◈ 개요 (OLA－DP)

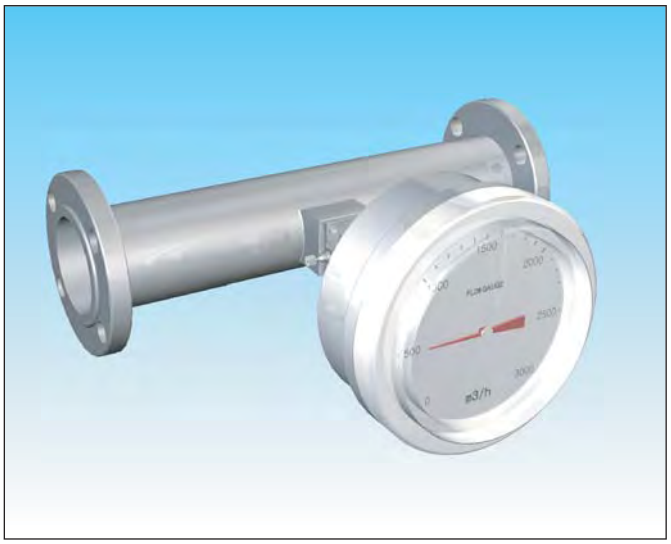
이 유량계는 차압에 의하여 순간 유량을 직접 측정할 수 있으며 지정된 유량 값에서 접점신호(옵션)을 내보낼 수 있는 유량계입니다.
Indicator부에 3－Way나 Cock Valve등을 취부 할수 있습니다.(옵션)
유량값이 아닌 차압 Scale 또는 % 등을 기입 가능합니다.

◈ Description OLA-DP

This flow meter can measure flowrate by differential pressure and can send contact signal option at presetted flow rate.
Can install 3-Way or cock valve in indicator section (option).
Differencial pressure scale or % can be indicated.

◈ Standard Size

SIZE		L	SIZE		L	SIZE		L
10A	3/8B	500	50A	2B	500	200A	8B	520
15A	1/2B	500	65A	2-1/2B	520	250A	10B	520
20A	3/4B	500	80A	3B	520	300A	12B	520
25A	1B	500	100A	4B	520	350A	14B	520
32A	1-1/4B	500	125A	5B	520	400A	16B	520
40A	1-1/2B	500	150A	6B	520	450A	18B	520
						500A	20B	520



OLA - DP

◈ Specification

Line Size : 10A ~ 500A
Fluid : Liquid & Gas
Pressure Rating : PN 0 MFR Standard
(Special DESIGN on Request)
Flange Connection : KS, JIS, ANSI, DIN
Mearsuring Principle : Orifice Differential Pressure
Accuracy : ±1.0% Measured value
Fluid Temperature : -20℃ ~ 100℃
Installation : Vertically or Horizontally
Flow-Rate Range : 10 : 1

Measuring Range : See - Catalog Table
Material : Body&Flange - Stainless Steel
Transmitter Housing - Stainless Steel
3-Way Valve - Stainless Steel
Display : Analog
Output : 1 x SPDT, 2 x SPDT
Voltage : Max. 230VAC
Current : 0.5A
Enclosure : IP65

◈ ORIFICE PLATE

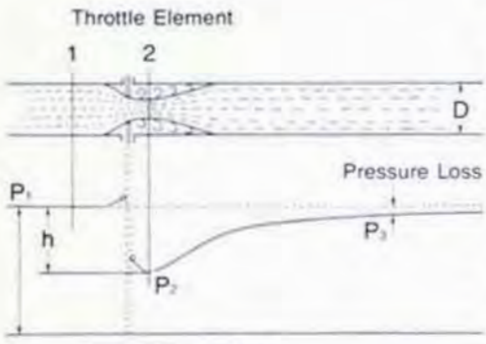


Fig.1

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($h=p_1-p_2$) 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 $=p_1-p_3$)

