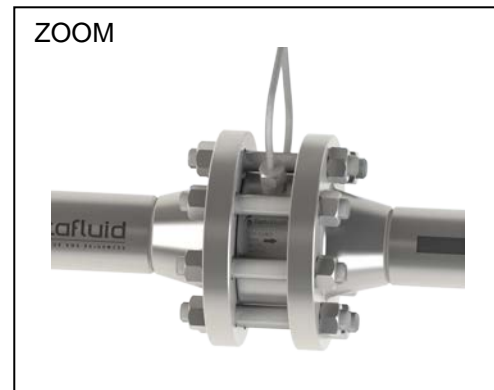


Datasheet *Orifice plate - Monobloc*

Rev.1 Jan 2015

- ✓ Orifice plate machined from a single piece of material with integrated pressure taps
- ✓ Orifice plate design based on ISO5167, BS1042, ASME.MFC.3M and ISO TR15377 :2007 industry standards
- ✓ Accuracy, repeatability and reliability of the flow element
- ✓ Integrated pressure taps (corner taps) – no need of orifice flanges
- ✓ Easy and quick installation and commissioning
- ✓ Very long life-time product
- ✓ Cost-effective and maintenance-free system



Contents

Specifications.....	page 2
Dimensions.....	page 3
Assembly.....	page 4
Ordering information.....	page 5
Upstream and downstream straight lengths acc. Standards.....	page 7
Installation and flowmeter orientation.....	page 8



The monobloc orifice plate body is made out of a single casting with integrated pressure connections, with no welding thus is highly resistant.

Applications - standards

Standards	ISO5167, BS1042, ASME.MFC.3M, ISO TR15377 :2007
Fluid temperature	-110°C to +800°C (if remote transmitter) To +125°C (DP transmitter limit)
Type of fluid	Gas, steam, liquid (single-phase fluids)
Nominal diameters	ND50 to ND1000 according ISO5167-1 (from 2 up to 40 inches) ND15 up to ND50 according ISO TR 15377 :2007 (from 1/2 up to 2 inches)
Maximum operating pressure	Limited by the flange rating



The monobloc orifice plate is dimensionally checked in compliance with the manufacturing quality controls. Manufacturing is possible according the european directive DESP97/23 CE requirements.

Features

Ratio pressure loss	42% to ΔP for $\beta=0,75$ up to 95% to ΔP for $\beta=0,2$
Accuracy	<1% to 2,5% depending on the installation
Material	Stainless steel, Carbon steel, Monel alloy, Hastelloys, Inconels, Duplex, Super Duplex, Titanium, Tantalum, PVC, etc

Mounting

Assembly	Between flanges (RF or RTJ)
Piping connection	Between straight sections (variable lengths regarding β and obstacles located up and downstream – see table here-after)
Type of gaskets	Flat seal (spiral wound gasket, graphite, PTFE) or RTJ (mild steel, stainless steel, monel alloy...)
Centering of orifice bore relative to piping	Distance e between the centerline of the orifice and the centerline of the pipe in the direction parallel to the pressure tapping : $e \leq 0,002 5D / (0,1 + 2,3 \beta^4)$

