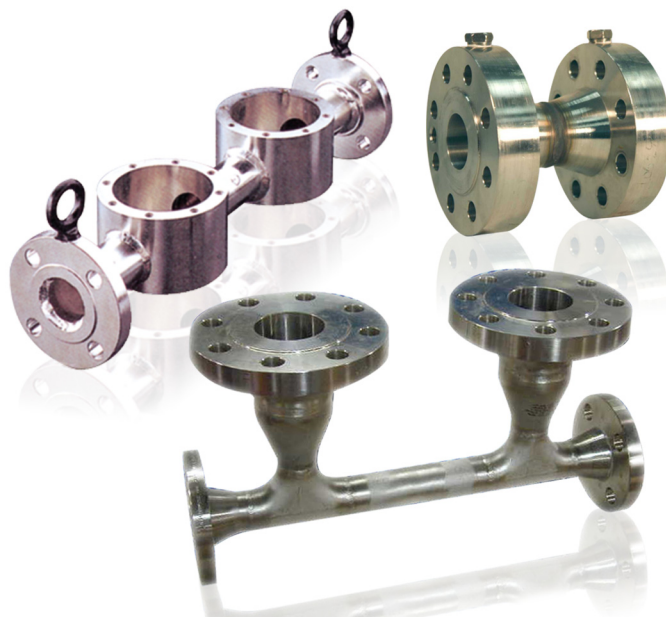


# FPD470 Wedge flow meter

## Differential pressure – primary flow element

Measurement made easy



### Introduction

WEDGE™ Flow Elements utilize V-shaped restrictions to produce a square root relationship between differential pressure and volumetric flow. Elements are designed for either clean or dirty service and are offered in various materials, pipe sizes, and pressure ratings. The differential pressure is measured by a differential pressure transmitter. Various process connections on the WEDGE are provided for either pneumatic or electronic transmitters or other differential pressure sensing devices. Wedge meters can be flow calibrated and supplied with a factory calibration report, this includes calculations for the user's process when such data is supplied. The differential pressure measurement is used to calculate flow using a standard wedge flow equation.

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# 1 Health & Safety

## 1.1 Document symbols

Symbols that appear in this document are explained below:



### **DANGER – Serious damage to health / risk to life**

This symbol in conjunction with the signal word 'DANGER' indicates an imminent danger. Failure to observe this safety information will result in death or severe injury.

---



### **NOTICE – Property damage**

This symbol indicates a potentially damaging situation. Failure to observe this safety information may result in damage to or destruction of the product and / or other system components.

---



### **IMPORTANT (NOTE)**

This symbol indicates operator tips, particularly useful information or important information about the product or its further uses. The signal word 'IMPORTANT (NOTE)' does not indicate a dangerous or harmful situation.

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## 1.2 Safety precautions

Information in this manual is intended only to assist our customers in the efficient operation of our equipment. Use of this manual for any other purpose is specifically prohibited and its contents are not to be reproduced in full or part without prior approval of the Technical Publications Department.

Instructions and procedures in this manual may require special precautions to ensure the safety of personnel performing the operations. Explosions could result in death or serious injury; therefore refer to the **Warnings** in the transmitter Operating Instructions before performing any operation in this manual.

To ensure that our products are safe and without risk to health, the following points must be noted:

- Read the relevant sections of these instructions carefully before proceeding.
- Observe all warning labels on containers and packages.
- Installation, operation, maintenance and servicing must only be carried out by suitably trained personnel and in accordance with the information given.
- Observe all normal safety precautions to avoid the possibility of an accident occurring when operating in conditions of high pressure and / or temperature.
- Store chemicals away from heat, protect them from temperature extremes and keep powders dry. Observe all normal safe handling procedures.
- When disposing of chemicals, ensure that no two chemicals are mixed.

Safety advice concerning the use of the equipment described in this manual or any relevant material safety data sheets (where applicable) may be obtained from the Company address on the back cover, together with servicing and spares information.

### 1.3 Pressure equipment safety



#### **DANGER – Serious damage to health / risk to life**

- The Pressure Equipment described in this manual is supplied, where appropriate, in accordance with the European Directive 97/23/EC and is designed to work in pressurized systems. Take care when installing all equipment and follow the instructions given. Failure to do this could result in damage to equipment and create possible hazards to operators and other equipment. Only use the equipment on the process for which it is designed. Install the equipment into a system that has been designed to allow for venting or draining of the process. For the necessary safety requirements refer to the appropriate instructions in this manual.
- Do not exceed the pipe vibration levels stated in the data sheet (DS/FPD470-EN). Excessive vibration could result in damage to the equipment and create possible hazards to other equipment and operators.

