Installation Operation & Maintenance (IOM) for 730-ES/EN-X

Pressure Sustaining Valve

(double Chambered)

Introduction

The Model 730ES/EN Pressure Relief / Sustaining Valve is an automatic control valve designed to sustain a minimum upstream backpressure or relieve excess pressure. It is a pilot controlled, hydraulically operated, diaphragm actuated globe valve in either the oblique (Y) or angle pattern design. Valve differential pressure powers the diaphragm actuator open or closed. The lower control chamber is connected to atmosphere, which serves to cushion the closing of the valve and enable th valve to operate quickly and accurately regardles of differential pressure. The upper control chamber, which operates on a three-way control principle, has varying pressure produced by the regulating pilot and the pilot.

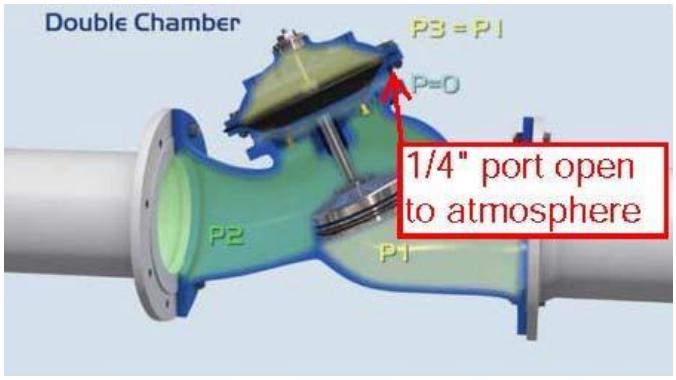
2. PRINCIPAL OF OPERATION

The pressure-regulating pilot senses upstream pressure and modulates open or closed. This varies the pressure in the upper control chamber causing the main valve to throttle thus maintaining constant upstream pressure. When the upstream pressure rises above the pilot setting the pilot opens, pressure in the upper control chamber decreases and the main valve modulates open to relieve upstream pressure and maintain pilot setting. Should the upstream pressure fall below the pilot setting the pilot closes, pressure in the upper chamber increases and the main valve throttles closed to maintain the preset pilot setting. The pressure relief/sustaining pilot has an adjusting screw to preset the desired upstream pressure and an internal needle valve to control the closing speed. For easy identification, the pressure relief/sustaining pilot is stamped with the number #X on the side of the pilot body.

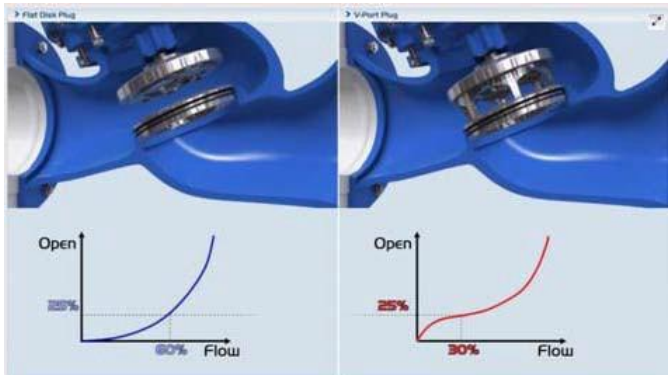
The Bermad 730-ES-X double chamber pressure sustaining/relief valve is a highly reactive pressure sustaining valve that is designed to maintain constant upstream pressure regardless of inlet pressure or flow. The double chamber design ensures no hydraulic lock out and full opening if required to minimize head loss.

Valve Details

The basic 700 series valve is configured as double chamber where the lower diaphragm is vented to atmosphere. It is critical for operation that this lower chamber is always vented and never blocked off.



To minimize the minimum head loss in the valve the inner spring is removed. Typically, the V port plug is used for regulation should the range of flows required is from zero upwards. If using the PRV for medium to higher flows only, the valve can be configured with a flat disc that increased the flow capacity slightly.



Pilot details

In the double chamber configuration, there are several different designs of pilots available to achieve the pressure sustaining function, each with different characteristics. The pilots are all three-way positioning pilots sensing the pressure on the upstream side. Some details of these pilots are as follows:

#X-R-16 three-way positioning pilot

This pilot is brass and has a larger flow path to enable very fast operation if required on closing if required. It has an inbuilt needle valve to control opening speed should it be required.

Spring range for regulation: 1-16 bar

Inlet pressure rating: 25 bar

Material Brass

PCX-A-M (Sharp) three-way positioning pilot

This pilot is brass and is used where reaction speed is not quite so critical and greater accuracy of control is required. If opening speed adjustability is required, an external needle valve is fitted to port 2.

