



## 取り付け

### ■ 取付場所

次のような場所には取り付けないでください。

- ・仕様の範囲を超えた高温、低温、高湿度、低湿度となる場所
- ・急激な温度変化があり、結露が起こる場所
- ・腐食性ガスや可燃性ガスが充満する場所
- ・本器の周囲にじん埃、塩分、鉄粉などの導電性物質、水滴、オイルミスト、有機溶剤などが多く含まれる場所
- ・直射日光および風雨の当たる場所
- ・本体に直接、機械的振動や衝撃が加わる場所
- ・電氣的ノイズの発生源に近い場所
- ・強電磁界、強電界の発生する場所

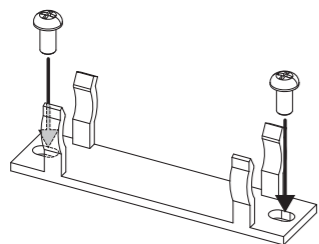
### ■ 取り付け時の注意

- ・振動のない場所に設置してください。本器を振動のある場所に設置した場合、正しく計測できず、誤動作および故障の原因となります。
- ・取付ブラケットは取付寸法に従って取り付けてください。取付ブラケットが破損する恐れがあります。
- ・本器に接続する配管は、仕様に記載されたチューブをご使用ください。
- ・チューブの取り付けは、日本ピラー工業 スーパー 300 タイプ Pシリーズの施工・締め付け手順に従ってください。取り付けは、手で強く締め付けてください。
- ・配管施工時および施工後に、本器に過大な力や変形が加わらないようにしてください。本器内部の流路に使用している石英ガラス管、および内部の継手部を破損させるおそれがあります。
- ・流体に気泡や脈動が含まれる場合には、本器の流量出力が不安定となったり、誤差が生じたりする可能性があります。気泡や脈動の発生を抑えるように留意してお使いください。
- ・本器は逆方向の流量測定はできません。流体が逆方向に流れた場合、エラーを表示することなく正方向の流れに相当する出力を示しますが、正方向と同等の流量出力にはなりません。
- ・配管接続後および使用中は、定期的に流体の漏れがないことを確認してください。

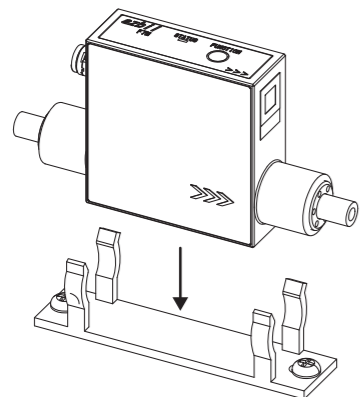
### ■ 取付手順

① 取付ブラケットを固定してください。

注 ねじはお客様にて準備してください。(ねじ穴径φ5.6 mm、ねじ頭部高さ5 mm以下)



② 流量計本体を取付ブラケットに固定してください。

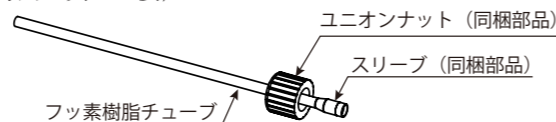


③ 上下流のフッ素樹脂チューブを次の方法で取り付けてください。

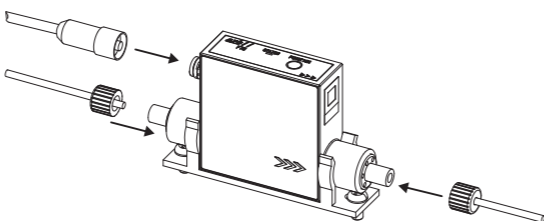
#### ■ 参考

- ・フッ素樹脂チューブの詳しい施工方法および取付方法は、日本ピラー工業株式会社 スーパー 300タイプ Pシリーズの施工手順書をご覧ください。

チューブを切断→ユニオンナットを挿入→スリーブを圧入(専用工具が必要)