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 if given by :

$$Q=K\sqrt{\frac{h}{\gamma_1}} \quad \cdots\cdots(1)$$

$$Q_N=K\sqrt{\gamma_1 h\frac{1}{\gamma_N}} \quad \cdots\cdots(2)$$

$$W=K\sqrt{\gamma_1 h} \quad \cdots\cdots(3)$$

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

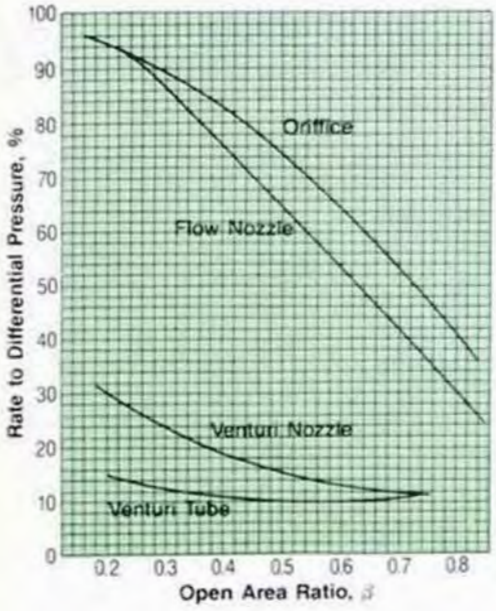


Fig. 2

$Q(m^3/hr)$: Volume Rate of Flow at Density in Operating Conditions

$Q_N(Nm^3/hr)$: Volume Rate of Flow at Density in Basic Conditions

$W(kg/hr)$: Differential Pressure

$h(kg/m^2)$: Weight Rate of Flow

$\gamma_1(kg/m^3)$: Density in Operating Conditions

$\gamma_N(kg/Nm^3)$: Density in Basic Conditions

K : Coefficient(determined by type and size of throttle element)

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 equations(this, however, is not applicable when the density varies to a great extent).

◈ ORIFICE PLATE

DESCRIPTION

Orifice plates have a disadvantage of permitting a greater pressure loss than other throttle elements(flow nozzles, venturi tubes, etc.) but are most popularly used because of their simpler shape, easier manufacturability, lower cost and higher reliability.

The types of orifice plates include concentric orifice plate, eccentric orifice plate, segmental orifice plate, quarter-circle orifice plate and square orifice plate, etc.

SPECIFICATION

Orifice Bore Type :
Concentric Square Edged Orifices
Quadrant Edged Orifices
Eccentric Orifices
Segmental Orifices
Minimum quadrant edged orifice diameter 4.5mm.
Minimum quadrant edge radius 0.5mm.

Flow calculation standards :
Concentric Square Edged Orifices : JIS Z 8762-1969(ISO R541-1967)
1D-1/2D(radius) tap and 2.5D-8D (pipe) tap are as per "ASME Fluid Meters, Their Theory and Application, 5th Edition, 1959."
Eccentric orifices : ASME Fluid Meters, Their Theory and Application, 5th
Segmental orifices : Edition, 1959
Note : JIS Z 8762-1969 flow data used to calculate orifice bores is identical to that of ISO R 541-1967.

Flange Ratings :
JIS 2, 5, 10, 16, 20, 30, 40 and 63kg/cm^2
ANSI Class 150, 300, 600 and 900(RF)
(Note : Flange dimensions are identical between ANSI and JPI.)

Pressure Taps : Flange Tap
corner tap
vena contracta tap
1D And ½D(Radius) tap

Plate Thicknesses : 2, 3, 4, 5, 6, 9, 10 12 mm

Tab Handle : Welded to orifice plate.

Materials : Plate : JIS SUS 304 or JIS SUS 316 stainless steel.

Drain and Vent Hole : Per ASME recommendations. Not drilled for orifice bores smaller than 25.4mm.

Markings : Upstream side of tab handle stamped "UPSTREAM" and with bore type and size, line size, tag number, quadrant edge radius and flange rating. Downstream side of tab handle stamped with orifice material and serial number.

Special Markings : Special marking may be furnished to meet specific requirements.

