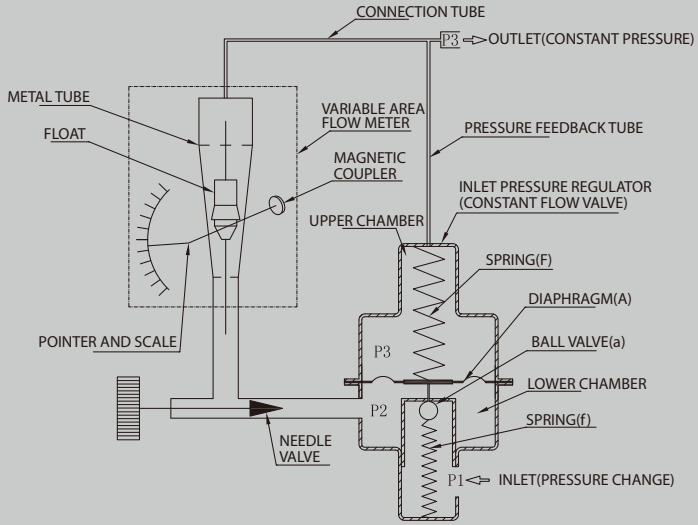
# MTFC SERIES PURGE DEVICE

## *Summary*

MTFC series products use a micro variable area flow meter combined with a constant flow valve to form a purging device, achieving stable output in flow measurement and pressure fluctuation situations.
Due to the use of stainless steel metal materials as the manufacturing material for the float flow meter, which is sturdy and reliable, with good appearance quality and stable measurement accuracy, the instrument can be widely used in process control such as purging, measuring liquid level, density, etc. in industries such as petrochemical, oil refining, fertilizer, steel, pharmaceutical, etc.

## *Operating Principle*

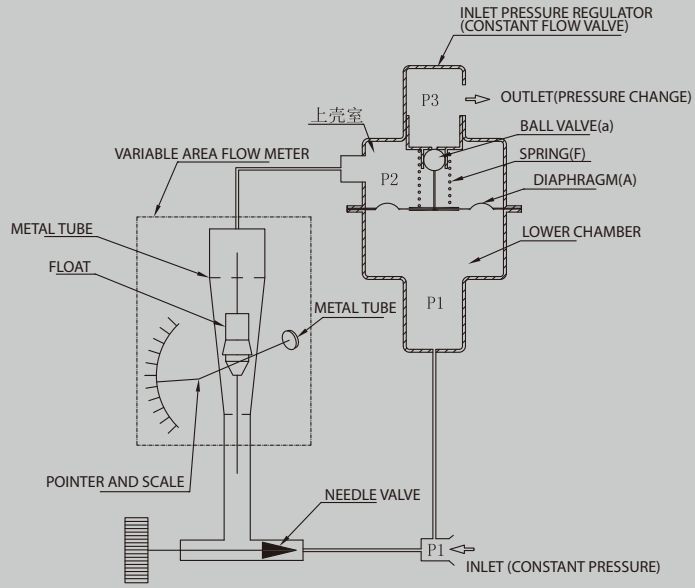
Inlet Purge device Measuring Principle




Schematic Diagram of the Inlet Purge device Measurement Principle

As shown in the Purge device Schematic Diagram: (RH Inlet Constant Flow Valve)
Elastic diaphragm is subjected to upward force :
1. P2A+P1a+f
Elastic diaphragm is subjected to downward force :
2. P3A+P2a+F
When the pressure is balanced , that is (1) = (2)
3. P2A+P1a+f= P3A+P2a+F
Since the flow rate is determined by the pressure on both sides of the diaphragm, P2-P3, the following formula can be obtained by the formula in (3):
4. P2-P3 = (F-f)/A-(a/A) (P1-P2)
Since A>>a, (a/A) (P1-P2) is negligible, and F, f, and A are constant values, so P2-P3 is constant value, then the flow rate will not change due to the pressure change at the inlet. When the fluid is an incompressible liquid, the RE inlet can be applied to the outlet pressure variation. For (4), P1 is constant and P3 is changing, so P3 becomes P3+△P,P2 becomes P2+△P, so P2-P3=C is a constant value.

