



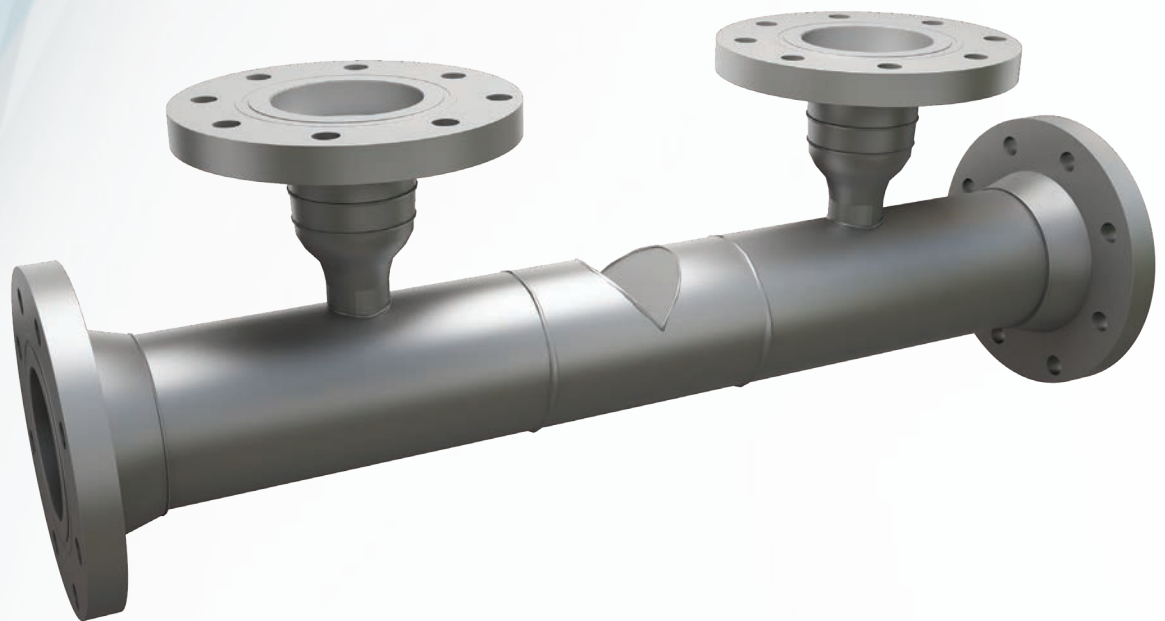
Technology Solutions

# TEK-DP 1670A

## Segmental Wedge Differential Pressure Flow Meters



FLOW



## Introduction

Tek-DP 1670A Segmental Wedge Flow Meter are Segmental Wedge type meters with no moving parts, making them virtually maintenance-free. They generally give repeatable readings in process flow applications. Therefore, Tek-DP 1670A Segmental Wedge Flow Meter can handle low flows using accurate transmitters, highly viscous flows, dirty or corrosive gas or liquid flows, and hot or cold flows with a small pressure loss. The Tek-DP 1670A Segmental Wedge Flow Meter provides bi-directional flow measurement. The welded construction and wide range of materials ensure a reliable and robust measurement under extreme pressure and temperature conditions or aggressive media. The Tek-DP 1670A Segmental Wedge Flow Meter design delivers a significant cost savings benefit since the profile is virtually immune to any wear or erosion, which requires very little maintenance and inspection.

## Measuring Principle

The wedge flow meter consists of a measurement pipe with pressure taps in front and behind a Differential Pressure ( $\Delta P$ ) flow element (restriction), which has a wedge shape. The restriction is welded into the measurement pipe section between the top taps, as shown in Figure 1.

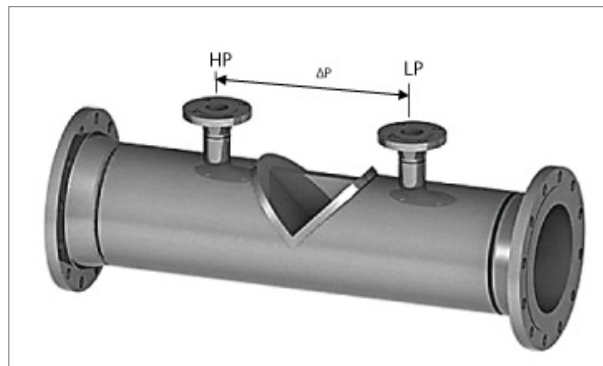


Fig 1: Tek-DP 1670A Wedge Meter Standard Design

The static pressure is measured in front of the wedge (high side) and behind the wedge, the low-pressure differential is taken (a low-pressure side).

