FLOW CELL

FLOW METER

Compact flow meters that combine orifice and float technologies.

FLOW CELL

NIPPON FLOW CELL CO., LTD.

Overview

The Flow Cell Flow Meter is a flow meter that integrates a base socket and a special area flow meter into a flow rate indicator. The base socket has a built-in orifice plate.
This unique design allows for very compact size and can be used for liquid and gas measurement.
Standard flow rate scales are available for each nominal diameter for water and AIR. Therefore, the most suitable scale can be selected depending on the flow rate for use.

Features

- Large stock of standard items for water and AIR allows short delivery times.
- Installs either horizontally or vertically.
- Flow indicator is compact.
- A cock piece can be fitted to eliminate the need for a by-pass line for cleaning, inspection, etc.
- A connector can be fitted to allow the flow indicator to be installed in a separate location for better visibility.
- A flow rate alarm transmitter can be fitted to allow output of an alarm signal.

Photo 1

Model FLT-H

Photo 3

Model FLY-H

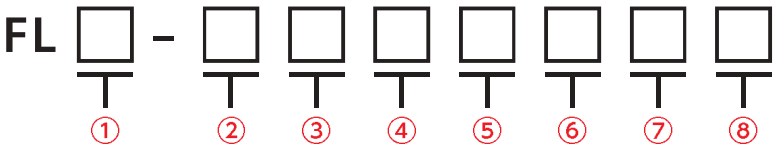
Photo 2

Model FLG

Photo 4

Model FLW-M

Model



① Pipe connection
T : Screw connection
Y : Wafer connection
G : Flange connection
W : TS flange connection

② Cock piece
H : H-type cock piece
M : M-type cock piece (for FLW)
None : No cock piece

③ Connector
C : With connector
None : No connector

④ D piece
D : With D piece
None : No D piece

⑤ Flanges for pipe connection
F : With flanges
FLY=JIS 10K FF flange (1 pair set)
FLW=JIS 10K FF TS flange (1 pair set)
None : No flanges

⑥ Float material
P : PVC (weighted)
Only for liquid
None : SUS316, titanium, glass, ruby (Standard) *1

⑦ O-ring material (O-ring for flow rate indicator and connections)
S : Fluoro rubber or EPDM
U : Fluororesin (for FLT, FLY, FLG)
None : NBR (Standard)

⑧ Alarm transmitter
AB : Photoelectric switch (for liquid and gas)
AM : Magnetic switch 1-output alarm (for liquid) *2
AMM : Magnetic switch 2-output alarm (for liquid) *2
None : No alarm transmitter

*1 If the float is a standard type, the material cannot be designated.
*2 If magnetic switches are used, the material of float type will be PVC and the symbol to represent the float material is indicated as "P."

Specifications

Table 1

Item	FLT	FLY	FLG	FLW
Measured fluid	Liquid, gas			
Measured flow rate range	See table 3 to 7			
Accuracy	Water: ±2.0%FS Other fluids: ±2.5%FS			
Connection and nominal diameter	Screw connection Rc3/8 to Rc4	Wafer connection JIS 10K flange 40A to 500A	Flange connection JIS 10K flange 15A to 500A	TS flange connection JIS 10K flange 15A to 300A
Max. operating press. Standard (custom spec.)	0.8MPa (2.0MPa)	0.8MPa (1.4MPa)		0.5MPa
Operating temp. *3	0 to 90°C (Fluororesin or fluoro rubber O-ring: 0 to 120°C) For PVC floats, operating temperature range is 0 to 50°C.			0 to 50°C
Standard accessories *4	–	Flange connection bolts, nuts, washers, and gaskets	–	Flange connection bolts, nuts, washers, and gaskets

*3 Fluid may not be frozen.
*4 FLY In the case of material No.5, bolt, nut, and washer: SS400
In the case of materials No.6 and No.7, bolt, nut, and washer: SUS304
Gasket: EPDM
FLW Bolt, nut, and washer: SUS304
Gasket: EPDM
For the materials, see the "Materials for Standard Usage." Table 8

Specifications of Alarm Transmitter **Table 2**

Model	AB	AM	AMM
Switch type	Photoelectric switch 1-output type	Magnetic switch	
		1-output type	2-output type
	Upper limit or lower limit		Upper limit and lower limit
Power supply	12 to 26.4VDC		
Alarm output	PhotoMOS relay output 30VDC 100mA	Relay contact: 250VAC/30VDC 1A	
Output configuration	When alarm is ON (contact a)	Contact a and contact b (contact c)	Contact a or contact b
Configured flow rate range	Lower limit alarm 25 to 90% of maximum flow rate Upper limit alarm 30 to 95% of maximum flow rate	Lower limit alarm 20 to 100% of maximum flow rate Upper limit alarm 20 to 100% of maximum flow rate	
Hysteresis	10% of maximum flow rate	3% of maximum flow rate	
Connection	1m vinyl cable 0.2mm^2×4 wires Outer diameter: φ4.2	Screw-fastening terminal block Outer diameter of external connection cable: φ5 to 7 Cable clamp diameter: M15	
Ambient temperature	-20 to 60°C (FLW -10 to 50°C) No dew condensation can be allowed.	-10 to 60°C (FLW -10 to 50°C) No dew condensation can be allowed.	
Ambient illuminance	4000lx or less (light-receiving surface)	–	
Protection structure	Equivalent to IP64		
Materials	PC, SUS304, C3604	ABS, ADC, SUS304	

