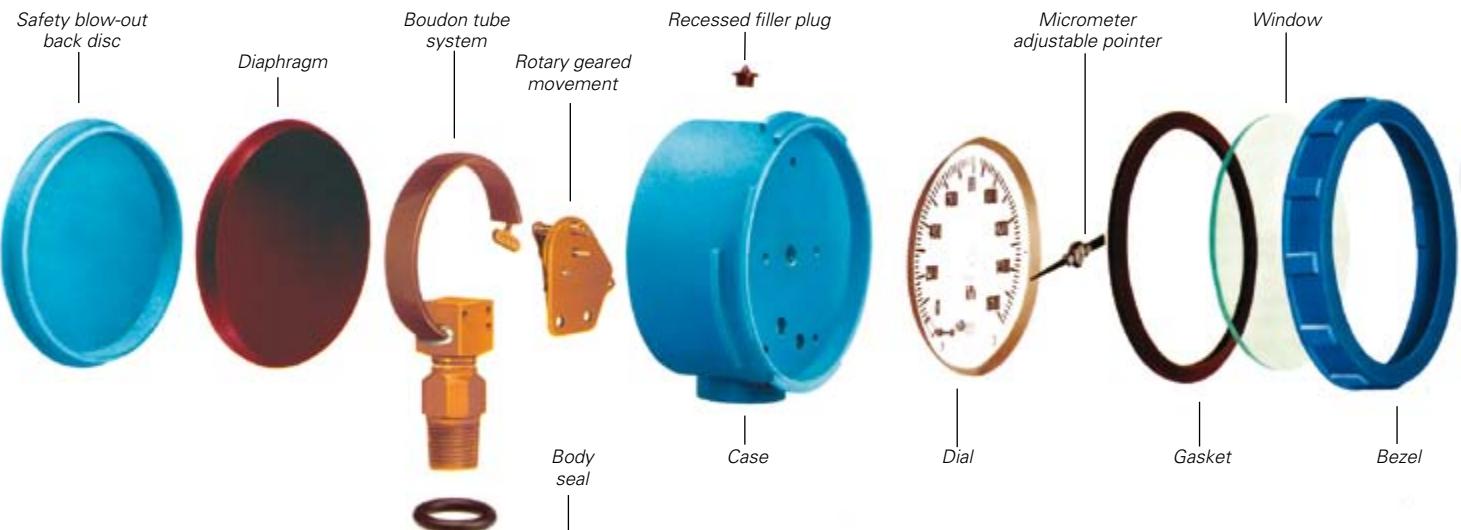




[www.rhomberginstruments.co.za](http://www.rhomberginstruments.co.za)  
**RHOMBERG**  
INSTRUMENTS

*Designer & Manufacturer of Pressure & Temperature Instruments  
Chemical Seals & Accessories*





## Key Factors for Gauge Selection

Many factors should be evaluated including temperature, vibration, process conditions, pulsation and corrosion, but by carefully considering the 7 key factors outlined below, the chances of correct selection will increase significantly.

### Process Medium

The process medium to which the gauge will be exposed is especially important when using a thin walled Bourdon tube because, if the wrong materials are selected, corrosion may occur which could lead to catastrophic failure. Materials which display the essential combination of properties (good spring memory, easy to form, easy to join, reasonably priced) are phosphor bronze, 316 stainless steel and Monel.

Where these materials can't satisfy the application, a diaphragm seal (gauge isolator) can be added to prevent the process media from contacting the Bourdon tube. This protects the gauge from corrosion attack, and also prevents viscous or dirty media from clogging the small bore Bourdon tube. The only limitation in using a diaphragm seal is that it typically degrades the accuracy of the pressure gauge by an additional 0,5 % of the full scale deviation.

### Pressure Gauge Range

It is important to select a pressure range which accommodates all anticipated pressure swings, and which prevents excessive needle movement. It is recommended to confine normal operating pressure to 25 % – 75 % of scale. With fluctuating pressures (e.g. pulsation caused by a pump or compressor), the maximum operating pressure should be lower (50 % of the full range).

Gauges in severe service should be liquid filled and throttled to reduce Bourdon tube stresses. To minimise sensing element stress and to extend the life of the gauge use internal throttle screws, pulsation dampeners, pressure snubbers, gauge savers or diaphragm seals.