Outlet Purge device Measuring Principle




Schematic Diagram of the Outlet Purge device Measurement Principle

As shown in the Purge device Schematic Diagram: (CH Outlet Constant Flow Valve)
Elastic diaphragm is subjected to downward force:
1. P2A+P3a+F
Elastic diaphragm is subjected to upward force:
2. P1A+P2a
When the pressure is balanced, that is (1) = (2)
3. P2A+P3a+F= P1A+P2a
Since the magnitude of the flow depends on the difference P1-P2 of the pressure regulator diaphragm, we can get by (3):
4. P1-P2=F/A- (a/A) (P2-P3)
Since A>>a, (a/A) (P2-P3) is negligible, and F and A are constant values, so in (4) P1-P2=C (constant value) then the flow rate will not change due to the change in outlet pressure P3.
In the case of incompressible liquids, the CH outlet constant flow valve can be used for inlet pressure changes. For (4), P2 is constant and P1 is variable, so P1 becomes P1+△P, P2 becomes P2+△P, so P2-P3=C is a constant value.
In the formula above:
A: Diaphragm cross-sectional area
A: Control valve spool (ball) cross-sectional area.
F/f: Spring pressure (spring force).
△P: Change in P2 or P3

## ***Product Features***

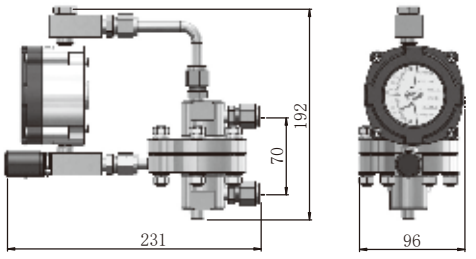
1. Single-/ double-/ multiple-channel forms (optional)
2. Single-table installation, panel installation (optional)
3. NPT 1/4, ferrule, thread, flange connection (optional)
4. 6mm, 8mm, 10mm, 12-25mm pipeline (optional)
5. Suitable for corrosive media or environments
6. Both mechanical and digital options available
7. Can be used where there are pressure fluctuations in the inlet and outlet.

## Technical Parameters

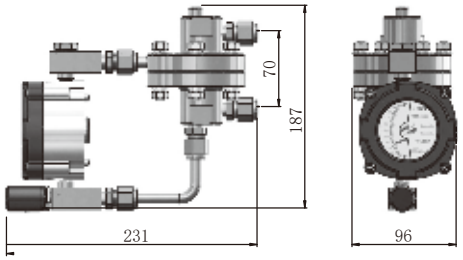
| | | |
|---|---|---|
| Measuring Range | 20℃, Water | 0.3-120L/H |
| | 20℃, 0.1013MPa Air | 1.2-3600L/H |
| Fluid Viscosity | η < 5mPa.s | |
| Range Ratio | 10:1 | |
| Measuring Accuracy | Standard：Level 4 | Special：Level 2.5 |
| Wetted Parts Material | Standard | 304/316L |
| | Others | On request |
| Fluid Temperature Range | | -40~300℃ |
| Max Fluid Pressure | | ≤1.6Mpa |
| Ambient Temperature | | -40℃≤T≤80℃ (When ≤ -35 ℃, there is no LCD display) |
| Minimum Required differential pressure | | See constant flow valve characteristic curve |
| Connection Type | Standard Thread | NPT 1/4" |
| | Standard Ferrule | ϕ6mm，ϕ8mm，ϕ10mm，ϕ12mm |
| | Standard Flange | HG/T20615 HG/T20592… |
| | Others | On request |
| Installation Type | | Flange Connection |
| | | Ferrule Connection |
| | | Panel Installation |
| Output Signal | | 4-20mA + HART |
| Power Supply Inlet | | M12×1.5 (Internal Thread) or on request |
| Enclosure | | Aluminum |
| Explosion-Proof Type | | Ex ia Ⅱ C T5/T4 Ga |
| Ip Rating | | IP66 |