Principles of Measurement

The flow rate in a main pipe can be obtained by measuring a bypass flow rate produced by a pressure differential generated before and behind an orifice plate according to the flow velocity. The Flow Cell Flow Meter manufactured based on this principle substantially comprises a base socket and flow rate indicator.
Differential pressure is generated by the orifice plate installed inside the base socket and flow produced by the differential pressure is drawn to the flow rate indicator. In the flow rate indicator, fluid enters a tapered tube via a strainer raise a float up.
The scale of total flow rate in the main pipe is marked on the outer face of tapered tube with respect to the float displacement.

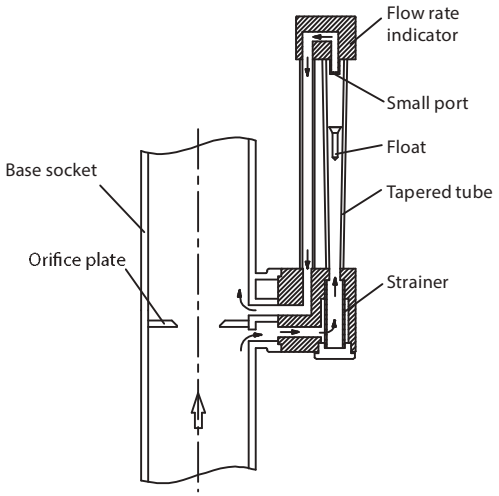


Fig.1 Principles of measurement

When Ordering the Standard Product for Water

Standard Flow Cell Flow Meter products for water are available for nominal sizes ranging from 10A to 300A. Each product bears a 4-digit alphanumeric "Spec. Code" that represents the specifications of each scale.

When ordering a product, select the suitable model for the use conditions from the "Models" section above, and select the Spec. Code that corresponds to the nominal diameter and the flow rate range from **Table 3**.

Once the Spec. Code is determined, notify us of the information along with the Model and Material No. (not required for FLW model).