Inlet pressure rating: 16 bar

Material: Brass

Spring ranges for regulation:

Spring	Spring color	Range (bar)
J	Green	0.2-1.7
K	Grey	0.5-3.0
N	Natural	0.8-6.5
V	Blue &	1-10
P	White	1-16

Pilot details continued

#8 large diameter three-way positioning pilot

This pilot is used when you need fast acting but extremely high accuracy on regulation with a tolerance of plus or minus 0.4m. It has the inbuilt needle valve like the X-R-16 brass pilot to control opening speed.

Spring range for regulation: M6 (2-14m), M5 (5-22m), M4 (15-35m), M8 (25-70m)

Pressure rating: 16 bar

Material: Brass or stainless steel.

Installation

There are many different things that are important when considering installation of the following valve, so we suggest the following in considered prior to installation:

1. Make sure the pipe upstream has been fully flushed to clear any pipeline debris that may get stuck in the inside of the valve
2. Make sure the weight of the valve is properly supported to ensure there is no flex in the system.
3. Make sure there is sufficient room either side of the valve to enable maintenance of the valve. Also make sure there is sufficient room above the valve to remove the actuator when it is required.
4. Install isolation valves close to the valve to enable internal service of the valve. If necessary, install a by-pass around the valve to continue flow while servicing the valve. If critical that there is not increase in pressure, then fit a smaller by-pass PRV in parallel and or a pressure relief valve set 5m above the set point of the reducing valve.
5. The valve orientation can be configured in many directions including vertical, horizontal, but not upside down as you cannot vent the air from the control chamber correctly. **Note: Valves are plumbed for horizontal installation from the factory unless specified when ordering. Make sure if the valve is being installed anything other than horizontal, you make the factory aware so they can plumb and configure the valve so there is never any air in the control chamber.**
6. If there are going to be high spots downstream of the valve where air cannot be released, contact Bermad for advice on the correct air release valve to be installed.
7. If the pipeline is subject or at risk of having larger solids present in the water, then install a Bermad 70F strainer prior to the PSV.

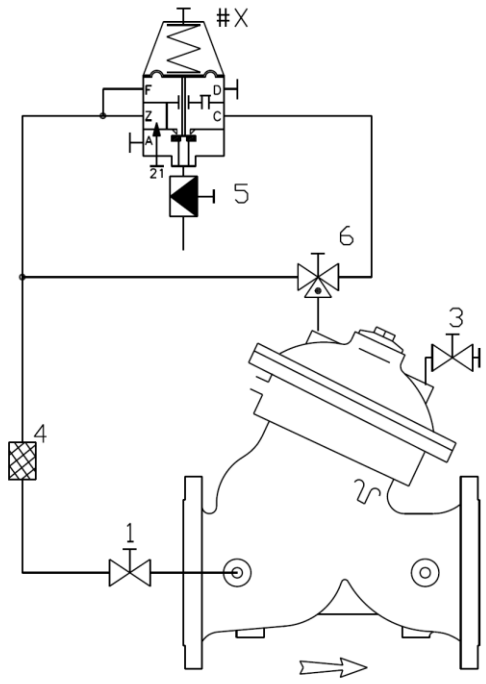
Note

If ever in doubt about the design of the station, contact your nearest Bermad office for advice on how best to configure the station for optimum performance