◈ ORIFICE PLATE

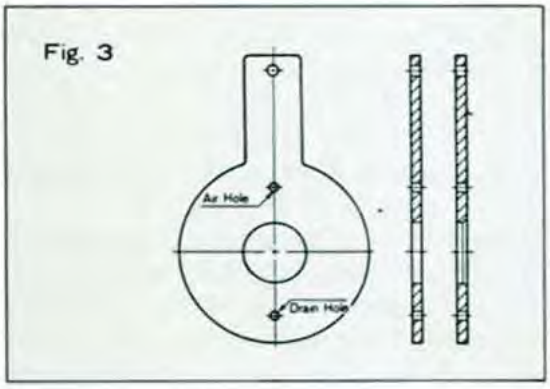
TYPES

● CONCENTRIC (Fig. 3)

This has special features such as simple structure, high accuracy, and easy mounting and dismounting. The orifice plates are correctly finished to the dimensions, surface roughness, and flatness to the applicable standard.

Differential pressure is measured through flange taps, vena contracta taps, radius taps, or corner taps.

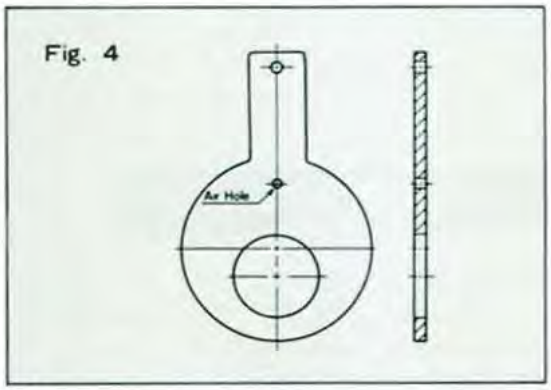
Fig. 3



● ECCENTRIC (Fig. 4)

For liquids containing solid particles that are likely to sediment or for vapors likely to deposit water condensate, this orifice plate is used with its eccentric bore bottom flush with the bottom of the piping inside surface so that the sedimentation of such inclusions is avoided. Likewise, for gases or vapors, it may be installed with its eccentric bore top flush with the bore top of the piping to avoid the stay of gas or vapor in its vicinity. Flange taps or vena contracta taps are used for this orifice plate.

Fig. 4

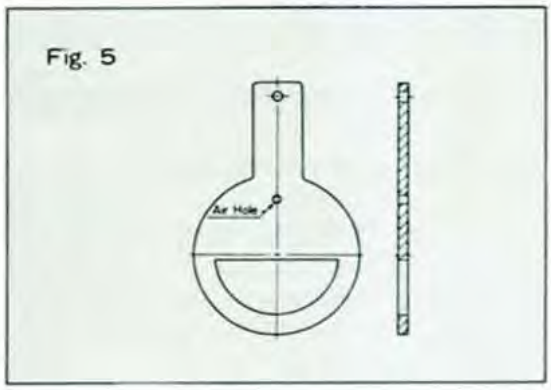


● SEGMENTAL (Fig. 5)

The bore of this orifice plate is a semicircle to perform the same function as the eccentric orifice plate. This is used for the similar purposes.

Flange taps or vena contracta taps are employed to take out fluid pressures.

Fig. 5

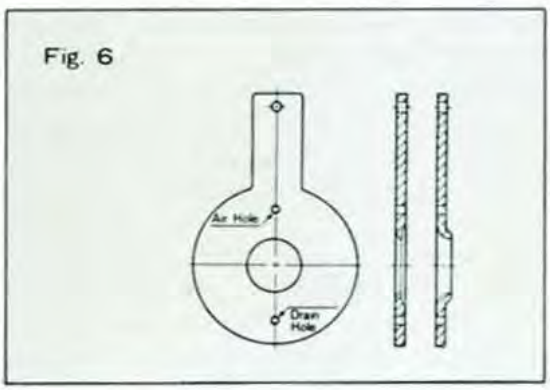


● QUARTERANT (Fig. 6)

The inlet edge of the bore of this orifice plate is rounded to a quarter circle. This orifice plate is principally used for measuring flow rates of low Reynolds Numbers.

