

FPD300 venturi tubes

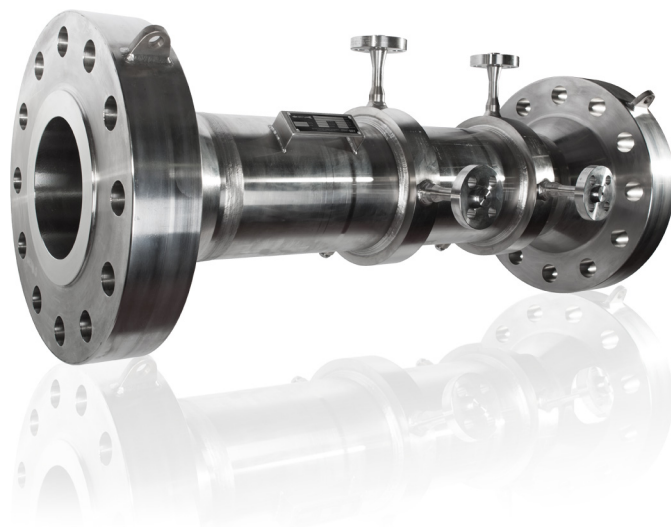
Differential pressure – primary flow element

Rugged flow metering with
low permanent pressure loss

Better Measurement
Better Outcome

Low permanent pressure loss as standard
— even lower pressure loss version available

Designed to ISO 5167
— other designs available on request



Widely used in the Oil & Gas industry
— designed to meet their demanding requirements

Extensive range of construction materials available
— from carbon and stainless steel to specialist alloys

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Introduction

The McMemon FPD300 classical venturi tube is a robust, low pressure-loss device that is available in line sizes 50 to 1200 mm (2 to 48 in.) as standard, with larger sizes available upon request. The meter can measure a wide range of clean liquids and gases. Smaller sized units are machined from barstock or forged bar; larger sizes are typically fabricated from rolled plate with forged flanges. For applications requiring exceptionally low pressure loss, we offer a version that has a longer outlet cone with a shallower internal angle. This combination reduces the overall pressure loss.

The features and benefits of McMemon FPD300 Venturi Tubes include:

- Mature, established technology
 - Available in sizes from DN50 to DN1200 (2 to 48 in.) and larger
 - No moving parts – virtually maintenance-free
 - Performance of device can be calculated from measurement of key dimensions alone – calibration available to offer reduced uncertainty
 - Suitable for a wide range of liquids, gases and steam
 - Available in a wide range of materials to suit the process fluid and the working conditions
 - Designs available for high temperatures and pressures
 - Suitable for horizontal or vertical pipelines
 - Significantly lower pressure losses – offers reduced operating costs in pumping or compression
 - Good performance even at high Beta-ratios
 - Less affected by upstream disturbances than many other devices
 - Profile resists the effects of wear – offers a particularly stable calibration and long life
 - Tolerant to the presence of some solids in the fluid
 - Suitable for passage of multiphase flows and wet gas
- Note.** Such applications require the application of special correlations to correct the flow readings.

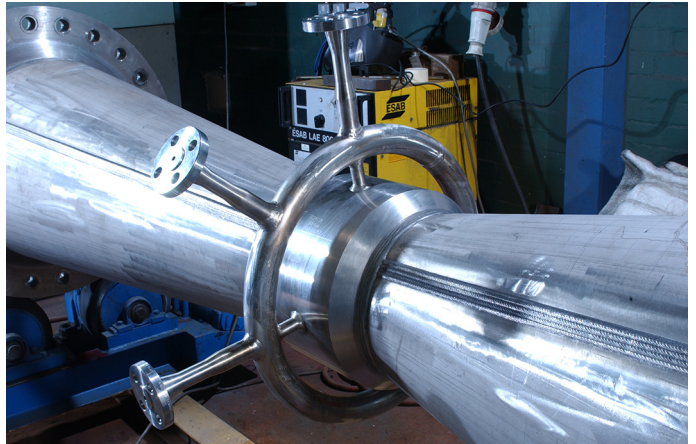


Fig. 1: Optional annular ring tappings

Specification

Pipeline size range (standard)

50 to 1200 mm (2 to 48 in.)

Models for larger pipelines are available to special order

Accuracy

Uncalibrated

Discharge coefficient uncertainty between ± 1.0 and ± 1.5 %, depending on construction and when within Reynolds Number limits specified in ISO 5167-4:2003.

Uncertainty is greater if outside of these limits (refer to Annex B of ISO 5167-4:2003).

Calibrated

Discharge coefficient uncertainty between ± 0.5 and ± 1.0 %, depending on the meter construction and calibration facility.

Repeatability

± 0.2 %

Pressure loss

5 to 20 % of differential head, dependent on the beta ratio and divergent angle

Beta ratios

0.4 to 0.75 (depending on construction)

To determine Beta ratio and differential pressure, refer to McMenon SolveDP sizing software or contact your local McMenon office.

