

FPD170 orifice carrier assemblies

Differential pressure – primary flow element

Simplified installation of orifice plates

Better Measurement

Better Outcomes



Simplified installation

- tapping points are integrated within the carrier

Designed to ISO 5167, PD ISO/TR 15377 or R W Miller (depending on plate variant)

- other designs available on request

Range of carrier designs and orifice plates available

- designs available for most orifice plate applications

Extensive range of construction materials available

- from carbon and stainless steel to specialist alloys

FPD170 orifice carrier assemblies

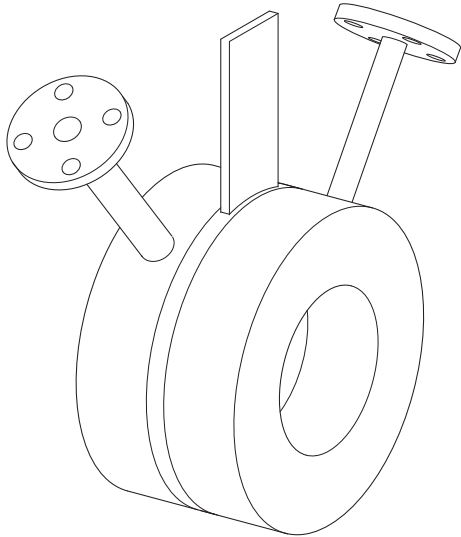
Differential pressure – primary flow element

Introduction

The McMenon FPD170 series of orifice carriers is available for line sizes 25 to 1000mm (1 to 40 in.) as standard, with larger sizes available upon request. The carriers can measure a wide range of liquids and gases, and also steam. The carrier variants are as follows:

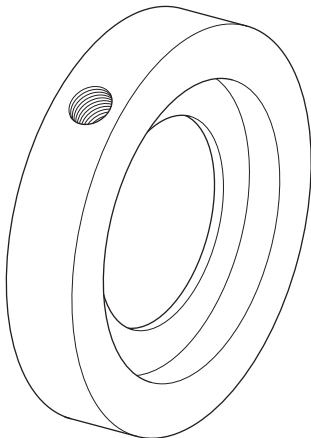
Split ring carrier

- two shells clamp the plate, but allow the tappings to be rotated to the desired orientation



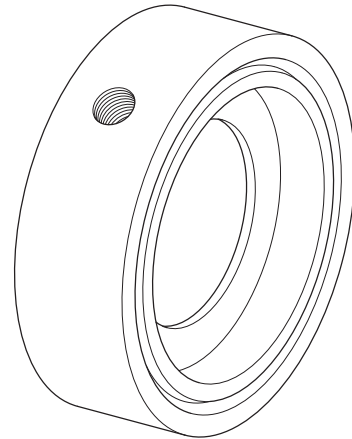
Integral carrier

- a one-piece carrier with an integral plate and fixed-orientation tappings



RTJ female integral carrier

- a one-piece carrier designed to fit between RTJ flanges; with integral fixed-orientation tappings and a female RTJ profile to accept RTJ ring gaskets



The features and benefits of McMenon FPD170 orifice carriers include:

- Mature, established technology
- Available in sizes from DN25 to DN1000 (1 to 40 in.) and larger
- No moving parts – virtually maintenance-free
- Performance of device can be calculated from measurement of key dimensions alone
- 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
- Suitable for horizontal or vertical pipelines

Specification

Pipeline size range (standard)

25 to 1000 mm (1 to 40 in.)

Models for larger pipelines are available to special order

Orifice plate variants

- Concentric square edged
- Conical entrance
- Eccentric
- Quarter circle
- Segmental

Accuracy

Typical discharge coefficient uncertainty lies between ± 0.5 and ± 0.75 %, dependent upon plate design and if within Reynolds Number limits specified in ISO 5167-2:2003.

Uncertainty is greater if outside of these limits.

