Quick Start Guide

TEK-DP 1670A

Segmental Wedge Differential Pressure Flow Meters

796 Tek Drive, Crystal Lake, IL 60014 USA
+1 847 857 6076
+1 847 655 6147
www.tek-trol.com

Quick Start Guide

WARNING

- Never exceed the maximum rated pressure or temperature of the flow element.
- Process pressure and/or process materials remaining in flow elements can cause injury do not open any pressure-retaining parts under line pressure.
- Standard plant safety procedures should be followed when removing elements from service.
- Qualified technicians must perform maintenance.
- Disconnect all power sources to avoid electrical shock when servicing DP/Pressure Transmitters etc.

1. Before you begin

This guide provides basic guidelines to assist you in quickly getting started.

Any installation of Pressure, Differential Pressure, or Temperature Transmitters in an explosive environment must always be in accordance with Local, National, and International Safety Standards, codes, and practices. Review the approvals section of the Tek-DP 1670A reference manual for any restrictions associated with a safe installation.

Do not remove the transmitter covers in explosive environments when the circuit is live.

Make sure the transmitter is installed by qualified personnel and in accordance with applicable codes of practice.

2. Unpack

Tek-DP 1670A Segmental Wedge Differential Pressure Flow Meters

3. Dimensional Drawing

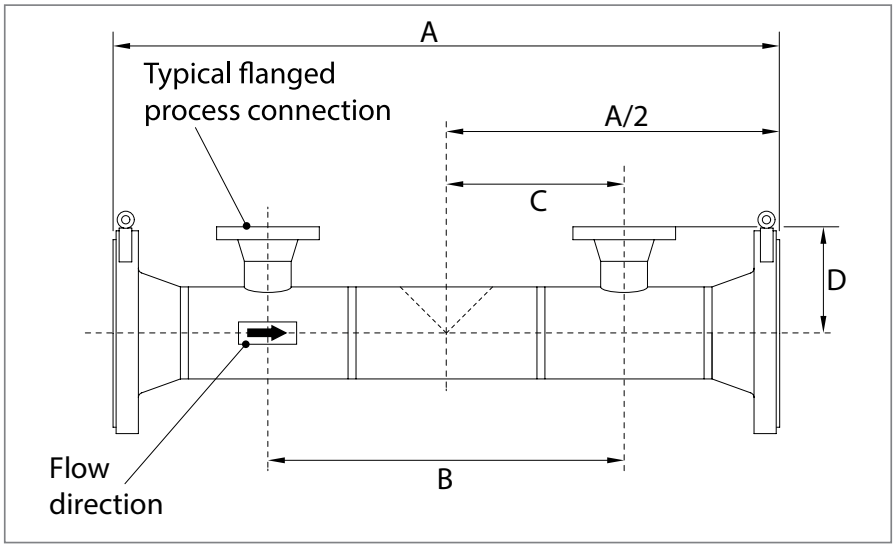


Fig 1: Tek-DP 1670A With Flanged Tappings and RFWN End Flanges (1 ½", 2 and 3")

***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
1 ½" (40)	21 ¼" (530)	21 ¾" (543)	22 ¼" (559)	11 ¾" (292)	5 ¾" (146)	8 ¼" (207)	8 ½" (214)	8 ½" (212)	25 (55)	28 (61)	32 (71)
2"(50)	21 ¾" (546)	22 ¼" (559)	23" (575)	11 ¾" (292)	5 ¾" (146)	8 ¾" (216)	8 ¾"(222)	9 ¼"(231)	28 (62)	32 (70)	38 (84)
3"(80)	25 ¾" (645)	25 ¾" (641)	26 ½"(660)	12 ½" (311)	6 ¼" (155)	6 ¼" (155)	6 ¾"(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.