### The Environment

Temperature changes affect the elastic modulus of the Bourdon tube to indicate higher pressure than actual as temperature increases, (lower as temperature decreases), except if made with expensive constant modulus materials.

In a liquid filled gauge with an uncompensating case, a temperature increase of as little as 10° C results in internal case pressure build up which causes a downscale pointer shift. An upscale pointer shift can result from a temperature drop of 10° C or more. This potential error most often occurs in pressure ranges of 600 kPa or less. In gauges with true case compensation, temperature error from internal case pressure build-up is negligible.

Where ambient conditions are corrosive or contain a large number of particles, specify hermetically sealed and / or liquid filled pressure gauges to prevent foreign elements from entering the case.

Vibration can cause wear to the gears of the rotary movement and can make it difficult to accurately read pressure off an oscillating pointer. Filling a gauge with dampening fluid, such as glycerine, helps prevent these problems.

### Accuracy

Accuracy is the conformity of a pressure gauge reading to an accepted standard (e.g. deadweight tester). Inaccuracy is the difference (error) between the true value and the indication, expressed as a percent of the span. It includes the combined errors of method, observer, apparatus and environment. Total accuracy error includes hysteresis and repeatability errors.

Accuracy is not a percentage of the gauge reading - for mechanical pressure gauges, accuracy is a percentage of the full range, full scale or span of the gauge. Accurate to within the stated accuracy at 20 DC. Add or deduct 0,3 % for every 10 DC above or below the stated accuracy

### Guidelines are:

Test Gauges (0,25 % up to 25 MPa, above 25 MPa up to 100 MPa. 0,3 %);  
Critical Processes (0,50 %); General Industry Processes (1,0 %);  
Less Critical Commercial Uses (2,0 %).

### Dial Size

Sizes range from 40 mm to 250 mm diameters, with the 63 mm, 100 mm and 150 mm being the most popular. The dial size is generally determined by the readability requirements (larger for remote reading and smaller where the gauge is close to the operator). More accurate pressure gauges generally have larger dials as more dial graduations are needed to read the higher degree of accuracy.

### Connections

Factors to consider include gauge pressures, size and weight, space limitations, leak integrity and past experience. 150 mm and 100 mm process gauges usually have  $\frac{1}{2}$ " NPT/BSP connections, especially when direct stem mounted and liquid filled. Smaller dial sizes generally have  $\frac{1}{4}$ " or  $\frac{1}{8}$ " connections.

### Mountings

*Pressure gauges may be:*  
Direct stem mount bottom connection;  
Remote wall - surface mount bottom connection;  
Panel surface mount back connection;  
Panel hole U clamp (yoke) flush mount back connection;  
Panel hole front flange flush mount back connection.

# Rhomberg Utility Gauges

SABS  
ISO 9001

## Liquid Filled & Dry Utility Gauges with Brass, Stainless Steel Wetted Parts

**PBS** - robust liquid-filled gauge**PBG** - stainless steel case with crimped on bezel**PBJ** - injection moulded plastic case with crimped on bezel,  
external zero adjustment screw**PBU** - steel case and bezel (optional stainless steel case)**PBM** - steel case with clip on window**PBN** - injection moulded plastic case with clip on window**PBK** - steel case with screw on window, internal zero adjustment screw**PBV** - panel mounted equipment gauge

## Features common to Rhomberg Utility Gauges

**Window**

Acrylic as standard (safety glass optional)

**Seal**

Nitrile (natural rubber for silicon fills)

**Dampening Fluid**

Glycerine, silicon

**Socket and Bourdon Tube**

Code:	SS	BB
Socket:	316 L/Ti	brass
Bourdon tube:	316 Ti	bronze

**Dial**

Aluminium/chromadek, black lettering on white background

**Pointer**

Black aluminium

**Connections**

Up to 1/4", from 3/8 and bigger an adaptor is available on request

**Maximum Range**

Vacuum through 100 MPa

Higher ranges available on request

**Snubbing**

Snubbing / push-in on brass and throttle screws on stainless steel

**Accuracy**

100 mm	1.6 % FSD (SABS 1062)
63 mm	1.6 % FSD

**Temperature Range**

Ambient temperature -25° C to +60° C

Note: minimum temperature should not be less or equal to the freezing point of the process fluid.