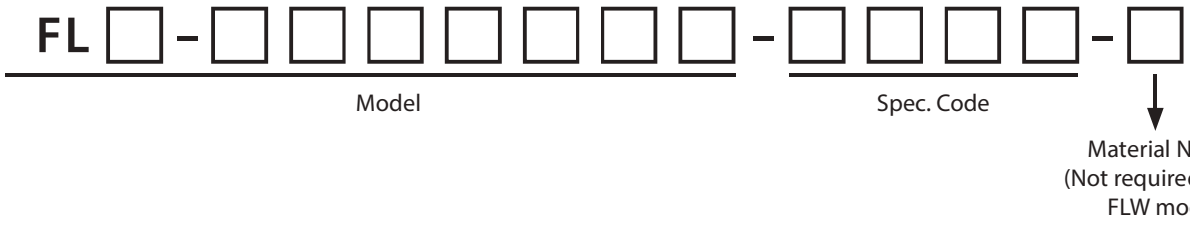


Table 3

Nominal diameter	Unit	Standard product for water (fluid name: H_2O) Upper line: Flow rate range Lower line: Spec. Code							Produced flow rate range Upper line: Minimum Lower line: Maximum
10A	L/min	0.6 to 3 A03M	1 to 5 A05M	1.2 to 6 A06M	1.4 to 7 A07M	2 to 10 A10M	–	–	0.6 to 3 L/min ↕ 3.5 to 17.5 L/min
	m^3/h	0.04 to 0.2 A02H	0.06 to 0.3 A03H	0.08 to 0.4 A04H	0.1 to 0.5 A05H	0.14 to 0.7 A07H	0.2 to 1 A10H	–	
15A	L/min	1 to 5 B05M	1.4 to 7 B07M	2 to 10 B10M	3 to 15 B15M	4 to 20 B20M	6 to 30 B30M	8 to 40 B40M	0.6 to 3 L/min ↕ 8 to 40 L/min
	m^3/h	0.1 to 0.5 B05H	0.14 to 0.7 B07H	0.2 to 1 B10H	0.3 to 1.5 B15H	0.4 to 2 B20H	–	–	
20A	L/min	2 to 10 C10M	3 to 15 C15M	4 to 20 C20M	6 to 30 C30M	8 to 40 C40M	10 to 50 C50M	12 to 60 C60M	0.8 to 4 L/min ↕ 12 to 60 L/min
	m^3/h	0.1 to 0.5 C05H	0.14 to 0.7 C07H	0.2 to 1 C10H	0.3 to 1.5 C15H	0.4 to 2 C20H	0.5 to 2.5 C25H	0.6 to 3 C30H	
25A	L/min	4 to 20 D20M	6 to 30 D30M	8 to 40 D40M	10 to 50 D50M	12 to 60 D60M	14 to 70 D70M	20 to 100 D10M	1.4 to 7 L/min ↕ 25 to 125 L/min
	m^3/h	0.4 to 2 D20H	0.5 to 2.5 D25H	0.6 to 3 D30H	0.8 to 4 D40H	1 to 5 D50H	1.2 to 6 D60H	1.4 to 7 D70H	
32A	L/min	10 to 50 E50M	12 to 60 E60M	14 to 70 E70M	20 to 100 E10M	25 to 125 E12M	30 to 150 E15M	35 to 175 E17M	2.5 to 12.5 L/min ↕ 35 to 175 L/min
	m^3/h	0.5 to 2.5 E25H	0.6 to 3 E30H	0.8 to 4 E40H	1 to 5 E50H	1.2 to 6 E60H	1.4 to 7 E70H	2 to 10 E10H	
40A	L/min	12 to 60 F60M	14 to 70 F70M	20 to 100 F10M	25 to 125 F12M	35 to 175 F17M	40 to 200 F20M	60 to 300 F30M	3.5 to 17.5 L/min ↕ 60 to 300 L/min
	m^3/h	1 to 5 F50H	1.2 to 6 F60H	1.4 to 7 F70H	2 to 10 F10H	2.5 to 12.5 F12H	3 to 15 F15H	3.5 to 17.5 F17H	
50A	L/min	25 to 125 G12M	30 to 150 G15M	35 to 175 G17M	40 to 200 G20M	60 to 300 G30M	80 to 400 G40M	100 to 500 G50M	6 to 30 L/min ↕ 100 to 500 L/min
	m^3/h	2 to 10 G10H	2.5 to 12.5 G12H	3 to 15 G15H	3.5 to 17.5 G17H	4 to 20 G20H	5 to 25 G25H	6 to 30 G30H	
65A	L/min	30 to 150 H15M	35 to 175 H17M	40 to 200 H20M	60 to 300 H30M	80 to 400 H40M	100 to 500 H50M	140 to 700 H70M	10 to 50 L/min ↕ 160 to 800 L/min
	m^3/h	2.5 to 12.5 H12H	3 to 15 H15H	3.5 to 17.5 H17H	4 to 20 H20H	5 to 25 H25H	6 to 30 H30H	8 to 40 H40H	
80A	L/min	35 to 175 J17M	40 to 200 J20M	60 to 300 J30M	80 to 400 J40M	100 to 500 J50M	140 to 700 J70M	200 to 1000 J10M	14 to 70 L/min ↕ 220 to 1100 L/min
	m^3/h	3.5 to 17.5 J17H	4 to 20 J20H	5 to 25 J25H	6 to 30 J30H	8 to 40 J40H	10 to 50 J50H	12 to 60 J60H	
100A	L/min	80 to 400 K40M	100 to 500 K50M	140 to 700 K70M	200 to 1000 K10M	250 to 1250 K12M	300 to 1500 K15M	350 to 1750 K17M	20 to 100 L/min ↕ 350 to 1750 L/min
	m^3/h	5 to 25 K25H	6 to 30 K30H	8 to 40 K40H	10 to 50 K50H	12 to 60 K60H	14 to 70 K70H	20 to 100 K10H	

125A	L/min	140 to 700 M70M	200 to 1000 M10M	250 to 1250 M12M	300 to 1500 M15M	350 to 1750 M17M	400 to 2000 M20M	600 to 3000 M30M	30 to 150 L/min ↕ 600 to 3000 L/min
	m^3/h	10 to 50 M50H	12 to 60 M60H	14 to 70 M70H	20 to 100 M10H	25 to 125 M12H	30 to 150 M15H	35 to 175 M17H	
150A	L/min	200 to 1000 N10M	250 to 1250 N12M	300 to 1500 N15M	350 to 1750 N17M	400 to 2000 N20M	600 to 3000 N30M	800 to 4000 N40M	50 to 250 L/min ↕ 800 to 4000 L/min
	m^3/h	12 to 60 N60H	14 to 70 N70H	20 to 100 N10H	25 to 125 N12H	30 to 150 N15H	35 to 175 N17H	40 to 200 N20H	
200A	L/min	400 to 2000 P20M	600 to 3000 P30M	800 to 4000 P40M	1000 to 5000 P50M	1.4 to 7 *5 P07P	–	–	80 to 400 L/min ↕ 1.4 to 7 m^3/min
	m^3/h	20 to 100 P10H	25 to 125 P12H	30 to 150 P15H	35 to 175 P17H	40 to 200 P20H	60 to 300 P30H	80 to 400 P40H	
250A	L/min	600 to 3000 Q30M	800 to 4000 Q40M	1000 to 5000 Q50M	1.4 to 7 *5 Q07P	2 to 10 *5 Q10P	–	–	120 to 600 L/min ↕ 2.2 to 11 m^3/min
	m^3/h	35 to 175 Q17H	40 to 200 Q20H	60 to 300 Q30H	80 to 400 Q40H	100 to 500 Q50H	120 to 600 Q60H	–	
300A	m^3/min	1.4 to 7 R07P	2 to 10 R10P	2.5 to 12.5 R12P	3 to 15 R15P	–	–	–	180 to 900 L/min ↕ 3 to 15 m^3/min
	m^3/h	60 to 300 R30H	80 to 400 R40H	100 to 500 R50H	120 to 600 R60H	160 to 800 R80H	180 to 900 R90H	–	

*5 Unit: m^3/min

Ordering a Non-Standard Product for Liquid

For applications where the liquid is other than water or the flow rate is outside of the standard flow rate range, a non-standard model is required.

