

Fujikin® Flow Control System



4th Manufacturers Awards,
Part Category Prize: Incentive Award

FINE series PURE®

FCS®

Pressure Series

Internet
"Beyond the Flow"
of Things®

Fujikin® Carp Group

We welcome customer feedback for all of our products and services.

The Order of the Rising Sun, Gold and Silver Rays
Spring of 2016

Medal with Yellow Ribbon
Spring of 2001

Total Solution for Gas Supply System

Fujikin®'s FCS® (Flow Control System) series leads the way in flow control technology.

4th Manufacturers Awards,
Part Category Prize: Incentive Award

Developed to enhance stability and repeatability during etch and deposition, the most critical steps in semiconductor wafer manufacturing, the FCS® differs dramatically from conventional mass flow controllers (MFC) in its very theory of operation.

By developing the FCS® around non-conventional methods, highly accurate flow control is achieved – accuracy that is impossible to achieve with traditional pressure-based MFC's.

The FCS® overcomes unstable process variations such as pressure fluctuations (hunting) and crosstalk in gas supply systems and provides an unlimited amount of flow control stability.

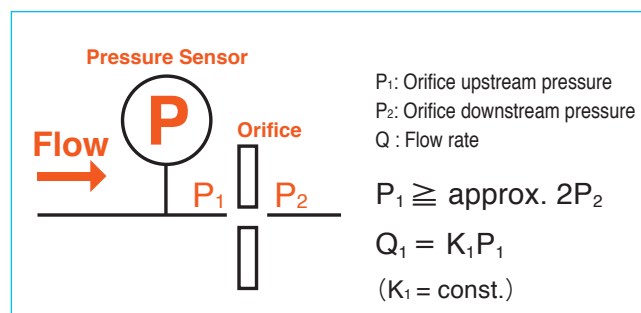
In addition, the high accuracy of the FCS® matches the state-of-the-art in semiconductor manufacturing and is therefore one of the FCS®'s most appealing features.

The FCS® promises the highest level of performance.



Operating Principle

The FCS® - unlike conventional mass flow controllers – controls flow by utilizing sonic or choked flow conditions.

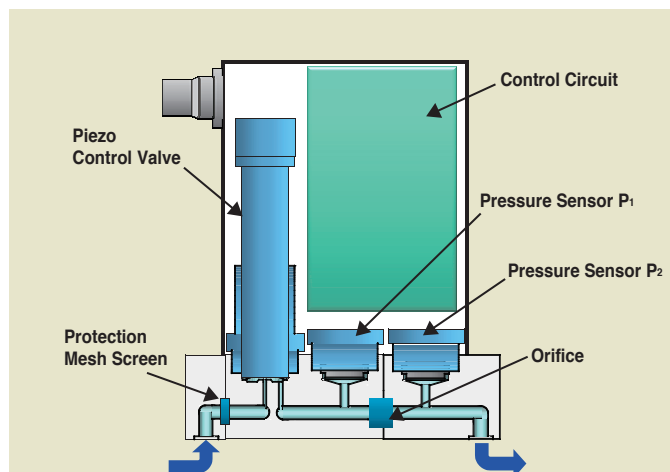


How does a pressure-based flow control system control flow?

If the absolute pressure upstream of an orifice (P_1) is at least double that of the pressure immediately downstream of the orifice (P_2), the flow rate (Q) of the gas through the orifice will equal the speed of sound (sonic flow).

Since the gas velocity through the orifice always remains at sonic velocity, the flow rate is proportional to P_1 only. This principle, known as critical expansion, is the principle under which the FCS® provides ultra-high flow control accuracy despite its amazingly simple design.

Internal Structure (for Part Number FCSP7000W)



Simple Structure

The FCS® features a simple internal structure with no dead space.

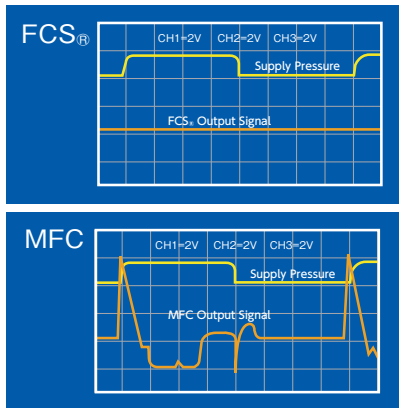
The FCS® has the following parts that come into contact with gas: a piezo control valve that allows quick response, high precision pressure sensors, and a special orifice. In addition, a control circuit with a high performance CPU is mounted for digital control of those parts.

Features

1. Fluctuations in upstream pressure have no effect on control flow rate.
2. Quick response time of 0.5 sec. or less.
3. Multi Gas / Multi Range (MGMR).
4. Can be mounted in any attitude or position.
5. Incorporates flow rate diagnosis function.
6. Not gas specific.
7. Complies with RoHS (Restriction of Hazardous Substances regulations).
(Because **Fujikin**® strives to develop and manufacture environmentally-friendly products, the FCS® complies with the RoHS.)

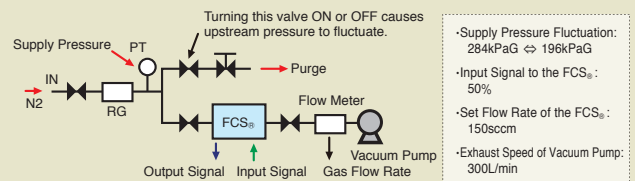
Superior Anti-Pressure Fluctuation Characteristics

Variations in upstream pressure can cause output of a Mass Flow Controller to fluctuate greatly. However, **Fujikin**®'s FCS® is immune to such fluctuations and flow spikes.



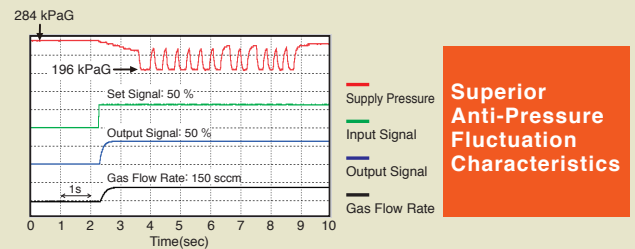
The advanced design eliminates the need for an upstream regulator (required with an MFC with a pressure of 0.8 MPaG or less) and reduces the cost – as well as the size – of the gas system.