Repeatability

± 0.2 %

Pressure loss

Typically 45 to 95 % of differential head, dependent on the beta ratio and plate design

Beta ratios

0.1 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
- Nipo-flange (B16.5)
- Socket weld

Other connection types may be possible – contact

McMenon. Dependent on the pipe size and design, up to 4 sets of tapings can be supplied

Materials of construction

Plate, carrier ring:

Standard

- Carbon steel
- Low temperature carbon steel
- 316 stainless steel

Optional (but not limited to):

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

Gaskets (supplied with split ring carriers only)

Standard: compressed asbestos-free fiber

Optional: spiral wound (stainless steel windings with carbon steel or stainless steel outer ring)

Other materials available

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Certification and Testing

A wide range of certification and testing options are available at extra cost. For example:

- Material certs to BS EN 10204 3.1 or 3.2
- Material certs to NACE MR0175 or MR01013
- Positive material identification (NITON XRF)
- Pressure Equipment Directive (PED)
- Impact testing
- Hardness survey
- 100 % dimensional check

Full details of any testing / certification requirements must be supplied at the time of enquiry / quotation

Welding

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

Temperature and pressure rating

Dependent on the design, the materials of construction and the process and / or tapping

Minimum straight pipe requirements

For standard uncertainty, without the use of flow straighteners:

Upstream

Typically between 6 and 44 D (but can be up to 75 D)

Downstream

Typically between 4 and 8 D

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.

Ordering information

Orifice carrier assemblies		FPD170	XX	XX	XX	XXX	XX	XX	XX	XXX	XX	XX	XXX	XXX	XXX	XX	XXX	XXX	XXX	XXX	XX	XXX	XX	XXX	XXX
Product design																									
Orifice split ring carrier	C1																								
Orifice integral carrier	C2																								
Orifice RTJ female integral carrier	C5																								
Customer-specific design																									
McMenon	A1																								
standard Aramco	A2																								
standard Shell	S1																								
Orifice design																									
Concentric square edged – flange taps	C2																								
Concentric square edged – corner taps	C1																								
Conical entrance – corner taps	L1																								
Eccentric – corner taps	E1																								
Eccentric – flange taps 90°	E2																								
Eccentric – flange taps 180°	E3																								
Quarter circle – corner taps	U1																								
Quarter circle – flange taps	U2																								
Segmental – flange taps	S2																								
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Orifice carrier assemblies		FPD170	XX	XX	XX	XXX	XX	XX	XX	XXX	XX	XX	XXX	XXX	XXX	XXX	XX	XXX	XXX	XXX	XXX	XX	XXX	XX	XXX	XXX
		See page 5																								
Line nominal bore																										
DN 25 (1 in.)		025																								
DN 32 (1¼ in.)		032																								
DN 40 (1½ in.)		040																								
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																								
Others		999																								
		Continued on next page ...																								

