

Flow nozzle

Model : F600

Spec. sheet no. FD06-01

Description

The flow nozzles, more costly than other orifice due to their structure, are suited for determining the flow rates of fluids flowing at high temperature and high pressure. Under the same measuring conditions, a flow nozzle has a higher mechanical strength, can permit the flow of more than 60 percent great volume of a fluid, and can measure the flow rates of fluids containing solid particles less disturbed than an orifice having the same bore.

Thus, they are suited, in addition, for high speed flowing fluids. We can supply not only single flow nozzles, but also flow nozzles having welded short pipes on both their upstream and downstream sides.



Specification

Nozzle mounting types

Flange type

Weld-in type

Holding ring type

Flow calculation standards

- Long-radius flow nozzle
JIS Z 8762, ISO 5167-3, ASME MFC-3M
- ISA 1932, flow nozzle
ISO 5167-3 JIS Z 8762

Pressure taps

1D and ½D tap, throat tap

Nominal pipe sizes available

50 ~ 630 mm

2" ~ 25"

β Limit

$0.2 < \beta < 0.8$

(Low - beta) long - Radius nozzle $0.2 \leq \beta \leq 0.5$

(High - beta) long - Radius nozzle $0.25 \leq \beta \leq 0.8$

β : Ratio of throat to pipe diameter = $d/D0$

(d: Throat diameter)

Nozzle thicknesses

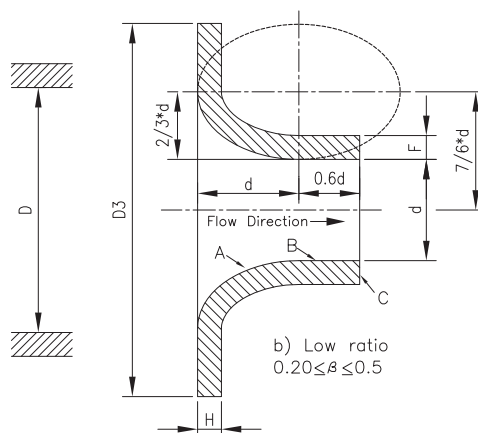
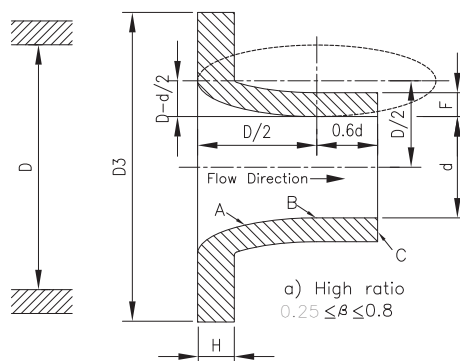
Maker standards

Material

A182-F11, F22, F91

A182-F304

A182-F316 / F316L



Main order

Ordering information

1. Base model

F600 Flow nozzle

2. Type

W Weld in
H Holding ring
F Flanged
O Other

3. Line size

JIS	mm	ANSI	inch	DIN	mm
J015	15A	A001	½B	D015	15A
J020	20A	A002	¾B	D020	20A
J025	25A	A003	1B	D025	25A
J040	40A	A004	1½B	D040	40A
J050	50A	A005	2B	D050	50A
J065	65A	A006	2½B	D065	65A
J080	80A	A007	3B	D080	80A
J100	100A	A008	4B	D100	100A
J125	125A	A009	5B	D125	125A
J150	150A	A010	6B	D150	150A
J200	200A	A011	8B	D200	200A
J250	250A	A012	10B	D250	250A
J300	300A	A013	12B	D300	300A
J350	350A	A014	14B	D350	350A
J400	400A	A015	16B	D400	400A
J450	450A	A016	18B	D450	450A
J500	500A	A017	20B	D500	500A
J600	600A	A018	24B	D600	600A
J700	700A	A019	28B	D700	700A
J800	800A	A020	32B	D800	800A
J000	1,000A	A021	40B	D000	1,000A
XXXX	Other				

