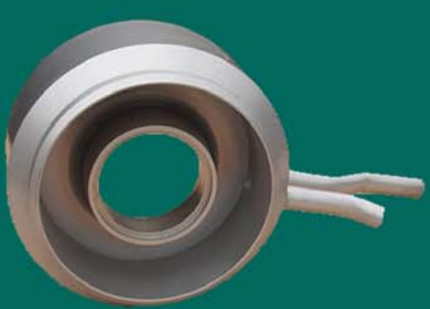
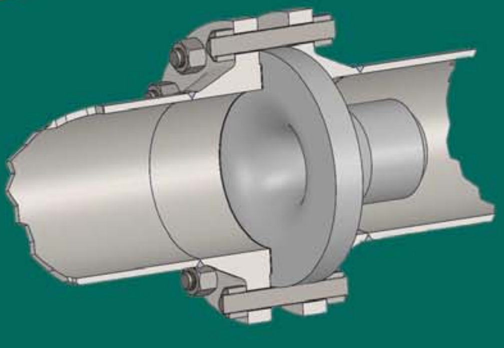
FLOW MEASURING

WITH FLOW NOZZLE





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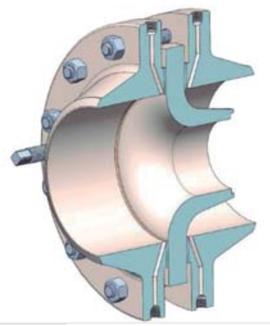
Introductions

The flow nozzle is used for high velocity flow measurement where erosion or cavitation would wear or damage an orifice plate. It does not rely on a sharp edge (that can degrade over time) for accuracy, therefore offering excellent long-term accuracy and it is often used for flow testing on steam-raising plant. The discharge coefficient of a flow nozzle is such that a nozzle can measure approximately 55 % higher flow rates than an orifice plate with a similar beta ratio and design differential pressure.

Applications & Type

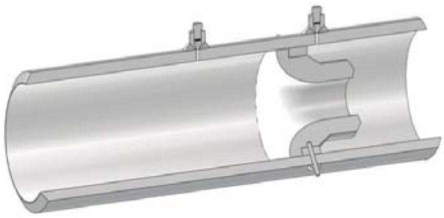
ISA1932 nozzle

the inlet profile is a quarter-circle with a cylindrical throat, for use with corner tapings.



Long radius nozzle

the inlet profile is a quarter-ellipse with a cylindrical throat. The ellipse can have one of two aspect ratios (low or high), depending on the beta ratio. Tappings are typically 1 pipe diameter (D) upstream and 1/2 D downstream of the inlet, but the downstream tapping position on some low ratio versions can differ.



Throat tap nozzle

the inlet profile is a quarter-ellipse with a cylindrical throat. The upstream tapping is in the pipework, 1 D from the inlet; the downstream tapping is within the cylindrical throat and the connection to it is on the circumference of the nozzle ring. The design is usually conforms to ASME PTC-6, with the nozzle mounted within a run of pipework, the upstream section of which includes a flow straightening element.

Specification

Pipeline size range (standard)
50 to 600 mm (2 to 24 in.)

Accuracy
Typical discharge coefficient uncertainty is between ±0.8 and ±2 %, depending on nozzle design and beta ratio. These values apply when within Reynolds Number limits specified in ISO 5167-3:2003; uncertainty is greater if outside of these limits.

Repeatability
±0.2 %

Process connection
- Weld-in
- Within metering pipe sections
- Between flanges,

Impulse connections
Several standard options are available for the connection of the meter to the transmitter:
-Threaded (female or male)
- weldolet
- Flange (B16.5)
- Socket weld

Welding Pressure
retaining welds are completed following the ASME Section IX

Temperature and pressure rating
Dependent on the design, the materials of construction and the process and / or tapping connection rating
Output signal

Minimum straight pipe requirements
For standard uncertainty, without the use of flow straighteners:
Upstream Typically between 10 and 46 D (but can be up to 80 D) from the nozzle inlet face
Downstream Typically between 4 and 8 D from the nozzle inlet face Actual requirements are depending upon the upstream fitting combination and the beta ratio. Refer to EN ISO 5167-4 for detailed information.

Compensation

Alongside differential pressure ∆p, pressure p and temperature T are test variable of flow q. If there are no strong fluctuations in pressure and temperature, then the accuracy of the differential pres- sure signal is fully sufficient for the majority of measuring points. There is then no need for any Compensation.