Process flange connection

- ANSI/ASME Classes 150 to 2500 (raised face)
- ANSI/ASME Classes 300 to 2500 (ring type joint)
- DIN PN10 to PN100 (raised face)

Contact McMenon for additional end connection ratings and formats

Impulse connections

Several standard options are available for the connection of the meter to the transmitter:

- Threaded (female or male)
- Nipolet
- Nipoflange (B16.5)
- Socket weld
- Annular ring (specify in detail)

Other connection types may be possible – contact McMenon

Materials of construction

Standard:

- Carbon steel
- Low temperature carbon steel
- 316 stainless steel
- 1 $\frac{1}{4}$ Cr 1Mo and duplex steel (UNS S31803).

Optional (but not limited to):

- 25 % Cr super duplex (UNS S32750)
- C276 alloy (UNS N010276)
- Alloy 400 (UNS N04400)
- Alloy 625 (UNS N06625)

Pressure Equipment Directive (PED)

FPD300 venturi tubes can fall under the pressure equipment directive, in which case McMenon will perform the calculations per PED Module H and if it falls under the CATII or CATIII classification will create a technical file to facilitate the request.

Welding

Pressure retaining welds are completed following the ASME Section IX code and also meet PED specifications.

Temperature and pressure rating

Dependent on the tube wall thickness, the materials of construction and the process and / or tapping connection rating.

Minimum straight pipe requirements

Upstream

Typically between 8 and 22 D

Downstream

Typically 4 throat diameters (but this is usually included within the meter)

Actual requirements are dependent upon the upstream fitting combination and the beta ratio.

Refer to EN ISO 5167-4 for detailed information. Alternatively, contact McMenon.

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Ordering information

Standard codes												Optional codes									
Venturi tube	FPD300	XX	XX	XX	XXX	XX	XX	XX	XX	XX	XX	XXX	XXX	XXX	XXX	XXX	XX	XXX	XXX	XX	XXX
Product design																					
Machined venturi		V1																			
Fabricated venturi		V2																			
Machined venturi – bidirectional		V3																			
Fabricated venturi – bidirectional		V4																			
Divergent angle																					
Classical (15° outlet cone)		A1																			
Bidirectional (21° inlet/outlet cones)		A2																			
Long pattern (7° outlet cone)		L1																			
Others		Z9																			
Fixed																					
Standard																					Y0
Meter nominal bore																					
DN 50 (2 in.)																					050
DN 80 (3 in.)																					080
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
DN 650 (26 in.)																					650
DN 700 (28 in.)																					700
DN 750 (30 in.)																					750
DN 800 (32 in.)																					800
DN 850 (34 in.)																					850
DN 900 (36 in.)																					900
DN 950 (38 in.)																					950
DN 1000 (40 in.)																					001
DN 1050 (42 in.)																					051
DN 1100 (44 in.)																					101
DN 1150 (46 in.)																					151
DN 1200 (48 in.)																					201
Others																					999

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Standard codes											Optional codes											
Venturi tube	FPD300	XX	XX	XX	XXX	XX	XX	XX	XX	XX	XX	XXX	XXX	XXX	XXX	XXX	XX	XXX	XXX	XX	XXX	
											See page 4											
Pipe schedule																						
5S																						S1
5																						S2
10S																						S3
10																						S4
20																						S5
30																						S6
40S																						S7
40																						S8
STD																						S9
60																						T1
80S																						T2
80																						T3
XS																						T4
100																						T5
120																						T6
140																						T7
160																						T8
XXS																						T9
Others																						Z9
Pipework material																						
316 / 316L stainless steel																						S6
304 / 304L stainless steel																						S4
Carbon steel (A105N/A106 GrB)																						C3
Low temperature carbon steel (LF2 C1/A333 Gr 6)																						C4
310 stainless steel																						S3
321 stainless steel																						S2
317 / 317L stainless steel																						S8
22 % Cr duplex (UNS S31803)																						D1
25 % Cr super duplex (UNS S32750/S32760)																						D2
6 % Mo SS (UNS S31254)																						M1
Alloy 400 (UNS N04400)																						M4
Alloy 625 (UNS N06625)																						N2
Alloy 800 (UNS N08800)																						U4
Alloy 825 (UNS N08825)																						U5
Alloy C276 (UNS N010276)																						U7
5Cr-1/2Mo low alloy F5 (UNS K41545)																						K3
1 1/4Cr-1/2Mo low alloy F11 (UNS K11597)																						K4
2 1/4Cr-1Mo low alloy F22 (UNS K21590)																						K5
Others																						Z9