The Produced Flow Rate Range shown in Table 3 and Table 4 show the minimum and maximum values of flow rate range that can be produced by flow meters with each nominal diameter.

(Since no standard product is available for nominal diameters from 350A to 500A, a non-standard product is required for these diameters.)

When ordering a non-standard product for liquid, decide the nominal diameter and the flow rate range (rangeability shall be 5 to 1), so that the flow rate for use is within the "Produced Flow Rate Range."

Produced Flow Rate Range in 350A to 500A — Table 4

Nominal diameter	350A	400A	450A	500A
Minimum flow rate	250 to 1250 L/min	300 to 1500 L/min	350 to 1750 L/min	500 to 2500 L/min
Maximum flow rate	4 to 20 m^3/min	6 to 30 m^3/min	8 to 40 m^3/min	9 to 45 m^3/min

Ordering a Standard Product for AIR

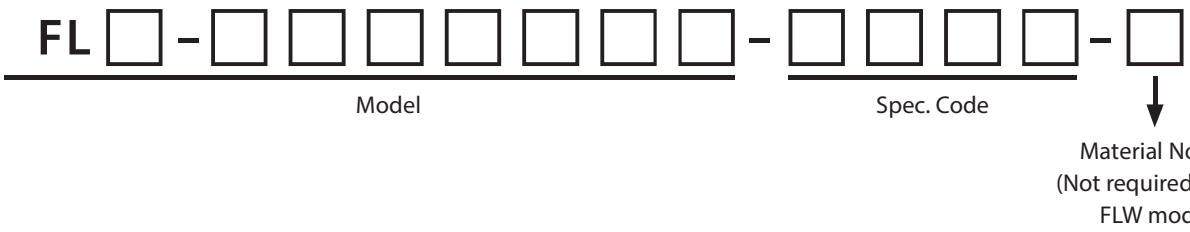
Standard Flow Cell Flow Meter products for AIR are available for nominal sizes ranging from 10A to 250A. Each product bears a 4-digit alphanumeric "Spec. Code" that represents the specifications in each scale.

When ordering a product, select the suitable model for the use conditions from the "Models" section above, and select the Spec. Code that corresponds to the nominal diameter and the flow rate range from Table 5.

However, when ordering a product for AIR, we may not be able to manufacture it for some Spec. Codes depending on the pressure or temperature for use.

Since it can be easily determined whether the product with the desired Spec. Code can be produced by following the procedure called "Judgement Method of Acceptability of Standard Scale Production for AIR," check with this method before deciding the Spec. Code.

Once the Spec. Code is decided, notify us of the information on the pressure and temperature for use along with the Model and Material No. (not required for FLW model).