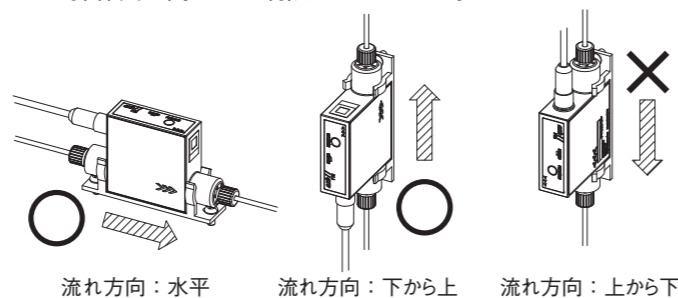


④ フッ素樹脂チューブ、および入出力ケーブルを本体に取り付けてください。



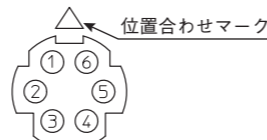
#### ❗ 取り扱い上の注意

- ・本器の設置向きは、下図の方向にしてください。操作面の向きには制限はありません。



## 結線

### ■ コネクタピン配列



### ■ コネクタピン信号表

Pin No.	信号名	内容	詳細	ケーブル色
1	POWER (24 V)	電源 DC24 V (+)	定格 DC24 V ±10%	茶
2	ANALOG OUTPUT	アナログ出力 (+)	DC1-5 V (外部負荷抵抗 250 kΩ以上)	赤
3	GND	電源 DC24 V (-)	電源およびデジタル信号のコモン	緑
		デジタル出力 (-)		
		デジタル入力 (-)		
4	DO	デジタル出力 (+)		橙
5	DI	デジタル入力 (+)		黄
6	A.GND	アナログ出力 (-)	アナログ信号のコモン	青

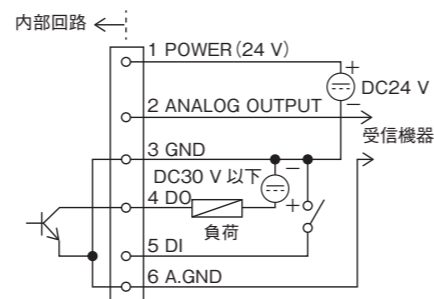
注1 出力間はすべて非絶縁です。

注2 誤った結線に対する保護機能はありません。

注3 デジタル入力にリレーを接続する場合は、金めっき接点のリレーをご使用ください。

注4 ケーブル色は別売部品のF9Y7HP1、F9Y7HF1の色です。

### ■ 配線例



## 仕様

製品形番	F7M9010	F7M9030
計測流量範囲(流体が水(H <sub>2</sub> O)の場合)	0.1 ~ 10 mL/min	0.3 ~ 30 mL/min
計測精度	±5 %RD(流量レンジの20 %以上)、±1 %FS(流量レンジの20 %未満) 基準状態*1における当社液体流量標準を基準とした体積流量に対する器差を表します	
繰り返し性	±1 %RD(流量レンジの20 %以上)、±0.2 %FS(流量レンジの20 %未満) 基準状態*1における当社液体流量標準を基準とした体積流量に対する器差のばらつきを表します	
計測可能流体	流路を詰まらせず、石英ガラス・テフロン(PFA)を腐食させず傷つけない流体 水(H <sub>2</sub> O)以外の流体では計測レンジが変化します	
精度・繰り返し性保証対象流体	水(H <sub>2</sub> O)	
精度・繰り返し性保証流量範囲(流体が水(H <sub>2</sub> O)の場合)	0.2 ~ 10 mL/min	0.6 ~ 30 mL/min
温度特性(流体と周囲の温度差なしの条件)	流体温度・周囲温度が共に10 ~ 35 °Cの範囲内、かつ両者が同一である条件にて 基準状態*1のときの出力値と比較して0.5 % RD/°C以内	
流体温度範囲(動作保証範囲)	5 ~ 50 °C(凍結なきこと)	
周囲温度範囲(動作保証範囲)	5 ~ 50 °C(結露、凍結なきこと)、輸送・保管温度は5 ~ 60 °C	
周囲湿度範囲(動作保証範囲)	10 ~ 90 %RH(結露なきこと)	
流体圧力範囲	0 ~ 500 kPa	
耐圧	700 kPa	
取付姿勢	水平取付 または 垂直取付(流れ方向は下→上)*2	
直管長(流体が水(H <sub>2</sub> O)の場合)	50 mm	
継手部引っ張り強度	30 N	
駆動電源電圧	DC24 V ±10 % 0.7 W以下	
出力信号	アナログ出力：1点 DC1 ~ 5 V*3 (外部負荷抵抗：250 kΩ以上、最大出力電圧：5.6 V) デジタル出力(オープンコレクタ)：1点(イベント出力 または 積算パルス*4) DC30 V、30 mA 以下	
デジタル入力	1点 無電圧接点 または オープンコレクタ 許容ON接点抵抗：250 Ω以下 許容OFF接点抵抗：100 kΩ以上 許容ON残留電圧：0.8 V以下 ON時端子電流：0.5 mA(接点抵抗250 Ω時)	
質量	85 g(取付ブラケットを含む、ケーブルは含まない)	
保護構造	IP65(防水コネクタ嵌合状態)	
適合規格・規制	EN61326-1、EN61326-2-3	