## Outline Drawing

### 1 Single Meter and Single Route Purging Structure

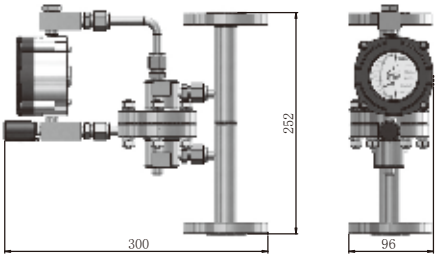



Inlet constant flow valve type

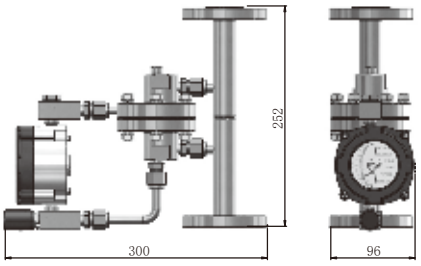



Outlet constant flow valve type

### 2 Single Meter and Single Route External Flange Structure

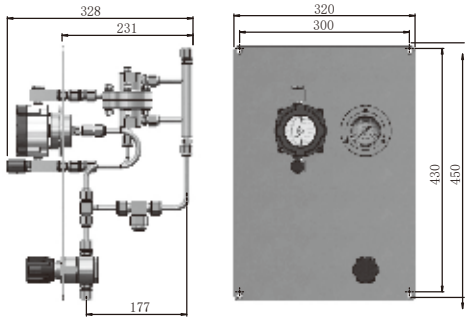



Inlet constant flow valve type



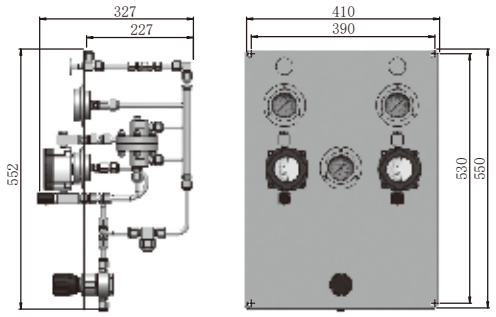

Outlet constant flow valve type

### *3 Single Meter and Single Route Panel Accessory Structure*




Outlet constant flow valve type

### *4 Single Meter and Single Route Panel Accessory Structure*




Outlet constant flow valve type

## *Model Selection Table*

| Model | Code | Content |
|---|---|---|
| MTFC- | A | Local indicator (pointer display) |
| | B | variable area flow meter |
| | 10S | Remote transmission (digital display) variable area flow meter |
| | 1 | DN10, side-in-side-out type |
| | Q | 1.6MPa |
| | N | Other working pressure value |
| | 6 | Standard NPT1/4 |
| | 8 | ☒6 Ferrule connection |
| | 10 | ☒8 Ferrule connection |
| | 12 | ☒10 Ferrule connection |
| | F | ☒12Ferrule connection |
| | T | Flange connection (DN) |
| | 2 | Other connection type |
| | 4 | Wetted material：304 |
| | Q | Wetted material：316L |
| | / | Other materials |
| | 0 | / |
| | i | Intrinsically safe |
| | D | Fluid Temperature： 0 ~ 200℃ |
| | G | Fluid Temperature：-40℃-0℃ 200℃-300℃ |
| | RH | Inlet constant flow valve |
| | CH | Outlet constant flow valve |
| | D | Single transmitter type |
| | P | Panel type |
| | 1 | Single route |
| | 2 | Double route |
| | M | Other |
| MTFC - | □ 10S □ □ □ / □ □ □ □ □ | |

## *Model Selection Example*

MTFC-A10S1F2/DCHD1 is a purge device, with a local pointer, an instrument diameter of DN10, a working pressure of ≤ 1.6MPa, flange connection, wetted material of 304, fluid temperature of 0 ＜ T ≤ 200 ℃, and an outlet constant flow valve. It is a single meter circuit type.

## Flow Table

Range Ratio 10:1, 100% Flow, Reference Condition: Water 20℃, Air 20℃-0.1013MPa

| | Water Flow | AIR FLOW | Pressure Loss |
|---|---|---|---|
| Taper Tube NO. | 【L/H】 | 【L/H】 | 【kPa】 |
| F005 | 4 | 125 | 1 |
| F010 | 6 | 232 | 1.9 |
| F015 | 8 | 340 | 2.3 |
| F030 | 11 | 435 | 2.5 |
| F040 | 15 | 530 | 2.7 |
| F080 | 20 | 660 | 3.6 |
| F125 | 40 | 1250 | 4.2 |
| F200 | 60 | 2000 | 8.5 |
| F300 | 80 | 2500 | 11.7 |
| F350 | 100 | 3400 | 16.6 |
| F400 | 120 | 3600 | 18 |