Standard Scale for AIR and Spec. Code

Table 5

Nominal diameter	Unit	Standard scale for AIR Upper line: Flow rate range Lower line: Spec. Code							Produced flow rate range (AIR 1atm 20℃) Upper line: Minimum Lower line: Maximum
10A	L/min (ntp)	10 to 50 A05L	20 to 100 A10L	25 to 125 A12L	30 to 150 A15L	40 to 200 A20L	50 to 250 A25L	60 to 300 A30L	0.5 to 2.5 m^3/h (ntp) ↕ 2 to 10 m^3/h (ntp)
	m^3/h (ntp)	0.6 to 3 A03C	1.2 to 6 A06C	1.6 to 8 A08C	2 to 10 A10C	2.5 to 12.5 A12C	3 to 15 A15C	4 to 20 A20C	
15A	L/min (ntp)	20 to 100 B01L	60 to 300 B03L	80 to 400 B04L	100 to 500 B05L	120 to 600 B06L	160 to 800 B08L	200 to 1000 B10L	0.6 to 3 m^3/h (ntp) ↕ 5 to 25 m^3/h (ntp)
	m^3/h (ntp)	1.2 to 6 B06C	4 to 20 B20C	5 to 25 B25C	6 to 30 B30C	8 to 40 B40C	10 to 50 B50C	12 to 60 B60C	
20A	L/min (ntp)	50 to 250 C25L	100 to 500 C50L	120 to 600 C60L	160 to 800 C80L	200 to 1000 C10L	0.25 to 1.25 *6 C12N	0.3 to 1.5 *6 C15N	0.8 to 4 m^3/h (ntp) ↕ 10 to 50 m^3/h (ntp)
	m^3/h (ntp)	3 to 15 C15C	6 to 30 C30C	8 to 40 C40C	10 to 50 C50C	12 to 60 C60C	16 to 80 C80C	20 to 100 C10C	
25A	L/min (ntp)	60 to 300 D03L	120 to 600 D06L	200 to 1000 D10L	0.25 to 1.25 *6 D12N	0.3 to 1.5 *6 D15N	0.4 to 2 *6 D20N	0.5 to 2.5 *6 D25N	1.2 to 6 m^3/h (ntp) ↕ 18 to 90 m^3/h (ntp)
	m^3/h (ntp)	4 to 20 D02C	8 to 40 D04C	12 to 60 D06C	16 to 80 D08C	20 to 100 D10C	25 to 125 D12C	30 to 150 D15C	
32A	L/min (ntp)	100 to 500 E05L	200 to 1000 E10L	0.3 to 1.5 *6 E15N	0.5 to 2.5 *6 E25N	0.6 to 3 *6 E30N	0.8 to 4 *6 E40N	1 to 5 *6 E50N	1.8 to 9 m^3/h (ntp) ↕ 30 to 150 m^3/h (ntp)
	m^3/h (ntp)	6 to 30 E03C	12 to 60 E06C	20 to 100 E10C	30 to 150 E15C	40 to 200 E20C	50 to 250 E25C	60 to 300 E30C	
40A	m^3/min (ntp)	200 to 1000 *7 F10L	0.3 to 1.5 F15N	0.5 to 2.5 F25N	0.6 to 3 F30N	0.8 to 4 F40N	1 to 5 F50N	1.2 to 6 F60N	2.5 to 12.5 m^3/h (ntp) ↕ 40 to 200 m^3/h (ntp)
	m^3/h (ntp)	12 to 60 F06C	20 to 100 F10C	30 to 150 F15C	40 to 200 F20C	50 to 250 F25C	60 to 300 F30C	80 to 400 F40C	
50A	m^3/min (ntp)	0.3 to 1.5 G15N	0.5 to 2.5 G25N	0.6 to 3 G30N	1 to 5 G50N	1.2 to 6 G60N	1.6 to 8 G80N	2 to 10 G10N	4 to 20 m^3/h (ntp) ↕ 60 to 300 m^3/h (ntp)
	m^3/h (ntp)	20 to 100 G10C	30 to 150 G15C	40 to 200 G20C	60 to 300 G30C	80 to 400 G40C	100 to 500 G50C	120 to 600 G60C	
65A	m^3/min (ntp)	0.3 to 1.5 H01N	1 to 5 H05N	1.2 to 6 H06N	1.6 to 8 H08N	2 to 10 H10N	2.5 to 12.5 H12N	3 to 15 H15N	6 to 30 m^3/h (ntp) ↕ 100 to 500 m^3/h (ntp)
	m^3/h (ntp)	20 to 100 H01C	60 to 300 H03C	80 to 400 H04C	100 to 500 H05C	120 to 600 H06C	160 to 800 H08C	200 to 1000 H10C	
80A	m^3/min (ntp)	0.5 to 2.5 J02N	1 to 5 J05N	1.2 to 6 J06N	2 to 10 J10N	2.5 to 12.5 J12N	4 to 20 J20N	5 to 25 J25N	9 to 45 m^3/h (ntp) ↕ 140 to 700 m^3/h (ntp)
	m^3/h (ntp)	30 to 150 J01C	60 to 300 J03C	80 to 400 J04C	120 to 600 J06C	160 to 800 J08C	250 to 1250 J12C	300 to 1500 J15C	
100A	m^3/min (ntp)	0.6 to 3 K03N	1.2 to 6 K06N	2 to 10 K10N	3 to 15 K15N	4 to 20 K20N	5 to 25 K25N	6 to 30 K30N	16 to 80 m^3/h (ntp) ↕ 250 to 1250 m^3/h (ntp)
	m^3/h (ntp)	40 to 200 K02C	80 to 400 K04C	120 to 600 K06C	200 to 1000 K10C	250 to 1250 K12C	300 to 1500 K15C	–	
125A	m^3/min (ntp)	1 to 5 M05N	2 to 10 M10N	3 to 15 M15N	4 to 20 M20N	5 to 25 M25N	6 to 30 M30N	8 to 40 M40N	25 to 125 m^3/h (ntp) ↕ 400 to 2000 m^3/h (ntp)
	m^3/h (ntp)	60 to 300 M03C	120 to 600 M06C	200 to 1000 M10C	250 to 1250 M12C	300 to 1500 M15C	400 to 2000 M20C	–	
150A	m^3/min (ntp)	2 to 10 N10N	3 to 15 N15N	4 to 20 N20N	5 to 25 N25N	6 to 30 N30N	8 to 40 N40N	10 to 50 N50N	35 to 175 m^3/h (ntp) ↕ 500 to 2500 m^3/h (ntp)
	m^3/h (ntp)	120 to 600 N06C	200 to 1000 N10C	250 to 1250 N12C	300 to 1500 N15C	400 to 2000 N20C	–	–	
200A	m^3/min (ntp)	2 to 10 P10N	3 to 15 P15N	6 to 30 P30N	8 to 40 P40N	10 to 50 P50N	16 to 80 P80N	–	60 to 300 m^3/h (ntp) ↕ 1000 to 5000 m^3/h (ntp)
	m^3/h (ntp)	120 to 600 P06C	200 to 1000 P10C	300 to 1500 P15C	400 to 2000 P20C	–	–	–	
250A	m^3/min (ntp)	3 to 15 Q15N	5 to 25 Q25N	6 to 30 Q30N	8 to 40 Q40N	10 to 50 Q50N	16 to 80 Q80N	–	100 to 500 m^3/h (ntp) ↕ 1400 to 7000 m^3/h (ntp)
	m^3/h (ntp)	200 to 1000 Q10C	300 to 1500 Q15C	400 to 2000 Q20C	–	–	–	–	