製品仕様の詳細は、取扱説明書 詳細編(CP-SP-1421)をご覧ください。

\*1 基準状態は、周囲温度、流体温度が共に23 °Cである状態です。左記以外の条件につきましてはお問い合わせください。

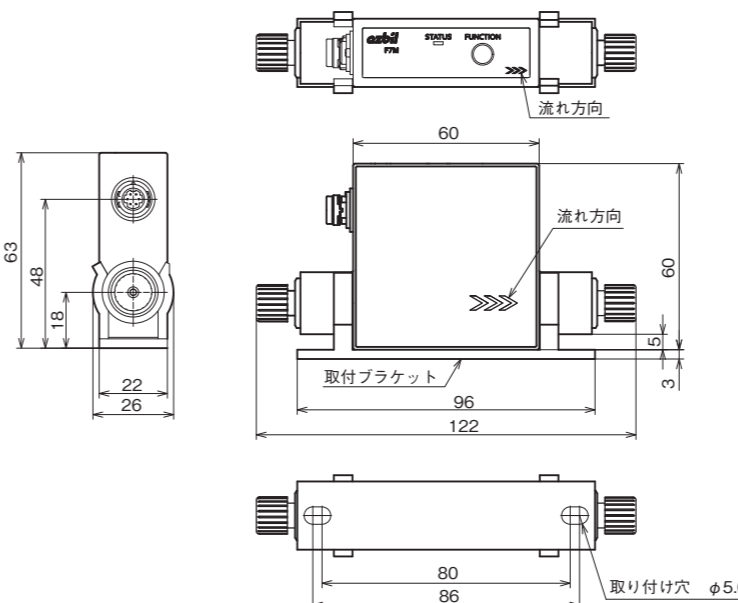
\*2 垂直取付の場合、水平時と比較して測定値に±1 % RD程度の誤差が生じます。

\*3 最小計測流量範囲を下回る場合は、出力信号は0 % (1 V)に固定となります。また、計測流量範囲の115 % (5.6 V)まで出力します。

\*4 パラメータの設定変更は、PCローダーが必要となります。

### ■ 外形寸法

単位：mm



[ご注意] この資料の記載内容は、お断りなく変更する場合がありますのでご了承ください。(26)

## ご返却時のお願い

製品調査などの目的で本器を当社に返却される際には、お客様にて流された流体の残渣が残らないよう、流路内を洗浄してください。また、取扱説明書 詳細編(CP-SP-1421)にある安全確認書に記入し、現品に添付してご返却ください。

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# F7M9010/9030 Micro Flow Rate Liquid Flow Meter User's Manual

Thank you for purchasing an Azbil Corporation product. This manual contains information for ensuring the correct use of this product. This manual should be read by those who design and maintain equipment that uses this product. Be sure to keep this manual nearby for handy reference. Please read "Terms and Conditions" from the following URL before ordering and use. <http://www.azbil.com/products/factory/order.html>

### NOTES FOR LONG-TERM USE

- After a prolonged period of use the seal of the flow path and fittings of this device may deteriorate, causing fluid leakage from the housing, or fire, or failure of this device and connected devices. Regularly check the piping connections and housing for leakage.
- The recommended replacement cycle of this device is five years, but earlier replacement may be needed, depending on the conditions of use and the environment of your machinery or equipment.