Tek-DP 1670A Segmental Wedge Flow Meter usually have a (coefficient of discharge) C.d. = 0.79 approximately, which can be further defined from external calibration.

Venturi, Orifice and DP Cone Meters have a throat with a low-pressure tapping located at the maximum velocity area. A wedge Meter consists of the low-pressure tapping in the pipe wall, not in a throat.

They have been used with other DP meter types as part of a multiphase/wet gas meter. While the meter is not generally used for fiscal measurement, it can be used for slurries and areas where high contamination and particulates are in the fluid stream.

## Comparison between Venturi, Orifice, Cone and Wedge Meters

The Venturi, Orifice, Cone and Wedge Meters are all geometrically different and it is not intuitively obvious how to compare them. The typical discharge coefficients (C.d.) versus beta ratios for all the major types of meters are shown in comparison with a Wedge Meter data shown in Figure 2.

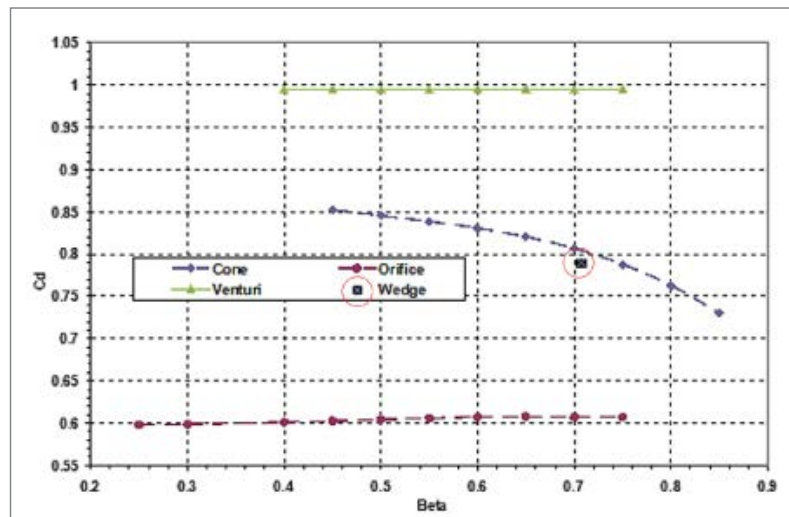


Fig 2: Typical DP Family Meter Discharge Coefficients (per beta ratio)

## Main Meter Components and Usage of Tek-DP 1670A

Tek-DP 1670A Quality Wedge Meters can also be wet calibrated for the process application's flow range to provide a  $\pm 0.5\%$  coefficient of discharge accuracy over the calibrated range. They are designed to measure a full pipe, highly viscous, particulate-laden flows. Typical applications include slurries, asphalt, chlorine, gas, steam (Certain defined applications), or air-entrained liquids.

Materials of construction can be varied design can be produced using any weldable materials depending upon the particular demands of the application. Current available manufacturing materials are: Carbon Steel, 316 & 316L Stainless Steel, 304 & 304L Stainless Steel, Duplex and Super Duplex steels, Hastelloy and Monel.

- Boiler and Pressure Vessel Code
- ASME B31.1 and 31.3 for ASME fluid meters
- MFC-3M-1985, ISO 16528, BS-7045 compliance if required.

Designed for use with Raised Face, Flat Face, Weld End, Ring Joint Flanges of any flange rating of either U.S. or overseas standards.

## Benefits

- $\pm 0.5\%$  calibrated accuracy.
- Robust design provides long-term accuracy.
- Low permanent pressure loss resulting in energy savings.
- No sharp edge to wear.
- Handles slurries and high solids content.
- Capable of bi-directional flow.
- Reliable and high performance down to Reynolds Number 500 (Viscous Fluids).
- Large potential flow range.
- Minimum upstream/downstream straight pipe needed.
- Handles non-ideal installations.