### 1.4 User guidelines

Correct use includes the following:

- Operation within the technical limit values.
- Observing and following the information provided on permissible media (fluids).
- Observing and following the instructions provided in the operating manuals.
- The following uses are not permitted:
  - Operation as a flexible adaptor in piping; for example, to compensate for pipe offsets, pipe vibrations and/or pipe expansions.
  - Use as a climbing aid; for example, for assembly purposes.
  - Use as a support for external loads; for example, as a support for piping.
  - Material gain; for example, by painting over the type plate or welding or soldering on parts.
  - Repairs, modifications, supplements or the installation of spare parts. These are permitted only if performed as described in the operating manual. More extensive work must be approved by ABB – the Company accepts no liability for unauthorized work.

The operating, maintenance and repair conditions that are stated in this manual must be observed. The Company accepts no liability for damage caused by usage that is incorrect or unprofessional.

### 1.5 Permissible process media (fluids)

Process media may be used only if:

- It can be assured that the physical and chemical properties of the pressure-bearing materials that come into contact with the process medium are not reduced from that required for operational safety, during the expected lifetime of the equipment.
- Process media with unknown properties for erosion and / or corrosion may be used only if the operator can perform regular and suitable tests to assure the safe condition of the equipment.

### 1.6 Technical limit process values

The equipment is intended for use only within the technical limit values specified on the data plate and in the data sheet (DS/FPD470-EN), including those for:

- maximum working pressure
- maximum and minimum operating temperatures
- maximum vibration levels

In addition, all connected pipework must be installed as it was designed, to ensure that there is no possibility of leakage or any undue stresses or strain acting upon it.

### 1.7 Potential safety hazards

The following potential safety hazards are associated with operating the system:

- High pressures
- Product (FPD470) weight

## 2 Introduction

### 2.1 General

The WEDGE elements are available with up to six different standard WEDGE ratios to provide the required differential pressures over a wide range of flow rates. The WEDGE ratio is defined as  $H/D$  where  $H$  is the WEDGE opening height and  $D$  is the nominal pipe diameter.

The WEDGE restriction is V-shaped at an optimum angle to give the best possible characteristics when measuring viscous fluids. The element will handle applications where the pipe Reynolds number is as low as 500 (well into the laminar flow zone) and as high as several million. This makes the element well suited to gas or steam flow measurement.

The area of unrestricted flow of the wedge meter is determined by different Height/Diameter ratios thus defining the differential range produced with respect to the fluid flow range. This  $H/D$  ratio equals the height of the opening under restriction divided by the internal pipe diameter.

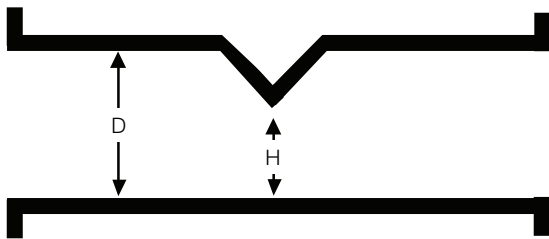


Fig. 2.1: WEDGE element cross-section view

### 2.2 Model FPD470P – clean service

The FPD470P WEDGE Flow Element offers in-line mounting in a flanged style body with flanged style body with various taps for the connection of transmitter impulse lines. This model is well suited for gas and steam applications as well as clean liquids. Refer to the data sheet ([DS/FPD470-EN](#)) for physical and performance specifications and ordering information.



Fig. 2.2: Model FPD470P Wedgemeter

### 2.3 Models FPD470F, FPD470C – dirty service

These WEDGE Flow elements are offered in a flanged body style and are designed for use with remote seal pressure transmitters. Application of this model is recommended for use on difficult to measure slurries and fluids with high solid content that are prone to plugging or have high erosion factors. In addition, these models may also be used where it is necessary to contain hazardous materials within the process piping or where process temperatures exceed the limits of a conventional direct-connect transmitter. Remote seal connections are offered in both flanged and chemical-tee type seal designs. Selection of the seal design is typically based on process conditions. The FPD470F is generally suited for fluids with a high solid content and abrasive properties since the seal is raised up and eliminates erosive effects of the process on the diaphragm surface. The FPD470C chemical-tee type is more suited to processes that tend to plug since the diaphragm face is flush with the pipe ID, and allows free passage of materials without buildup in the seal area. Refer to the data sheet ([DS/FPD470-EN](#)) for physical and performance specifications and ordering information.



Fig. 2.3: Model FPD470C chemical-tee tapping Wedgemeter



Fig. 2.4: Model FPD470F flanged tapping Wedgemeter

## 2.4 Accuracy

Pipe size (in.)	WEDGE ratio (H/D)	Accuracy in % of flow rate	
		Water calibrated in factory flow lab *	Uncalibrated
1/2	0.2, 0.3, 0.4, 0.5	+ 0.75 %	+ 5 %
1 and 1 1/2	0.2, 0.3, 0.4, 0.5	+ 0.5 %	+ 5 %
2 and 3	0.2, 0.3, 0.4, 0.5	+ 0.5 %	+ 5 %
4 to 24	0.3, 0.4, 0.5, 0.6, 0.7	+ 0.5 %	+ 5 %

\* Refer to calibration report supplied with each calibrated instrument

**Table 2.1: Models FPD470P, F and C**

## 2.5 Maximum working pressure

Flanged element – maximum working pressure is that of flange rating per ANSI B16.5, except FPD470C with chemical-tee transmitter connections that may not exceed 300 psi or flange rating, whichever is the lower.