### NOTICE

Be sure that the user receives this manual before the product is used. Copying or duplicating this user's manual in part or in whole is forbidden. The information and specifications in this manual are subject to change without notice. Considerable effort has been made to ensure that this manual is free from inaccuracies and omissions. If you should find an error or omission, please contact the azbil Group. In no event is Azbil Corporation liable to anyone for any indirect, special or consequential damages as a result of using this product.

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### SAFETY PRECAUTIONS

Safety precautions are for ensuring safe and correct use of this product, and for preventing injury to the operator and other people or damage to property. You must observe these safety precautions. Also, be sure to read and understand the contents of this user's manual.

#### Key to symbols

**WARNING**  
Warnings are indicated when mishandling this product might result in death or serious injury to the user.

**CAUTION**  
Cautions are indicated when mishandling this product might result in minor injury to the user, or only physical damage to this product.

### WARNING

Do not apply pressure or temperature that is outside the range stated in the specifications of this device. Do not drop this device or subject it to vibration or impact that exceeds the conditions for use. Doing so may damage the fused silica glass tube (used as the flow path in this device) and its seal, causing leakage inside and outside of the device, fire, or failure of this device and connected devices. (See PRECAUTIONS for details.)

CAUTION	
	If damage could result from a problem with this device, implement an appropriate redundant design.
	Take appropriate measures so that no foreign matter is included with the fluid. If rust, oil mist, or other foreign matter from the pipes enters and adheres to this device, a measurement or control error may occur, or this device may be damaged. If there is a possibility of foreign matter entering this device, install a filter upstream of this device or take other appropriate measures. Be sure to inspect and replace the filter at regular intervals.
	Install this device in a place without vibration. Otherwise, measurements will be incorrect and a device malfunction or failure may result.
	When connecting this device to the piping, do not apply a load to the connections that exceeds the range stated in the specifications. If an excessive load was applied, check for fluid leakage.
	During or after piping, do not apply excessive force that deforms this device. Doing so may damage the fittings or the fused silica glass tube used as the flow path.
	The power supply circuit and I/O circuit are not isolated. Therefore, ensure that the power supply is isolated from the power supply of external devices. If this device and external devices share a common power supply, faulty operation or device failure may result.
	This device cannot withstand power surges caused by lightning. Install a surge protector on the connected equipment.
	Make sure that the wiring is correct before turning the power on. Incorrect wiring will cause damage and device failure.
	If any problem occurs during operation, shut off the power immediately and stop using this device.
	Do not press the switch on this device with excessive force or with a sharp-edged object. Doing so may impair the protective functions of this device.
	Make sure that there is no fluid or pressure inside the piping before removing this device. There is a danger that residual fluid in the piping may spew out.

### PRECAUTIONS

If this device is used under conditions that exceed the conditions of use stated in the specifications (applying a fluid pressure exceeding the pressure resistance, high-temperature fluid exceeding the process fluid temperature range, excessive vibration, etc.) or if this device is dropped, the flow path and its seal can be damaged, causing the following phenomena:

- Sensor problems (error output, or output of 0 V only continues)
- Power short-circuit of the external device due to impaired isolation of this device
- Fluid leakage from the housing (if the fluid pressure is high, fluid will spew out from the protective sheet)

If these phenomena occur, shut off the power and fluid to this device immediately and stop using it.

### UNPACKING

The following items should be included in your purchased model F7M.

- Main unit: 1
- Mounting bracket: 1
- Union nuts: 2
- Sleeves: 2
- User's manual (this manual) CP-UM-5922JE: 1

### OVERVIEW

This device is a micro flow rate liquid flow meter that uses a thermal flow sensor developed by Azbil Corporation as its sensing element.