Commissioning

We suggest the following be considered prior to any commissioning of the PSV

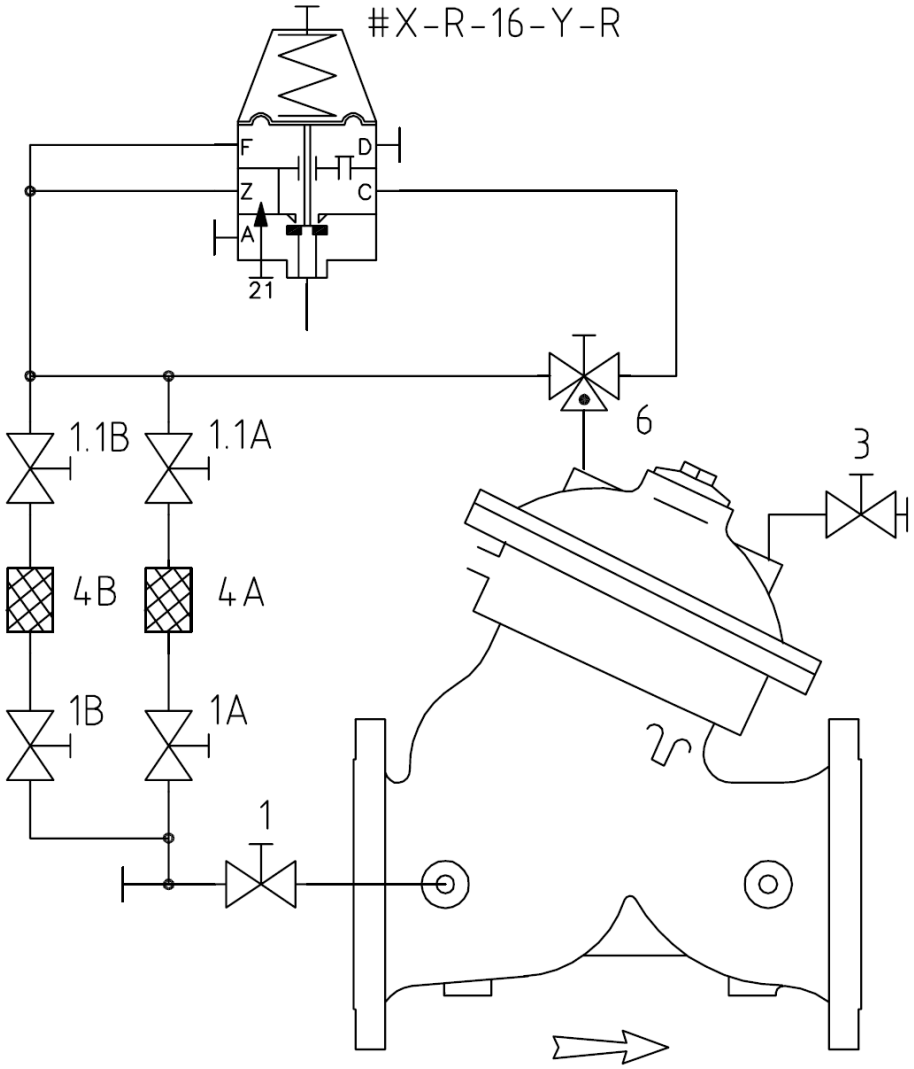
1. Make sure the valve is safely supported and that the installation is easy and safe to operate
2. Flush any debris out of the pipe prior to the PRV to discard any debris in the pipe.
3. Turn adjustment bolt for pilot clockwise fully with full tension.
4. Open inlet isolation valve on valve (1) inlet and (5) outlet to the pilot
5. Relax a fitting at the highest point on the valve to release air from the cover of the valve.
6. Open a small valve downstream of the PSV to induce a small amount of flow
7. Start to turn the adjustment bolt on the pilot clockwise fully to ensure the valve is closed. Slowly turn the adjustment bolt anti-clockwise (no more than ¼ of a turn at a time) and watch the valve open. When the valve opens, a small amount of water will vent from the 5-needle valve port to open the valve. Do not continue to turn the bolt until the water has stopped venting.
8. Continue to turn incrementally with delays until the desired pressure is reached. If operating at extremely low flows, the vent line may have to be slowed down by closing the needle valve (21) clockwise. Tighten locknut to complete.



PARTS LIST

1	2W Cock Valve
3	2W Cock Valve
4	Control Filter
5	Needle Valve
6	3W Cock Valve
#X	3W Position Pilot

AS BUILT



PARTS LIST

1	2W Cock Valve
3	2W Cock Valve
6	3W Cock Valve
4	Control Filter
#X-R-16-Y-R	3W Position PS Pilot

Trouble Shooting

Valve fails to open

- The needle valve is blocked. Close fully and back off to same set point.
- The valve is already fully open, so the inlet pressure is almost equal to the downstream pressure. Check the inlet pressure range typically of the PRV.
- The set point of the pilot adjustment bolt is not correct. Increase anticlockwise at ¼ of a turn at a time until the valve opens and is stable at the correct set point.
- The outlet pressure is greater than the inlet pressure and the valve is remaining closed as it is a non-return valve. Check inlet pressures.
- Check ball valves 1 is fully open and not blocked.

Valve fails too close

- The inlet strainer (#4) is blocked. Isolate and clean.
- An object is under the main valve body keeping the body from closing. Isolate the valve and remove the actuator to clean the debris out.
- The adjustment bolt on the pilot is wound fully clockwise to make the valve go fully open. Check the adjustment bolt on pilot setting.
- Check ball valves 1 is fully open and not blocked.

Valve is oscillating on pressure set point.

- The needle valve is blocked. Close fully and back off to same set point.
- Check ball valves 1 is fully open and not blocked.
- There is an air pocket either upstream or downstream of the PSV that is causing the air pocket to collapse and expand. Release air or fit correct air release valves to rectify

Note: If in any doubt, call the Bermad nearest sales office for advice

Maintenance

We suggest the following maintenance is carried out to ensure the valve is operating as designed.

6 Monthly

- Clean inlet strainer (#4)
- Check function of PRV by altering inlet flow or pressure to see that the valve remains stable.
- Check the pressure gauge is functioning as designed
- Make sure the port on the underside of the diaphragm open to atmosphere is always fully opened and not blocked.

