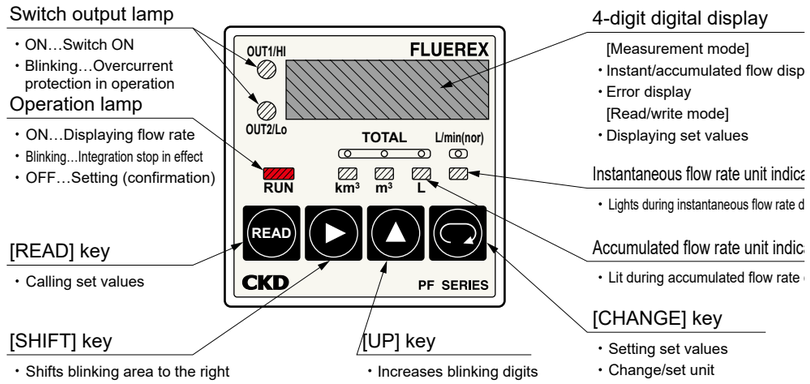
## Functions and operations for monitor




## Functions

| Item | Description | Initial state |
|---|---|---|
| Switch parameter setting | Switch output (OUT1, OUT2) operation can be set.<br>●Parameter 0: Instantaneous flow rate ON when inside the range<br>●Parameter 1: Instantaneous flow rate ON when outside the range<br>●Parameter 2: Accumulated flow ON at setting value or more<br>●Parameter 3 (OUT2 only): Integrated pulse output<br>* Refer to Page 412 (Integrated pulse output) for details.<br>●Low, High<br>●Hysteresis setting<br>• Hysteresis setting is not there in integrated switch. | Parameter 0 for both OUT1 and OUT2<br>Low: 0000<br>High: 0000 |
| Peak value display | The max. value of flow rate display can be confirmed. | - |
| Instantaneous flow rate/ accumulated flow display switching | The display can be changed between the instantaneous flow rate and accumulated flow. | Instantaneous flow rate |
| Integration measurement Halt/Integration clear | The pause/value can be cleared during accumulated flow display. | - |

For details on operation and setting method, refer to CKD components product website (https://www.ckd.co.jp/kiki/en/) → "Model No."→ Instruction manual





Pneumatic components (sensors)

# Safety Precautions

Be sure to read this section before use.
For general pneumatic components precautions, refer to Intro Page 17.

Product-specific cautions: Pneumatic flow rate sensor PFD Series

## Design / Selection

### 1 .Checking the specifications

**⚠DANGER**

■Never use this product with flammable fluids.

**⚠WARNING**

■Use the product in the range of conditions specified for the product. The product in this catalog is designed for use only in a compressed air system. Use with pressures or temperatures outside the specifications range may result in damage or operation failure.

■This product cannot be used as a billing meter. Do not use this product for commercial transactions as it is not compliant with the Measurement Act. Intended applications include industrial sensors.

■Because compressed air or nitrogen gas is used as an applicable fluid, do not use fluids other than these, because accuracy cannot be guaranteed.

### 2.Safety Design

**⚠WARNING**

■Take measures to prevent physical harm or property damage in the event of breakdown of this product.

**⚠CAUTION**

■Understand compressed air features before designing a pneumatic circuit.
●Pop-out, air discharge, or leakage due to air compression and expansion may occur.
●Design the circuit so that compressed air in the system is exhausted.

■Check for leakage current to avoid malfunction caused by the leakage current.
When using a programmable controller, leakage current may cause malfunction.

■Because both the sensor and monitor of this product are independent, they can be replaced with a model that has the same flow rate range.
●They cannot be replaced with a model that has a different flow rate range.
●The sensor and monitor must be used in a set. By using only either one of them, this kit does not operate.

■Although there is no movable section in the flow rate sensor, when repeating ON/OFF of the solenoid valve, the mesh section or fixed section of the rectifier may move slightly and this may result in the generation of particles. When the generation of particles must be eliminated, be sure to install a filter on the secondary side (downstream side) of the flow rate sensor.

### 3. Design by Application

**⚠CAUTION**

■Exerts no influence on performance as it uses compressed air and a small amount of leakage is tolerable. Contact CKD if no-leakage is required.

### 4. Working Environment

**⚠DANGER**

■Never use this product in an explosive gas atmosphere. The structure is not explosion-proof, and explosions or fires could occur.

■When using nitrogen gas as an applicable fluid, oxygen deficiency could be caused. Observe the following instructions.
①Use in well ventilated locations.
②Ventilate the work area when nitrogen gas is being used.
③Inspect nitrogen gas piping regularly to avoid leaks.

**⚠WARNING**

■Install in a place where the product is not exposed to rain, water, or direct sunlight.

■Do not use this product in an environment where corrosion may occur. Use in such an environment could lead to damage or operation failure.

■Consult with CKD if ozone is generated in the supplied air.

■Avoid using this product in environments where ozone is generated.

■Use with fluid temperature within the range of 0 to 40°C. Even if the ambient temperature is within the specified range, do not use this product in a location where the temperature could suddenly change and cause condensation.

■Do not use at a pressure exceeding the max. working pressure, as excessive pressure can cause product failure.

■The sensor section employs a dust-proof, drip-proof structure that provides reliability during maintenance and cleaning, during which it may be exposed to water splashing. However, avoid using this product in a location where it may be constantly exposed to water or intense splattering of water and/or oil.