Higher temperatures can be accommodated with heat reducing devices.



## PBG - Robust Liquid Filled - Equipment and Industrial Gauges

For heavy duty service where vibration or pulsation of medium would cause excessive wear on a dry gauge or where corrosive ambient conditions prevail. Specific application examples are hydraulic equipment, mining equipment and irrigation equipment.

### Case

Case: 304 stainless steel  
Bezel: 304 stainless steel  
Window: Polycarbonate  
Seal: TPV (desmopan)  
Dampening fluid: glycerine, silicone (options available)

### Configurations

A B D E F U V	Nominal Sizes
(52 mm available only D conf.)	mm 42 52 63 100
(42 mm available only D conf.)	Imp 1½" 2" 2½" 4"

### Internals

Socket: brass or stainless steel  
Bourdon tube: bronze or stainless steel  
Movement: brass or stainless steel  
Dial: aluminium/chromadek  
Pointer: aluminium, black anodised

### Connections

½" + ¼" (BSP - NPT - BSPT) Options ¾" + ½"  
(bottom and centre-back)

### Maximum Range

60 MPa (brass) 100 Mpa (SS)

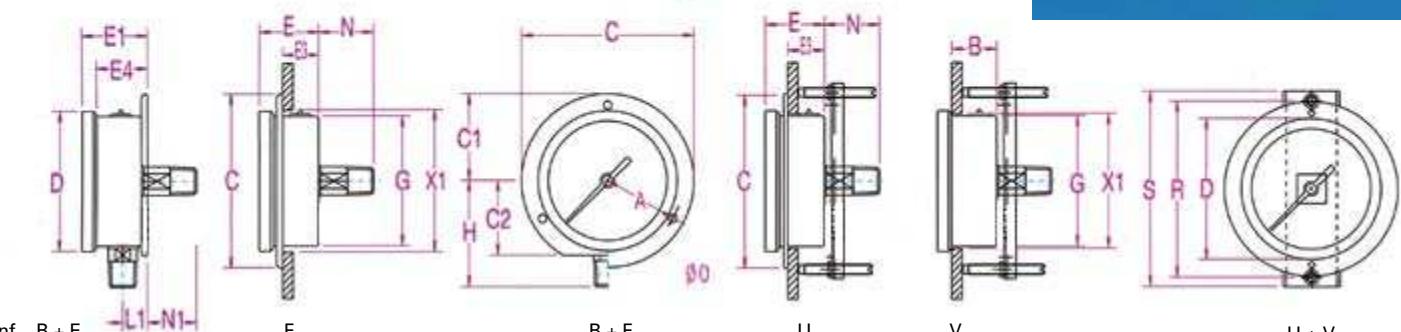
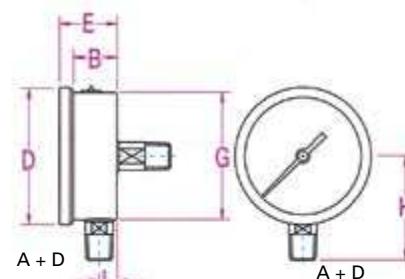
### Accuracy

1,6 % FSD

### Temperature Range

Ambient temperature -25° C to +60° C

Note: minimum temperature should not be less or equal to the freezing point of the filling fluid.