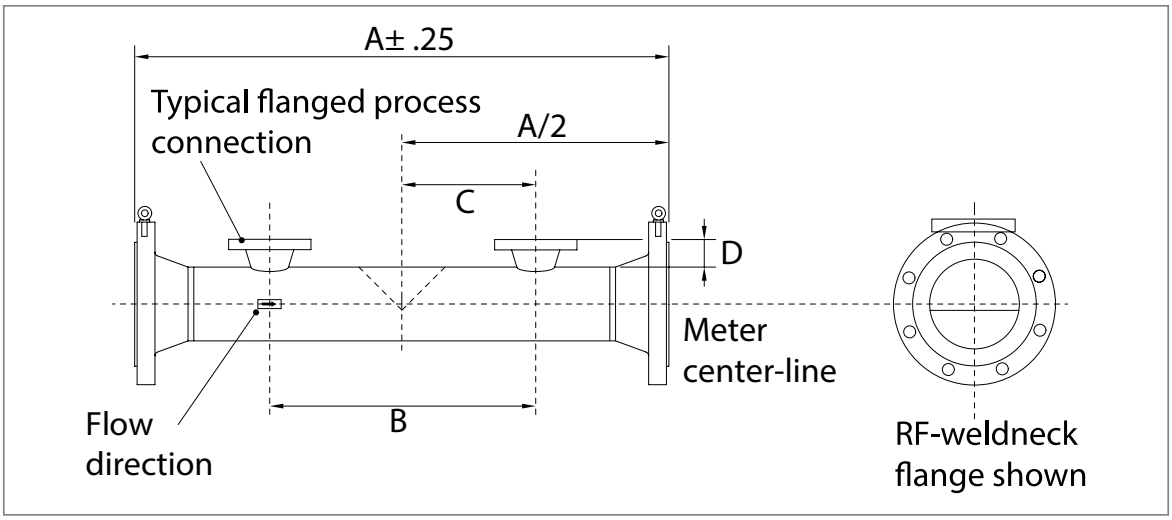


Fig 2: Tek-DP 1670A With Flanged Tapping's and RFWN End Flanges (4" to 24")

***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)	

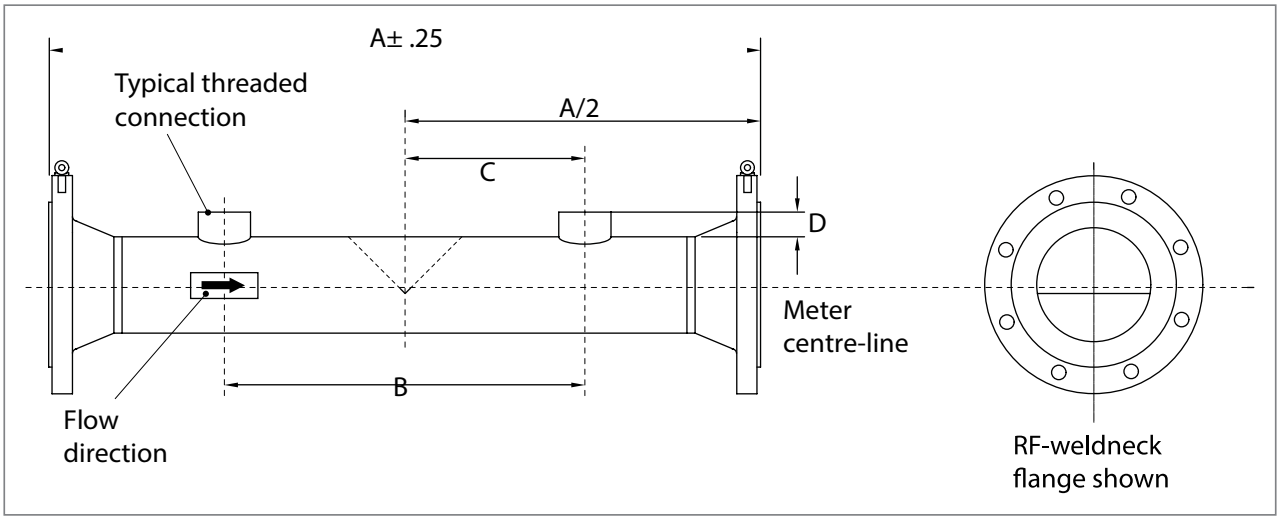


Fig 3: Tek-DP 1670A with Threaded Connection

***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)	

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

4. Installations

- ### Mounting Location Selection

  - Generally, horizontal orientation of the flow element with the impulse tap positioning situated between 45 to 90 degrees from a vertical centerline of the impulse tap component(s) is recommended. This method of horizontal mounting allows for free passage of most solids and helps to eliminate air entrapment at the transmitter connection in liquid operation. See Figure 8. below
  - Other positions are acceptable provided proper venting of the transmitter sensing lines are

accomplished. The differences between sensing line elevations shall also be considered. Tap position locations are suggested to be below the pipe centerline for clean liquid service.

- Service taps must be positioned such that all are self-draining for dirty liquid service (for ex, triple taps units will be at the 3, 9, and 12 o'clock position).
- Dirty liquid service can be any process where the fluid may settle, cake, or be set up within the tap chambers. Examples of dirty liquid services are waste streams, coke slurries, black liquor, fluids with high particulates, etc.
- As shown in Figure 9, vertical installations may introduce a slight hydrostatic head effect that must be considered when zeroing the transmitter.
- Please Note: For applications where installed accuracy is critical, laboratory flow calibration for Coefficient of discharge (Cd) development per field installation geometry is recommended. This service is optional but can be provided at additional cost.