## 2.6 Maximum working temperature (all models)

Dependent upon wetted material and gasket material.

## 3 Installation

### 3.1 Selecting a mounting location

Horizontal installation is recommended for all WEDGE elements rotated 45° to approximately 90° along the pipe center line as shown in Fig. 3.1. This method of mounting allows for free passage of solids and eliminates air entrapment at the transmitter connection. Other positions are acceptable provided proper venting of the transmitter is accomplished and differences in lead line elevations are considered. For clean liquid service, taps locations are suggested to be below the pipe centerline. For dirty liquid service, service taps must be positioned such that all are self draining, (for example, 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 set up within the tap chambers. Examples of dirty liquid service are waste streams, coke slurries, black liquor, fluids with high particulates etc. Vertical installations as shown in Fig. 3.2 may introduce a slight hydrostatic head effect that must be considered when zeroing the transmitter – see Section 5, page 16.

### 3.2 Straight pipe run requirements

As with most flow elements, proper operation and performance is dependent on the required lengths of unrestricted upstream and downstream piping. The recommended minimum length of the upstream side of the WEDGE flow element depends on the type of fitting at the end of the straight run and the pipe configuration. Minimum upstream and downstream lengths are shown in Table 3.1. The minimum lengths will cause a slight  $Kd^2$  shift.

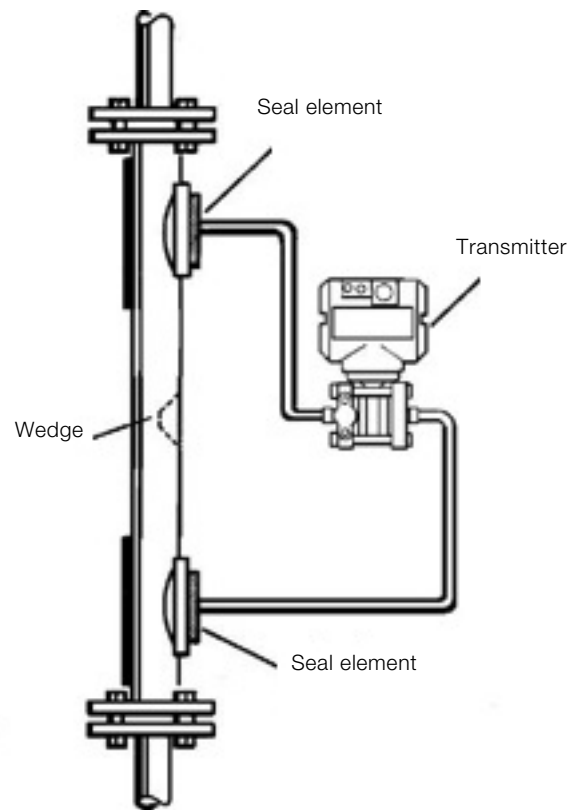


Fig. 3.2: Typical FPD470C chemical-tee vertical installation

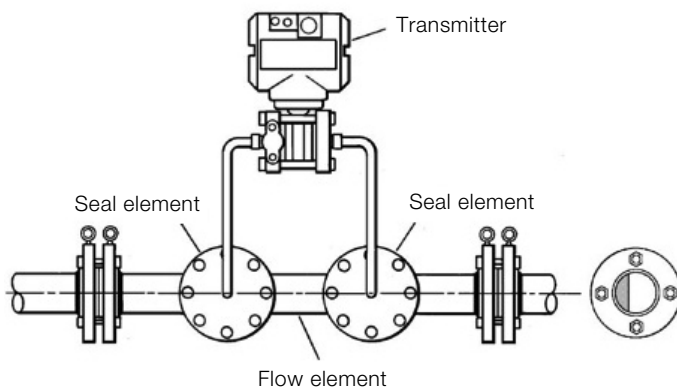


Fig. 3.1: Typical FPD470C remote seal Wedge horizontal installation

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

\* Based on testing conducted in the flow calibration laboratory. Measured from apex of wedge element.

Table 3.1: Straight pipe length requirements from various flow obstructions \*

### 3.3 Installation and differential pressure connections



#### **DANGER – Serious damage to health / risk to life**

Never exceed the maximum pressure or temperature recommended for the measured process. Exceeding maximum pressure or temperature ratings can lead to personal injury or equipment damage. The process piping flanges for installation must be identical as detailed in the serial number on the data plate. The process temperature and pressure must never exceed the ratings for the element stamped on the data plate.

#### 3.3.1 General

Before installation of any WEDGE element, inspect for damage; particularly at sealing surfaces. Any damage must be reported as soon as possible. Check the data plate to ensure that the stamped ratings match the process conditions of the pipeline in which it is to be installed. Each flow element has a data plate attached with an arrow indicating the required direction of flow. Failure to correctly orientate the WEDGE element to the direction of flow may result in improper results when using data supplied for an element that has been calibrated.