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Standard codes											Optional codes													
Venturi tube	FPD300	XX	XX	XX	XXX	XX	XX	XX	XX	XX	XX	XXX	XXX	XXX	XXX	XXX	XX	XXX	XXX	XX	XXX			
		See page 4				See page 5																		
Meter material																								
316 / 316L stainless steel											S6													
304 / 304L stainless steel											S4													
310 stainless steel											S3													
321 stainless steel											S2													
317 / 317L stainless steel											S8													
22 % Cr duplex (UNS S31803)											D1													
25 % Cr super duplex (UNS S32750)											D2													
25 % Cr super duplex (UNS 32760)											D3													
6 % Mo SS (UNS S31254)											M1													
Alloy 400 (UNS N04400)											M4													
Alloy 625 (UNS N06625)											N2													
Alloy 800 (UNS N08800)											U4													
Alloy 825 (UNS N08825)											U5													
Alloy C276 (UNS N010276)											U7													
Others											Z9													
Fixed																								
Standard											Y0													
Process connection type																								
Weld prepared ends											P1													
Raised face weld neck end flange											R2													
RTJ weld neck end flange											J2													
Others											Z9													

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Standard codes											Optional codes										
Venturi tube		FPD300	XX	XX	XX	XXX	XX	XX	XX	XX	XX	XXX	XXX	XXX	XXX	XX	XXX	XXX	XX	XXX	
							See page 4		See page 5		See page 6										
Process connection rating																					
ASME Class 150											A1										
ASME Class 300											A3										
ASME Class 400											A4										
ASME Class 600											A6										
ASME Class 900											A7										
ASME Class 1500											A8										
ASME Class 2500											A9										
DIN PN 6											D0										
DIN PN 10											D1										
DIN PN 16											D2										
DIN PN 25											D3										
DIN PN 40											D4										
DIN PN 63											D5										
DIN PN 100											D6										
Others											Z9										
Surface treatment																					
Primer to McMenon Standard (primer only)											HF1										
Painted to McMenon Standard (primer and top coat)											HF2										
Other (specify in detail)											HFZ										
Tapping type																					
Threaded (female)											TT1										
Nipolet											TT2										
Nipoflange (B16.5)											TT3										
Socket weld											TT4										
Thread (male) nipple											TT5										
Annular ring (specify in detail)											TT6										
Others											TZ9										

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Venturi tube	Standard codes										Optional codes													
	FPD300	XX	XX	XX	XXX	XX	XX	XX	XX	XX	XX	XXX	XXX	XXX	XXX	XXX	XXX	XX	XXX	XXX	XX	XXX		
						See page 4		See page 5		See page 6		See page 7												
Tapping rating																								
BSP Tr (M)																							TRB	
NPT F																								TRC
NPT M																								TRD
As line rating																								TRE
ASME Class 300 RF																								TR2
ASME Class 600 RF																								TR3
ASME Class 900 RF																								TRV
ASME Class 1500 RF																								TRW
ASME Class 2500 RF																								TRX
ASME Class 300 RTJ																								TRY
ASME Class 600 RTJ																								TR6
ASME Class 900 RTJ																								TR7
ASME Class 1500 RTJ																								TR8
ASME Class 2500 RTJ																								TR9
DIN PN 6																								D0
DIN PN 10																								D1
DIN PN 16																								D2
DIN PN 25																								D3
DIN PN 40																								D4
DIN PN 63																								D5
DIN PN 100																								D6
Others																								TRZ
Tapping size																								
1/2 in.																								TS2
3/4 in.																								TS3
Others																								TZ9
Tapping sets																								
One																								TN1
Two																								TN2
Three																								TN3
Four																								TN4
Tapping orientation																								
Inclined up																								TG2
Horizontal																								TG3
Inclined down																								TG4

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Venturi tube	Standard codes										Optional codes													
	FPD300	XX	XX	XX	XXX	XX	XX	XX	XX	XX	XX	XXX	XXX	XXX	XXX	XXX	XXX	XX	XXX	XXX	XX	XXX		
		See page 4			See page 5	See page 6			See page 7			See page 8												
Certification																								
Material certs BS EN 10204 3.1 (not available for iron)																						C2		
Material certs BS EN 10204 3.2 (not available for iron)																						C3		
Material NACE MR0175 (certificate not included – price separately)																						CN		
Material NACE MR0103 (certificate not included – price separately)																						CM		
Positive material identification (NITON XRF)																						CA		
100 % dimensional check																						C6		
Others																						Z9		
Testing																								
Impact testing @ -46 °C (-50.8 °F)																						CH1		
Impact testing @ -196 °C (-320.8 °F)																						CH2		
Hardness survey																						CH3		
Others																						CZ9		
Calibration																								
Standard water calibration																						CW1		
Special calibration																						CWZ		
Documentation language																								
German																						M1		
Italian																						M2		
Spanish																						M3		
French																						M4		
English																						M5		
Chinese																						M6		
Added requirements																								
Manufactured to customer drawing																						GD9		
Special device																						STZ		
Material source limitations apply																						MS1		
Others																						MZ9		

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Notes

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