## Applications

- Mining
- Industrial Fluids
- Petrochemical
- Oil and Gas
- Chemical
- Pulp and Paper

## Specifications

<b>Accuracy</b>	±0.5% of the coefficient of discharge accuracy over calibrated Reynolds Number. (Wet calibration at approved laboratory) ±5.0% of actual flow rate (dry calibration based on geometry only)
<b>Repeatability</b>	±0.2%
<b>Line Size</b>	1" to 24" Nominal Diameter
<b>End Connections</b>	Flange ends, weld end, slip-on, RTJ joint, butt end
<b>Fluid Capability</b>	Gas or liquid – Pipe running full
<b>Temperature</b>	Dependent upon wetted material and gasket materials being used
<b>Pressure</b>	Maximum working pressure is per ANSI B16.5 Standards
<b>Material</b>	Carbon Steel, 316 SS, 316L SS, 304 SS, Super Duplex Steel, Hastelloy and Monel
<b>Pipe Reynolds Number (ReD) Capability</b>	Relatively low pipe Reynolds Numbers can be addressed with fair accuracy, the discharge coefficient being generally stable through the confirmed application ranges, Bi-directional usage is permitted using applicable pressure / differential pressure transmitters
<b>Standards</b>	ASME B31.1 and B31.3

## Wedges Designs

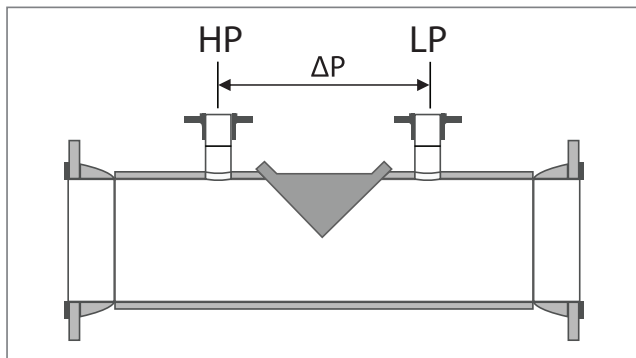


Fig 3: Flanged Hub

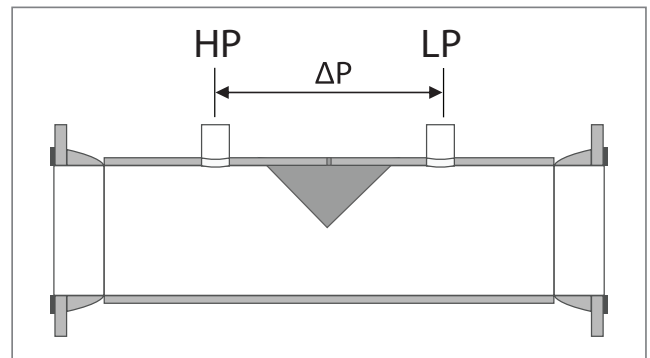


Fig 4: Threaded Taps

## Dimensional Drawings

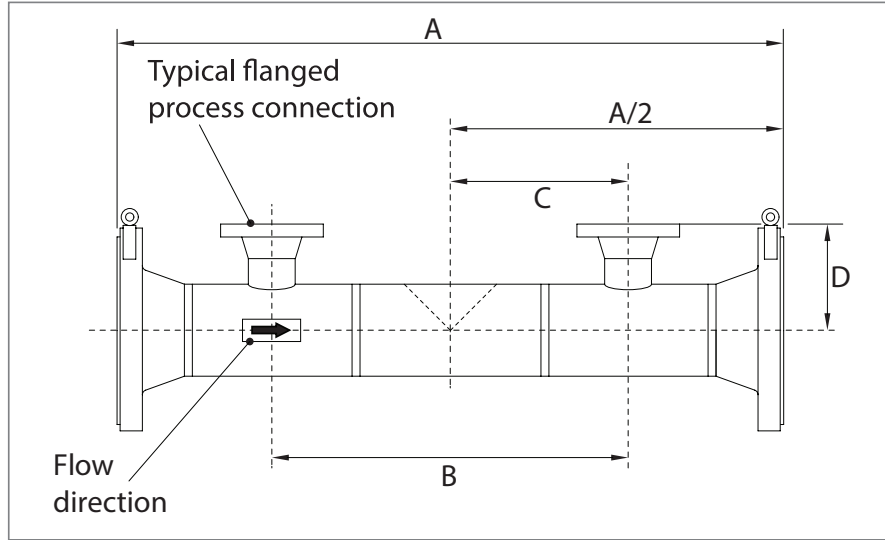


Fig 5: Tek-DP 1670A With Flanged Tappings and RFWN End Flanges (1 1/2, 2 and 3")

\*Note: Flow direction may be Bi -Directional.