Flange taps or corner taps are used.

Fig. 6



◈ ORIFICE PLATE WITH RING

DESCRIPTION

Orifice Ring Assemblies are used for flow measurement of smaller or medium sized pipes at lower pressures. Each assembly consists of one orifice plate and two orifice rings. Differential pressures are taken out in a corner tap system.

Orifice Blocks, which are of a unit-construction type and provide higher pressure ratings than the Orifice Ring Assemblies, also are available. Differential pressures are taken out in a corner tap system.

SPECIFICATION

Orifice Bore Type :
Concentric Square Edged Orifices
Quadrant Edged Orifices
Minimum quadrant edged orifice diameter 4.5mm.
Minimum quadrant edge radius 0.5mm.

Flow calculation standards :
Concentric Square Edged orifices : JIS Z 8762－1969(ISO R541－1967)
Notes :
JIS Z 8762－1969 flow data used to calculate orifice bores is identical to that of ISO R 541－1967.

Flange ratings :
JIS 5, 10, 16, 20kg/cm²
ANSI(or JPI) 150LB
(Note : ANSI and JPI ring dimensions are identical.)

Pressure Taps : Corner taps

Plate Thicknesses : 2, 3, 4, 5, 6, 9, 10mm

Tab Handle : Welded to orifice plate.

Pressure Tap Nipples : 15mm(½inch) Sch 80.
Lengh : 150mm
Tap Connections : PT½ or ½NPT male, socket weld, butt weld or flange. (Flange rating to be the same as the of the process pipeline.)

Drain and Vent Hole : Per ASME recommendations. Not drilled for orifice bores smaller than 25.4mm.

Markings : Upstream side of tab handle stamped "UPSTREAM" and with bore type and size, line size, tag number, quadrant edge radius and flange rating. Downstream side of tab handle stamped with orifice material and serial number.

Special Markings : Special markings may be furnished to meet specific requirements.

Materials :
Ring and Pressure Tap Nipple : Carbon Steel, SUS 304 or SUS 316 stainless steel.
Plate : SUS 304 or SUS 316 stainless steel
Tab Handle : SUS 304 or SUS 316 stainless steel

Gasket :
Material : Asbestos
Thickness : 1.5-mm

◈ ORIFICE PLATE WITH INTEGRAL RING

DESCRIPTION

Orifice Plate with integral Ring is a different pressure type primary device used to produce a fluid flow restriction in a pipeline. The differential pressure across the orifice plate is proportional to the square of the fluid velocity. The differential pressure is applied to the integral pressure taps through single holes in the corner formed by the ring wall and the orifice plate.

The orifice plate with ring is cut and shaped from one block of metal. The pressure tap nipples are welded to the orifice plate and ring.

Orifice Plate with integral Ring is suitable for high pressure and temperature service applications and is similar to Orifice Plate with Ring.

SPECIFICATIONS

Orifice Bore Type : Concentric Square Edged Orifices. quadrant edged orifices.

Flow Calculation Standards :
Concentric Square Edge Orifice : JIS Z 8762－1969(ISO R541－1967)
Note : JIS Z 8762－1969 flow data used to caculate orifice bores is identical to that of ISO R541－1967.

Flange Ratings : JIS 30, 40 and 63kg/cm^2
ANSI Class 300, 600 and 900(RF)

Pressure Taps : Single hole type corner taps. annular chamber type corner taps.

Nominal Pipe Sizes : 15 to 400mm(½to 16 inches.)

Pressure Tap Nipple : 15mm(½inch)Sch 80
Length : 150mm

Tap Connections : PT½ or ½NPT male, socket weld, butt weld or flange. (Flange rating to be the same as that of the process pipeline.) Angle between two taps is a straight angle.

Plate and Nipple Materials :
SUS 304 stainless steel
SUS 316 stainless steel

Markings : Ring rim stamped with tag number, bore size, flow direction, material, line size, flange rating and serial number.