### MODEL SELECTION

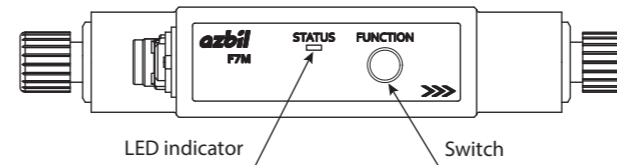
Base model No.	Flow rate range	Display function	Flow path material	Piping connection method	Fluid type	Signal type	Connector type	Optional functions			Code	Remarks
								1	2	3		
F7M	9 0 1 0 9 0 3 0	A	Q	1 2	0	0	1					Measurable flow rate range: 0.1–10 mL/min Measurable flow rate range: 0.3–30 mL/min No display (equipped with an LED status indicator) Fused silica glass, PFA, PTFE Fitting for fluororesin tubes SUPER-300 Type Pillar fitting P series (made by Nippon Pillar Packing Co., Ltd.) Outer dia. 3 mm, inner dia. 2 mm Fitting for fluororesin tubes SUPER-300 Type Pillar fitting P series (made by Nippon Pillar Packing Co., Ltd.) Outer dia. 1/8 in., inner dia. 0.086 in. Water (H <sub>2</sub> O) Analog output, digital input, digital output Waterproof connector: HR30-6R-6P(71) None None None D With inspection certificate Y With traceability and inspection certificates 0 Product version

### PARTS SOLD SEPARATELY

Name	Part No.
PVC-insulated cable, 2 m	F9Y7HP1
Fluororesin-insulated cable, 2 m	F9Y7HF1
Fitting (metric system), 2 sets	F9Y7F1
Fitting (inch system), 2 sets	F9Y7F2
Mounting bracket	F9Y7B1
Fluororesin tube assembly (metric system), 2 sets	F9Y7T1
Fluororesin tube assembly (inch system), 2 sets	F9Y7T2
Fluororesin tube assembly for metal pipes (Rc 1/8), 2 sets	F9Y7T3
Fluororesin tube assembly for metal pipes (R 1/8), 2 sets	F9Y7T5
Adapter for loader communication*	F9Y7A1

\* Available soon

### NAMES AND FUNCTIONS OF PARTS



Switch: Used to adjust zero point when measuring fluid other than water

LED indicator: The following is indicated.

#### For measurement

Operating state	LED behavior
Operating normally	Lit green
Warning	Blinks green (slowly)
Alarm	Blinks red (slowly)
Error	Lit red
Power shutoff	Off

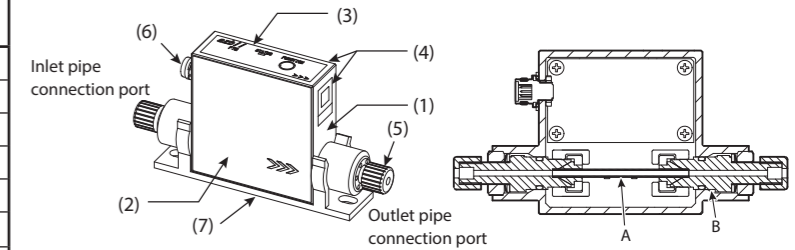
#### For zero point adjustment

Operating state	LED behavior
Zero point adjustment in progress	Blinks green (fast)
Zero point adjustment succeeded	Blinks green three times
Zero point initialization completed	
Zero point adjustment failed	Blinks red three times

#### LED blinking pattern

LED behavior	Blinking pattern
Blinking (fast)	Turns on and off at 100 ms intervals
Blinking (slow)	Turns on and off at 500 ms intervals

### MATERIALS



#### Main unit materials

No.	Name	Material	Note
(1)	Housing	PPS + glass fiber	An epoxy resin adhesive is used to connect the cover to the housing.
(2)	Cover	PPS + glass fiber	
(3)	Protective sheet	PET film	-
(4)	Label	PET film	-
(5)	Union nut	PFA	This part is included with the product but not attached at delivery.
(6)	Waterproof connector	PPS, PBT, CR rubber	HR30-6R-6P(71) made by Hirose Electric Co., Ltd
(7)	Mounting bracket	PC	-

#### Wetted material

No.	Name	Material	Note
A	Sensor tube	Fused silica glass	-
B	Fitting	PFA, PTFE	The material of the included sleeves is PFA.