Size in (mm)	A ± 1/4" (±4.58mm) in (mm)			B in (mm)	C in (mm)	D in (mm)			Approximate Weight kg (lbs.)		
	Flange Rating					Flange Rating			Flange Rating		
	150	300	600			150	300	600	150	300	600
1 1/2" (40)	21 1/4" (530)	21 3/4" (543)	22 1/4" (559)	11 3/4" (292)	5 3/4" (146)	8 1/4" (207)	8 1/2" (214)	8 1/2" (212)	25 (55)	28 (61)	32 (71)
2" (50)	21 3/4" (546)	22 1/4" (559)	23" (575)	11 3/4" (292)	5 3/4" (146)	8 3/4" (216)	8 3/4" (222)	9 1/4" (231)	28 (62)	32 (70)	38 (84)
3" (80)	25 3/4" (645)	25 3/4" (641)	26 1/2" (660)	12 1/2" (311)	6 1/4" (155)	6 1/4" (155)	6 3/4" (166)	7" (175)	35 (78)	42 (92)	46 (102)

\*Note: Slip on, full face and RTJ flange connection are also available. Contact Tek-Trol for length details.

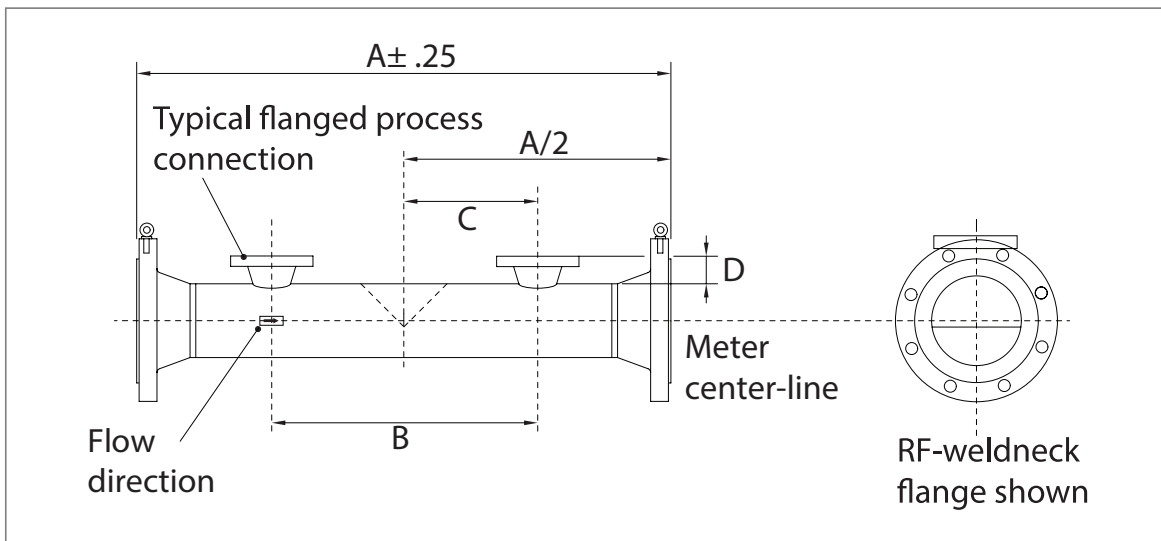


Fig 6: Tek-DP 1670A With Flanged Tappings and RFWN End Flanges (4" to 24")

\*Note: Flow direction may be Bi -Directional.