12 Monthly

- All the items on 6 monthly list
- Flush control chamber completely to remove any debris in the control chamber
- Close needle valve on pilot and re-0open to the same set point to dislodge any debris on the seat

5 yearly

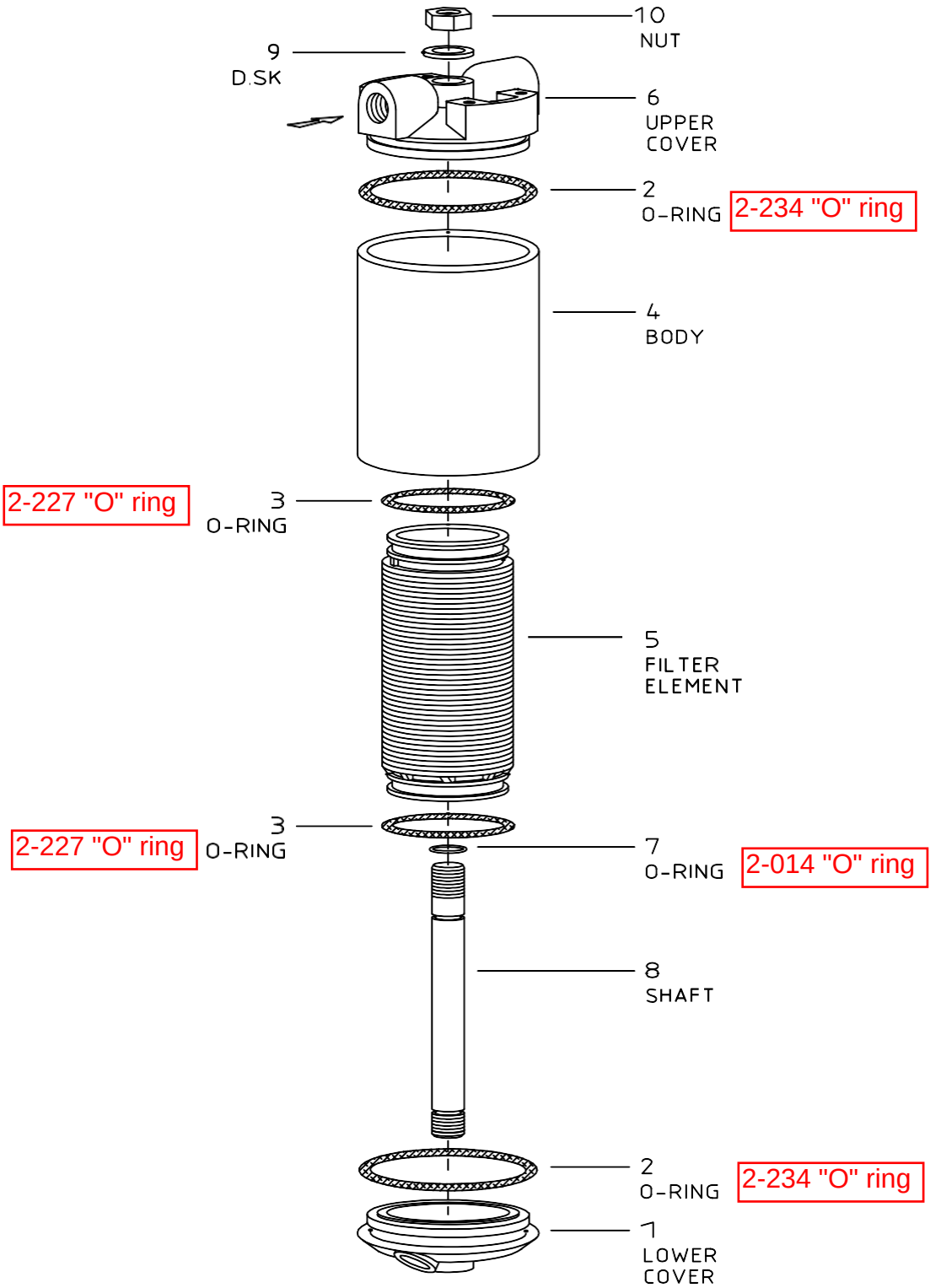
- All the items in 12 monthly service
- Remove the actuator and check the internal for any wear on the seat, body or seal disc seal of the valve.

10 Yearly

- All the items in 5 yearly service
- Install a full-service kit in the pilot and valve.