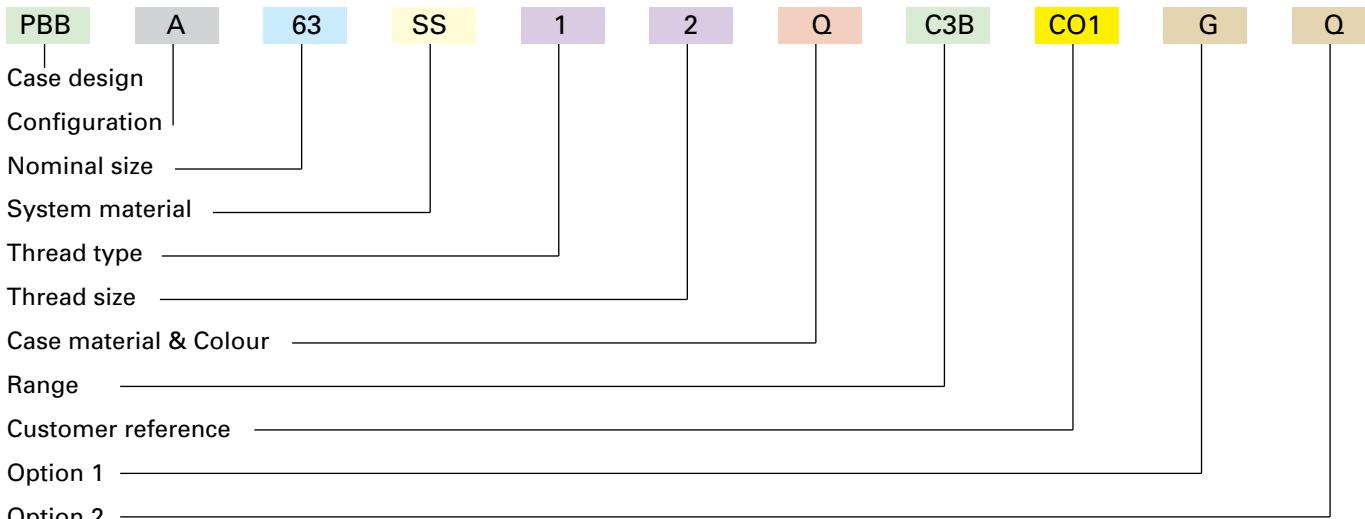
Nominal size

Dimensions (X is panel cut-out diameter)

Metric Imperial	A	B	C	C1	C2	D	E	E1	E3	E4	G	H	L	L1	N	N1	O	R	S	X1
63 mm 2½"	37,00 1,48	22,00 0,87	85,00 3,35	42,50 1,67	36,50 1,44	69,00 2,72	29,00 1,14	33,00 1,30	22,00 0,87	25,50 1,01	62,00 2,44	60,00 2,36	9,00 0,35	13,00 0,51	27,00 1,06	23,00 0,91	3,50 0,14	68,00 2,68	77,00 3,03	63,50 2,50
100 mm 4"	58,00 2,28	22,00 0,87	133,00 5,24	66,50 2,62	56,00 2,20	108,50 4,27	29,00 1,14	34,00 1,34	22,00 0,87	24,00 0,95	99,50 3,92	77,50 3,05	9,00 0,35	13,00 0,51	23,50 0,93	23,50 0,91	5,00 0,20	110,00 4,33	122,00 4,80	101,00 3,98

## Gauges Ordering Code

Example of how to make up the ordering product code:



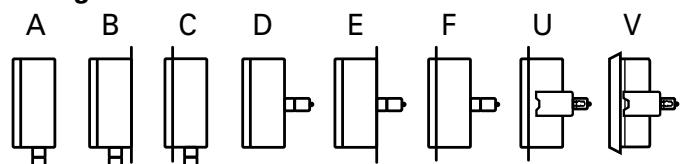
For the complete part number for Diaphragm Pressure Gauges, please consult with your sales representative when placing an order.

### Case Type and Size

Case	Case & Bezel Material (Std)	Size Code	Nom. size mm (inch)	Available Configuration
PBB	polished 304 stainless steel	63 10 15	63 (2½) 100 (4) 150 (6)	A B C* D E F U V *100 mm only
PBZ	colour coded (grey) PBT	10 15	100 (4) 150 (6)	A B
PBX	colour coded (black) PBT	10	100 (4)	A
PCB	polished 304 stainless steel	63 10 15	63 (2½) 100 (4) 150 (6)	A B C* D F U V *100 mm only
PCZ	colour coded (grey) PBT	10 15	100 (4) 150 (6)	A B
PCK	(black) mild steel	68	68 (2½)	A D V
PDB	polished 304 stainless steel	10 15	100 (4) 150 (6)	H
PDZ	colour coded (grey) PBT	10 15	100 (4) 150 (6)	H
DPG	colour coded (blue) PBT	10	100 (4)	A
MBB	polished 304 stainless steel	10 15	100 (4) 150 (6)	A B C* D E F U V *100 mm only
HGZ	polished 304 stainless steel	10 15	100 (4) 150 (6)	A
PBG	304 stainless steel	52 63 10	52 (2) 63 (2½) 100 (4)	A B D* E F U V *52 mm back entry only
PBJ	(black) injection moulded, 304 stainless steel bezel	63 80	63 (2½) 80 (3)	A
PBS	polished 304 stainless steel	63	63 (2½)	AD