Size in (mm)	A ± ¼" (±4.58mm) in (mm)			B in (mm)	C in (mm)	D in (mm)			Approximate Weight kg (lbs.)		
	Flange Rating					Flange Rating			Flange Rating		
	150	300	600			150	300	600	150	300	600
4" (100)	36" (900)	36 ¾" (920)	39 ½" (990)	15 ¼" (381)	7 ½" (190)	2 ¾" (70)	3" (80)	3 ½" (89)	61 (135)	68 (150)	79 (175)
6" (150)	41" (1028)	42" (1047)	44" (1100)	18 ¼" (457)	9" (225)	2 ¾" (70)	3" (80)	3 ½" (89)	73 (160)	95 (210)	122 (270)
8" (200)	43 ¾" (1092)	44 ½" (1111)	46 ¾" (1168)	20 ¾" (521)	10 ½" (260)	2 ¾" (70)	3" (80)	3 ½" (89)	95 (210)	120 (265)	166 (365)
10" (250)	45 ¾" (1143)	47" (1175)	50 ¼" (1257)	24" (600)	12" (300)	2 ¾" (70)	3" (80)	3 ½" (89)	122 (270)	156 (345)	238 (525)
12" (300)	52 ¾" (1321)	54" (1350)	56 ¾" (1416)	27" (675)	13 ½" (336)	2 ¾" (70)	3" (80)	3 ½" (89)	159 (350)	181 (400)	
14" (350)	56" (1400)	57" (1425)	59 ½" (1485)	29 ½" (736)	14 ¼" (356)	2 ¾" (70)	3" (80)	3 ½" (89)	186 (410)	277 (610)	
16" (400)	59" (1475)	60 ½" (1511)	63 ½" (1587)	31" (775)	15 ½" (387)	2 ¾" (70)	3" (80)	3 ½" (89)	227 (500)	342 (755)	
18" (450)	63" (1574)	64 ½" (1613)	67" (1675)	34" (850)	16 ½" (413)	2 ¾" (70)	3" (80)	3 ½" (89)	227 (500)	395 (870)	
20" (500)	67 ½" (1686)	68 ¾" (1720)	71 ½" (1790)	37 ½" (940)	18 ¾" (470)	2 ¾" (70)	3" (80)	3 ½" (89)	318 (700)	499 (1100)	
24" (600)	74 ¼" (1854)	75 ½" (1886)	78 ¾" (1968)	42 ¾" (1066)	21 ¼" (533)	2 ¾" (70)	3" (80)	3 ½" (89)	433 (955)	594 (1310)	

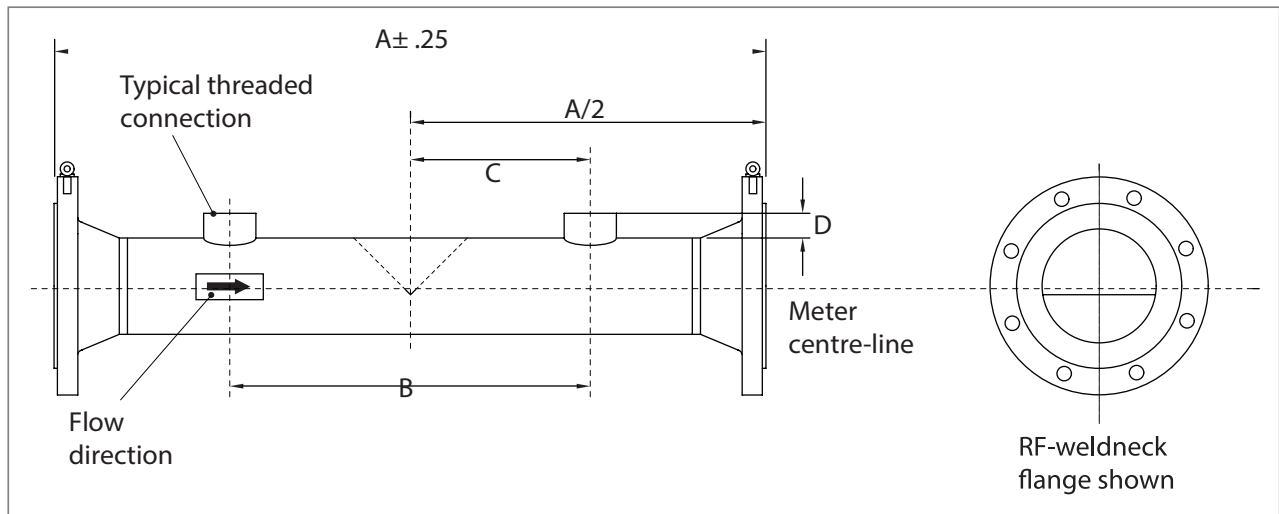


Fig 7: Tek-DP 1670A with Threaded Connection

\*Note: Flow direction may be Bi -Directional.