Technical description

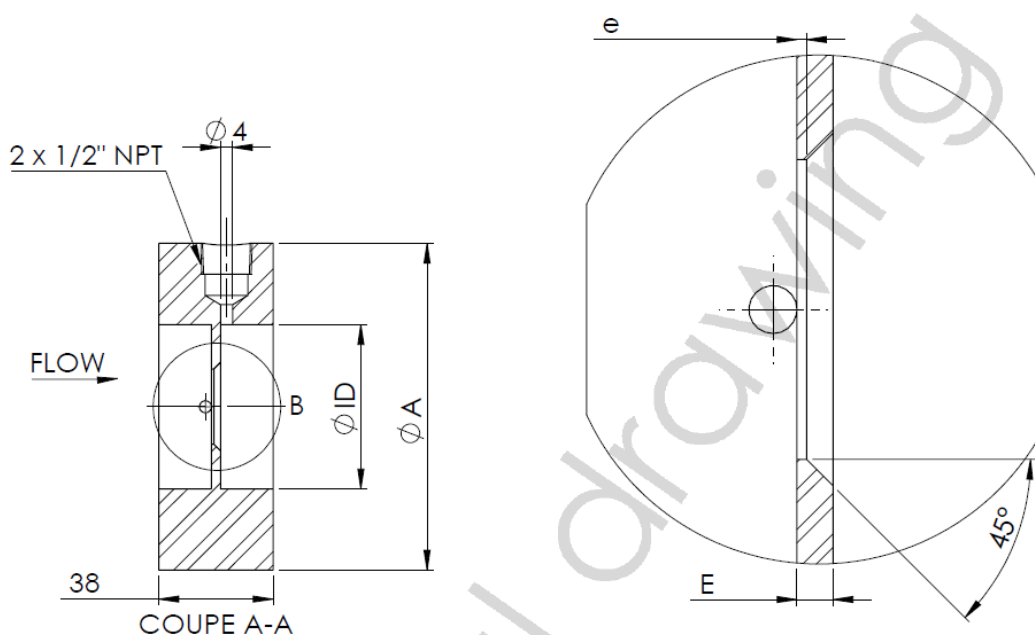
Upstream face	1-Raised Face with sharp edge : radius $r < 0,0004 d$ Smoothed face : roughness criterion $Ra < 10^{-4} d$ Plane : default $< 0,005 (D-d)/2$ 2-Conical entrance, quarter circle, eccentric, segmental and multi bores are available ; dimensions are in accordance with ISO5167 and ISO TR 15377 standards
Plate thickness	Between 0,005D and 0,05D
Monobloc thickness	Standard : 38mm Possible from narrow (20mm) to wide (60mm)

Limits of use

Corner taps	$d \geq 12.5 \text{ mm}$ $0.1 \leq \beta \leq 0.75$ $Re_D \geq 5000$ for $0.1 \leq \beta \leq 0.559$ $Re_D \geq 16000 \beta^2$ for $\beta > 0.559$
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Dimensions