Case	Case & Bezel Material (Std)	Size Code	Nom. size mm (inch)	Available Configuration
PBN	(black) injection moulded case polycarbonate clip-in lens	42 54 68	42 (1½) 54 (2) 68 (2½)	A D
PBM	(black) mild steel polycarbonate clip-in lens	42 54 68	42 (1½) 54 (2) 68 (2½)	A D V
PBK	(black) mild steel threaded polycarbonate window	42 54 68 96	42 (1½) 54 (2) 68 (2½) 96 (4)	A* D V* * only option for safety pattern ** 54 mm & 68 mm only
PBU	(black) mild steel flat acrylic window	42 54 63 96 10 12	42 (1½) 54 (2) 63 (2½) 96 (4) 100 (4) 125 (5)	A B **D E **F *U * * 54 mm & 68 mm only ** on application 100 mm, 125 mm
PBV	(black) mild steel with nickel plated bezel, flat acrylic window	52	52 (2)	D V

### Configurations

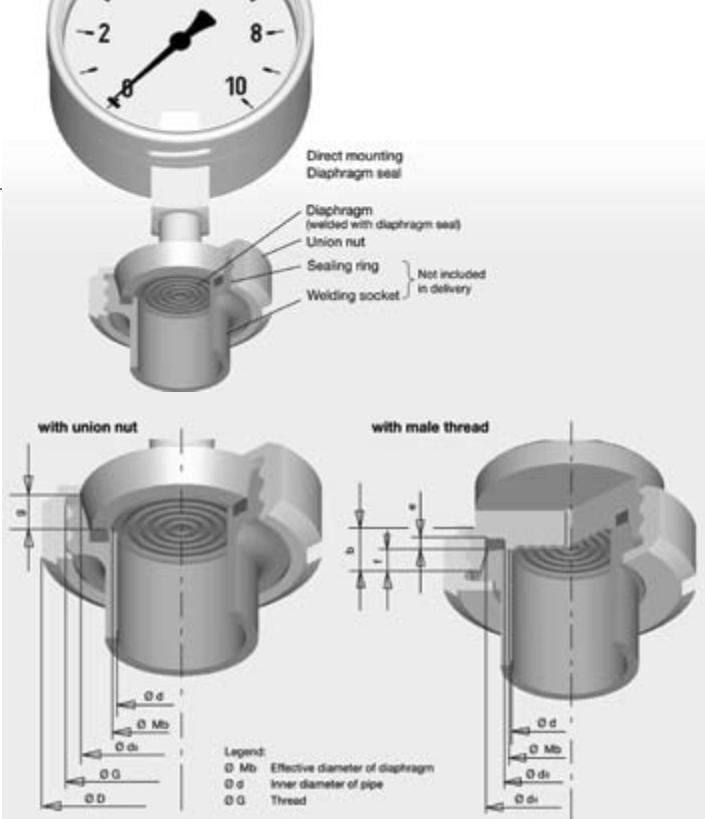


- A bottom connection, stem mounting
- B bottom connection, back flange, surface mounting
- C bottom connection, front flange, surface mounting
- D back connection, stem mounting
- E back connection, back flange, surface mounting
- F back connection, wide front flange, (drilled) panel mounting
- U back connection, wide front flange, (undrilled) panel mounting (yoke)
- V back connection, narrow front-ring, panel mounting (yoke)





