more, the switch output is ON. (Display shows HHH value and maintain output)
Integrated output 1	S - r -	When reaches the specified flow rate or more, the switch output is ON.
Integrated output 2	S - r -	When reaches the specified flow rate or more, the switch output is OFF.
Switch output to OFF	- - - -	Switch to OFF

Select function output mode

<Select function output>

Press once. (determination)

To instantaneous flow rate display

<Being held down (CH1 output ON)>

<Being held down(CH2 output ON)>

<Being held down(CH1 and CH2 output ON)>

0 point adjustment mode

0 point adjustment setting display

Press simultaneously (adjusted value reading) adjustment value display

Press once. (determination)

To instantaneous flow rate display

Setting of display speed

Display setting of display speed

Press or key to select response time

Press key to set.

<250msec> <500msec> <1000msec>

Press once. (determination)

To instantaneous flow rate display

Setting of display color

Display color setting display

Setting of display color

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

Sub display shows the state of CH2

Main display shows the state of CH1.

Reset to the initial setting

Reset setting

Press key to set.

<Reset is not executed>

<Reset is executed>

Press once. (determination)

To instantaneous flow rate display

Model number display

Model number display

Full scale flow rate

<Model number>

<Working fluid> <Switch output>

AI: Air N: NPN output P: PNP output