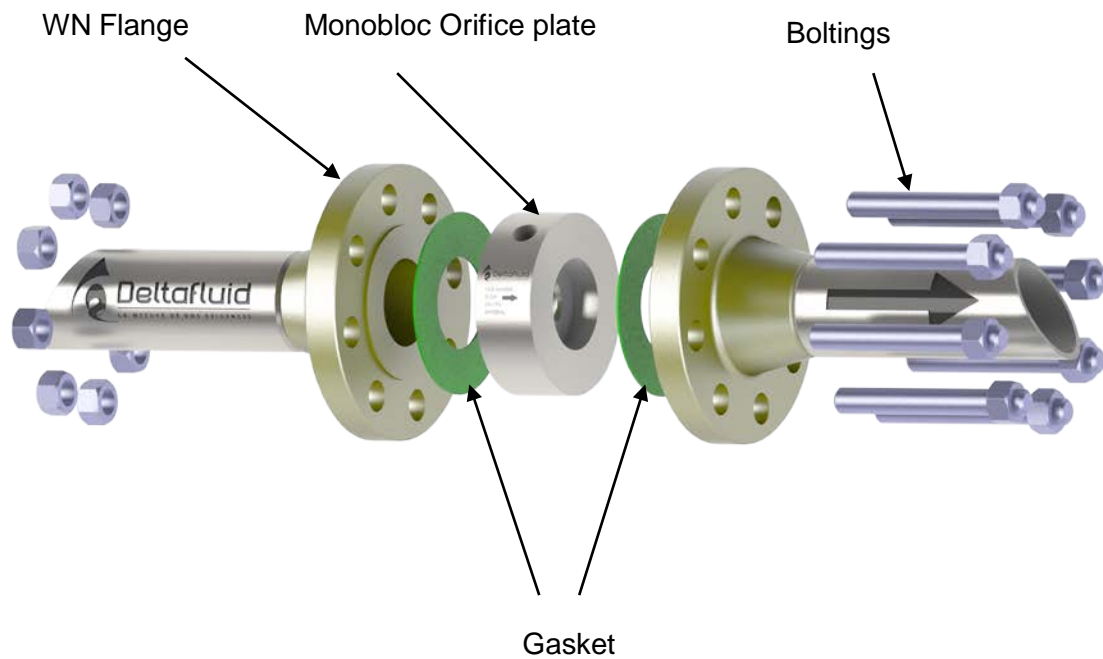
Example upstream face RF sharp edge



DÉTAIL B
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DN	E	e	ϕA : EXTERNAL DIAMETER OF THE PLATE					
			150# RF	300# RF	600# RF	900# RF	1500# RF	2500# RF
1/2"	3	0.5	46	52	52	61	61	68
3/4"	3	0.5	55	65	65	68	68	74
1"	3	0.5	65	71	71	77	77	84
1"1/2"	3	0.8	84	93	93	96	96	115
2"	3	0.8	103	109	109	141	141	144
2"1/2"	3	1.2	122	128	128	163	163	166
3"	3	1.6	135	147	147	166	173	195
4"	3	1.6	173	179	192	204	208	233
6"	3	3	220	249	265	287	281	315
8"	3	3	277	306	319	357	350	385
10"	3	3	338	360	398	433	433	474
12"	3	3	408	420	455	496	519	547
14"	6	6	449	484	490	519	576	
16"	6	6	512	538	563	573	639	
18"	6	6	547	595	611	636	703	
20"	6	6	604	652	681	696	754	
24"	6	6	716	773	789	836	900	

Example of assembly : a monobloc orifice plate with integrated pressure taps between welding-neck flanges



Ordering information – MAIN CODE

Delta MOP-PT-SE		MAIN CODE						
Monobloc orifice plate with integrated pressure taps (0/0)		XXX	XX	XXX	XXXXX	XXX	XX	XX
Sharp Edge*	Delta MOP-PT-SE*							
Type of face								
Raising Face	RF**							
Ring Torque Joint	RTJ							
Plate thickness								
Standard 38 mm			38					
Narrow 20 mm			20					
Wide 60 mm			60					
Nominal diameter								
DN15 - 1/2"				1				
DN20 - 3/4"				0,75				
DN25 - 1"				1				
DN32 - 1"1/4				1,25				
DN40 - 1"1/2				1,5				
DN50 - 2"				2				
DN65 - 2"1/2				2,5				
DN80 - 3"				3				
DN100 - 4"				4				
DN125 - 5"				5				
DN150 - 6"				6				
DN200 - 8"				8				
DN250 - 10"				10				
DN300 - 12"				12				
DN350 - 14"				14				
DN400 - 16"				16				
DN450 - 18"				18				
DN500 - 20"				20				
DN600 - 24"				24				
Rating								
150#					A150			
300#					A300			
600#					A600			
900#					A900			
1500#					A1500			
2500#					A2500			
PN10					D10			
PN16					D16			
PN25					D25			
PN40					D40			
PN63					D63			
PN100					D100			
Plate material								
Stainless steel 304					SS4			
Stainless steel 316					SS6			
Inconel					INC			
Monel					MON			
Hastelloy					HLY			
PTFE					PTF			
Duplex					DPX			
Superduplex					SDX			
Others - SPECIFY					O			
Number of pressure tapings								
2 pressure tapings						2		
4 pressure tapings						4		
Others - SPECIFY						O		
Types of pressure tapings								
1/2NPTF							NP	
1/2BSP							BS	
SW							SW	
Others - SPECIFY							O	

*Available also as
 conical entrance -CE
 quarter circle -QC
 eccentric -EC
 segmental -SG
 and multi holes -MH