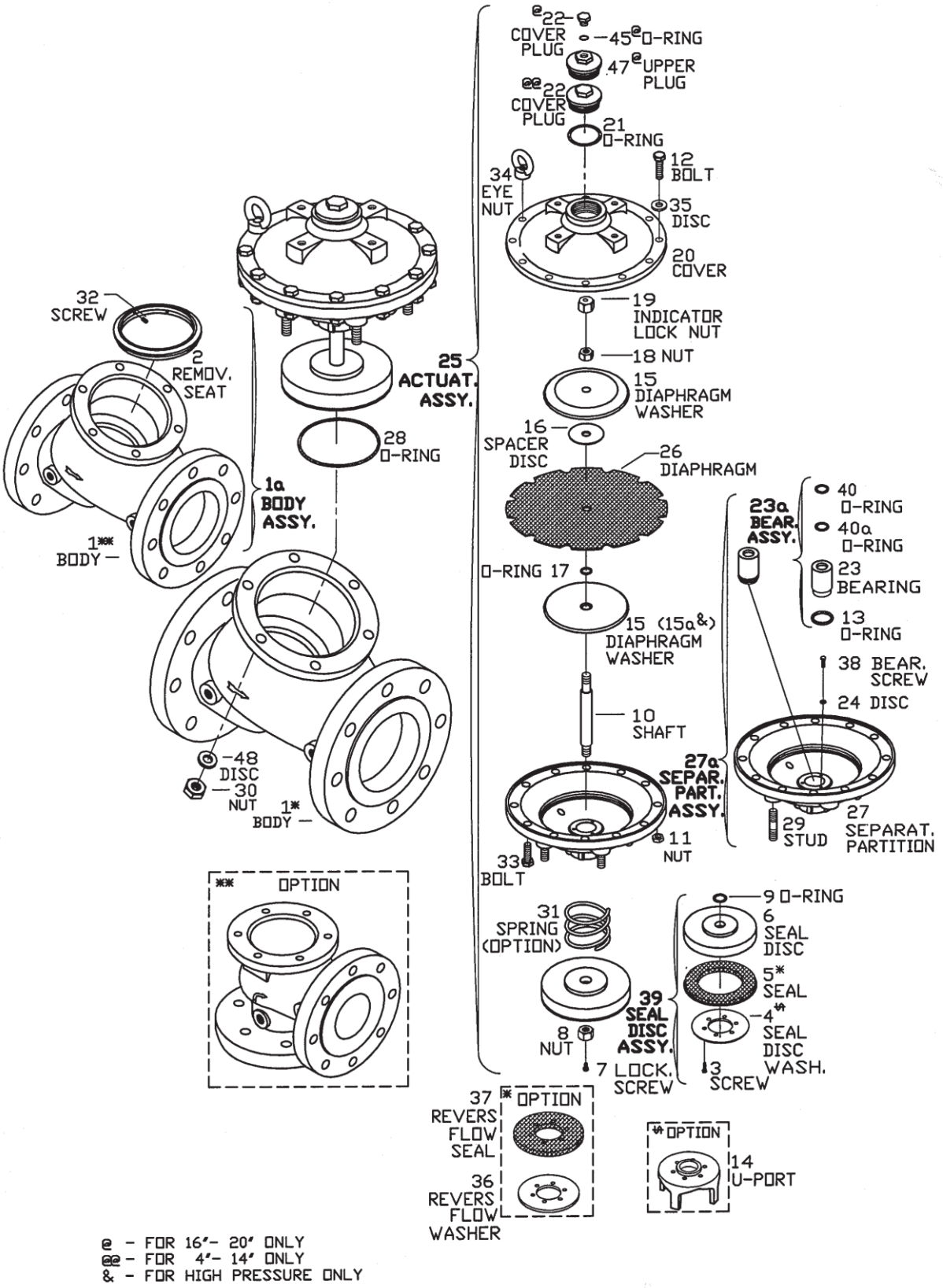
Note: If in any doubt as always contact your nearest Bermad Sales office.