## INSTALLATION

### Installation location

Do not install where exposed to any of the following:

- Temperature and humidity that exceed the specified high/low limits
- Sudden temperature changes that result in condensation
- Corrosive gas or flammable gas atmosphere
- Large amounts of dust, salt, iron powder or other conductive substances in the atmosphere, or water droplets, oil mist, or organic solvents
- Direct sunlight, wind, or rain
- Direct vibration or shock
- Sources of electrical noise
- Strong magnetic or electrical fields

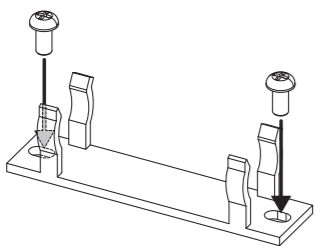
### Mounting Precautions

- Install this device in a place without vibration. Otherwise, measurements will be incorrect and device malfunction or failure may result.
- Install the mounting bracket, observing the specified mounting dimensions. Otherwise, the bracket may be damaged.
- Use a tube that fits the description in the specifications for the piping connected to this device.
- Attach the tube in accordance with the SUPER-300 Type Pillar fitting P series Instruction Manual (by Nippon Pillar Packing Co., Ltd.). When attaching the tube, fasten the union nut tightly by hand.
- During or after piping, do not apply excessive force that deforms this device. Doing so may damage the fittings or the fused silica glass tube that is used as the flow path.
- If the fluid contains bubbles or pulsations, the flow rate output from this device might be unreliable or there might be measurement errors. Make sure that bubbles or pulsations are not generated in the fluid.
- This device cannot measure the flow rate of fluid that flows in the reverse direction. If the flow direction is reversed, this device outputs a flow rate that is close but not equal to the regular forward flow rate, and it does not indicate an error.
- Check that there is no leakage after the piping work and during operation at regular intervals.

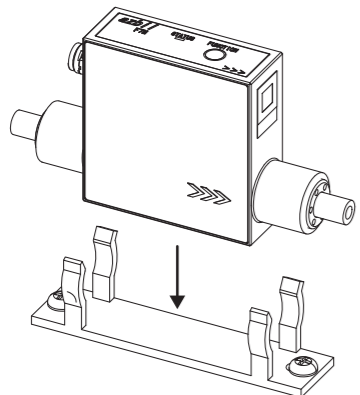
### Installation Procedure

- (1) Install the mounting bracket securely.

Note: The screws are not included with the product. (Screw hole diameter: 5.6 mm, thread head height: 5 mm max.)



- (2) Mount the main unit on the mounting bracket.

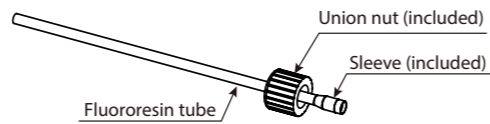


- (3) Attach the upstream and downstream fluororesin tubes to the device as instructed below.

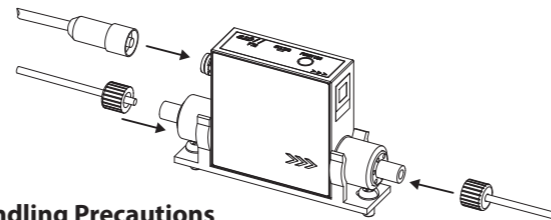
### Note

- For detailed instructions on mounting the fluororesin tubes, see the SUPER-300 Type Pillar fitting P series Instruction Manual (published by Nippon Pillar Packing Co., Ltd.).