Test Flow Chart

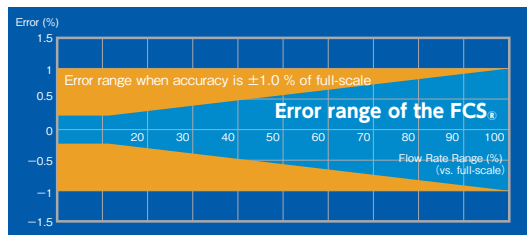


- Supply Pressure Fluctuation: 284kPaG ↔ 196kPaG
- Input Signal to the FCS: 50%
- Set Flow Rate of the FCS: 150sccm
- Exhaust Speed of Vacuum Pump: 300L/min

FCS® Signal Monitor



Superior Accuracy



Accuracy: ±1.0 % S.P. (set point)
Controls flow rate to within ±1.0 % S.P. (set point) when the flow rate is 10 % or more of the F.S. (full scale).

Accuracy: ±0.1% F.S. (full scale)
Controls flow rate to within ±0.1% F.S. (full scale) when the flow rate is 10 % or less of the F.S.(full scale).

Pressure regulator not required on the gas supply line.

Gas line costs can be reduced!

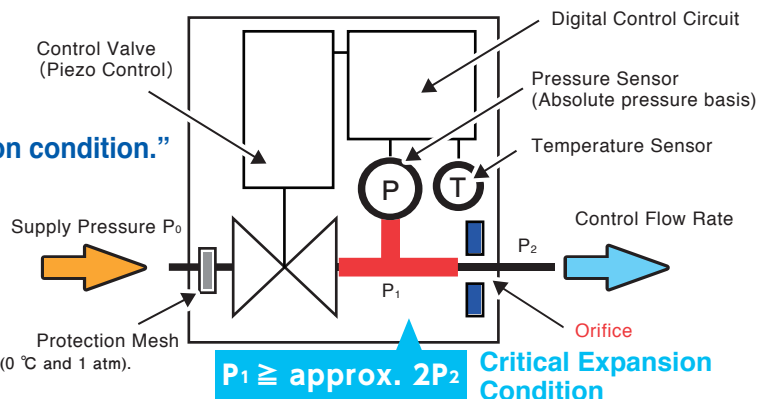
Structure

The FCS® is a pressure-based flow controller incorporating the principle of “Critical expansion condition.”

For example, when orifice downstream pressure P_2 is 10 torr or less

- $P_1 = 20$ torr → Flow rate: 10 sccm
- $P_1 = 200$ torr → Flow rate: 100 sccm
- $P_1 = 2000$ torr → Flow rate: 1000 sccm

* sccm: volumetric flow (cc/min) converted in terms of standard conditions (0 °C and 1 atm).



FCSP8000

Dynamic Range Model

Incorporating two orifices
(one for large flow rate and one for small flow rate), this
single FCS® can cover two flow rate ranges.

RoHS

Operating Principle

Critical Expansion Condition

$[P_1 \text{ (Supply Pressure)} \geq \text{approx. } 2P_2 \text{ (Output Pressure)}]$
 $Q=K_1P_1 \text{ (} K_1=\text{const.)}]$

Quick Response

Within 0.5 seconds of flow rate response time
(Rising Response Time)

No Regulator Required

Since the flow rate is controlled by pressure, no regulator
is required.

High Performance and High Reliability

Flow rate accuracy: $\pm 1.0\%$ S.P. (10 to 100 %)

Seal Materials

Metal seal

I/O

DeviceNet™



Specifications

Model	FCSP8000D		
Type	Standard Type	Low Pressure (AS) Type	Low Pressure (B) Type
Supply Pressure Range	250 to 898.7 kPaG	20 to 898.7 kPaG	50 to 898.7 kPaG
Flow Rate Accuracy	$\leq \pm 1.0\%$ S.P. (Setting Signal: 10 to 100 %) $\leq \pm 0.1\%$ F.S. (Setting Signal: 1 to 10 %)	$\leq \pm 1.0\%$ S.P. (Setting Signal: 30 to 100 %) $\leq \pm 0.3\%$ F.S. (Setting Signal: 1 to 30 %)	$\leq \pm 1.0\%$ S.P. (Setting Signal: 20 to 100 %) $\leq \pm 0.2\%$ F.S. (Setting Signal: 1 to 20 %)
Flow Rate Control Range (N ₂ gas conversion)	10 SCCM – 2.4 SLM		
Response Time	Within 0.5 seconds reach to $\pm 2.0\%$ of setting value (starting characteristic)		
Downstream Pressure	$\leq P_1$		
Maximum Pressure	1 MPaG (However, the pressure for guaranteed accuracy is 0.89 MPaG or less.)		
External Leakage	1×10^{-10} Pa·m ³ /sec or less		
Seat Leakage	2×10^{-5} Pa·m ³ /sec or less (at supply pressure of 0.89 MPaG)		
Temperature for Guaranteed Accuracy	0 to 50 °C (Guaranteed Accuracy: 15 to 35 °C *HT50: 15 to 50 °C)		
Supply Voltage Power Consumption	+11 to +25 VDC: 4.5 VA (4.5 W)		
I/O Signals	DeviceNet™ (as per SEMI E54 and ODVA SEMI SIG Profile-compliant)aa		
Mounting Attitude	Can be installed in any attitude		
Material of Wetted Area	SUS316L Stainless Steel, Super Ferrite Alloy (Cr ₂ O ₃ treated), Ni-Co alloy		
Connections / Dimensions	1.125 Wseal (92 mm), 1.125 CSeal (92 mm)		

The latest catalog can be downloaded from <http://www.fujikin.co.jp/go/c75101e>.