*6 Unit: m^3/min (ntp) *7 Unit: L/min (ntp)

Judgement Method of Acceptability of Standard Scale Production for AIR

① Use the "Pressure and Temperature Coefficient Table for Standard Specifications" (Table 6) to check the coefficient of pressure and temperature for use. At this point, if production in a combination of pressure and temperature not listed in the coefficient table is desired, a product with non-standard specifications is required. Therefore, see the section, "Ordering a Non-Standard Product."

Table 6

Pressure \ Temperature	20°C	30°C	40°C	50°C	60°C	70°C	80°C
1atm	1.000	1.017	1.034	1.050	1.066	1.082	1.098
10kPa	0.954	0.970	0.986	1.002	1.017	1.032	1.047
20kPa	0.914	0.929	0.945	0.959	0.974	0.989	1.003
25kPa	0.896	0.911	0.926	0.940	0.955	0.969	0.983
30kPa	0.878	0.893	0.908	0.922	0.936	0.950	0.964
35kPa	0.862	0.877	0.891	0.905	0.919	0.933	0.946
40kPa	0.847	0.861	0.875	0.889	0.903	0.916	0.929
45kPa	0.832	0.846	0.860	0.874	0.887	0.900	0.913
50kPa	0.818	0.832	0.846	0.859	0.872	0.885	0.898
55kPa	0.805	0.819	0.832	0.845	0.858	0.871	0.884
60kPa	0.792	0.806	0.819	0.832	0.845	0.857	0.870
70kPa	0.769	0.782	0.795	0.807	0.820	0.832	0.844
0.1MPa	0.709	0.721	0.733	0.745	0.756	0.767	0.779
0.2MPa	0.580	0.590	0.599	0.609	0.618	0.627	0.636
0.3MPa	0.502	0.511	0.519	0.528	0.536	0.544	0.551
0.4MPa	0.450	0.457	0.465	0.472	0.479	0.486	0.493
0.5MPa	0.410	0.417	0.424	0.431	0.438	0.444	0.450
0.6MPa	0.380	0.386	0.393	0.399	0.405	0.411	0.417
0.7MPa	0.356	0.362	0.367	0.373	0.379	0.385	0.390

② Select the desired flow rate range from the standard flow rate ranges for each diameter listed in the table, "Standard Scale for AIR and Spec. Code" (Table 5).

③ If the maximum value is selected from a flow rate range (i.e if the range is 10 to 50L/min (ntp), 50L/min (ntp)), multiply this value by the pressure and temperature coefficient checked in step ①.

④ Take a look at the far right column "Produced Flow Rate Range" for the nominal diameter selected in ② in the table "Standard Scale for AIR and Spec. Code" (Table 5). If the value obtained from ③ comes between the maximum value in the upper line and the maximum value in the lower line, the product with the desired nominal diameter and flow rate range can be produced. Check the "Spec. Code" described in the table.

<Example of Procedure for Deciding Acceptability>

① If the desired scale pattern is 0.6 to 3.0m³/min (ntp) with nominal diameter = 40A, pressure for use = 60kPa, and temperature for use = 50°C, then according to the coefficient table Table 6 the coefficient is "0.832", and we calculate 3.0m³/min (ntp) × 0.832 = 2.496m³/min (ntp) = 149.76m³/h (ntp). The produced flow rate range in 40A can be produced because the value falls within the maximum value in the upper line (= 12.5m³/h (ntp)) and the maximum value in the lower line (= 200m³/h (ntp)). The Spec. Code is "F30N."

② If the desired scale pattern is 40 to 200m³/h (ntp) with nominal diameter = 100A, pressure for use = 0.7MPa, and temperature for use = 20°C, then according to the coefficient table Table 6 the coefficient "0.356", and we calculate 200m³/h (ntp) × 0.356 = 71.2m³/h (ntp). The produced flow rate range in 100A cannot be produced since the value falls outside of the maximum value in the upper line (= 80m³/h (ntp)) and the maximum value in the lower line (= 1250m³/h(ntp)). Explore options such as expanding the flow rate range or reducing the pipe size.