Example Main code :
 Delta MOP-PT-SE-38-1-A300-
 SS4-2-NP

** MOP-PT-SE-RF can be assembled with simple or double & male or female facing depending on the flange

Ordering information –OPTIONAL CODE

OPTIONAL CODE	XX	XXX	XXX	X	XX	XX	XX	X	X
Flanges*⁽¹⁾									
Welding neck	WN								
Slip on	SO								
Socket welding	SW								
Others	O								
Flanges material									
ASTM A105		105							
A350LF2		350							
Carbon steel* ⁽²⁾		CST							
Stainless steel 304		SS4							
Stainless steel 316		SS6							
Inconel		INC							
Monel		MON							
Hastelloy		HLV							
PTFE		PTF							
Duplex		DPX							
Superduplex		SDX							
Other		O							
Pipe Schedule									
5-5S			5						
10-10S			10						
20			20						
30			30						
40S-Std			STD						
40			40						
60			60						
XS-80S			XS						
80			80						
100			100						
120			120						
140			140						
160			160						
XXS			XXS						
Gaskets									
Flat				F					
Graphite				G					
Spiral wound				S					
PTFE				P					
Others				O					
Boltings material									
Carbon steel					CS				
Stainless steel					SS				
Others					O				
Manifold									
3-way remote mounting						3R			
5-way remote mounting						5R			
DP Transmitter									
Standard							SD		
Multivariable							MV		
Temperature sensor*⁽³⁾									
With temperature sensor								Y	
Without temperature sensor								N	
Piping*⁽⁴⁾									
Upstream									U
Downstream									D

Example Optional code :
WN-105-STD-F-CS-3R-MV-Y-UD

*⁽¹⁾ MOP-PT-SE-RF can be assembled with simple or double & male or female facing depending on the flange

*⁽²⁾ Type of carbon steel to be specified

*⁽³⁾ Type of temperature sensor to be specified

*⁽⁴⁾ Process connection to be specified

Straight lengths

Required straight lengths between orifice plates and fittings – without flow conditioners

Values expressed as multiples of internal diameter, D

Diameter ratio d/D	UPSTREAM SIDE OF PRIMARY ELEMENT													DOWN STREAM OF PRIMARY ELEMENT													
	β	single 90° bend or two 90° bends in any plane (S>30D)	Two 90° bends in the same plane: S-config. 30D>S>10D	Two 90° bends in the same plane: S-config. 10D>S	Two 90° bends in perpendicular planes 30D>S>5D	Two 90° bends in perpendicular planes 5D>S	Simple 90° tee with or without an extension	Simple 45° bend or 2 bends in the same plane : S-config (S>2D)	Concentric reducer 2D to D over a length of 1,5D to 3D	Concentric expander 0,5D to D over a length D to 2D	Full bore ball valve or gate valve fully open	Abrupt symmetrical reduction	Thermometer pocket or well of $\varnothing < 0,03 D$	Fittings (columns 2 to 11) and the densitometer pocket													
	1	2	3	4	5	6	7	8	9	10	11	12	13	12													
<0,2		6	3	10	10	19	18	34	17	3	7	5	6	12	6	30	15	5	3	4	2						
0,40		16	3	10	10	44	18	50	25	9	3	30	5	12	8	12	6	30	15	5	3	6	3				
0,50		22	9	18	10	22	10	44	18	75	34	19	9	30	18	8	5	20	9	12	6	30	15	5	3	6	3
0,60		42	13	30	18	42	18	44	18	65	25	29	18	30	18	9	5	26	11	14	7	30	15	5	3	7	3,5
0,67		44	20	44	18	44	20	44	20	60	18	36	18	44	18	12	6	28	14	18	9	30	15	5	3	7	3,5
0,75		44	20	44	18	44	22	44	20	75	18	44	18	44	18	13	8	36	18	24	12	30	15	5	3	8	4

Notes:

The minimum straight lengths required are the lengths between various fittings located upstream and downstream of the orifice plate and the orifice plate itself.

Straight lengths shall be measured from the upstream face of the orifice plate.