Cut the tube → Insert the union nut → Insert the sleeve into the tube (a special tool is required)

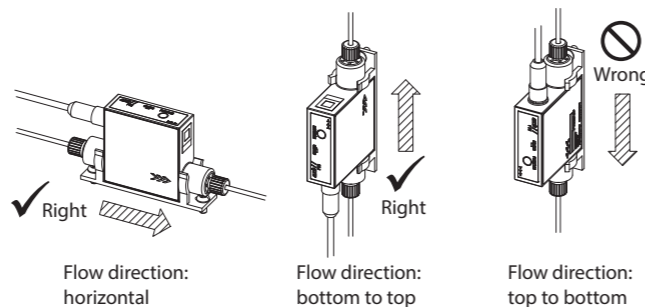


- (4) Attach the fluororesin tubes and the I/O cable to the main unit.



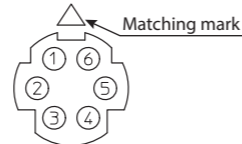
### Handling Precautions

- Install this device in the orientation shown below. The operation panel can face any direction.



## WIRING

### Connector Pin Layout

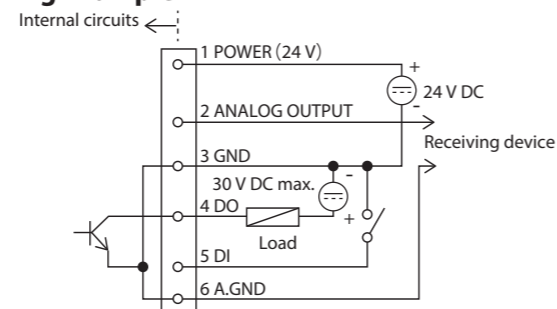


### Connector Pin Signal Table

Pin No.	Signal name	Description	Details	Cable color
1	POWER (24 V)	Power supply 24 V DC (+)	Rated 24 V DC ± 10 %	Brown
2	ANALOG OUTPUT	Analog output (+)	1-5 V DC (external load resistance: 250 kΩ min.)	Red
3	GND	Power supply 24 V DC (-) Digital output (-) Digital input (-)	Common ground for power supply and digital signals	Green
4	DO	Digital output (+)		Orange
5	DI	Digital input (+)		Yellow
6	A.GND	Analog output (-)	Common ground for analog signals	Blue

- Notes
1. There is no isolation between outputs.
  2. No protection is provided for wrong wiring.
  3. If relays are connected to the digital inputs, use relays with gold-plated contacts.
  4. The cable colors are those of F9Y7HP1 and F9Y7HF1, which are sold separately.

### Wiring Example



## SPECIFICATIONS

Model No.	F7M9010	F7M9030
Measurable flow rate range (for water (H <sub>2</sub> O))	0.1-10 mL/min	0.3-30 mL/min
Measurement accuracy	±5 % rdg. (at 20 % or more of the flow rate range), ±1 % FS (at less than 20 % of the range) The instrumental error in the volumetric flow rate was measured by Azbil's fluid flow rate calibration equipment under standard conditions*1	
Repeatability	±1 % rdg. (at 20 % or more of the flow rate range), ±0.2 % FS (at less than 20 % of the range) Instrumental error discrepancies in the volumetric flow rate measured by Azbil's fluid flow rate calibration equipment under standard conditions*1	
Measurable fluid	Fluid that does not clog the flow path and does not corrode or damage the fused silica glass tube or the PFA fitting used in the flow path. The measurement range differs for fluids other than water (H <sub>2</sub> O).	
Accuracy- and repeatability-guaranteed fluid	Water (H <sub>2</sub> O)	
Accuracy- and repeatability-guaranteed flow rate range (for water (H <sub>2</sub> O))	0.2-10 mL/min (H <sub>2</sub> O)	0.6-30 mL/min (H <sub>2</sub> O)
Temperature characteristic (where the fluid and ambient temperatures are the same)	Where the fluid and ambient temperatures are the same and within 10-35 °C Within 0.5 % rdg. / °C of the output value under standard conditions*1	
Fluid temperature range (operation-guaranteed range)	5-50 °C (without freezing)	
Ambient temperature range (operation-guaranteed range)	5-50 °C (without condensation or freezing) (5-60 °C at transportation and storage)	
Ambient humidity (operation-guaranteed range)	10-90 % RH (without condensation)	
Process fluid pressure range	0-500 kPa	
Pressure resistance	700 kPa	
Mounting orientation	Horizontal or vertical (flow direction: bottom to top)*2	
Straight pipe length (for water (H <sub>2</sub> O))	50 mm	
Fitting pullout strength	30 N	
Drive power voltage	24 V DC ± 10 %, 0.7 W max.	
Output signal	Analog output: 1-5 V DC*3 (1 output) (External load resistance: 250 kΩ min. Maximum output voltage: 5.6 V) Digital output: event output or totalized flow pulse*4, 30 V DC, 30 mA max. (1 output)	
Digital input	1 Non-voltage contacts or open collector Allowable ON resistance: 250 Ω max. Allowable OFF resistance: 100 kΩ min. Allowable ON residual voltage: 0.8 V max. ON terminal current: 0.5 mA (when contact resistance is 250 Ω)	
Weight	85 g (including the mounting bracket but excluding the cable)	
Protection rating	IP65 (with waterproof connector connected)	
Standards and regulations compliance	EN61326-1, EN61326-2-3	