Ordering a Non-Standard Product for Gas

For applications with specifications other than the standard scale for AIR, or a gas other than AIR, a non-standard product is required.
Table 7 shows the minimum value and the maximum value of the flow rate range for AIR (1atm, 20°C) that can be produced for each nominal diameter.
When ordering a non-standard product for gas, decide the nominal diameter and the flow rate range (rangeability shall be 5 to 1) so that the flow rate for use is within the "Produced Flow Rate Range."
In addition, if a product with the non-standard specifications for gas is required, decide the nominal diameter and flow rate range by converting the flow rate for use to the one for AIR, 1atm, 20°C using the method in "Formula for calculating production acceptability" shown in **Fig.2** so that the flow rate for use falls within the minimum and maximum values shown in the "Produced Flow Rate Range" shown in **Table 7**.

Fig.2 Formula for calculating production acceptability

$$Q_A = Q_1 \sqrt{\frac{\rho_1}{1.293}} \sqrt{\frac{100\ (273+t_1)}{(100+p_1)\ 293}}$$

Q_A : AIR equivalent (1atm, 20°C) flow rate (m^3/h (ntp), etc.)
Q_1 : flow rate for use (m^3/h (ntp), etc.)
ρ_1 : gas density for use (kg/m^3 (ntp))
p_1 : pressure for use (kPa)
t_1 : temperature for use (°C)

Produced Flow Rate Range for AIR in 1atm at 20°C (Unit: m^3/h (ntp)) **Table 7**

Nominal diameter	10A	15A	20A	25A	32A
Minimum flow rate	0.5 to 2.5	0.6 to 3	0.8 to 4	1.2 to 6	1.8 to 9
Maximum flow rate	2 to 10	5 to 25	10 to 50	18 to 90	30 to 150
Nominal diameter	40A	50A	65A	80A	100A
Minimum flow rate	2.5 to 12.5	4 to 20	6 to 30	9 to 45	16 to 80
Maximum flow rate	40 to 200	60 to 300	100 to 500	140 to 700	250 to 1250
Nominal diameter	125A	150A	200A	250A	300A
Minimum flow rate	25 to 125	35 to 175	60 to 300	100 to 500	140 to 700
Maximum flow rate	400 to 2000	500 to 2500	1000 to 5000	1400 to 7000	2000 to 10000
Nominal diameter	350A	400A	450A	500A	
Minimum flow rate	160 to 800	250 to 1250	300 to 1500	350 to 1750	
Maximum flow rate	2500 to 12500	3500 to 17500	4000 to 20000	5000 to 25000	

External Appearance, Materials, and Dimensions

Materials for Standard Usage

Table 8

Part name	Model	Nominal diameter	No.5	No.6	No.7	No.8
Base socket	FLT	10A to 20A	–	SCS14		–
		25A to 100A	FCD450			
	FLY	40A to 300A	FCD450	–		
		350A to 500A	SS400			
		40A to 200A	–	SCS14		
		250A to 500A		SUS304	SUS316	
	FLG	15A to 50A	SS400, SCS14	SUS304, SCS14	–	
		65A to 500A	SS400	SUS304		
	FLW	15A to 300A	–			PVC
Flow rate indicator	All models/nominal diameters		C3604, SCS14	SUS304, SCS14 SUS316	SUS316, SCS14	PVC
Tapered tube			Heat-resistant glass			
O-ring			NBR			
Orifice plate			SUS304		SUS316	PVC
H-type cock piece			C3604, SCS14 NBR, fluororesin, fluoro rubber	SUS316, SCS14 NBR, fluororesin, fluoro rubber		–
M-type cock piece			–			PVC, fluororesin, fluoro rubber
D piece			SUS316, SCS14			PVC
Connector						