◈ ORIFICE PLATE WITH HOLDING RING

DESCRIPTION

The Holder Ring Assembly is a combination of a holder ring and an orifice plate designed for ring-type-joint(RTJ) flanges of ANSI or JPI Specifications. The holder ring has a function of holding the orifice plate and also a function as a gasket to prevent leakage of the process fluid. This metallic sealing system is applicable to a fluid of high temperature and high pressure. The pressure tapping system normally is of the flange tap type.

SPECIFICATIONS

Orifice Bore Type :
Concentric Square Edged Orifices
Quadrant Edged Orifices

Flow Calculation Standard :
Concentric Square Edge orifices : JIS Z 8762－1969(ISO R541－1967)
Note : JIS Z 8762－1969 flow data used to calculate orifice bores is identical to that of ISO R 541－1967.

Flange Ratings :
ANSI 300, 600, 900 and 1500 lb. ring joing(RJ)

Pressure Taps : Flange taps

Plate Thicknesses : 2, 3, 4, 5, 6, 9mm

Tab Handle : Welded to ring

Holding Ring : Riveted to plate.
Octagonal or oval.

Drain and Vent Hole : Per ASME recommendations. Not drilled for orifice bores smaller than 25.4mm.

Markings : Upstream side of tab handle stamped with "UPSTREAM" and with bore type and size, line size, tag number, quadrant edge radius and flange rating. Dowstream side of tab handle stamped with orifice and ring material, and serial number.

Special Markings : Special markings may be furnished to meet specific requirements.

Materials :
Plate : SUS 304 or SUS 316 stainless steel
Holding Ring : carbon steel, SUS 304 or SUS 316 stainless steel
Rivets : SUS 304 or SUS 316 stainless steel
Tab : Handle : SUS 304 or SUS 316 stainless steel

Nominal Pipe Sizes Available :

Orifice Bore Type	Pipe Sizes	Pipe Diameter Given in the Applicable Standards
Concentric Square Edge	1½ inches to 14 inches	50 to 760mm
Quadrant Edge	1½ inches to 6 inches	25 to 150mm

◈ ORIFICE FLANGE ASSEMBLIES

DESCRIPTION

Orifice Flange Assemblies are used in conjunction with Orifice Plates for flow measurement of smaller or medium size pipes at lower or medium pressure ranges. The flange connection is of an RF type and the differential pressure tapping system is with flange taps.

SPECIFICATIONS

Orifice Flanges types : Slip-on
welding neck.
ring-joint welding neck

Nominal diameters :
25mm(1 inch) to 500mm(20 inches)

Flange rating :
JIS 10, 20, 30kg/cm²RF
ANSI(or JPI) 150, 300, 600 lb RF

Flange material :
carbon steel
SUS 304 · SUS 316

Materials of bolts and nuts :
STUD BOLTS : SNB7
Nuts : S45C
Jack bolts and nuts : S25C

Gaskets :
Thickness : 1.5mm
Material : Asbestos sheet gasket
Vortex gaskets and other special types

Piping connection method :
JIS 10kg/cm² : Insertion welding type (slip-on type)
JIS 20, 30kg/cm², ANSI and JPI : Butt welding type(welded neck)

Differential pressure piping connection :
Select referring to the model number construction table.

Flange Ratings and Facings.

Mounting	Standard	Flange Rating and Facing
Slip-on	JIS	10 and 16kg/cm²(PF) 20kg/cm²(RF)
	ANSI	Class 150 and 300(RF)
Welding neck	JIS	10, 16 and 20kg/cm² RF
	ANSI	Class 150, 300, 600 and 900 RF
Welding neck	ANSI	Class 300, 600, 900 and 1500 ring-joint(RJ)
Slip-on	JIS	5, 10 and 16kg/cm² PF 20kg/cm² RF
	ANSI	Class 150 and 300 RF
Welding neck	JIS	10, 16, 20, 30, 40 and 63kg/cm² RF
	ANSI	Class 150, 300, 600 and 900 RF