#### 3.3.2 Line installation

All WEDGE flow elements require a gasket between the process line connection and the mating flange. Select gaskets that will be able to withstand the maximum process temperature and pressure and resist corrosive attack of the process itself. End gaskets and gaskets for the FPD470F flanged seal are **not** provided by ABB as standard (it is available as an option).

To provide safe installation, it is important that the pipeline flanges be suitable for the temperature and pressure of the measured process. When completing the bolting process, ensure that the gaskets are correctly centered so that protrusion into the pipe opening is minimized. Misalignment may cause added flow turbulence. However, performance affects are typically minimal depending upon the application. Bolt the element in-line with suitable hardware using recommended bolt torques for the type and class rating of the flanges.

#### 3.3.3 Differential pressure connections

The high pressure connection is always on the upstream side of the flow direction arrow and the low pressure connection on the downstream side. Fittings used must be able to withstand the process temperature and pressure conditions as well as provide adequate corrosion resistance. Refer to the appropriate transmitter manual for connections to the transmitter high and low ports.

The FPD470F flanged seals require a backup flange rated for the same type and class as that on the WEDGE element. Backup flanges with bolts and nuts are generally offered as an option to the transmitter and are not supplied with the WEDGE element. Observe recommended torque specifications for the type and class being used.

Model FPD470C wedge meters with chemical-tee type seals are supplied with the seal mounting hardware and gaskets. Do not substitute the type of cap screws or gaskets supplied as injury may result due to improper installation. Refer to Fig. 3.3 for the identification code of mounting screws. When installing chemical-tee seals, tighten caps screws uniformly and avoid excessive tightening of one while others are loose. Final torque values are dependent on selected temperature rating of the WEDGE as two different gaskets are employed.



Final torque values for Model FPD470C chemical-tee connections are:

204 °C (400 °F) maximum temperature  
Garlock® GYLON® 3500 gasket  
15.8 to 16.9 N.m (140 to 150 in.lb)

340 °C (645 °F) maximum temperature  
Graphite gasket  
12.4 to 13.5 N.m (110 to 120 in.lb)

Torque all other models per ANSI flange ratings.

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**!** **NOTICE – Property damage**  
Do not exceed specified torque.

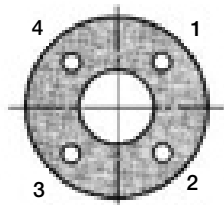
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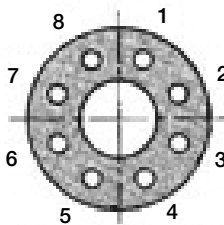
Fig. 3.3: Mounting bolt identification

### 3.3.4 Pipe connections

Tighten the flange bolts in a 'star' pattern as shown in Fig. 3.4 to avoid localized stresses on the gaskets.



4 Bolt flange tightening sequence  
1 - 3 - 2 - 4



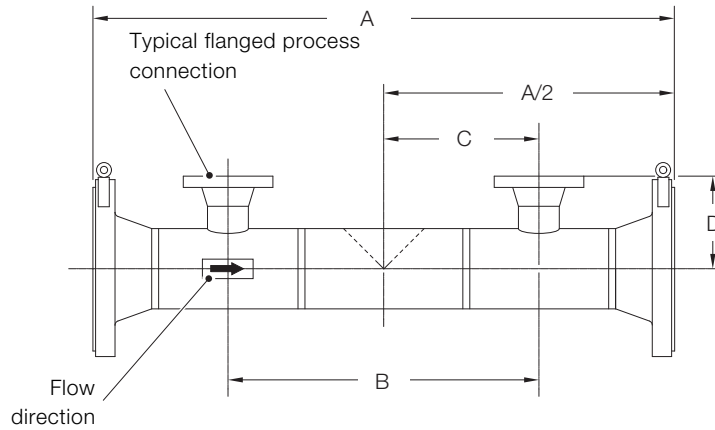
8 Bolt flange tightening sequence  
1 - 5 - 3 - 7 - 2 - 6 - 4 - 8

Fig. 3.4: Flange bolt tightening pattern

## 4 Dimensions and weights

### 4.1 Series FPD470F with flanged tapplings and RFWN end flanges

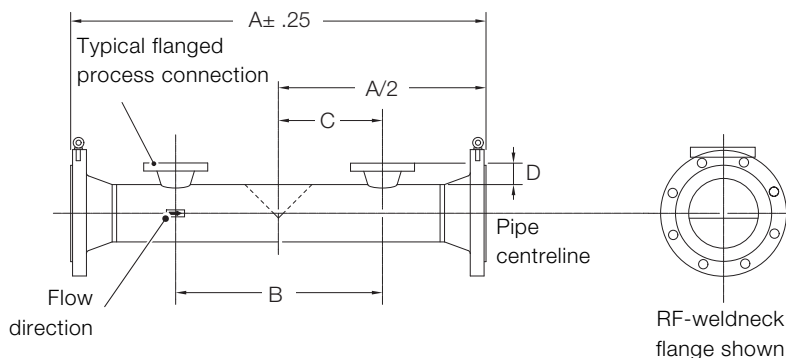
#### 4.1.1 Sizes 40, 50 and 80 mm (1½, 2 and 3 in.)