FCSP7000

High Performance Standard Model

RoHS

Operating Principle

Critical Expansion Condition

$$[P_1 \text{ (Supply Pressure)} \geq \text{approx. } 2P_2 \text{ (Output Pressure)}, \\ Q=K_1P_1 \text{ (} K_1=\text{const.)}]$$

Quick Response

Within 0.5 seconds of flow rate response time
(Rising Response Time)

No Regulator Required

Since the flow rate is controlled by pressure, no regulator is required.

High Performance and High Reliability

Flow rate accuracy: $\pm 1.0\%$ S.P. (10 to 100 %)

Seal Materials

Metal seal

I/O

Analog, DeviceNet™, RS-485



Specifications

Model	FCSP7000 / FCSP7000D		
Type	Standard Type	Low Pressure (AS) Type	Low Pressure (B) Type
Supply Pressure Range	250 to 898.7 kPaG	20 to 898.7 kPaG	50 to 898.7 kPaG
Flow Rate Accuracy	$\leq \pm 1.0\%$ S.P. (Setting Signal: 10 to 100 %) $\leq \pm 0.1\%$ F.S. (Setting Signal: 1 to 10 %)	$\leq \pm 1.0\%$ S.P. (Setting Signal: 30 to 100 %) $\leq \pm 0.3\%$ F.S. (Setting Signal: 1 to 30 %)	$\leq \pm 1.0\%$ S.P. (Setting Signal: 20 to 100 %) $\leq \pm 0.2\%$ F.S. (Setting Signal: 1 to 20 %)
Flow Rate Control Range (N ₂ gas conversion)	10 SCCM – 10 SLM	27 SCCM – 1 SLM	39 SCCM – 2 SLM
Response Time	Within 0.5 seconds reach to $\pm 2.0\%$ of setting value (starting characteristic)		
Downstream Pressure	$\leq P_1$		
Maximum Pressure	1 MPaG (However, the pressure for guaranteed accuracy is 0.89 MPaG or less.)		
External Leakage	1×10^{-10} Pa·m ³ /sec or less		
Seat Leakage	2×10^{-5} Pa·m ³ /sec or less (at supply pressure of F2400 (F850B) or less) 5×10^{-4} Pa·m ³ /sec or less (at supply pressure of F3L (F1300B) or more)		
Temperature for Guaranteed Accuracy	0 to 50 °C (Guaranteed Accuracy: 15 to 35 °C *HT50: 15 to 50 °C)		
Supply Voltage Power Consumption	Analog I/O specifications +15 VDC: 120 mA, -15 VDC: 120 mA	DeviceNet™ communication specifications +11 to +25 VDC: 4.5 VA (4.5 W)	
I/O Signals	0 to 5 VDC	DeviceNet™ (as per SEMI E54 and ODVA SEMI SIG Profile-compliant), RS-485	
Mounting Attitude	Can be installed in any attitude		
Material of Wetted Area	SUS316L Stainless Steel, Super Ferrite Alloy (Cr ₂ O ₃ treated), Ni-Co alloy		
Connections / Dimensions	1.125 Wseal (92 mm), 1.5 Wseal (79.8 mm), 1/4"UJR(124 mm), 1.125 C-Seal (92 mm)		

FCSP7000W

Wide Range Model

RoHS

Operating Principle

This model controls the differential pressure within and partly outside the Critical Expansion Condition range.

[P_1 (Supply Pressure) \geq approx. $2P_2$ (Output Pressure),
 $Q=K_1P_1$ ($K_1=const.$)] range

Quick Response

Within 0.5 seconds of flow rate response time
 (Rising Response Time)

No Regulator Required

Since the flow rate is controlled by pressure, no regulator is required.

High Performance and High Reliability

Flow rate accuracy: ± 1.0 % S.P. (10 to 100 %)

Seal Materials

Metal seal

I/O

Analog, DeviceNet™, RS-485



Specifications

Model	FCSP7000W / FCSP7000DW		
Type	Standard Type	Low Pressure (AS) Type	Low Pressure (B) Type
Supply Pressure Range	250 to 898.7 kPaG	20 to 898.7 kPaG	50 to 898.7 kPaG
Flow Rate Accuracy	$\leq \pm 1.0$ % S.P. (Setting Signal: 10 to 100 %) $\leq \pm 0.1$ % F.S. (Setting Signal: 1 to 10 % [For controlling differential pressure: 4 to 10 %])	$\leq \pm 1.0$ % S.P. (Setting Signal: 30 to 100 %) $\leq \pm 0.3$ % F.S. (Setting Signal: 1 to 30 % [For controlling differential pressure: 10 to 30 %])	$\leq \pm 1.0$ % S.P. (Setting Signal: 20 to 100 %) $\leq \pm 0.2$ % F.S. (Setting Signal: 1 to 20 % [For controlling differential pressure: 8 to 20 %])
Flow Rate Control Range (N ₂ gas conversion)	20 SCCM to 10 SLM	27 SCCM to 1 SLM	39 SCCM to 2 SLM
Response Time	Within 0.5 seconds reach to ± 2.0 % of setting value (starting characteristic)		
Downstream Pressure	$\leq P_1$		
Maximum Pressure	1 MPaG (However, the pressure for guaranteed accuracy is 0.89 MPaG or less.)		
External Leakage	1×10^{-10} Pa·m ³ /sec or less		
Seat Leakage	2×10^{-5} Pa·m ³ /sec or less (at supply pressure of F2400(F850B) or less) 5×10^{-4} Pa·m ³ /sec or less (at supply pressure of F3L(F1300B) or more)		
Temperature for Guaranteed Accuracy	0 to 50 °C (Guaranteed Accuracy: 15 to 35 °C *HT50: 15 to 50 °C)		
Supply Voltage	Analog I/O specifications	DeviceNet™ communication specifications	
Power Consumption	+15 VDC: 120 mA, -15 VDC: 120 mA	+11 to +25 VDC: 4.5 VA (4.5 W)	
I/O Signals	0 to 5 VDC	DeviceNet™ (as per SEMI E54 and ODVA SEMI SIG Profile-compliant), RS-485	
Mounting Attitude	Can be installed in any attitude		
Material of Wetted Area	SUS316L Stainless Steel, Super Ferrite Alloy (Cr ₂ O ₃ treated), Ni-Co alloy		
Connections / Dimensions	1.125 Wseal (92 mm), 1.5 Wseal (79.8 mm), 1/4"UJR (124 mm), 1.125 CSeal (92 mm)		

The latest catalog can be downloaded from <http://www.fujikin.co.jp/go/c75101e>.