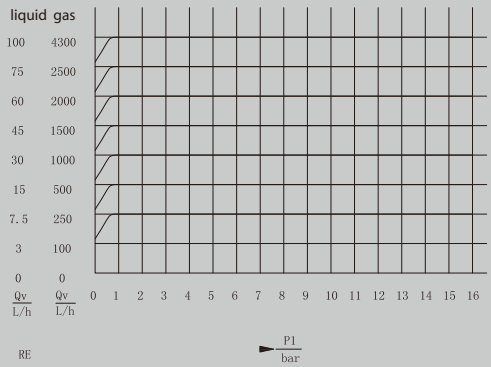
## Constant Flow Valve

Purge devices work with constant flow valve (Normal pressure type, working pressure ≤1.6MPa)

| Pressure Regulator Assembly | RH | CH |
|---|---|---|
| Application Condition | Inlet pressure changes, outlet pressure is stable. | Inlet pressure is stable, outlet pressure changes. |
| Fluid Status | Liquid or Gas | Gas |
| Fluid Temperature | ≤150℃ (Standard) | ≤150℃ (Standard) |
| Inlet Pressure P1 | Please see RH graph | - |
| Outlet PressureP2 | - | Please see CH graph |
| Minimum Pressure Difference △P | 0.5 bar | 0.15 bar |
| Sealing Material | Fluorine rubber | Fluorine rubber |
| Diaphragm Material | PTFE | PTFE |

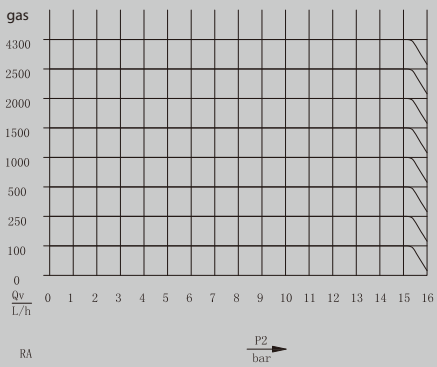
The pressure difference ΔP is the difference between the inlet pressure P1 and the outlet pressure P2.

RH CURVE TABLE



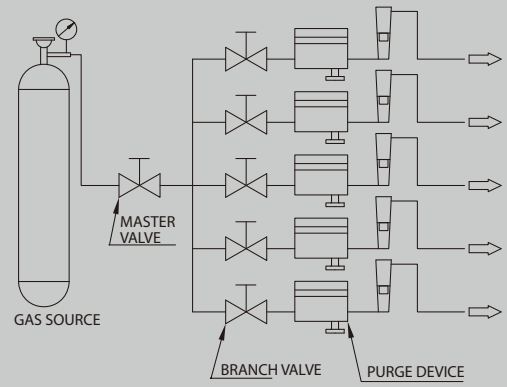

Reference: air,20℃, 1.013 bar abs
Qv: range

CH CURVE TABLE



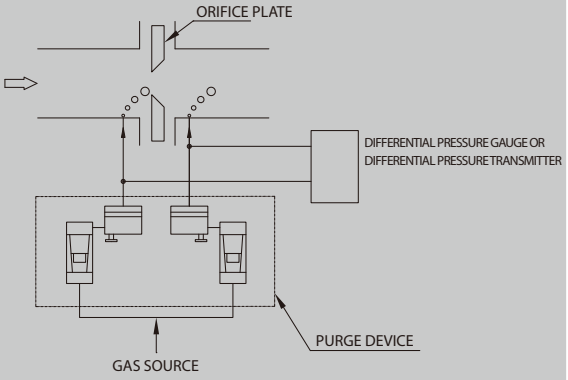

Take inlet pressure is 16 bar as example.
Reference: air,20℃, 1.013 bar abs
Qv: range

## Typical Applications



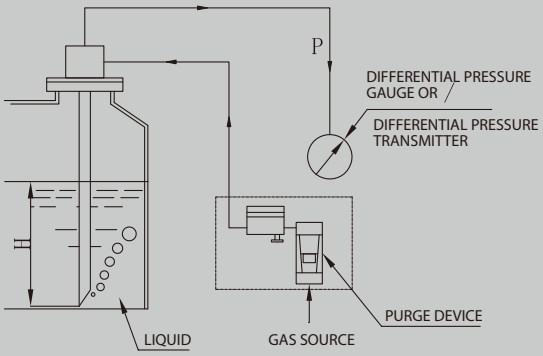

### APPLICATION UNDER VARYING SUPPLY PRESSURE CONDITIONS

As shown in the diagram above, one main air supply is divided into multiple branch air supply sources. If one or more of the branch sources stops supplying or adjusts the flow, a change in the main source pressure will occur. An inlet (primary pressure) pressure change control type purge device maintains its output flow constant.