For details on the product specifications, refer to the user's manual (CP-SP-1421E).

\*1. "Standard conditions" means that both the ambient and fluid temperatures are 23 °C. Please contact us for other conditions.

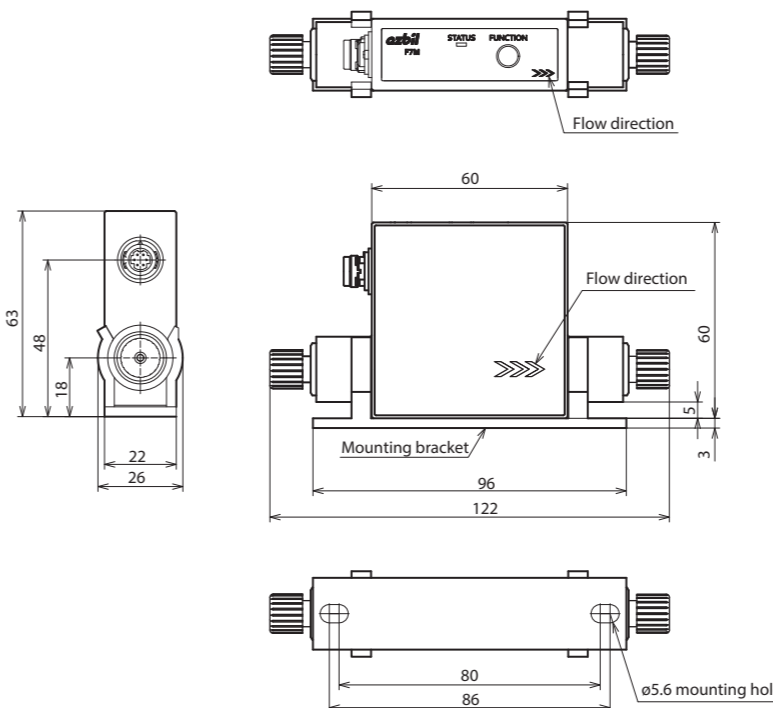
\*2. For vertical mounting, there is an output shift of about ± 1 % rdg. in measurements when compared with horizontal mounting.

\*3. If the flow rate is below the lowest measurable rate, the output signal is always 0 % (1 V). Up to 115 % (5.6 V) of the highest measurable flow rate can be output.

\*4. A dedicated PC loader is required to change parameter settings.

### External Dimensions

Unit: mm



## PRODUCT RETURN

When returning this device to the azbil Group for examination or other purposes, clean the flow path to remove fluid residue. Please complete the Safety Sheet at the end of the user's manual (CP-SP-1421E) and include it in the shipping box with your device.

基于SJ/T11364-2014「电子电气产品有害物质限制使用标识要求」的表示式样

产品中有害物质的名称及含量

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
基板	×	○	○	○	○	○
筐体	×	○	○	○	○	○

本表格依据SJ/T 11364 的规定编制。  
○：表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。  
×：表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572规定的限量要求。

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Specifications are subject to change without notice. (09)

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