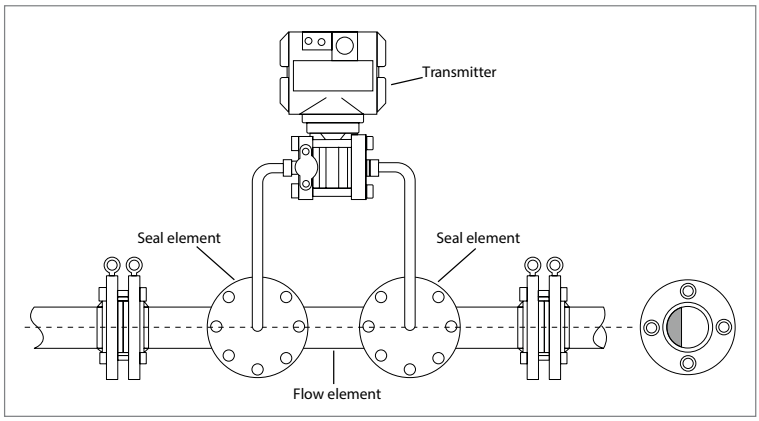


Fig 4: Horizontal Installations

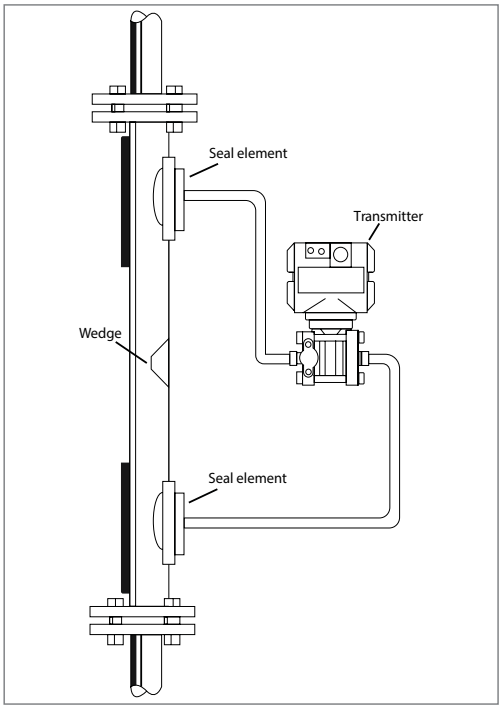


Fig 5: Vertical Installations

- ***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:
    - Upstream requirements as a general rule: 10 nominal pipe diameters.
    - Downstream requirements as a general rule: 2 nominal pipe diameters.

Table 1: Minimum upstream and downstream lengths

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

- ***Pipe Connections***

  Tighten the flange bolts in a 'star' pattern, as shown in Figure 6, to avoid localized stresses on the gaskets.