Dimensions

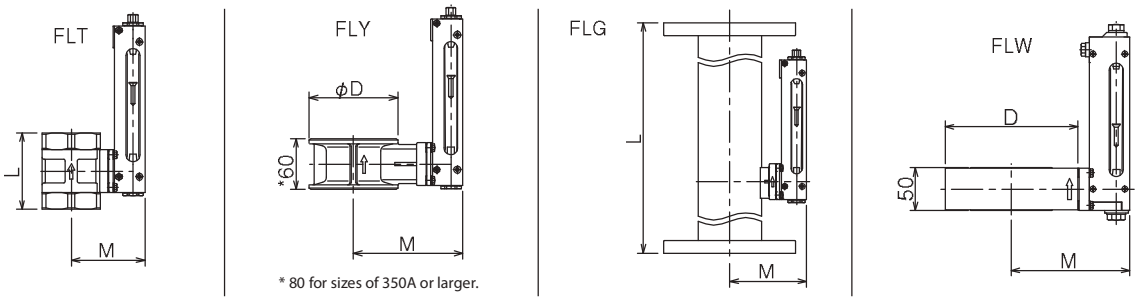


Fig.3 External view

Table 9

Nominal diameter	FLT				FLY				FLG				FLW			
	M	*M1	L	Mass Approx. (kg)	M	*M1	D	Mass Approx. (kg)	M	*M1	L	Mass Approx. (kg)	M	*M1	D	Mass Approx. (kg)
10A	65	106	70	1.0	–				–				–			
15A	66	107	70	1.0					66	107	520	3.0	109	159	102	2.3
20A	69	110	70	1.0					69	110		3.5	111	161	106	2.3
25A	72	113	70	1.0					72	113		4.5	125	175	127	2.3
32A	77	118	74	1.5					77	118		6.0	130	180	137	2.3
40A	80	121	85	1.5	121	162	89	3.0	80	121		6.5	133	183	142	2.3
50A	87	128	90	2.0	129	170	104	3.5	87	128		8.0	140	190	156	2.4
65A	98	139	100	2.5	139	180	124	4.0	101	142	540	10.0	150	200	177	2.6
80A	106	147	110	3.0	144	185	134	5.5	108	149		11.0	156	206	188	3.9
100A	118	159	120	4.5	156	197	159	6.5	120	161		14.0	168	218	212	4.2
125A	–				176	217	190	9.0	133	174		20.0	188	238	257	7.3
150A					191	232	220	10.0	146	187		25.0	204	254	287	8.2
200A					216	257	270	14.5	171	212		35.5	229	279	338	11.1
250A					251	292	333	19.5	197	238		49.5	264	314	408	14.8
300A					274	315	378	24.5	222	263		58.5	287	337	453	18.3
350A					296	337	423	33.5	241	282		76.0	–			
400A					331	372	485	40.5	266	307		96.0				
450A					361	402	541	49.0	292	333		120				
500A					389	430	596	54.5	317	358		145				

*M1 dimensions are the dimensions with cock piece
H-type cock piece: 0.5kg, M-type cock piece: 0.2kg
Mass of FLY and FLW includes the weight of standard accessories.

Notes on Use

① After aligning the arrow mark on the base socket with the flow direction, install the flow rate indicator vertically.
The flow rate indicator can be installed any flow direction vertically or horizontally.

② Note about the straight pipe directly before and behind the Flow Cell Flow Meter
The value obtained by multiplying the pipe diameter by each scale factor related to the orifice shown in **Table 10** is the minimum required length for the straight pipe before and after the Flow Cell Flow Meter.

Table 10

	Elbow, tee or contraction pipe	Valve or expansion pipe
Upstream side	6	8
Downstream side	3	3

③ Use of a cock piece enables removal of the flow rate indicator without stopping the flow in the main pipe. This makes it easy to drain the water to prevent the flow rate indicator from being damaged when the flow rate indicator is being cleaned, or when the water freezes.

④ Use the D piece to maintain the temperature of pipe. (**Fig.4**)

⑤ Use of connectors
If it is impossible to install the flow rate indicator in an easily viewable location due to the constraints of the piping or installation site, use the connector so that the flow rate indicator can be installed in an easily viewable position. In this case, since piping may affect the meter accuracy, limit the length of the pipe for connecting the connector to 5m or less (**Fig.5**).

⑥ Be wary of the fluid inside the flow rate indicator becoming frozen, such as in the winter, since this may damage the tapered tube or flow rate indicator unit.

⑦ If the small port inside the flow rate indicator gets clogged, the indicated reading may be inaccurate. In order to measure the flow rate correctly, clean the flow rate indicator regularly in accordance with the conditions.

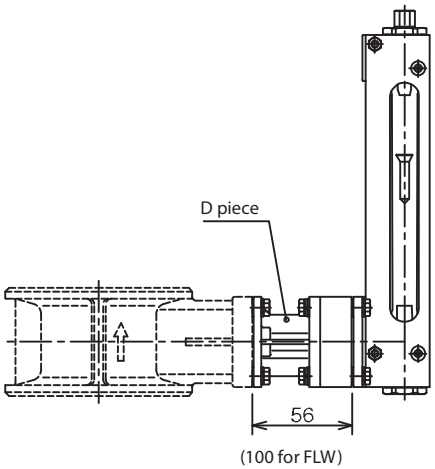


Fig.4 External view of D piece

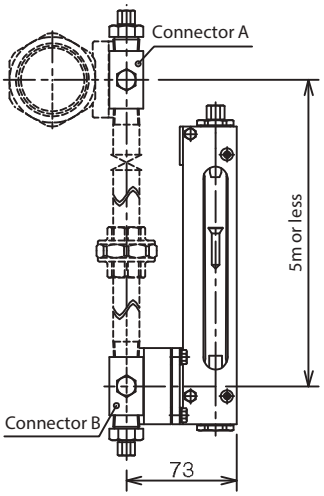


Fig.5 External view of connector

MEMO

MEMO

NIPPON FLOW CELL CO., LTD.

HEAD OFFICE
Shinbashi 2-chome MT Bldg.
2-5-5, Shinbashi, Minato-ku, Tokyo 105-0004, Japan
TEL: (03) 3500-2171
FAX: (03) 3500-1071
URL:http://www.flow-cell.co.jp/