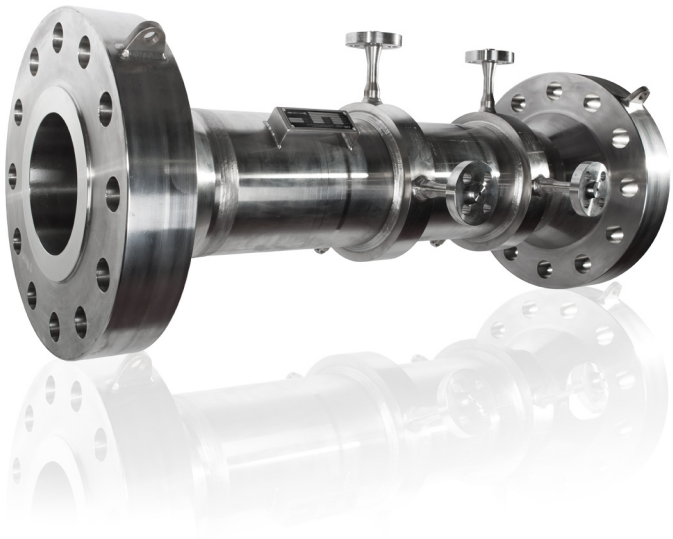
Data sheet DS/FPD300–EN

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

McMENON

FPD300 venturi tubes
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Introduction

The McMenon 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 McMenon 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.

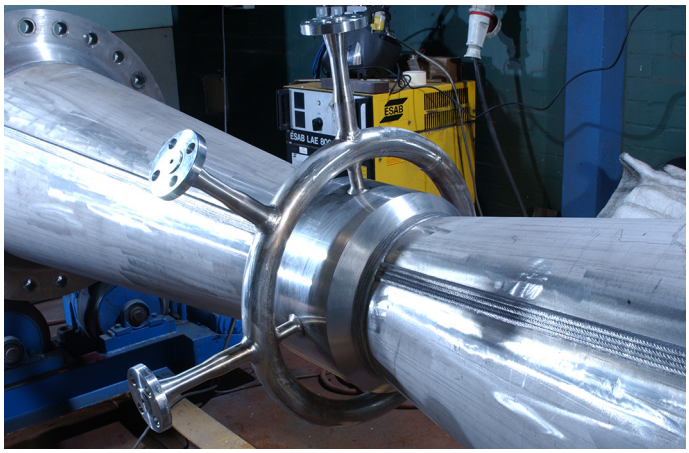

Fig. 1: Optional annular ring tappings

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
— $1^{1}/_{4}$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.

FPD300 venturi tubes
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Ordering information

		Standard codes									Optional codes										
Venturi tube	**FPD300**	**XX**	**XX**	**XX**	**XXX**	**XX**	**XX**	**XX**	**XX**	**XX**	**XXX**	**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	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-$^{1}/_{2}$Mo low alloy F5 (UNS K41545)							K3															
1$^{1}/_{4}$Cr-$^{1}/_{2}$Mo low alloy F11 (UNS K11597)							K4															
2$^{1}/_{4}$Cr-1Mo low alloy F22 (UNS K21590)							K5															
Others							Z9															

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FPD300 venturi tubes
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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	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												

Continued on next page ...

		Standard codes										Optional codes										
Venturi tube	**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														
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) Other (specify in detail)												HF2										
												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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		Standard codes										Optional codes										
Venturi tube	**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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		Standard codes										Optional codes										
Venturi tube	**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

FPD300 venturi tubes
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Notes

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DS/FPD300-EN 11.2016

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