

## **PINCH TYPE ON/OFF PR AND PL VALVES**

### **INTRODUCTION**

The PROCHEM pinch valves are probably the simplest form of on/off or flow control valves available. They are suitable for handling a wide range of solids, sludges, and liquids. The valves are of extremely simple construction with only two major components - a flexible elastomeric sleeve contained within a body assembly. Because of this simple construction the wearing component count is limited to just one item - the easily replaceable inner sleeve. The sleeve is mounted within the valve body as shown and the valve mounted in the pipeline.

### **OPERATION**

**ON/OFF OR CONTROL MODE:** When compressed air, water, or other pressure fluid is introduced into the annular casing, the sleeve is closed together. The moulded-in fabric laminations of the sleeve enable it to close in a very controlled manner about the valve centre line. This serves the double purpose of providing both predictable control and a large sealing area for drip tight shut off - even with trapped solids. The degree of sleeve closure can be controlled simply by adjusting the actuating fluid pressure providing either open-shut or modulating control operation. When open, the valve becomes part of the pipework, produces minimal pressure loss, and eliminates pockets that induce build-up or choking. When partially closed, the sleeve presents a streamlined flow path generating minimum turbulence and erosion.

**PRESSURE RELIEF MODE:** By pre-charging the annular chamber it is possible to use pinch valves as pressure relief (or pressure loading) valves. The valve is equipped with a pre-charge manifold incorporating a pressure gauge and the annular chamber pressurised to a pre-determined level. The valve then remains closed until such time as the line pressure approaches the pre-set pressure within the valve chamber. When this pressure is reached the sleeve will begin to open and allow passage of fluid through the valve. As the line pressure drops below the pre-set level the sleeve will close once more shutting off flow. See later for specific considerations for PR/PL applications.

### **APPLICATIONS**

On/Off or Control valving for slurries, sludges, liquids, powders, sand etc..  
Pneumatic conveying system control.  
Pneumatic powder diverter valves.  
Air-locks for powder handling systems.  
Water & sewage treatment plant fluid handling.  
Pressure relief on positive displacement sludge pumps i.e. raw/treated sewage.  
Pressure loading on lime slurry dosing systems.  
On/Off, control, or pressure relief/loading duties with abrasive or corrosive liquids.

### **SPECIAL CONTROL APPLICATIONS.**

103 pinch valves can be supplied complete with solenoid valves, warning lamps, alarm contacts, and air-fail close operation - see OPTIONS section later.

### **OPERATING PRESSURE RANGES.**

The 103 Series pinch valves have a normal maximum operating pressure of 8BarG. up to 3"/DN80 size and 6BarG. from 4"/DN100 to 8"/DN200. Special high pressure sleeves are available at extra cost to extend the maximum pressure of the larger valves to 8BarG. In all cases the control pressure required for complete closure is 1.8 - 2.0 BarG. above this. In PR mode the over pressure varies from 0 to 1Bar depending upon the valve set pressure and size.

### SIZES AND CONNECTIONS

The 103 series pinch valves are available in sizes from  $\frac{3}{4}$ "/DN20 through to 8"/DN200 in the following forms.

<b>CAST IRON BODY, SCREWED CONNECTIONS</b>	<b><math>\frac{3}{4}</math>"/DN20 TO <math>1\frac{1}{4}</math>"/DN32</b>
<b>CAST IRON OR ALUMINIUM BODY, FLANGED CONNECTIONS</b>	<b><math>1\frac{1}{2}</math>"/DN40 TO 8"/DN200</b>
<b>PVC BODY, SCREWED OR S.W. CONNECTIONS</b>	<b><math>\frac{3}{4}</math>"/DN20 TO <math>1\frac{1}{2}</math>"/DN40</b>

Screwed connections are Imperial BSPF(R).

Screwed connection valves can be fitted with nipples and flanges or union connections to order.