## Chemical Seals



### DAIRY SEAL

**Application:** food, beverage, paint, biochemical and pharmaceutical industry

**Material:** Grade 316 Stainless Steel

**Diaphragm:** Flush welded 316 Stainless Steel (other material/coatings on request)

**Protection:** PTFE (Teflon coating available)

**Gauge Port:** Female: 1/4" BSP, BSPT or NPT

*Optional:* 3/8", 1/2" BSP, BSPT or NPT

**Process Connection:** NW25 — 65, SMS 38 & 51

**Minimum Pressure:** 30 PSI

**Maximum Pressure:** 40 BAR

DN	For pipe	PN	Dimensions in mm									Weight in kg		
			Outside Ø x thickness	G	b	d	Mb	D	$d_3$	$d_4$	$d_6$	e	f	g
20	23 x 1.5	40	Rd 44 x 1/6	14	20	22	54	23	32.8	36,5	3	6	8	0.4
25	29 x 1.5	40	Rd 52 x 1/6	14	26	25	63	30	39.8	44	3.5	7	10	0.4
32	35 x 1.5	40	Rd 58 x 1/6	14	32	32	70	36	45.8	50	3.5	7	10	0.5
40	41 x 1.5	40	Rd 65 x 1/6	14	38	40	78	42	51.8	56	3.5	7	10	0.75
50	53 x 1.5	25	Rd 78 x 1/6	14	50	52	92	54	63.8	68,5	3.5	7	11	0.8
80	85 x 2	25	Rd 110 x 1/4	20	81	71	127	85	94.8	100	3.5	8	12	1.25



### PULP & PAPER

**Application:** DN48 used in the pulp and paper industry

**Material:** Grade 316 Stainless Steel

**Diaphragm:** Flush welded 316 Stainless Steel (other material/coatings on request)

**Gauge Port:** Female: 1/4", 3/8", 1/2" BSP or NPT

**Process Connection:** DN48

**Minimum Pressure:** 30 PSI

**Maximum Pressure:** 40 BAR

### TRI-CLAMP

**Application:** food and beverage industry

**Material:** Grade 316 Stainless Steel

**Diaphragm:** Flush welded 316 Stainless Steel (other material/coatings on request)

**Gauge Port:** Female: 1/4", 3/8", 1/2" BSP or NPT

**Process Connection:** 1.5" or 2" Tri-clamp

**Minimum Pressure:** 15 PSI (100kPa)

**Maximum Pressure:** 580 PSI (40BAR)

## Chemical Seals



### XWD1

**Application:** general application in the process industry  
**Material:** 316 Stainless Steel (upper & lower flange)  
**Diaphragm:** Welded 316 Stainless Steel  
 (other materials/coating on request)  
**Thread Option:** Gauge Port: Female:  $\frac{1}{4}$ " BSP  
 Optional:  $\frac{1}{4}$ ",  $\frac{3}{8}$ ",  $\frac{1}{2}$ " BSP, BSPT or NPT  
**Process Connection:** Male & female:  $\frac{1}{2}$ " BSP,  $\frac{3}{8}$ " BSP, BSPT or NPT. Optional:  $\frac{1}{4}$ ",  $\frac{3}{8}$ " BSP, BSPT or NPT, flanged type  
**Minimum Pressure:** 15 PSI (100kPa)  
**Maximum Pressure:** 2 500 PSI (17,5MPa)  
**Burst Pressure:** 50 Mpa



### FLANGED SEAL

Flanged seals are for continuous use for safety concerns.  
 Cleanout type for easy cleaning, with flushing connections available.  
**Material:** Grade 316 Stainless Steel (Upper & lower flange)  
**Options:** Monel, Hastelloy B, Hastelloy C, Titanium, Tantalum, PVC, Carbon steel, Teflon, Alloy 20 and more available (nickel plated carbon steel upper housing standard, other material available).

**Configurations:**  $\frac{1}{2}$ " (15 mm), 1" (25 mm),  $1\frac{1}{2}$ " (40 mm) and 2" (50 mm)

Pipe size & #150 and #300 pressure rating standard.  
 (Other configurations available).

**Instrument Connections:**  $\frac{1}{4}$ " &  $\frac{1}{2}$ " BSP female gauge connections standard (other connections available).  
 Saddle diaphragm seals available upon request.



### MIDI

50 mm Midi seal (welded system)

**Application:** in the process industry where space is minimal  
**Material:** Grade 316 Stainless Steel  
**Diameter:** 50 mm  
**Diaphragm:** Welded 316 Stainless Steel  
**Gauge Port:** Female:  $\frac{1}{4}$ " BSP, BSPT or NPT  
**Optional:**  $\frac{3}{8}$ ",  $\frac{1}{2}$ " BSP, BSPT or NPT  
**Process Connection:** Male & Female:  $\frac{1}{4}$ " BSP, BSPT or NPT  
**Optional:**  $\frac{3}{8}$ ",  $\frac{1}{2}$ " BSP or NPT

**Minimum Pressure:** 35 PSI (250kPa)  
**Maximum Pressure:** 2 500 PSI (17,5MPa)  
**Burst Pressure:** 10 000 PSI (70MPa)