Large Control Filter

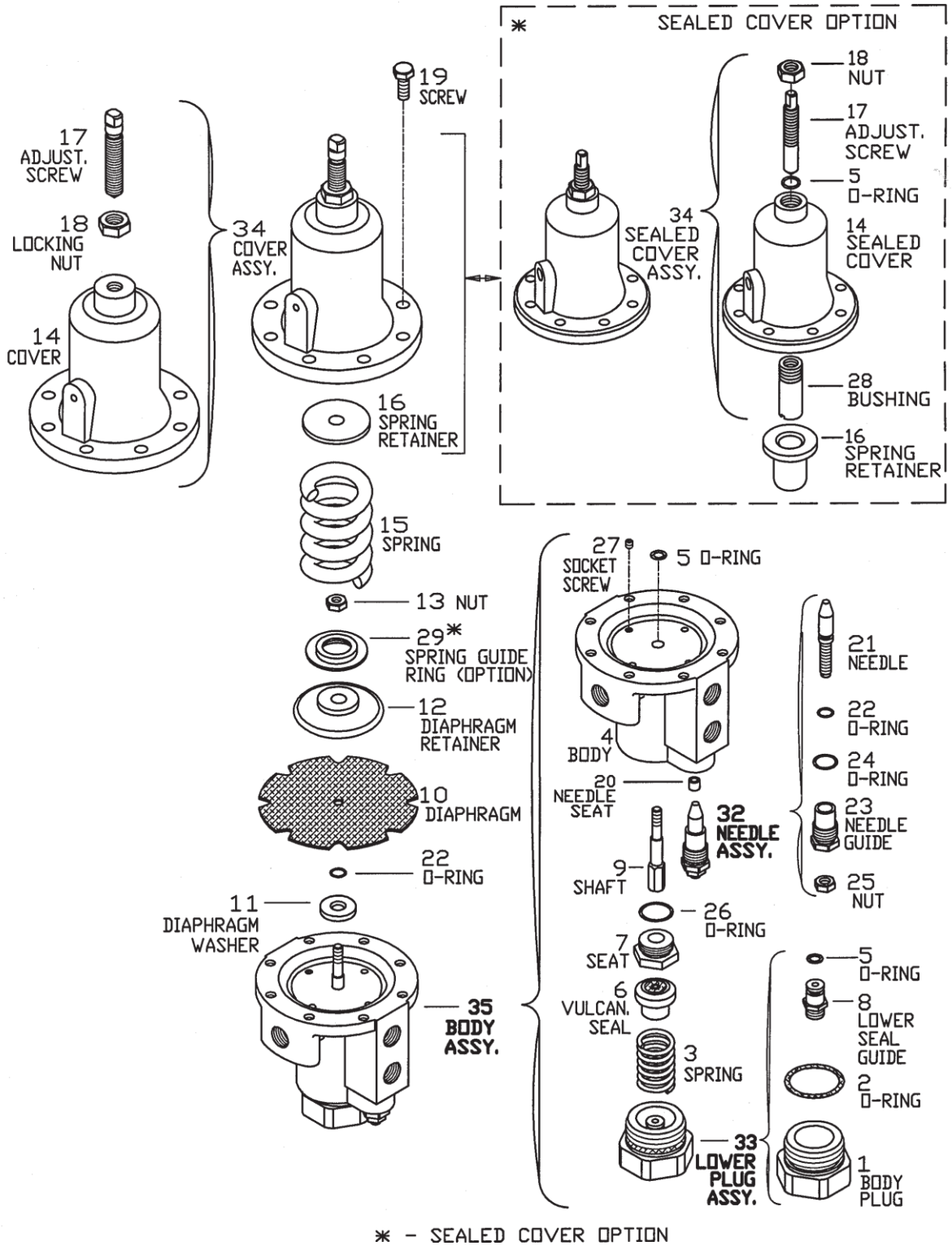


Diaphragm Actuated Basic Control Valves