Pipe size mm (in.)	A ±4.58 mm (±0.18 in.)			B	C	D mm (in.)			Approximate weight kg (lbs.)		
	Flange rating					Flange rating			Flange rating		
	150	300	600			150	300	600	150	300	600
40 (1½)	530 (20.86)	543 (21.37)	559 (22)	292 (11.5)	146 (5.75)	207 (8.18)	214 (8.43)	212 (8.37)	25 (55)	28 (61)	32 (71)
50 (2)	546 (21.5)	559 (22)	577 (22.75)	292 (11.5)	146 (5.75)	216 (8.5)	222 (8.75)	231 (9.12)	28 (62)	32 (70)	38 (84)
80 (3)	645 (24.5)	641 (25.25)	660 (26)	311 (12.25)	155 (6.13)	155 (6.13)	166 (6.56)	175 (6.88)	35 (78)	42 (92)	46 (102)

**i IMPORTANT (NOTE)** Slip on, full face and RTJ flange connection are also available. Contact ABB for length details.

#### 4.1.2 Sizes 100 to 600 mm (4 to 24 in.)

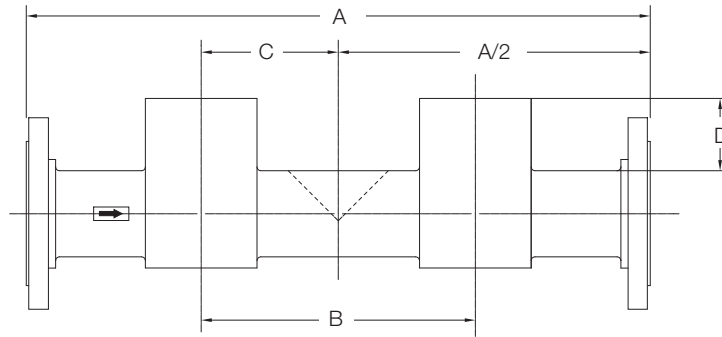


Pipe size mm (in.)	A ±6.35 mm (±0.25 in.)			B	C	D max (ref) mm (in.)			Approximate weight kg (lbs.)		
	Flange rating					Flange rating			Flange rating		
	150	300	600			150	300	600	150	300	600
100 (4)	901 (35.5)	920 (36.25)	990 (39)	381 (15)	190 (7.5)	70 (2.75)	79 (3.12)	89 (3.5)	61 (135)	68 (150)	79 (175)
150 (6)	1028 (40.5)	1047 (41.25)	1098 (43.25)	457 (18)	228 (9)	70 (2.75)	79 (3.12)	89 (3.5)	73 (160)	95 (210)	122 (270)
200 (8)	1092 (43)	1111 (43.75)	1168 (46)	521 (20.5)	260 (10.25)	70 (2.75)	79 (3.12)	89 (3.5)	95 (210)	120 (265)	166 (365)
250 (10)	1143 (45)	1174 (46.25)	1257 (49.5)	597 (23.5)	298 (11.75)	70 (2.75)	79 (3.12)	89 (3.5)	122 (270)	156 (345)	238 (525)
300 (12)	1321 (52)	1352 (53.25)	1416 (55.75)	673 (26.5)	336 (13.25)	70 (2.75)	79 (3.12)	89 (3.5)	159 (350)	181 (400)	
350 (14)	1397 (55)	1428 (56.25)	1485 (58.5)	736 (29)	356 (14)	70 (2.75)	79 (3.12)	89 (3.5)	186 (410)	277 (610)	
400 (16)	1473 (58)	1511 (59.5)	1587 (62.5)	775 (30.5)	387 (15.25)	70 (2.75)	79 (3.12)	89 (3.5)	227 (500)	342 (755)	
450 (18)	1574 (62)	1613 (63.5)	1676 (66.00)	851 (33.5)	413 (16.75)	70 (2.75)	79 (3.12)	89 (3.5)	227 (500)	395 (870)	
500 (20)	1686 (66.37)	1720 (67.75)	1790 (70.5)	940 (37)	470 (18.5)	70 (2.75)	79 (3.12)	89 (3.5)	318 (700)	499 (1100)	
600 (24)	1854 (73)	1886 (74.25)	1968 (77.5)	1066 (42)	533 (21)	70 (2.75)	79 (3.12)	89 (3.5)	433 (955)	594 (1310)	