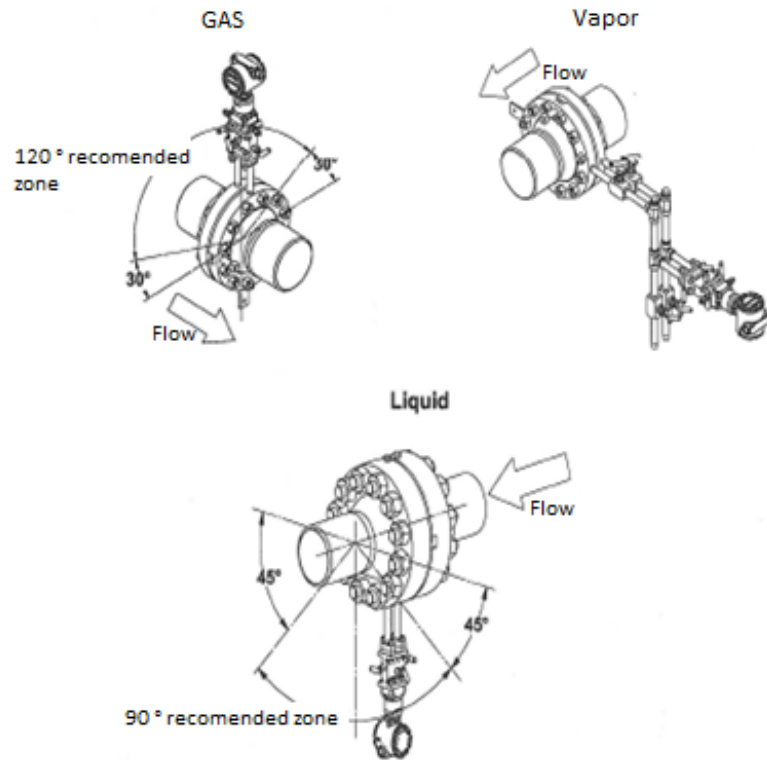
First column for each fitting gives lengths corresponding to « zero additional uncertainty » values (cf standard ISO 5167.1)

Second column for each fitting gives lengths corresponding to “0,5% additional uncertainty” values (cf standard ISO 5167.1).

S represents the distance between two accessories

Orientation of the primary element

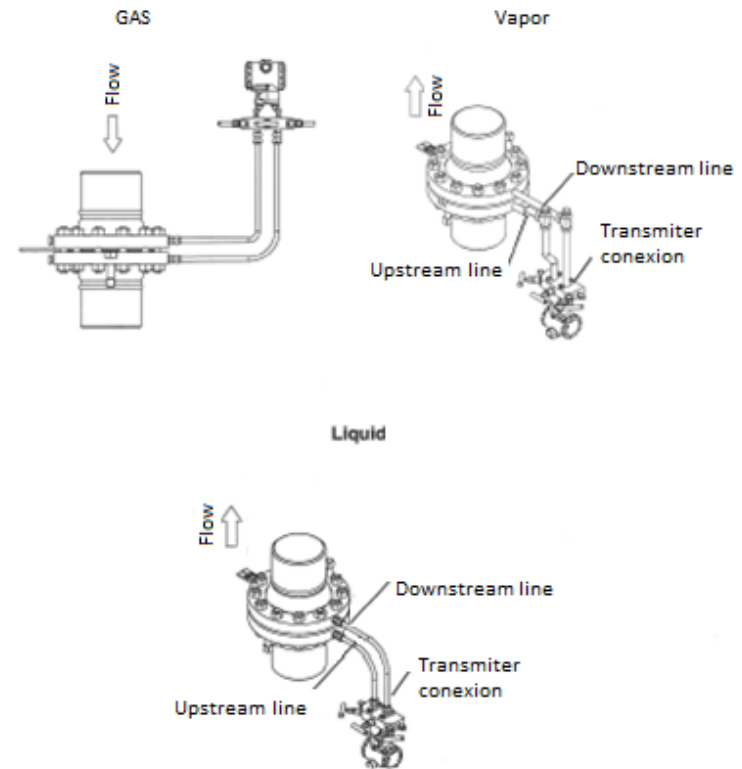
Horizontal line



With liquid applications, the transmitter must be mounted below the pipe. This ensures that air bubbles rise back to the process pipe and thus do not influence the measurement.

With gas applications, the transmitter must be mounted above the pipe. This ensures that any condensate flows back into the process pipe and thus does not influence the measurement.

Vertical line



* Align the Upstream line with the downstream line before plugging to the transmitter

With steam applications, two condensate pots should be used. They must be mounted on the same level so that the pipes between the transmitter and the condensate pots must be completely filled with water. The transmitter must be placed below the pipe.