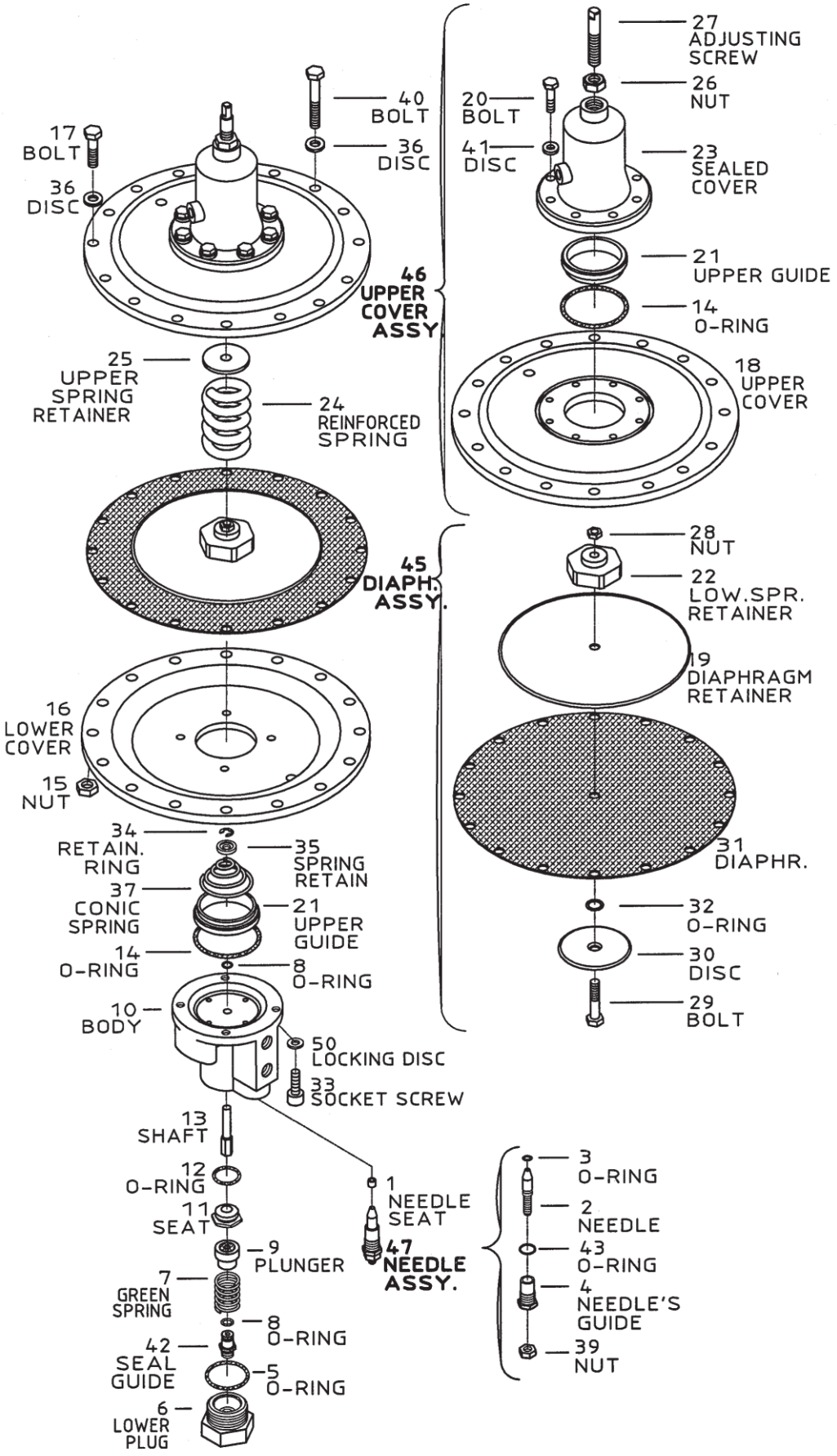
Sizes: 5”24"ES



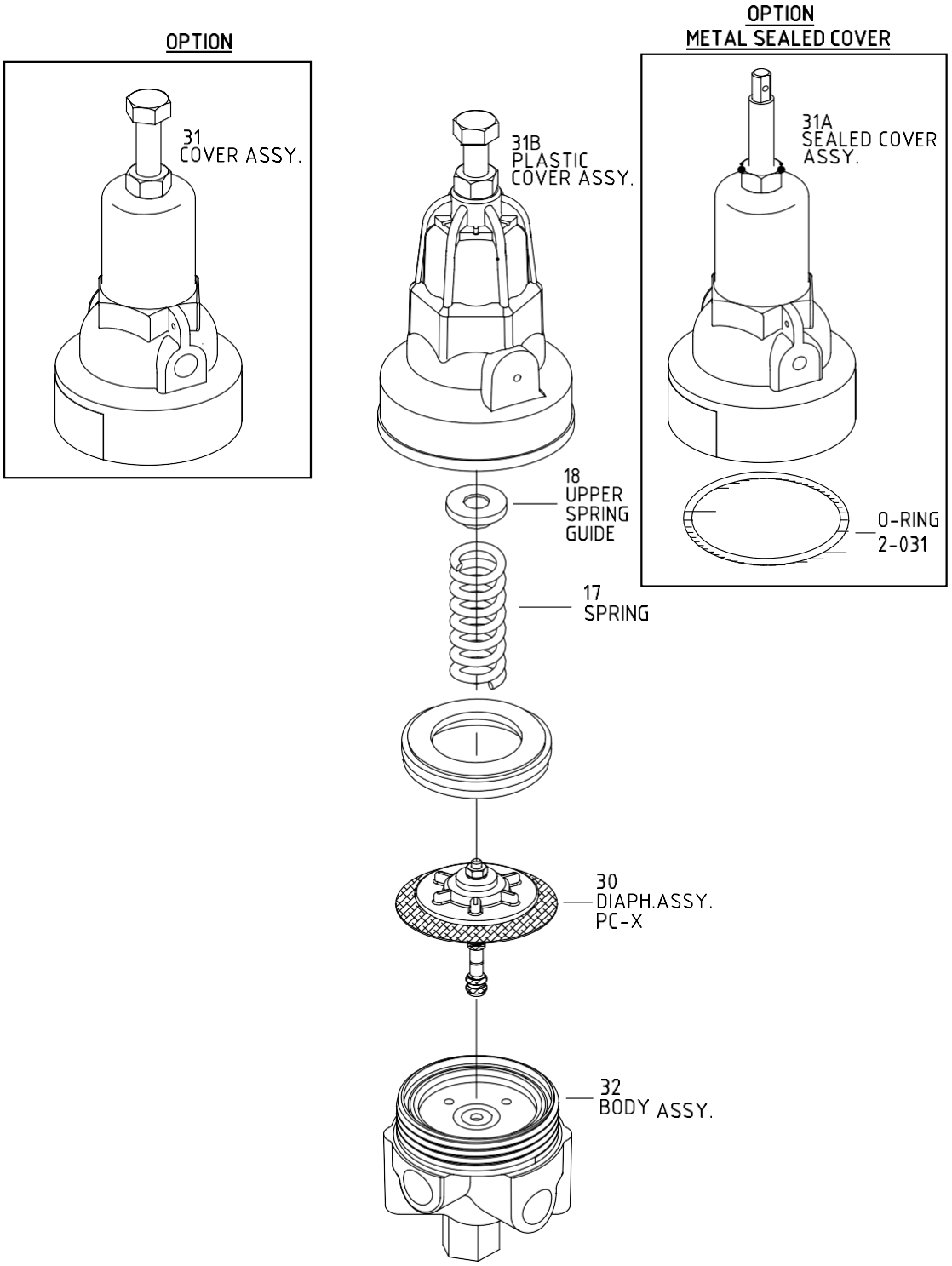
#X 3-way Positioning Hydraulic Pilot Valve