**i IMPORTANT (NOTE)** Slip on, full face and RTJ flange connections are also available. Contact ABB for length details.

## 4.2 Series FPD470C with chemical-tee tapings and RFSO end flanges

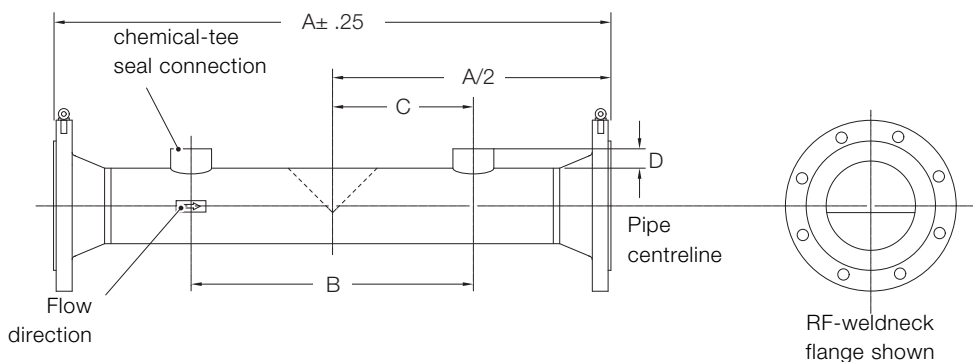
### 4.2.1 Sizes 15 to 80 mm (1/2 to 3 in.)



Pipe size mm (in.)	A $\pm 3.3$ mm ( $\pm 0.13$ in.)	B mm (in.)	C mm (in.)	D mm (In.)	Approximate weight kg (lbs.)		
					Flange rating		
					150	300	600
15 (1/2)	457 (18)	165 (6.5)	82.5 (3.25)	25 (1)	10 (23)	10 (23)	10 (23)
25 (1)	482 (19)	179 (7.06)	90 (3.53)	38 (1.5)	11.8 (26)	13 (29)	13.6 (30)
40 (1 1/2)	508 (20)	203 (8)	101 (4)	47 (1.86)	19.5 (43)	22 (49)	23 (51)
50 (2)	533 (21)	213 (8.38)	106 (4.19)	57 (2.25)	23 (51)	25 (55)	27 (59)
80 (3)	609 (24)	263 (10.35)	131 (5.19)	70 (2.75)	31 (69)	36 (79)	38 (84)

### 4.3 Series FPD470C with chemical-tee tapplings and RFWN end flanges

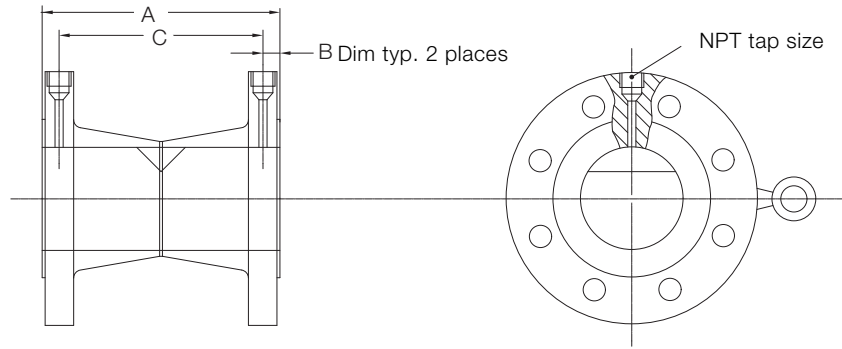
#### 4.3.1 Sizes 100 to 600 mm (4 to 24 in.)



Pipe size mm (in.)	A ±6.35 mm (±0.25 in.)			B mm (in.)	C mm (in.)	D mm (in.)	Approximate weight kg (lbs.)		
	Flange rating						Flange rating		
	150	300	600				150	300	600
100 (4)	901 (35.5)	920 (36.25)	965 (38)	381 (15)	190 (7.5)	24 (0.94)	29 (65)	34 (75)	50 (110)
150 (6)	1028 (40.5)	1047 (41.25)	1098 (43.25)	457 (18)	228 (9)	24 (0.94)	41 (90)	59 (130)	88 (195)
200 (8)	1092 (43)	1111 (43.75)	1168 (46)	521 (20.5)	260 (10.25)	24 (0.94)	52 (115)	79 (175)	129 (285)
250 (10)	1143 (45)	1174 (46.25)	1257 (49.5)	597 (23.5)	298 (11.75)	24 (0.94)	75 (165)	127 (280)	204 (450)
300 (12)	1321 (52)	1352 (53.25)	1416 (55.75)	673 (26.5)	336 (13.25)	24 (0.94)	106 (235)	172 (380)	
350 (14)	1397 (55)	1428 (56.25)	1485 (58.5)	711 (28)	356 (14)	24 (0.94)	140 (310)	283 (625)	
400 (16)	1473 (58)	1511 (59.5)	1587 (62.5)	775 (30.5)	387 (15.25)	24 (0.94)	186 (410)	290 (640)	
450 (18)	1574 (62)	1613 (63.5)	1676 (66.00)	851 (33.5)	413 (16.75)	24 (0.94)	227 (500)	367 (810)	
500 (20)	1686 (66.37)	1720 (67.75)	1790 (70.5)	940 (37)	470 (18.5)	24 (0.94)	286 (630)	456 (1005)	
600 (24)	1854 (73)	1886 (74.25)	1968 (77.5)	1066 (42)	533 (21)	24 (0.94)	395 (870)	539 (1190)	