FCSP7300*W (MGMR)

Wide Range Model

RoHS

Operating Principle

This model controls the differential pressure within and partly outside the Critical Expansion Condition range.

$$[P_1 \text{ (Supply Pressure)} \geq \text{approx. } 2P_2 \text{ (Output Pressure),} \\ Q=K_1P_1 \text{ (} K_1=\text{const.)}] \text{ range}$$

Quick Response

Within 0.5 seconds of flow rate response time
(Rising Response Time)

Multi Gas / Multi Range (MGMR)

Users may change gas and full scale flow rate easily.

No Regulator Required

Since the flow rate is controlled by pressure, no regulator is required.

High Performance and High Reliability

Flow rate accuracy: $\pm 1.0\%$ S.P. (10 to 100 %)

Seal Materials

Metal seal

I/O

DeviceNet™, EtherCAT®, RS-485



Specifications

Model	FCSP7300DW / FCSP7300EW / FCSP7300RW		
Type	Standard Type		Low Pressure (B) Type
Supply Pressure Range	250 to 898.7 kPaG		50 to 898.7 kPaG
Flow Rate Accuracy	$\leq \pm 1.0\%$ S.P. (Setting Signal: 10 to 100 %) $\leq \pm 0.1\%$ F.S. (Setting Signal: 1 to 10 % [For controlling differential pressure: 4 to 10 %])		$\leq \pm 1.0\%$ S.P. (Setting Signal: 20 to 100 %) $\leq \pm 0.2\%$ F.S. (Setting Signal: 1 to 20 % [For controlling differential pressure: 8 to 20 %])
Flow Rate Control Range (N ₂ gas conversion)	10 SCCM – 4 SLM (N ₂ converted flow rate)		39 SCCM – 500 SCCM (N ₂ converted flow rate)
Response Time	Within 0.5 seconds reach to $\pm 2.0\%$ of setting value (starting characteristic)(Setting value: 10 – 100 %)		
Downstream Pressure	$\leq P_1$		
Maximum Pressure	1 MPaG (However, the pressure for guaranteed accuracy is 0.89 MPaG or less.)		
External Leakage	1×10^{-10} Pa·m ³ /sec or less		
Seat Leakage	2×10^{-5} Pa·m ³ /sec or less		
Temperature for Guaranteed Accuracy	0 to 50 °C (Guaranteed Accuracy: 15 to 35 °C *HT50: 15 to 50 °C)		
Supply Voltage	11 – 25 VDC	24 VDC	± 15 VDC
Power Consumption	4.5 VA max.	4.5 VA max.	150 mA max.
I/O Signals	DeviceNet™ (ODVA compliance)	EtherCAT®	RS485
Mounting Attitude	Can be installed in any attitude		
Material of Wetted Area	SUS316L, Ni-Co alloy, Hastelloy®C22		
Connections / Dimensions	1.125 Wseal (92 mm)、1.125 Cseal (92 mm)		

The latest catalog can be downloaded from <http://www.fujikin.co.jp/go/c75101e>.

Part No. Designation

FCSP7302

FCS P7302 D W2 (-T5) - 4CW2 - F300 /N2 - B7 D*

FLOW CONTROL SYSTEM	①	②	③	④	⑤	⑥	⑦	⑧	⑨
		① Series ② Communication D : DeviceNet™ E : EtherCAT® R : RS485	③ Control Range W2 : Wide range 200Torr W4 : Wide range 400Torr	④ Guaranteed Accuracy None : 15~35 °C T5 : 15~50 °C	⑤ Fitting type, face-to-face dimension or seal pitch 4CW2: 1.125 Wseal Seal pitch 92 mm 4CC2: 1.125 Cseal Seal pitch 92 mm	⑥ Full scale F300: 300 SCCM F4L : 4 SLM	⑦ Gas Name Chemical formula	⑧ Bin No. B1: 10-20 SCCM B2: 21-40 SCCM B3: 41-80 SCCM B4: 81-160 SCCM B5: 161-300 SCCM B6: 301-600 SCCM B7: 601-1000 SCCM B8: 1001-2000 SCCM B9: 2001- 4000 SCCM (N ₂ Equivalent)	⑨ Function D: DeviceNet™ function selection E: EtherCAT® function selection R: RS485 function selection

Auto Pressure Controller

UPC® Series

The Ultimate Pressure Controller

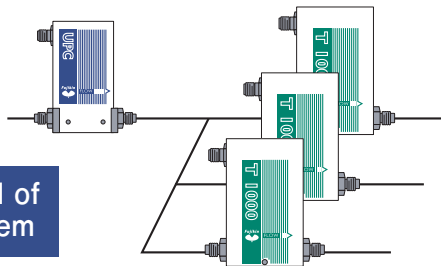
RoHS

Operating Principle

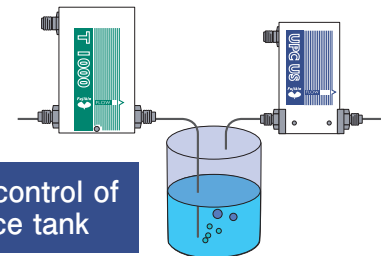
The UPC® Series controllers keep the pressure constant using a built-in pressure sensor.

Application

- ▶ Any pressure can be set using an electrical signal.
- ▶ Connecting a UPC® Series controller to the upstream side of a mass flow controller makes extremely stable flow control possible.
- ▶ When two or more mass flow controllers are connected in one line and a rapid change in gas flow rate occurs on one of them, the other mass flow controllers may sometimes be affected. This can be prevented by using a UPC® series controller (downstream type).
- ▶ The UPCUS® (upstream type of pressure controller) keeps constant the internal pressure of the liquid source tank of an MOCVD system, for example, to improve the vaporization stability in amount of a liquid source.
- ▶ Can be used as a controller for cooling wafer rear surfaces.
- ▶ High temperature type (for max. 150 °C and max. 250 °C) and with a flow monitor type are also available from the product lineup.