◈ ORIFICE FLANGE ASSEMBLIES

TYPES

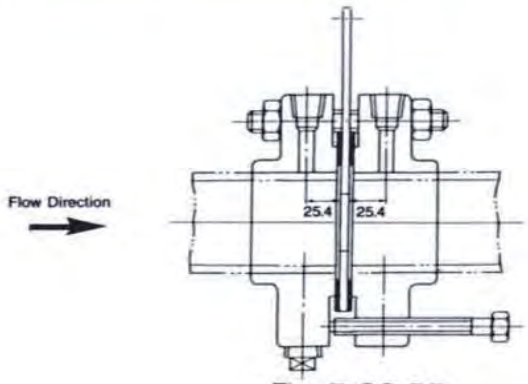


Fig. 7 SO-RF

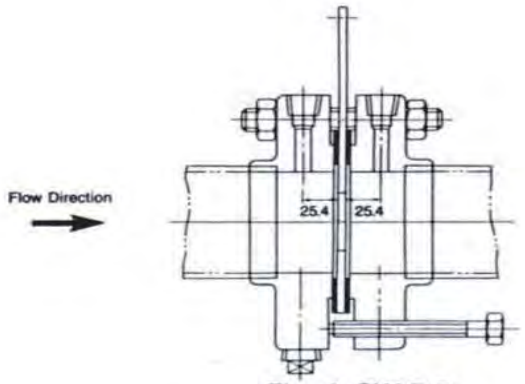


Fig. 8 SW-RF

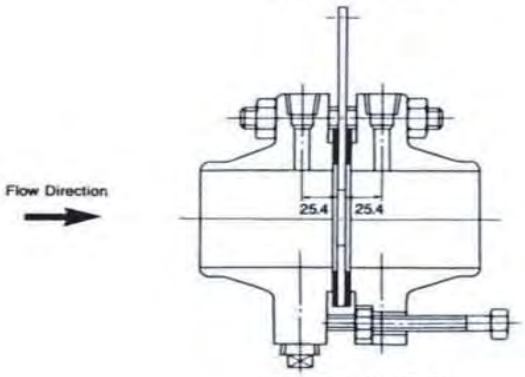


Fig. 9 WN-RF

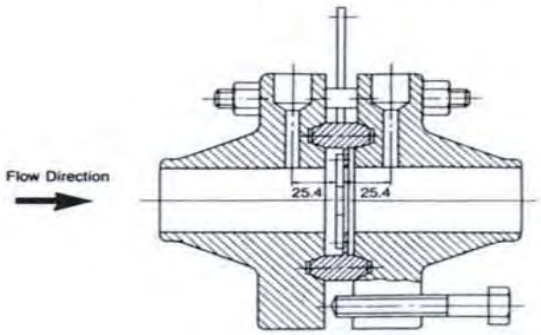


Fig. 10 WN-RJ

Slip-On Flanges (Fig. 7)

The slip-on flange has a low hub because the pipe slips into the flange prior to welding. It is welded both inside and out to provide sufficient strength and prevent leakage. Slip-on flanges are all bored slightly larger than the O.D. of the matching pipe. They are preferred over welding neck flanges by many users due to their lower initial cost, but final installation cost is probably not much less than that of the welding neck flange because of the additional welding involved.

Socket Welding Flanges (Fig. 8)

The socket welding flange is similar to a slip-on flange except it has a bore and a counterbore dimension. The counterbore is slightly larger than the O.D. of the matching pipe, allowing the pipe to be inserted into the flange similar to a slip-on flange. The diameter of the smaller bore is the same as the I.D. of the matching pipe. A restriction is built into the bottom of the bore which sets as a shoulder for the pipe to rest on. This eliminates any restriction in flow when using a socket welding flange.

Welding Neck Flanges (Fig. 9)

The welding neck-flange is normally referred to as the "high hub" flange. It is designed to transfer stresses to the pipe, thereby reducing high stress concentrations at the base of the flange. The welding neck flange is the best designed butt-welded flange of those currently available because of its inherent structural value. It is expensive because of the design.