4. Tap type

R Radius tap
T Throat tap

5. End connection

F Flanged
W Welded on

6. Element material

4 A182 F304
5 A182 F316
6 A182 F316L
7 A182 F91
Z Other

7. Pipe material

C1 A106 Gr.B
C2 A106 Gr.C
A1 A335 P11
A2 A335 P22
A3 A335 P91
XX Other

8. Holding ring material

A1 A182 F11
A2 A182 F22
A3 A182 F91
C1 A105
H4 A182 F304
H5 A182 F316
ZZ Other
NO None

9. Boss size

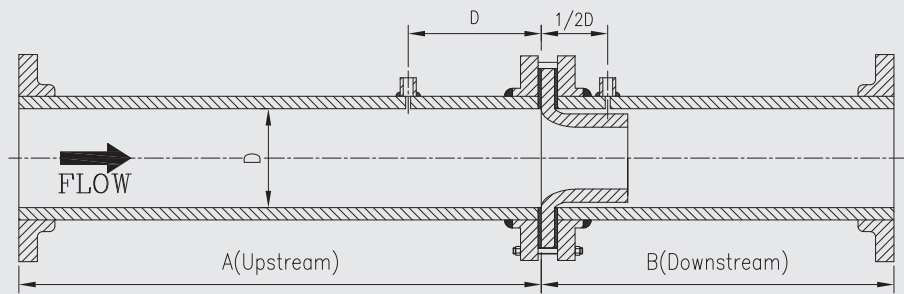
2S ½" S.W
3S ¾" S.W
4S 1" S.W
OH Other

10. Option

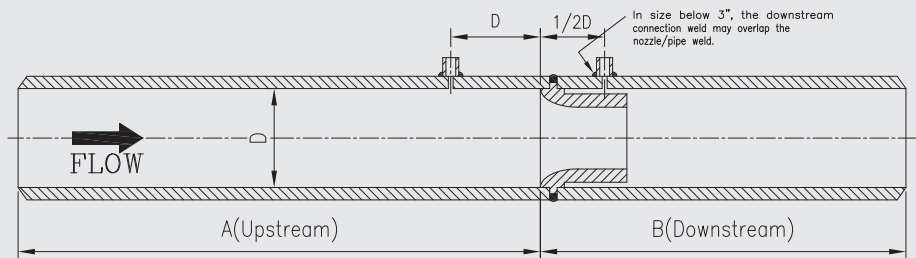
I Inspection pot
N None
O Other

1	2	3	4	5	6	7	8	9	10
F600	W	A014	R	W	5	C1	N0	3S	N

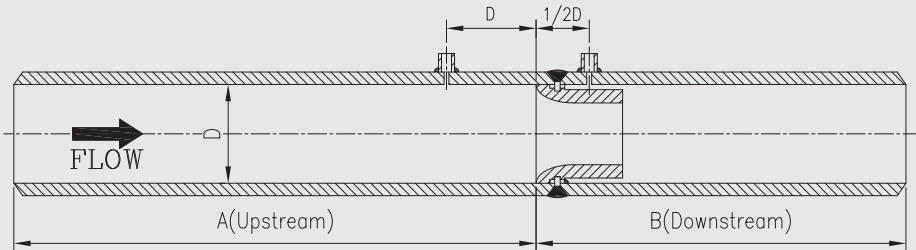
Sample ordering code



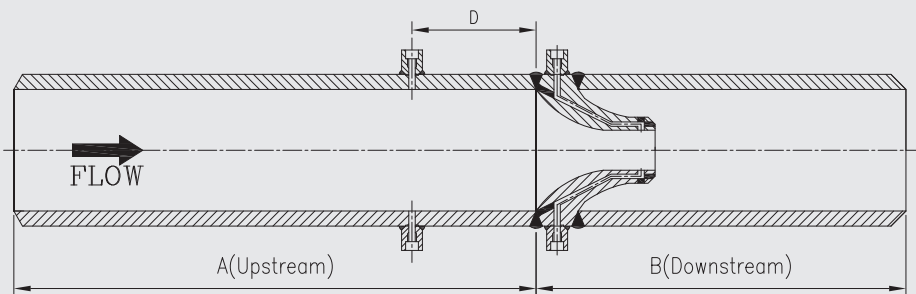
– Flange type –



– Weld in type –



– Holding ring type –



– Throat tap type –

Differential pressure and pressure loss

When a throttle element is interposed in a closed passage of fluid in piping, a difference is produced between the pressures upstream and downstream the throttle element as illustrated in Fig.1. This difference ($\Delta P = p_1 - p_2$) is called differential pressure. The fluid passing through the section 2 gradually regains its pressure as it flows downstream, but the downstream pressure cannot be recovered up to the upstream pressure, part of the pressure being lost. This loss is called a pressure loss (permanent pressure