Pressure control of gas supply system



Internal pressure control of MO material source tank

Part number designation

UPC Analog I/O Downstream pressure controller - **4J2C** Face-to-face dimension: 124mm Piping height: 12.7mm - **C150** Full scale pressure range: 150 kPa abs. **L** Control valve Cv value: 0.0055

Specifications

Model	UPC® (Downstream pressure controller)		UPCUS® (Upstream pressure controller)
Pressure Range	F.S.13.3 kPa abs. (100torr)		F.S. 150/300/500 kPa abs.
Control Pressure Range	1.0 to 100 %		1.0 to 100 % ※1
Control Valve Cv Value	-		L Type: 0.0055 / M Type: 0.011 / H Type: 0.03
Pressure Adjusting Accuracy (After auto zeroing)	1.0 to 40 %: ±0.2 %F.S. 40 to 100 %: ±0.5 %S.P.		F.S.150 kPa abs. [1.0 to 40 %: ±0.2 %F.S., 40 to 100 %: ±0.5 %S.P.] F.S.300/500 kPa abs. [1.0 to 20 %: ±0.1 %F.S., 20 to 100 %: ±0.5 %S.P.]
Supply Pressure Range	0 to 200 kPaG		to 897.3 kPaG
Maximum Pressure	200 kPaG		1 MPaG
External Leakage	1.0×10 ⁻¹⁰ Pa·m ³ /sec.		
Permissible Operating Temperature Range	0 to 50 °C (Guaranteed Accuracy: 15 to 35 °C) ※2		
Supply Voltage	Analog: ±15 VDC (Power Consumption +15 V 120 mA, -15 V 120 mA) DeviceNet™: +11 to +25 VDC, 4.0 W		
Pressure Setting/Output Signal	0-10 VDC / 0-10 VDC		0-5 VDC / 0-5 VDC
Material of Wetted Area	SUS316L, Ni-Co Alloy		SUS316L, Ni-Co Alloy, FS9
Connections / Dimensions	1.5 Wseal (79.8 mm), 1/4"UJR(124 mm)		1.5 Wseal (79.8 mm), 1/4"UJR(106 mm, 124 mm), 1.125 Wseal (92 mm)

※1: Pressure control range of the UPCUS® will change based on the flow conditions. For details, please contact us.
 ※2: The accuracy guaranteed temperature range of 15 to 50 °C can be supported by the HT50 type as option.

The latest catalog can be downloaded from <http://www.fujikin.co.jp/go/c75101e>.

Part No. Designation

FCSP8000

FCSP 8002 D-4CW2-F1L A F100 A

FLOW CONTROL SYSTEM	① Series P: PRESSURE CONTROLLER	③ Communication D: DeviceNet™ communication	⑤ Full scale pressure range (for large flow rate side) F10: 10SCCM F1L: 1SLM(For details, see Tables 1-1 to 3.)	⑥ Supply pressure None: Standard Type A: AS Type B: B Type
	② 8102 F10-F2400 10SCCM-2.4SLM	④ Fitting type, face-to-face dimension or seal pitch 4CW2: 1.125Wseal, seal pitch: 92 mm	⑦ Full scale pressure range (for small flow rate side) F10: 10SCCM F1L: 1SLM(For details, see Tables 1-1 to 3.)	⑧ Supply pressure None: Standard Type A: AS Type B: B Type

Table 1-1
Flow rate range table (Maximum outlet pressure: 50 torr)

No.	Flow rate range type	Flow rate range (N2 Gas) (SCCM)
1	F300, F20	300 - 1.0
2	F1L, F50	1000 - 3.0
3	F2L, F100	2000 - 6.0
4	F50B, F6B	50 - 1.0
5	F200B, F28B	200 - 4.0
6	F500B, F64B	500 - 10
7	F1LB, F122B	1000 - 20

Table 1-2
Flow rate range table (Maximum outlet pressure: 100 torr)

No.	Flow rate range type	Flow rate range (N2 Gas) (SCCM)
1	F100, F10	100 - 1.0
2	F500, F50	500 - 5.0
3	F1L, F100	1000 - 10
4	F2L, F200	2000 - 20
5	F50B, F13B	50 - 3.5
6	F100B, F28B	100 - 7.0
7	F200B, F50B	200 - 14
8	F500B, F125B	500 - 35
9	F1LB, F250B	1000 - 70

Table 1-3
Flow rate range table (Maximum outlet pressure: 150 torr)

No.	Flow rate range type	Flow rate range (N2 Gas) (SCCM)
1	F100, F20	100 - 3.0
2	F200, F30	200 - 6.0
3	F500, F80	500 - 15
4	F1L, F160	1000 - 30
5	F2L, F300	2000 - 60
6	F50B, F20B	50 - 7.5
7	F100B, F39B	100 - 15
8	F200B, F83B	200 - 30
9	F300B, F122B	300 - 45
10	F500B, F180B	500 - 75
11	F1LB, F375B	1000 - 150

FCSP7000

FCSP 7002 D W - HT50 - 4WS3 - F10 A - A1

FLOW CONTROL SYSTEM	① Series P: PRESSURE CONTROLLER	③ Communication None: Analog communication D : DeviceNet™ communication	⑥ Fitting type, face-to-face dimension or seal pitch 4 J 2: 1/4UJR, face-to-face dimension: 124 mm, piping height: 25 mm 4 P 2: 1/4UPG, face-to-face dimension: 115 mm, piping height: 25 mm 4WS1: 1.5Wseal, seal pitch: 79.8 mm 4CW2: 1.125Wseal, seal pitch: 92 mm Note: Some fitting shapes may not support the DeviceNet™	⑦ Full scale F10: 10SCCM F1L: 1SLM (For details, see Table 2.)	⑧ Pressure condition (for minimum supply pressure) None: Standard Type(250 kPaG) A: Low Pressure (AS) Type(20 kPaG) B: Low Pressure (B) Type(50 kPaG)
	② 7010 7002:F10-F2400 10 SCCM-2.4SLM 7003:F3L-F10L 3 SLM-10 SLM	④ Control Range None: Standard W : Wide range	⑤ Guaranteed Accuracy None: 15 to 35 °C HT50: 15 to 50 °C	⑨ Functions and option A0: Not equipped with flow rate self-diagnosis function A1: Performs flow rate self-diagnosis independently. A3: Performs flow rate self-diagnosis after auto zeroing.	⑩ Surface treatment None: UP treated