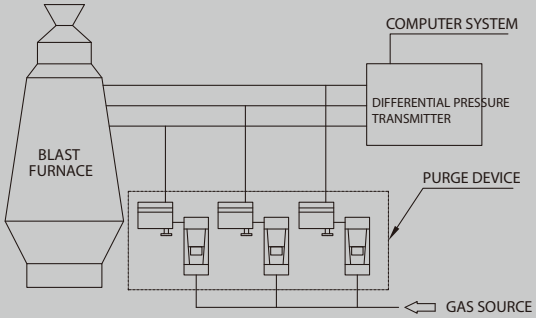

### PURGE ORIFICE

When using the orifice plate to measure the flow of corrosive liquids or liquids containing solid particles, a double-mounted purge device is used to continuously and quantitatively blow air into the pressure ports before and after the orifice plate to ensure that corrosive liquids or liquids containing solid particles do not flow into the pressure guide tube of the differential pressure meter or differential pressure transmitter.




### LEVEL MEASUREMENT

This is a method of detecting the level of liquid by measuring the back pressure at the end of the blowpipe. The purge device, which uses the outlet (secondary pressure) pressure change control type, continuously and quantitatively blows gas into the measurement object. A differential pressure transmitter or manometer is usually used to display the liquid level.




### APPLICATION IN STATIC PRESSURE MEASUREMENT SYSTEM FOR BLAST FURNACE BODIES

By detecting the static pressure of each section of the blast furnace body and calculating the air permeability resistance index to forecast the furnace condition, so as to take timely measures to ensure normal smelting, thus achieving the purpose of increasing production and energy conservation.

## Precautions for Installation of Purge Device

- Please select the appropriate location for installation of the flow purge device to ensure easy adjustment, cleaning, and removal of the purge device.
- As the float flow rate of the purge device is accompanied by a magnetic coupling drive, it is necessary to ensure that the disturbing magnetic field generated by other working equipment does not affect the measurement results of the flow meter.
- When installing, ensure that the purge device is stable and, if necessary, fitted with a mounting bracket in an appropriate location.
- The installation dimensions shall not exceed the given dimensions by too much or too little in order to avoid tensile or compressive forces acting on the purge device.
- When the liquid fluid contains ferromagnetic particles, a magnetic filter must be installed before the instrument.
- To ensure proper operation of the instrument, the fluid flowing through the instrument must be clean and free of impurities such as dust particles. Although our company installs a miniature filter, it is strongly recommended that customers install the filter upstream as it is not easy to disassemble and clean.

## Handling of Purge Device

- Pay attention to be sure that the fluid flows in the same direction as required by the instrumentation device. Close all fine adjustment needle valves prior to installation of the instrument.
- In fluid measurement, drain and purge the piping before operation to avoid shock action and open the valve slowly.
- In gas measurement, open the valve slowly to adjust the pressure to the operating pressure.
- In the case of the panel combination type, a pressure-reducing filter is usually installed at the inlet, and it should be noted that in normal operation, the pressure value is adjusted according to the order.

## Diagnosis, Analysis, and Treatment of Common Faults

| Issue | Reason | Solution |
|---|---|---|
| Flow cannot be adjusted to the set value | Inlet pressure is too low | Adjust the pressure to the required value |
| | Inlet magnetic filter plugged | Clean the magnetic filter |
| | Flow meter is blocked by dirt | Clean the magnetic filter or tube |
| | Constant flow valve diaphragm is damaged | Contact the supplier |

## Model Description of Purging Device

This Catalog lists only a selection of structures for illustration. There are many forms of installation in practice, which can result in various combinations or connections. If you have special requirements, we will provide you with an overall plan, model, etc. that meets your requirements.