#### 4.4 Series FPD470P with RFWN end flanges

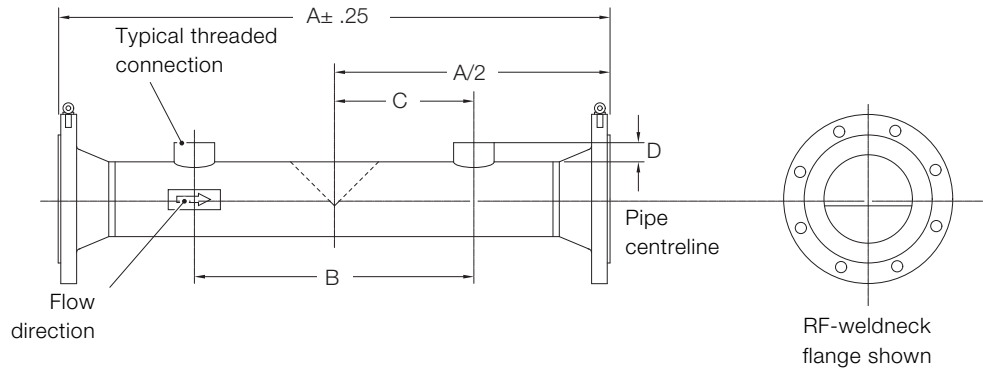
##### 4.4.1 Sizes 50 to 150 mm (2 to 6 in.)



Pipe size mm (in.)	A mm (in.)			B mm (in.)			C mm (in.)			NPT tap size (in.)			Approximate weight kg		
	Flange rating			Flange rating			Flange rating			Flange rating			Flange rating		
	150	300	600	150	300	600	150	300	600	150	300	600	150	300	600
50 (2)	127 (5.00)	171 (6.75)	171 (6.75)	11 (0.44)	24 (0.94)	24 (0.94)	105 (4.13)	124 (4.87)	124 (4.87)	1/4	1/2	1/2	6.3 (14)	12.2 (27)	16 (36)
75 (3)	140 (5.50)	178 (7.00)	178 (7.00)	13 (0.52)	24 (0.94)	24 (0.94)	112 (4.44)	130 (5.12)	130 (5.12)	3/8	1/2	1/2	11 (25)	10.4 (23)	23.5 (52)
100 (4)	190 (7.50)	222 (8.75)	254 (10.00)	12.7 (0.50)	24 (0.94)	24 (0.94)	165 (6.50)	174 (6.87)	206 (8.12)	3/8	1/2	1/2	16 (35)	24 (66)	34 (76)
150 (6)	254 (10.00)	276 (10.87)	323 (12.75)	14 (0.56)	24 (0.94)	24 (0.94)	223 (8.80)	228 (9.00)	174 (6.87)	3/8	1/2	1/2	24.5 (54)	48 (106)	50 (110)

**i IMPORTANT (NOTE)** Slip on, full face and RTJ flange connections are also available. Contact ABB for length details.

#### 4.4.2 Sizes 200 to 600 mm (8 to 24 in.)



Pipe size mm (in.)	A ±6.35 mm (±0.25 in.)			B mm (in.)	C mm (in.)	D mm (in.)	Approximate weight kg (lbs.)		
	Flange rating						Flange rating		
	150	300	600				150	300	600
200 (8)	1092 (43)	1111 (43.75)	1168 (46)	520 (20.5)	260 (10.25)	24 (0.94)	52 (115)	79 (175)	129 (285)
250 (10)	1143 (45)	1174 (46.25)	1257 (49.5)	597 (23.5)	298 (11.75)	24 (0.94)	75 (165)	127 (280)	204 (450)
300 (12)	1320 (52)	1352 (53.25)	1416 (55.75)	673 (26.5)	336 (13.25)	24 (0.94)	107 (235)	172 (380)	
350 (14)	1397 (55)	1428 (56.25)	1485 (58.5)	711 (28)	356 (14)	24 (0.94)	140 (310)	283 (625)	
400 (16)	1473 (58)	1511 (59.5)	1587 (62.5)	775 (30.5)	387 (15.25)	24 (0.94)	186 (410)	290 (640)	
450 (18)	1575 (62)	1612 (63.5)	1676 (66)	851 (33.5)	425 (16.75)	24 (0.94)	226 (500)	367 (810)	
500 (20)	1676 (66.37)	1720 (67.75)	1790 (70.5)	940 (37)	470 (18.5)	24 (0.94)	286 (630)	455 (1005)	
600 (24)	1854 (73)	1886 (74.25)	1968 (77.5)	1066 (42)	533 (21)	24 (0.94)	394 (870)	539 (1190)	

**i IMPORTANT (NOTE)** Slip on, full face and RTJ flange connections are also available. Contact ABB for length details.

## 5 Start-Up

### 5.1 Operation

Before any true zero reading can be taken, it is necessary to establish that the process pipe and flow element are completely purged and there is no flow. A shutoff valve or control valve downstream of the element facilitates this condition. Opening the valve for a short period of time removes any gases that are present in the system. In the case of the Model FPD470P pipe-tap WEDGE, it is necessary to purge air from the transmitter body by opening the vent valves on the high and low side flanges. Any air present in the transmitter body results in a false zero reading.