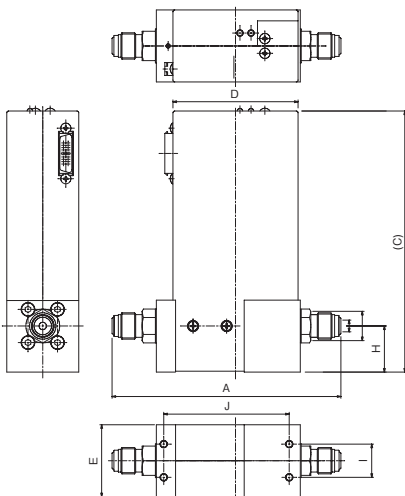
Table 2 Full-scale flow rate range table

(N2 gas and unit: SCCM, SLM)

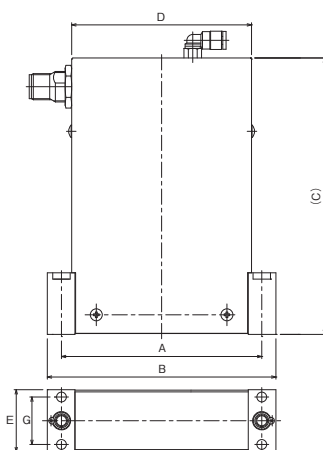
Standard Type			Low Pressure (AS) Type		Low Pressure (B) Type	
F10	F160	F1L	F27A	F300A	F39B	F375B
F20	F200	F1300	F37A	F500A	F50B	F850B
F30	F210	F1600	F50A	F680A	F64B	F1LB
F40	F260	F2L	F65A	F1LA	F83B	
F43	F300	F2400	F100A	F2300A	F100B	
F50	F400	F3L	F115A		F122B	
F65	F450	F5L	F133A		F145B	
F80	F500	F7L	F160A		F180B	
F100	F600	F10L	F200A		F200B	
F110	F850		F285A		F250B	
F130						

Dimensions

Connection: UJR Type



Connection: Wseal Type



UJR Type

(Unit: mm)

	A	C	D	E	H	I	J
P7000(WR)	124	141.5	67.8	39	25	25	68
UPC	106/124	128	70.5	28.1	25	18	—

IGS 1.5 Wseal Type

(Unit: mm)

	A	B	C	D	E	G
P7000(WR)	79.8	93	141.5	67.8	39	30
UPC	79.8	93	128	70.5	39	30

IGS 1.125 Wseal Type

(Unit: mm)

	A	B	C	D	E	G
P7000/P8000	92	105	127	82.6	28.5	21.8
UPC	92	105	128	70.5	28.5	21.8

Accessories

Signal Checkers (one complete set)

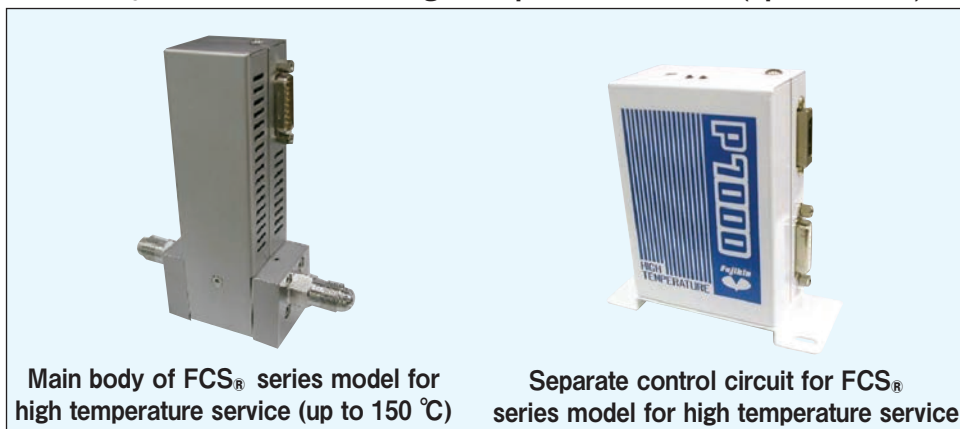


Special Power Supply + Branch Adaptor

Signal Checkers (Main Body)

Related Products

The FCS[®] series models for high temperature service (up to 150 °C)