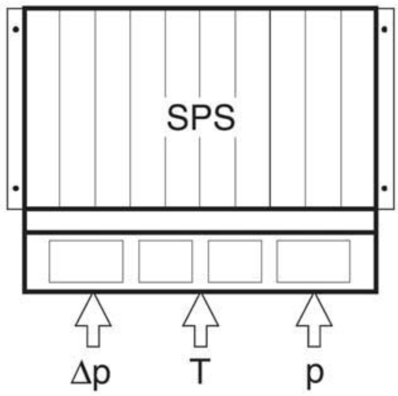
With some applications, particularly in the gas and steam sectors, a special compensation is required. A change in pressure and/or temperature leads to a change in density. If this is not taken into account, total accuracy may be reduced.

The following parameters are required for compensation:

- Gases: compensation of P and T
- Saturated steam: either P or T are compensated
- Superheated steam: compensation of P and T
- Liquids: compensation of T (very rare)

Both on the process side and on the system side, there are two possibilities for implementing compensation (large differences in price and effort).

The process variables are fed into the (available) PLC or Flow Computer. The flow equations are programmed there. With this solution the investment costs are low, but the commissioning costs are increased.



Ordering Information

FNZ-	XXX	XX	XX	XX	XX	XX	XXX	XXX	XX	XX	XX	XXX
Design												
ISA1932 nozzle	NF1											
Long radius nozzle	NF2											
Throat tap nozzle	NF3											
Nozzle Size												
DN 50 (2 in.)		50										
DN 65 (21/2 in.)		65										
DN 80 (3 in.)		80										
DN 90 (31/2 in.)		90										
DN 100 (4 in.)		100										
DN 125 (5 in.)		125										
DN 150 (6 in.)		150										
DN 200 (8 in.)		200										
DN 250 (10 in.)		250										
DN 300 (12 in.)		300										
DN 350 (14 in.)		350										
DN 400 (16 in.)		400										
DN 450 (18 in.)		450										
DN 500 (20 in.)		500										
DN 550 (22 in.)		550										
DN 600 (24 in.)		600										
Nozzle Material												
316L stainless			I1									
310 stainless steel			I2									
321 stainless steel			I3									
Alloy 625			I4									
Other			P5									
Line Sch.												
Schedule 10S				A1								
Schedule 30S				A2								
Schedule 40S				A3								
Schedule STD				A4								
Schedule 80S				A5								
Schedule XS				A6								
Schedule 100				A7								
Schedule 120				A8								
Schedule 140				A9								
Schedule 160				B1								
Schedule XXS				B2								
Others				XX								
Rating												
ANSI Class 150					A1							
ANSI Class 300					A2							
ANSI Class 600					A3							

Ordering Information

ANSI Class 900	A4					
ANSI Class 1500	A5					
ANSI Class 2500	A6					
PN 10	P1					
PN 16	P2					
PN 25	P3					
PN 40	P4					
PN 63	P5					
PN 100	P6					
PN 160	P7					
Flanged Material						
Not Applicable		I0				
316 / 316L stainless		I1				
310 stainless steel		I2				
321 stainless steel		I3				
Carbone Steel A105		I4				
Other		P5				
Tap Type						
Threaded			TH			
Flanged			FL			
Socket weld			SL			
Weldolet			WL			
Not Applicate			DH3			
Tap size						
1/2"				HA1		
1"				HA2		
1 1/2"				HA3		
2"				HA4		
Other				HA5		
N/A				HA6		
Transmitter						
Not Applicable					0	
4~20 mA with Display, 24VDC Loop					10	
4~20 mA without Display, 24VDC Loop					11	
4~20 mA HART with Display, 24VDC Loop					20	
4~20 mA HART without Display, 24VDC Loop					21	
Other					30	
Bolt & Nut						
Not Applicable						0
C.S A192/A193						CS
C.S A192/A193 Cold Galvanized						CG
C.S A192/A193 ETFE Coated						CE
C.S A192/A193 Zinc Reach						CZ
Stainless Steel 304 A192/A193						S1
Stainless Steel 316 A192/A194						S2
Other						O1

Ordering Information

Certification			
Material certificates		C0	
Material NACE MR0175		C1	
Material NACE MR0103		C2	
100% dimensional check		C3	
Hardness survey		C4	
Impact testing @ –196 °C (–320.8 °F)		C5	
Others		C6	
Added requirements			
Manufactured to customer drawing			DW
Special device			SP
Gate Valve 1/2" Carbone Steel			GV1
Gate Valve 1/2" Stainless Steel 304			GV2
Gate Valve 1/2" Stainless Steel 316			GV3
Ball Valve 1/2" Stainless Steel 304			BV1
Ball Valve 1/2" Stainless Steel 316			BV2
Niddle Valve 1/2" Stainless Steel 304			NV1
Niddle Valve 1/2" Stainless Steel 316			NV2
Nipple Carbone Steel 1/2*1/2" Male			NP1
Nipple Stainless Steel 304, 1/2*1/2" Male			NP2
Nipple Stainless Steel 316, 1/2*1/2" Male			NP3
Compress Fitting 1/2" to tube			CF
Others			OT

Contact us

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