#### 5.1.1 Zero check

With the flow element under full line pressure, at normal operating temperature, and at zero flow, the transmitter zero can be adjusted to an exact reading on the readout device. If possible, open the downstream valve for a few seconds and close it. If the output does not return to a zero reading, readjust the zero screw on the transmitter. Repeat this procedure two or three times to establish a true zero.

#### 5.1.2 Span check

In most cases, it is not possible to check for the correct span as this would require a field calibration. The transmitter may be calibrated at the factory if ordered to agree with the calibration and / or calculation of the WEDGE flow element.

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**i** **IMPORTANT (NOTE)** A calibration report is supplied with each WEDGE flow element that is flow laboratory calibrated. Check that the calculated differential of the flow element agrees with the differential span of the transmitter. If it does not, it is necessary to recalibrate the transmitter.

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### 5.2 Accuracy

All WEDGE flow elements that are factory calibrated in the flow laboratory are calibrated to within 0.5 % of the flow rate ( $1/2$  in. size WEDGE meters are 0.75 %). The accuracy of uncalibrated elements may be up to 5 % of flow rate, depending upon the type of element, pipe size, and WEDGE ratio (see Section 2.4, page 6). Additional errors are evident if the process fluid density differs from the designed value. The same will be true if improper upstream pipe conditions exist. The percent errors given do not include the inherent errors of the transmitter that are normally very small until flow rates fall below 30 % of maximum flow (9 % of maximum differential pressure).

## 6 Maintenance

### 6.1 Removing element from service



#### **DANGER – Serious damage to health / risk to life**

Process pressure and material retained in the flow element can cause injury and damage to equipment. Standard plant safety procedures must be followed when removing the element from service.

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The WEDGE meter has no moving parts that require servicing. Removal of the wedge element is generally not required other than for normal maintenance cleaning of process lines. Before removal, shut off all process flow and 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 pipe line.

### 6.2 Inspection

Check sealing surfaces periodically for nicks and gouges before reinstallation. Elements under severe operating conditions must also be inspected for signs of corrosion and erosion to minimize unexpected shutdowns.

### 6.3 Reinstallation

Follow the procedures outlined in Section 3, page 7 to reinstall the meter. Apply Molykote 505 or equivalent to Model FPD470C chemical-tee seal screws to prevent seizure of threads. Renew gaskets upon reinstallation.



## 7 Spares

Ref.	Description	Part No.	Qty.
1	Gasket, chemical-tee: Garlock GYLON 3500: Up to 204 °C (400 °F) Graphite: 204 °C (400 °F) to 340 °C (645 °F)	43P1604	2
		155S1043	1
2	Chemical-tee cap screw	9P2342	16

Table 7.1: Replacement parts

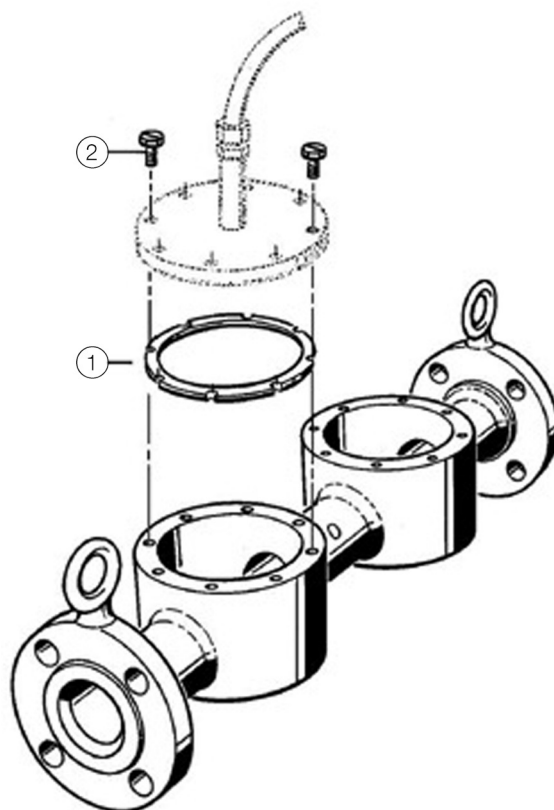


Fig. 7.1: Model FPD470C with chemical-tee – replacement parts

## 8 Acknowledgements

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## Notes

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