Size in (mm)	A ± ¼" (±4.58mm) in (mm)			B in (mm)	C in (mm)	D in (mm)	Approximate Weight kg (lbs.)		
	Flange Rating						Flange Rating		
	150	300	600				150	300	600
8" (200)	43 ¾" (1092)	44 ½" (1111)	46 ¾" (1168)	20 ¾" (520)	10 ½" (260)	1" (25)	52 (115)	79 (175)	129 (285)
10" (250)	45 ¾" (1143)	47" (1175)	50 ¼" (1257)	24" (600)	12" (300)	1" (25)	75 (165)	127 (280)	204 (450)
12" (300)	52 ¾" (1320)	54" (1350)	56 ¾" (1416)	27" (675)	13 ½" (336)	1" (25)	107 (235)	172 (380)	
14" (350)	56" (1400)	57" (1425)	59 ½" (1485)	29 ½" (736)	14 ¼" (356)	1" (25)	140 (310)	283 (625)	

Size in (mm)	A ± ¼" (±4.58mm) in (mm)			B in (mm)	C in (mm)	D in (mm)	Approximate Weight kg (lbs.)		
	Flange Rating						Flange Rating		
	150	300	600				150	300	600
16"(400)	59"(1475)	60 ½"(1511)	63 ½"(1587)	31"(775)	15 ½"(387)	1"(25)	186 (410)	290 (640)	
18"(450)	63"(1575)	64 ½"(1612)	67"(1675)	34"(850)	17"(425)	1"(25)	226 (500)	367 (810)	
20"(500)	67"(1675)	68 ¾"(1720)	71 ½"(1790)	37 ½"(940)	18 ¾"(470)	1"(25)	286 (630)	455 (1005)	
24"(600)	74 ¼"(1854)	75 ½"(1886)	78 ¾"(1968)	42 ¾"(1066)	21 ¼"(533)	1"(25)	394 (870)	539 (1190)	

Dimensions are subject to vary at time of manufacturing based on final Beta selected. Dimensional drawing with a final engineering sizing sheet will be provided within 1-2 weeks of order acceptance

## Installations

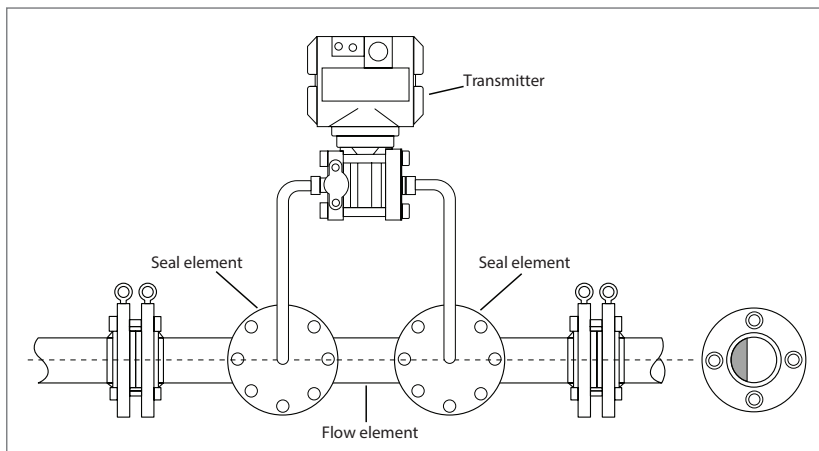


Fig 8: Horizontal Installations

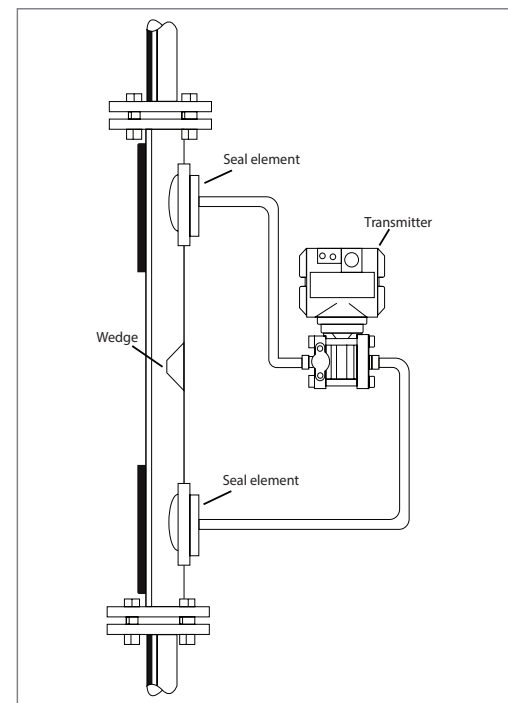


Fig 9: Vertical Installations

## Straight Pipe Run Requirements

- As with most flow elements, proper operation and performance are dependent on the required lengths of available upstream and downstream piping.
- The recommended minimum length of the upstream side of the Wedge flow element depends on the fittings at the end of the straight runs and respective pipe configuration.
- Minimum upstream and downstream lengths are as follows:
  - o Upstream requirements as a general rule: 10 nominal pipe diameters.
  - o Downstream requirements as a general rule: 2 nominal pipe diameters.