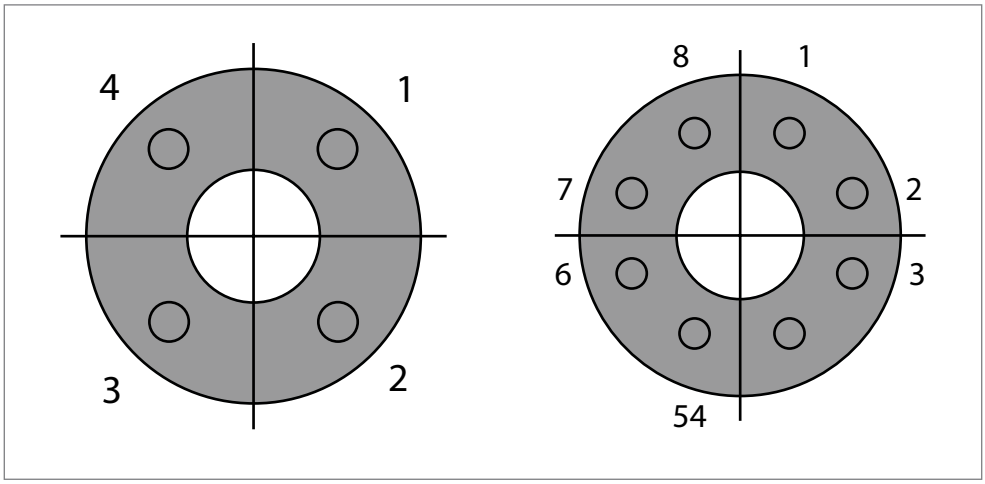


Fig 6: Flange bolt tightening pattern

5. Maintenance

- ### Removal of the Wedge Meter
  - The Tek-DP 1670A Segmental Wedge Flow Meter has no moving parts that require servicing.
  - Removal of the meter is generally not required other than for standard maintenance cleaning of process lines.
  - Before removal, shut off all process flow, pressure and drain lines if possible before loosening any bolts.
  - Disconnect transmitter connections and remove impulse lines or remote seal elements.
  - Loosen and disconnect element line connections and remove from process pipeline.
- ### Inspection
  - Check sealing surfaces periodically for nicks and gouges before reinstallation.
  - Elements under severe operating conditions must be inspected for signs of corrosion and erosion to minimize unexpected shutdowns.

6. Troubleshooting

This section provides troubleshooting techniques for most common operating problems shown in table 2.

Table 2: Troubleshooting Techniques

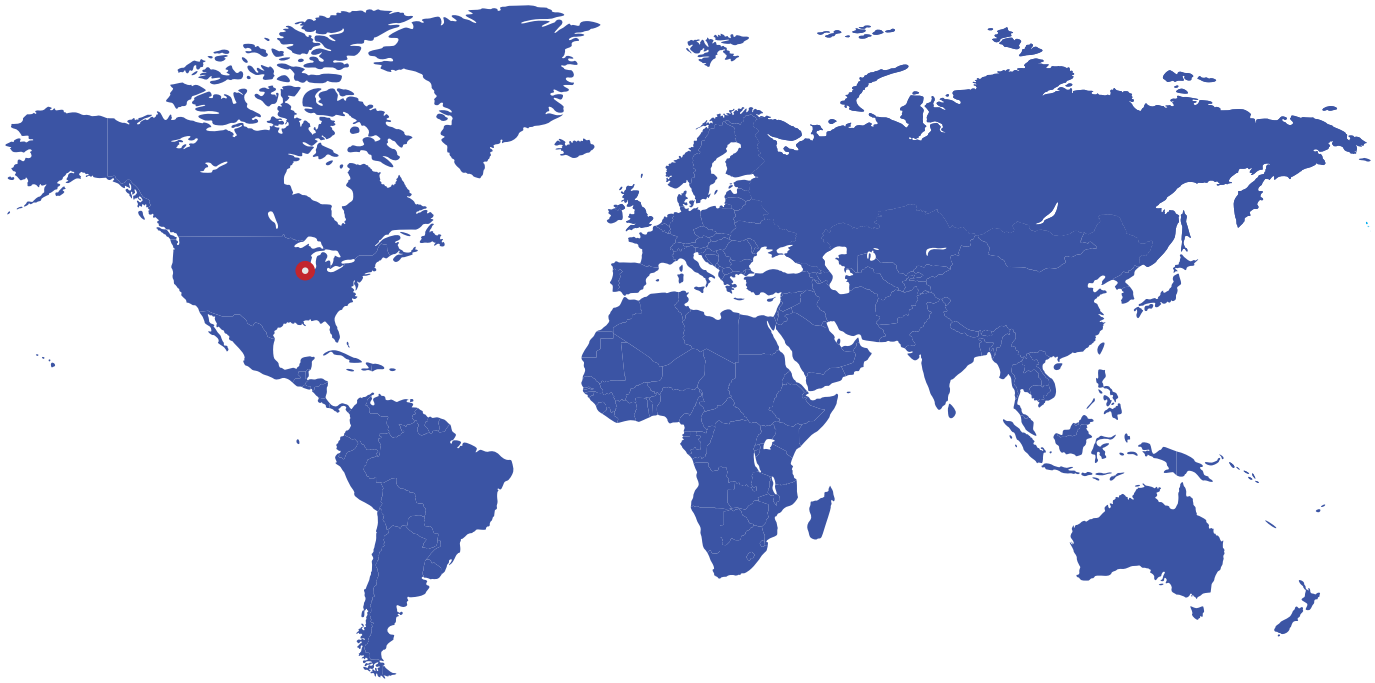
Symptoms	Area	Possible Problem or Solution
No Signal (0mA)	Transmitter	• No Power to transmitter. • Transmitter not wired correctly. • Check continuity on wiring or loose connection.
Negative Signal (<0mA)	Transmitter	• Transmitter wires are reversed.
Low signal (<4mA)	Tek-DP 1670A	• Wedge Meter is installed backwards, with gauge lines attached as marked. • In this case, the high-pressure tap would be sensing a lower pressure than the low-pressure tap. • This negative DP would force the signal below 4mA.
	Gauge Line	• Gauge lines are reversed. Transmitter shows more pressure on lower side than higher side. • Check "H" and "L" marks on Wedges.
Zero Signal (4mA)	Tek-DP 1670A	• Meter has been damaged. • Remove meter and visually inspect. • No flow in pipeline. • Check other system locations to verify flow through the meter. • The meter could be under pressure but still have no flow.
	Manifold	• Manifold / gauge lines closed or blocked. • Ensure valves and lines are open. • If fluid is safe, open vent valves on transmitter to verify pressure in the gauge lines.