loss = p_3). The extent of this pressure loss depends on the type of throttle elements and their open area ratio, as shown in Fig.2 The relation between the flow rate and the differential pressure is given by:

$$Q = C \sqrt{\Delta P / \rho}$$

$$Q_n = C \sqrt{\Delta P * \rho / \rho_n}$$

$$W = C \sqrt{\Delta P * \rho}$$

Q (m³/h) : Volume rate of flow at density operating conditions

Q_n (Nm³/h) : Volume rate of flow at density base conditions

W (kg/h) : Weight rate of flow

ρ (kg/m³) : Density in operating conditions

ρ_n (kg/Nm³) : Density in base conditions

C : Constant coefficient

From the above, the relation between the flow rate and the differential pressure where the density is constant but the flow rate is variable is as listed in table 1. In other words, the flow rate is obtainable by measuring the differential pressure. When the density is variable (When the pressure and temperature are variable), the true flow rate can be given by compensating the variate of the density by the above equation (This however, is not applicable when the density varies to a great extent.)

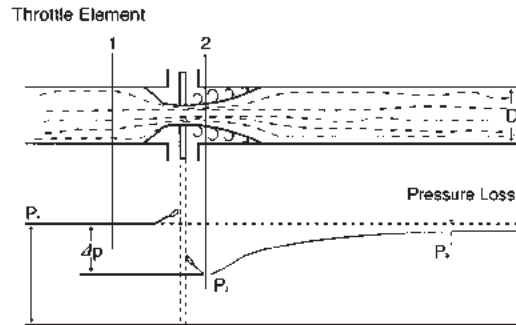


Fig.1

Table 1 : Relation between Flow Rate and Differential Pressure

Flow rate (%)	100	90	80	70	60	50	40	30	20	10	0
Differential pressure	100	81	64	49	36	25	16	9	4	1	0

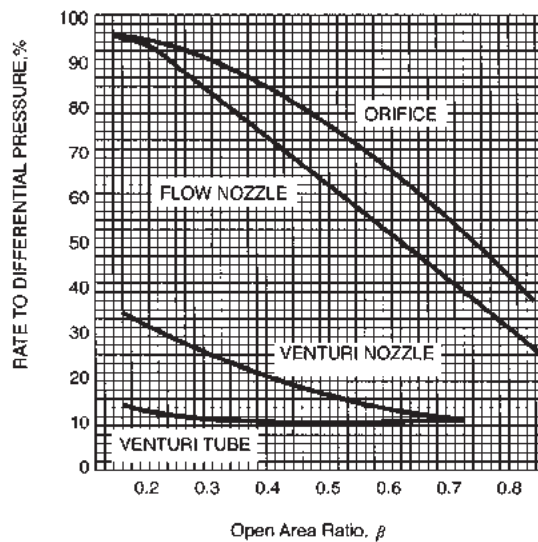


Fig.2