#8-16 3-way Altitude Pilot Valve (Maximum Setting 16 Meters)



PC-Sharp-X Metal 3-Way Multi Purpose Mini Pilot Valve



Created 1.8.2009

Updated 5.8.09

WW-700 Series Elastomers

Page Number	700	Part No. O-ring code # Item No. (Qty - 1)	Part No. O-ring code # Item No. (Qty - 1)	Part No. O-ring code # Item No. (Qty - 2)	Part No. O-ring code # Item No. (Qty - 1)	Part No. O-ring code # Item No. (Qty - 2)	Part No. O-ring code # Item No. (Qty - 1)	Part No. Material # Item No. (Qty - 1)	Part No. O-ring code # Item No. (Qty - 2)	Part No. Material # Item No. (Qty - 1)	# KIT Item No.
38	1.5"-2.5" DN40-DN65	28	9	8	29	13	21	26	(p.41 p.43)	5	2520-00000
		2-232	2-012	5-617	2-020	2-012	2-119	NBR	2-011	NBR	
		0535171232	0517172007	0527172130	0517172175	0517172007	0526172310	25200B0510	0517172012	25200B2503	
39	3" DN80	28	9	8	13	35	21	26	(p.41 p.43)	5	2530-00000
		2-237	2-012	5-617	2-120	2-012	2-119	NBR	2-011	NBR	
		0535171237	0517172007	0527172130	0526172466	0517172007	0526172310	25300B0312	0517172012	25300B2506	
40	4" DN100	28	9	40	13	17	21	26	(p.41 p.43)	5	2540-00000
		2-246	5-617	5-617	2-120	2-012	2-119	NBR	2-011	NBR	
		0535171246	0527172130	0527172130	0526176466	0517172007	0526172310	22400B0026	0517172012	25400B2322	
40	6" DN150	28	9	40	13	17	21	26	(p.41 p.43)	5	2560-00000
		2-364	2-212	2-212	2-126	5-617	2-227	NBR	2-011	NBR	
		0553171364	0535172061	0535172061	0526172171	0527172130	0535172365	22600B0026	0517172012	25600B2305	
40	8" DN200	28	9	40	13	17	21	26	(p.41 p.43)	5	2580-00000
		2-372	2-216	2-216	2-130	2-116	2-227	NBR	2-011	NBR	
		0553171372	0535171216	0535171216	0526172566	0526172111	0535172365	22801B0026	0517172012	25800B2305	
40	10" DN250	28	9	40	13	17	21	26	(p.41 p.43)	5	2510-00000
		2-379	2-218	2-218	2-133	2-118	2-227	NBR	2-011	NBR	
		0553171379	0535172034	0535172034	0526172160	0526172166	0535172365	22011B0026	0517172012	25010B2305	
40	12" DN300	28	9	40	13	17	21	26	(p.41 p.43)	5	2512-00000
		2-456	2-223	2-326	2-227	2-120	2-227	NBR	2-011	NBR	
		0569171456	0535171223	0553172027	0535172365	0526172466	0535172365	25120B0326	0517172012	25120B2305	
40	16"-20" DN400-500	28	9	40	13	17	21 + 45	26	(p.41 p.43)	5	2516-00000
		2-466	2-230	2-233	2-340	2-223	2-119 + 2-236	NBR	2-011	NBR	
		0569171466	0535171230	0553171333	0553171340	0535171223	0535172125 (21) & 0526172310 (45)	25160B0326	0517172012	25160B2305	

* Please note that some items may be used for various sizes and positions.
* Data correct at "Updated" date only, please consult factory for updated data.