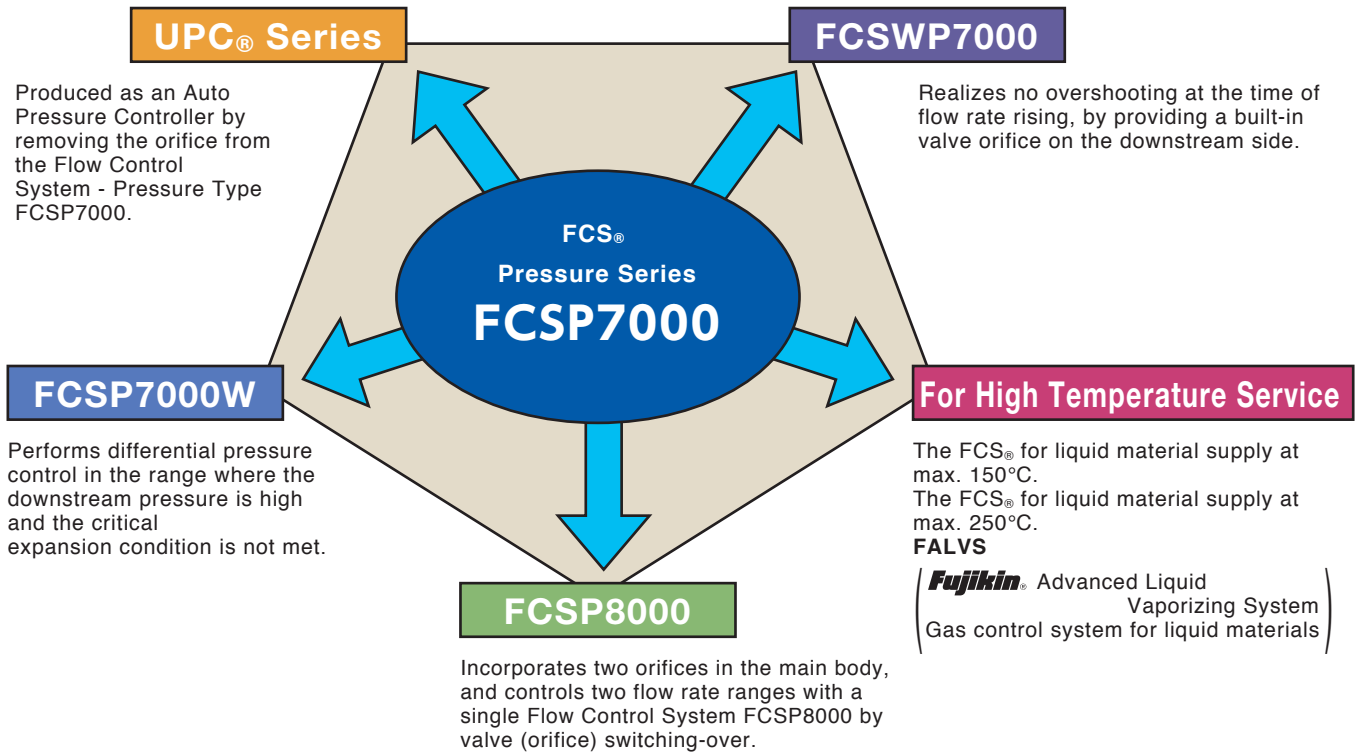
Main body of FCS[®] series model for high temperature service (up to 150 °C)

Separate control circuit for FCS[®] series model for high temperature service

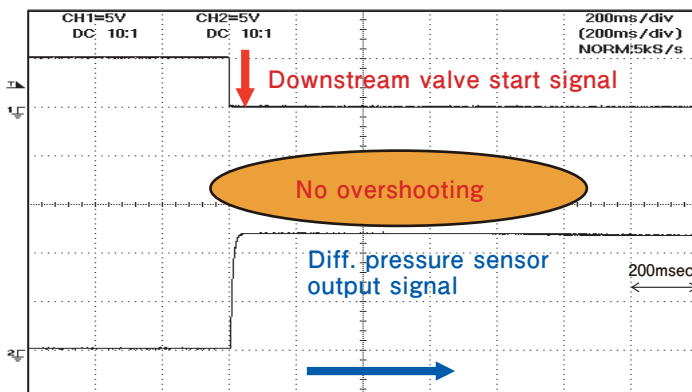
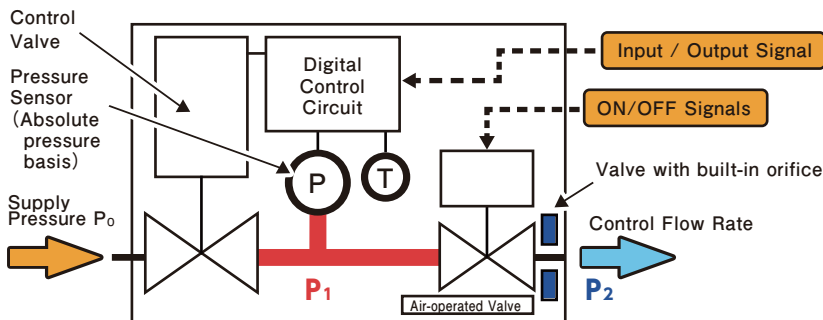


FFMS[®]
(Fujikin[®] Flow Measurement System)

Devices Derived from FCSP7000



FCSP7000ALD® (FCS® for measures against transient response fluctuations)



■ For High Temperature Service

FALVS® (**Fujikin**® Advanced Liquid Vaporizing System, Vapor Control System for Liquid Materials)




Vaporization Section

- Controls liquid material supply with the upstream orifice of the vaporization section and a pneumatic valve.
- Generates vapor pressure appropriate to the heating temperature of the vaporization section.
- Composed of three chambers for sufficient heating of gas and prevention of liquid flow into the FCS®.

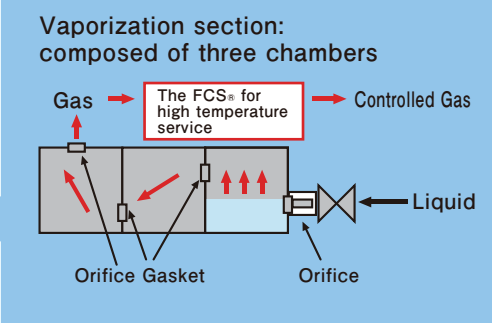
The FCS® for High Temperature Service

- No change in flow rate due to change in supply pressure – high accuracy and quick response. → Easy temperature control of vaporizer
(to ensure temperature setting between min. supply pressure and max. allowable pressure of pressure sensor)



Body of the FALVS®

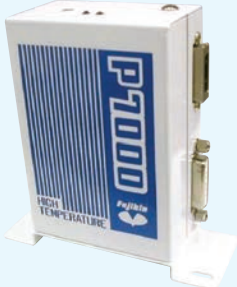
Vaporization section: composed of three chambers



Gas → The FCS® for high temperature service → Controlled Gas

Orifice Gasket Orifice


Liquid



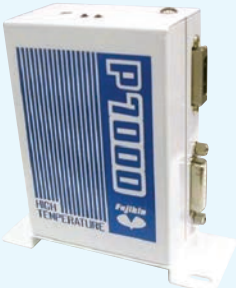
Separate Control Circuit for the FALVS®

The FALVS is used to vaporize liquid material and precisely control the vapor flow rate.