### MINI

35 mm Mini seal (welded system)

**Diameter:** 35 mm  
**Minimum Pressure:** 100 PSI (700kPa)  
**Maximum Pressure:** 6 000 PSI (42MPa)  
**Burst Pressure:** 8 000 PSI (56MPa)

## Chemical Seals



### XWD4

**Application:** general in the process industry

**Material:** Top & bottom housing material: 316 Stainless Steel

**Diaphragm:** Welded 316 Stainless Steel/Tantalum/Teflon coated

**Sealing:** O-ring, Viton

**Fill Screw:** 316 Stainless Steel

**Thread Ranges:**  $\frac{1}{8}$ ",  $\frac{1}{4}$ ",  $\frac{3}{8}$ ",  $\frac{1}{2}$ ", 1" (NPT/NPTS/BSP/BSPT)

Male threads are available on request

**Minimum Pressure:** 100kpa

**Maximum Pressure:** 40 BAR

(Higher pressures available on request - complete welded system).

### XWD5

**Application:**

Water purification plants

**Material:** Top and bottom housing 316L, PTFE coated

**Diaphragm:** 316 SS PTFE (Teflon). Option: 316L uncoated

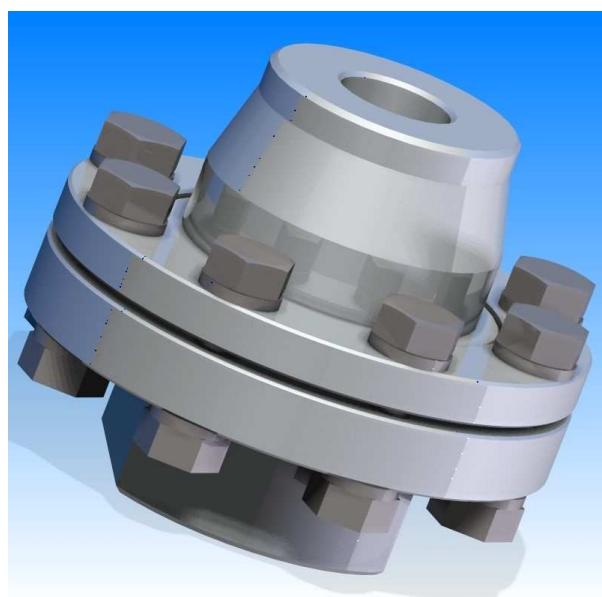
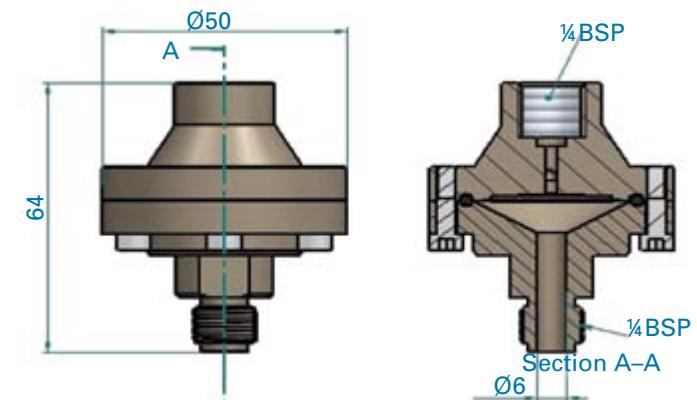
**Fill screw:** 316 stainless steel

**Thread size:** Instrument connection  $\frac{1}{4}$ " BSP female  
Process connection  $\frac{1}{4}$ " BSP male

**Minimum Pressure:** 100kpa

**Maximum Pressure:** 16 BAR

Dimensions in mm



### XWD6

**Application:** general application in the process industry

**Material:** 316 Stainless Steel (upper & lower flange)

316SS clamp rings

**Diaphragm:** Welded 316 Stainless Steel

(other materials/coating on request)

**Thread Option:** Gauge Port: Female:  $\frac{1}{4}$ " BSP

Optional:  $\frac{1}{4}$ ",  $\frac{3}{8}$ ",  $\frac{1}{2}$ " BSP, BSPT or NPT

Process Connection: Male & female:  $\frac{1}{2}$ " BSP,  $\frac{3}{8}$ " BSP, BSPT or NPT. Optional:  $\frac{1}{4}$ ",  $\frac{3}{8}$ " BSP, BSPT or NPT, flanged type