Fittings	Recommended		Minimum	
	Upstream	Downstream	Upstream	Downstream
3 Elbows close coupled	15D	5D	15D	3D
2 Elbows close coupled out of plane	10D	5D	10D	3D
2 Elbows close coupled in plane	10D	5D	5D	3D
1 Elbow	10D	5D	5D	3D
Tee-bull plugged	10D	5D	5D	3D
Tee-run plugged	10D	5D	5D	3D
Tee-flow in bull and run	10D	5D	5D	3D
Y-run plugged	10D	5D	5D	3D
Concentric reducer	10D	5D	5D	3D
Concentric expander	10D	5D	5D	3D
Partially open gate valve	10D	5D	10D	3D

## Model Chart

Example	Tek-DP 1670A	0050	A	01	A	01	W0	A	00	03	01	A	MTR	Tek-DP 1670A-0050-A-01-A-01-W0-A--00-03-01-A-MTR
Series	Tek-DP 1670A													Segmental Wedge Differential Pressure Flow Meters
Size		0025 0050 0065 0080 0100 0150 0200 0250 0300 0350 0400 0450 0500 0600												1" 2" 2 ½" 3" 4" 6" 8" 10" 12" 14" 16" 18" 20" 24"
Meter Body			A B C D E F G H I X											Carbon Steel (Standard) Low Temp CS 304L SS 316L SS Duplex 2205 Duplex 2507 Chromemoly CrMo P11 Chromemoly CrMo P22 Inconel Cladding Special



Pipe Schedule				01 02 03 04 05 06 07 08 09 10 11 12 13 XX																Standard (Tek-Trol's Standard) 10S 10 20 30 40S 40 80S 80 120 160 Extra Strong XX Strong Special
Process Connection					A B C D E F G H I W U X															RF Slip On RF Weld Neck RTJ Slip On RTJ Weld Neck Hubs API Beveled End Socket NPTF (Up to 3" Only) Wafer Style (Up to 4" Only) Union Special
Pressure Rating					01 02 03 04 05 06 07 08 09 XX															150# 300# 600# 900# 1500# 2500# 3000# (NPT) 10K(API/Hubs) 15K (API/Hubs) Special
Wedges Type							W0 W1 XX													Flanged Hub (Used for Liquids) Threaded Taps (Used for Gases) Special

Wedges Material of Construction									A B C D E F G H I X				Carbon Steel Low Temp CS 304L SS (Standard Option) 316L SS Duplex 2205 Duplex 2507 Chromemoly CrMo P11 Chromemoly CrMo P22 Inconel Cladding Special
Tap Location									00 01 X				Standard Pipe Taps Special
Beta										01 02 03 04 05 06 07 XX			0.45 0.5 0.55 0.6 0.65 0.7 0.75 Special
Flow Transmitters/ Computers											01 02 03 04 05 06 XX		None (Customer Supplied) Tek-Bar 3110 (Liquids) - Smart DP Tek-Bar 3800 (MVT Steam and Compressed Gases) Tek-FC 8000 (Natural Gas - Flow Computer) TekValsys DPRO (Insitu Flow Validation) TekValsys DPRO WFGM (Wet Gas) Special
Calibration												A B C D X	Dry (ISO 5167) Water Air Multiphase Special
Options													MTR Material Test Report EN3.1 MC Material Cert EN2.1 PMI Positive Material Identification (NDE) COC Certificate of Conformity HYD Hydro Test XRT X-Ray DPT Dye Penetrant MPT Magnetic Particle Testing O2C O2 Cleaned TAG SS TAG PLATE UMR Upstream Meter Run - 1PC DMR Downstream Meter Run - 1PC FMR Meter Run with Flow Conditioner Plates- 2PC CDE Certified Drawing Electronic (As Built) MRB Manufacturing Record Book DFT Dry Film Thickness - Custom Paint Spec CPC Custom Product Code

# Customer Service & Support



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