### ⚠CAUTION

■Confirm before use that it will withstand the working environment.
This product cannot be used in environments where functional obstacles could occur. Such environments include high temperatures, chemical atmospheres, or those where chemical liquids, vibration, moisture, dripping water, coolant or gas are present. Environments where ozone is generated.

■Be sure to use within ambient temperature range of 0 to 50°C.

■Avoid using the product for vibration of 49 m/s$^2$ or more and shock of 294 m/s$^2$ or more.

■CE-compliance working conditions
This product is CE-marked, indicating conformity with the EMC Directives. The standard for the immunity for industrial environments applied to this product is EN61000-6-2; the following requirements must be satisfied in order to conform to this standard:
Conditions
●The power cable connected to the terminal block must be less than 3 m long.
●This product is not equipped with surge protection. Implement surge protection measures on the system side.

## 5. Securing of space

### ⚠WARNING

■Secure sufficient space around the pneumatic components for installation, removal, wiring, and piping work.

## 6. Others

### ⚠WARNING

■When suddenly opening the valve that connects to the sensor, fluid with a flow rate dozens of times greater than the rated flow rate may flow, and this can cause damage to the platinum thin film sensor or rectifier and flow out to the secondary side. When opening the valve that connects to the sensor, open it slowly so that the value in the monitor display may not exceed the rated flow rate.

■Keep away from high voltage lines, high voltage components and power components such as motors.

### ⚠CAUTION

■After the power supply is turned ON, internal settings such as hardware check are performed for 10 seconds. During this time, the display/output cannot operate normally. Particularly, if a switch output is used in the control of an interlock circuit, an abnormal stop may occur. Mask the output during this period.

■When using this product for an interlock circuit, provide multiple interlock circuits as a precaution against breakdown, and also perform regular inspections to confirm normal operation.

■Even when the instantaneous flow rate display is 0, if there is a minimal flow rate signal (including error), the integrating flow rate (integration count) may be displayed. If measuring the integrating flow with the flow rate display at 0 will be a problem, use the integrating flow measurement start/stop function as required.

■Keep the cable away from all noise sources, including power distribution wires. Noise can cause malfunctions.

■Do not short-circuit the output transistor. When a load is short-circuited, overcurrent protection circuit is triggered to prevent damage to the output transistor; however, if this state persists, the output transistor could be damaged.

■Do not use a load that can produce surge voltage. When directly running the load that generates a surge such as relay and solenoid valve, use a surge absorber built-in type. If there is a surge source on the same power supply line, similarly implement surge protection.

■This product has no protection against lightning surge. This product is CE marking compliant but has no protection against lightning surge. For the protection against lightning surge, take countermeasures on the equipment side.

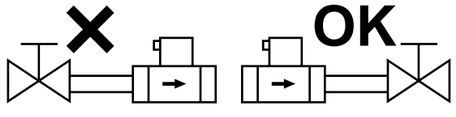
■Regularly inspect the product at least once a year to check that it operates correctly.

■Make sure that the lead wire is free of repeated bends and tension. This may lead to disconnection.

■For the wiring to the sensor and monitor, use the accessory cable (3 m).

■When mounting a pneumatic components, do not use a mounting method that relies on support from the piping.

■When adjusting the flow rate using a metering valve (glove valve, ball valve, etc.), install the metering valve on the secondary side (downstream side) of the sensor. Generated drift (turbulence in the flow) could cause errors.

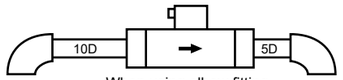




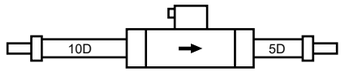

■Do not install the regulator immediately before the sensor. Generated drift may cause errors.
●When installing the regulator on the primary side, provide a straight piping section of 10D and over.
* "D" here indicates the inner diameter of the piping material.
●Select a regulator that has sufficient margin of flow characteristics for the max. flow rate of the sensor.

■Align the fluid flow direction to the direction indicated on the sensor when connecting the pipes. When connecting it in reverse, the larger value is displayed.

■When using an elbow or bush in the piping, it is recommended to provide straight piping sections of 10D and over on the primary side and 5D and over on the secondary side.
●For PFD-163 Series, be sure to provide straight piping sections.
●Bore size change by bush should be limited to one size.



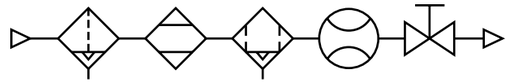
When using elbow fitting



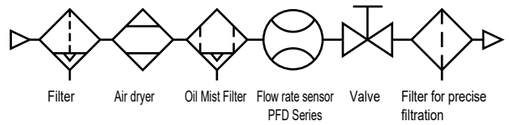
When using bush fitting

■Install a pneumatic filter just before the pneumatic component in the circuit.

■Air Quality
●Use CKD clean air system components appropriate for your application.
●Use compressed air that does not contain oil oxides, tar, carbon, etc., from the air compressor.
●Use compressed air that does not contain solid foreign matter.
●Install a filter, air dryer, and oil mist filter on the primary side (upstream side) of the sensor. The sensor's rectifier (mesh) rectifies the flow in the pipe. It does not filter out foreign matter, so provide a filter.




・When ultra clean air is required




For precautions during mounting, installation, adjustment, use and maintenance, refer to the CKD Components Product Site (https://www.ckd.co.jp/kiki/en/) → "Model No.→ Instruction Manual