Orifice carrier assemblies	FPD170	XX	XX	XX	XXX	XX	XX	XXX	XX	XX	XXX	XXX	XXX	XX	XXX	XXX	XXX	XX	XXX	XX	XXX	XX	XXX	XXX
See page 5		See page 6																						
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																				
Carrier 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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Orifice carrier assemblies		FPD170	XX	XX	XX	XXX	XX	XX	XX	XXX	XX	XX	XXX	XXX	XXX	XX	XXX	XXX	XXX	XXX	XX	XXX	XX	XXX	XXX	
		See page 5			See page 6		See page 7																			
Orifice plate 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																	
Orifice plate thickness																										
1.5 mm									S01																	
2 mm									S02																	
3 mm									S03																	
4 mm									S04																	
6 mm									S05																	
8 mm									S06																	
10 mm									S07																	
12 mm									S08																	
15 mm									S09																	
16 mm									S10																	
1/8 in.									T03																	
1/4 in.									T05																	
3/8 in.									T07																	
1/2 in.									T09																	
3/4 in.									T11																	
Others									Z99																	
Flange type																										
Raised face flange									R1																	
Oval RTJ									J1																	
Octagonal RTJ									J3																	
Flat face flange (fits inside bolt circle)									F1																	
Flat face flange (full face plate with bolt holes)									F2																	
Others									Z9																	
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Orifice carrier assemblies	FPD170	XX	XX	XX	XXX	XX	XX	XX	XXX	XX	XX	XXX	XXX	XXX	XX	XXX	XXX	XXX	XXX	XX	XXX	XX	XXX	XXX	
		See page 5			See page 6	See page 7	See page 8																		
Flange 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															
DIN PN 160										D7															
Others										Z9															
Gasket material																									
Soft Iron										GP3															
316 / 316L stainless steel										GS6															
304 / 304L stainless steel										GS4															
22 % Cr duplex (UNS S31803)										GD1															
25 % Cr super duplex (UNS S32750)										GD2															
25 % Cr super duplex (UNS S32760)										GD3															
6 % Mo SS (UNS S31254)										GM1															
Alloy 20 (UNS N08020)										GU1															
Alloy 400 (UNS N04400)										GM4															
Alloy 600 (UNS N06600)										GU3															
Alloy 625 (UNS N06625)										GN2															
Alloy 800 (UNS N08800)										GU4															
Alloy 825 (UNS N08825)										GU5															
Alloy C276 (UNS N010276)										GU7															
Others										GZ9															
Orifice sealing face																									
Scrolled (3.2 to 6.3 μm)										SF6															
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Orifice carrier assemblies	FPD170	XX	XX	XX	XXX	XX	XX	XX	XX	XX	XX	XXX	XXX	XXX	XXX	XX	XXX	XXX	XXX	XXX	XX	XXX	XX	XXX	XXX			
		See page 5			See page 6	See page 7	See page 8			See page 9																		
Drain / Vent hole																												
Drain hole (gas applications)															HT1													
Vent hole (liquid applications)															HT2													
Drain / Vent hole size																												
1 mm															HA1													
1.5 mm															HA2													
2 mm															HA3													
3 mm															HA4													
4 mm															HA5													
5 mm															HA6													
5.5 mm															HA7													
6 mm															HA8													
6.5 mm															HA9													
7.5 mm															HB1													
8 mm															HB2													
10 mm															HB3													
3/32 in.															HB4													
1/8 in.															HB5													
5/32 in.															HB6													
3/16 in.															HB7													
7/32 in.															HB8													
1/4 in.															HB9													
9/32 in.															HC1													
5/16 in.															HC2													
11/32 in.															HC3													
3/8 in.															HC4													
13/32 in.															HC5													
7/16 in.															HC6													
15/32 in.															HC7													
1/2 in.															HC8													
Others															HZ9													
Surface treatment																												
Oxygen cleaning															P1													
Others															Z9													
Tapping type																												
Threaded (female)															TT1													
Nipolet															TT2													
Nipoflange (B16.5)															TT3													
Socket weld															TT4													
Thread (male) nipple															TT5													
Others															TZ9													

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Orifice carrier assemblies		FPD170	XX	XX	XX	XXX	XX	XX	XX	XXX	XX	XX	XX	XXX	XXX	XX	XXX	XXX	XX	XXX	XX	XXX	XX	XXX	XXX	
			See page 5			See page 6		See page 7		See page 8			See page 9			See page 10										
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																								
Kidney flange		TRK																								
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																								
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 (not available for iron; certificate not included – please price separately)		CN																								
Material NACE MR0103 (not available for iron; certificate not included – please price separately)		CM																								
Positive material identification (NITON XRF)		CA																								
100 % dimensional check		C6																								
Others		Z9																								

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Orifice carrier assemblies	FPD170	XX	XX	XX	XXX	XX	XX	XX	XXX	XX	XX	XXX	XXX	XX	XXX	XXX	XXX	XXX	XX	XXX	XXX	XX	XXX	XXX																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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Notes

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