Wrong Signal High or Low	Tek-DP 1670A	• Process conditions do not match actual conditions. • Contact Tek-Trol or your sales representative to recalculate using the correct process conditions. • Wrong meter. • Verify serial numbers on meters to ensure correct specifications. • Sometimes two meters are interchanged. Remember each Wedges has a unique flow coefficient.
	Gauge Lines	• Foreign material trapped in gauge lines. Dirt and sediment can settle into the gauge lines. If the fluid is safe, vent the gauge lines and inspect for spurts of solids, gasses, or liquids (whichever should not be there). • If the fluid is not safe, open the center manifold valve for several minutes under high DP. Close the valve and compare the signal level to before readings. • In a horizontal, liquid application, install the meter with the taps on the sides of the pipe (3 or 9 o'clock) For a horizontal, gas application, install at top or sides of the pipe (12, 3, or 9 o'clock).
	Flow Computer	• Flow calculations have an error. • Use loop calibrator and apply 4, 12, and 20mA to computer / system. • Each of these points should be correlate with the Wedges sizing information. • Current output signal is read incorrectly. • Apply a known current to the loop and read the raw signal in the computer. • Most computers allow the user to see the mA signal directly.
Unsteady Signal	Tek-DP 1670A	• Partially full pipe occurring (liquids only). • Periods with a partially full pipe will cause wrong readings. See above for details.
Slow response time	Transmitter	• Dampening to long.
Sudden change in readings	Tek-DP 1670A	• Foreign object lodged in meter. • This will increase the restriction of the meter and raise the DP. • Remove the meter and visually inspect.
	Gauge Lines	• There may be leakage in line.

Signal very High	Tek-DP 1670A	• Meter body, near the pressure taps.
		• If any arrow is not visible and the meter is large than 2", the flow direction can be determined by the location of the pressure taps.
		• The pressure taps will be closer to the upstream side.
		• On meters less than 2", the gauge lines will need to be removed. Look at the base of both pressure taps. One tap will be smooth at the base, the other will be mostly weld material.
		• The smooth tap is on the upstream side.
		• Flow is going in the opposite direction from what was expected. The assumption of flow direction is sometimes wrong.
		• Verify with other system readings.
		• With a meter measuring backward flow, the DP signal will be approximately 30% high.
		• Partially full pipe (liquids only). A partially full pipe will cause the meter to read very high. This can happen even in pressurized systems.
		  ▪ On horizontal pipes: If the fluid is safe, open a pressure tap on the top of the pipe. Air release will indicate partially full pipe.
		  ▪ On vertical pipes: Up flow will guarantee a full pipe. Down flow is difficult to diagnose if the pipe is full.
		• Foreign object lodged in meter. This will increase the restriction of the meter and raise the DP. Remove the meter and visually inspect.

Signal very High	Gauge Lines	• Leak on low pressure gauge line. • Perform a leak check from the meter to the transmitter.
	Transmitter	• Leak on low pressure vent valve. Perform a leak check on valve. • Zero point has shifted positively. This will cause errors more pronounced at the low end of the transmitter range. • Verify by closing the manifold side valves and opening the center valve. The reading should go to zero (4mA). • Recalibrate if necessary. DP span is set very low. • Use pressure calibrator or handheld communicator to verify span point.
	Flow Computer	• 4mA set to minimum flow. • Our calculations assume that 4mA will be equal to zero flow. Sometimes 4mA is set to equal the minimum flow on the sizing page. • This error will be zero at maximum flow and increase as the flow decreases. • The amount of error will depend on the zero offset.
Signal Very Low	Manifold	• Manifold is cross-vented. The center valve must be closed. • To test, close the two side valves and watch the transmitter signal. • If the signal goes to zero (4mA), the center valve is not closed completely.
	Gauge lines	• Leak on high pressure gauge line. • Perform a leak check from the meter to the transmitter.

TEKTROL
Technology Solutions



796 Tek Drive
Crystal Lake, IL 60014
USA
Fax: +1 847 655 6147
Email: tektrol@tek-trol.com
www.tek-trol.com