The FCS® for High Temperature Service at 250 °C (max.)



Body of the FCS® for High Temperature Service at 250 °C (max.)








Separate Control Circuit of the FCS® for High Temperature Service



FCS[®]-Thermal Series

Product Line-Up

Series		Mass Flow Controller					
							
Features		PI Function Model ·Equipped with Pressure Sensor ·Insensitive to sudden pressure fluctuations (Pressure Insensitive) ·With MGMR Function ·Corrosion Resistant Hastelloy Sensor ·Flow Accuracy: ±1.0 % S.P.	MGMR Model ·MGMR (Multi Gas / Multi Range) Function ·Corrosion Resistant Hastelloy Sensor ·Flow Accuracy: ±1.0 % S.P.	Standard Digital Model ·Flow Accuracy: ±1.0 % F.S. ·All Flow Rate Areas: Response Time ≒ 1 sec ·24V Function Model- Corresponds to EtherCAT [®] , PROFIBUS ·CC-Link ·Correspond to the special Specification	High Flow Rate Model ·Max. Flow Rate 500 SLM ·Flow Rate Accuracy: ±1.0 % F.S.(300 SLM or less) ±2.0 % F.S.(201 SLM or more) ·Response Time: ≒ 3 sec	High Temperature Model ·50 - 80 °C (Please consult Fujikin for use at temperatures above 80 °C)	
Series Name		FCS-T1000MP	FCS-T1000Z	FCS-T1000F	FCS-T1200F FCS-T1500F	FCS-T1000M(Z)F-HT FCS-T1200MF-HT	
Flow Range (N ₂ Equivalent)		10 SCCM - 50 SLM	10 SCCM - 50 SLM	10 SCCM - 50 SLM	51 - 500 SLM	10 SCCM - 150 SLM	
Seal Material		Metal	Metal Rubber	Metal Rubber	Metal Rubber	Metal	
Flow Accuracy		±1.0 % S.P. (25-100 %) ±0.25 % F.S. (2-25 %)	±1.0 % S.P. (25-100 %) ±0.25 % F.S. (2-25 %)	±1.0 % F.S.	±1.0 % F.S.(T1200) ±2.0 % F.S.(T1500)	±1.0 % S.P. (25-100 %) (T1000MZ) ±0.25 % F.S. (2-25 %) (T1000MZ) ±1.0 % F.S. (2-100 %) (T1000MF, T1200MF)	
Response Time		≒1 sec	≒1 sec	≒1 sec	≒3 sec	≒1sec(10 SCCM - 50 SLM) ≒3sec(51 - 150 SLM)	
PI Function		PI					
MGMR Function		MGMR	MGMR	MR MG ※1			
Communication	*2 Analog	±15V Drive 0-5VDC Input / Output	±15 V Drive 0-5 VDC	±15 V Drive 0-5 VDC	±15 V Drive 0-5 VDC	±15 V Drive 0-5 VDC	±15 V Drive 0-5 VDC
		+24V Drive 0-5VDC Input / Output		+24 V Drive 0-5 VDC	+24 V Drive 0-5 VDC	+24 V Drive 0-5 VDC <small>For rubber type only</small>	+24 V Drive 0-5 VDC <small>For T1000 only</small>
		+24V Drive 4-20mA Input / Output		+24 V Drive 4-20 mA	+24 V Drive 4-20 mA	+24 V Drive 4-20 mA <small>For rubber type only</small>	+24 V Drive 4-20 mA <small>For T1000 only</small>
	*3 Digital	RS485	RS485	RS485	RS485	RS485	RS485
		DeviceNet™	DeviceNet™	DeviceNet™	DeviceNet™	DeviceNet™	DeviceNet™ <small>For T1000MF only</small>
		EtherCAT [®]	EtherCAT[®]	EtherCAT[®] <small>For metal type only</small>	EtherCAT[®]	EtherCAT[®]	EtherCAT[®]
		PROFIBUS			PROFIBUS		
CC-Link			CC-Link				
Fittings	Union Gasket Type (UJR Type)	1/4 UJR	1/4 UJR	1/4 UJR	3/8 UJR(T1200) 1/2 UJR(T1500)	1/4 UJR(T1000M) 3/8 UJR(T1200MF)	
	Double Compression Ring Type (F900 Type)	-	1/4 F900	1/4 F900	3/8 F900(T1200) 1/2 F900(T1500)	1/4 F900(T1000M) 3/8 F900(T1200MF)	
	Integrated System Type (IGS Type)	1.5 Wseal 1.125 Wseal 1.125 Cseal	1.5 Wseal 1.125 Wseal 1.125 Cseal	1.5 Wseal 1.125 Wseal 1.125 Cseal	-	1.5 Wseal 1.125 Wseal 1.125 Cseal	
Surface Finish		EP <small>Option</small>	EP <small>For metal type only</small>	EP <small>For metal type only</small>	EP <small>For metal type only</small>	EP <small>Option</small>	
Connespon dence to RoHS		RoHS	RoHS	RoHS	RoHS	RoHS	
Mass Flow Meter			Mass Flow Meter	Mass Flow Meter	Mass Flow Meter	Mass Flow Meter <small>For T1000 only</small>	

*1: MR Specifications: Changeable to 1/3 flow of the specified full scale flow. MG Specifications: up to four kinds of gases and flow rates can be registered.

*2: Analog Interface: D-sub 9 pin. With the proviso, TM39 HRs-made HR10A-7R-6P. UPC₉, UPCUS₉ has half pitch 20 P.

*3: Digital Interface: for RS485 communications, FCS-T1000 Series has RJ11 connector; FCS-T2000 Series has RJ45 connector.



Fujikin Carp Group



The Year 2013 Prime Minister's Prize
The 5th Monodzukuri Nippon Grand Award
Overseas Operation "Excellence Prize"

URL <http://www.fujikin.co.jp/> E-mail info@fujikin.co.jp

CAT: No.712-01E-H