**Minimum Pressure:** 15 PSI(100kPa)

**Maximum Pressure:** 1000 PSI (700BAR)

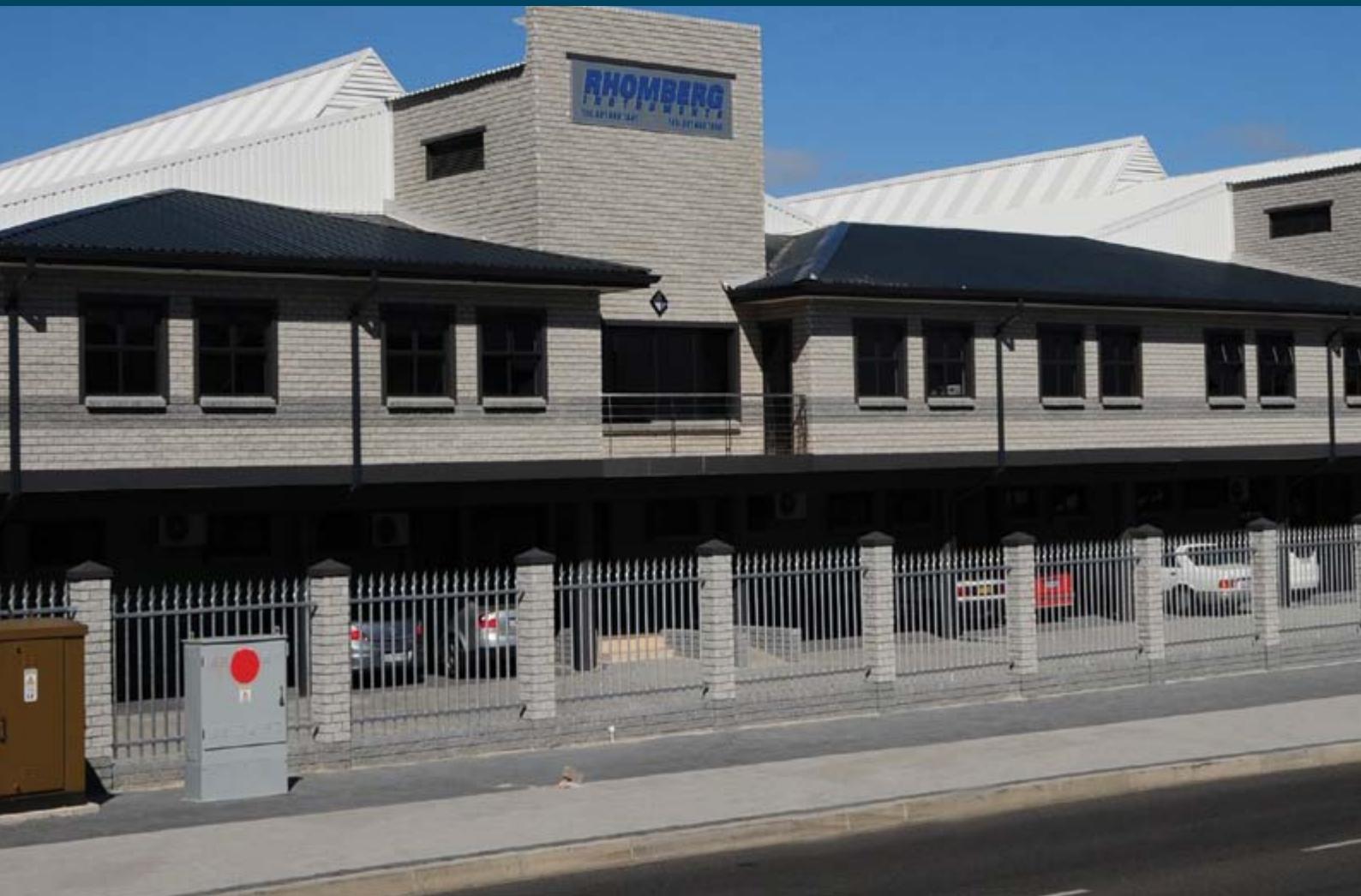
**Burst Pressure:** 1200BAR(12MPa)

Higher pressure available on request (please consult factory)



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