Flanged connections are available drilled to BS, DIN, or ANSI standards.

Note: All cast flange o.d. and raised face dimensions are to BS4504.

### MATERIALS OF CONSTRUCTION

The 103 Series pinch valves have only two main components - the body assembly and the elastomeric sleeve. The only areas in contact with the process fluid are the sleeve and the inside faces of the end flanges or screwed connections. In cases where the process fluid is not compatible with the standard end connection materials then these can either be lined or manufactured from suitable materials. The range of construction materials and options is as follows:

#### BODY MATERIALS.

<b>VALVE TYPE</b>	<b>BODY MATL'S</b>	<b>STD. END MATL.</b>	<b>SPECIAL ORDER END CONN. MATL.</b>
METAL SCREWED VALVES	CAST IRON	MILD STEEL	S/STEEL, SPECIAL METALS, ALUMINIUM. POLYPROP, PVC, PTFE.
PVC SCREWED VALVES	PVC	PVC	POLYPROP, PTFE. SPECIAL METAL.
METAL FLANGED VALVES	CAST IRON OR ALUMINIUM	CAST IRON OR ALUMINIUM	S/STEEL, SS FACED, PLASTIC COATED. SPECIAL METALS.

#### SLEEVE MATERIALS.

Within all of the above body assemblies a wide range of elastomeric sleeves can be used to suit the process fluid being handled. The standard sleeve materials are as follows along with their corresponding normal **maximum operating temperatures.**

<b>SLEEVE ELASTOMER</b>	<b>MAX. TEMP.</b>
NAT. RUBBER	80 C
FOOD QUALITY NAT. RUBBER	70 C
NEOPRENE	80 C
BUNA N	80 C
EPDM	120 C
VITON	120 C

## CAPACITIES.

ON/OFF OR CONTROL MODE. The series 103 pinch valve is effectively a piece of pipework when in the fully open condition and produces no appreciable pressure loss so can be sized on normal pipeline velocities with regard to capacity. As with normal pipework sizing, the velocity should take account of the nature of the fluid and special considerations given to particularly abrasive powders or fluids. For capacity sizing of the 103 valves when used as pressure relief or loading valves other factors need to be taken into account and these are dealt with below.

PRESSURE RELIEF MODE. In this mode special considerations need to be given to the sizing of the valve system. With the annular chamber pre-charged the trapped air is forced to occupy a smaller volume when the sleeve begins to open and so its pressure will increase thus imposing a higher-than-set pressure on the fluid passing through the sleeve. This rise in pressure is common to all PR valves and is normally acceptable. If the 103 pinch valve is sized with a flow velocity through the pipeline of 1 m/s then the rise in pressure during venting is normally within acceptable values ( 20%). For lower pressure rises the effective volume of the pre-charge air must be increased in accordance with Boyles Law ( $P_1V_1 = P_2V_2$ ). This is readily achieved by incorporating an auxiliary air chamber (See Drgs.). When an auxiliary chamber is used either the same valve can be used as would be selected at 1 m/s line velocity or a smaller size can be used to perhaps match up with existing pipe sizes. By using auxiliary chambers the pressure rise can be reduced to around 10%. If this small rise is also unacceptable then a 'live' air system can be used to provide the pre-charge. In this arrangement the valve is charged with a permanent air supply the pressure of which is set via a self venting pressure regulator (See sketch). The output from the pressure regulator is set to the required valve set pressure and as the pinch valve opens then the air pressure build up in the annular chamber triggers the pressure regulator to vent back down to its pre-set control position. Thus the pre-set pressure in the annular chamber is maintained constant as the pinch valve opens and closes so producing a constant back pressure on the process line.

In view of the various factors involved in the PR MODE sizing, PROCHEM should be contacted to provide this.

## OPTIONS/VARIATIONS.

**In standard on/off mode** the 103 valve can be supplied complete with integral solenoid valve and lamp enclosure to indicate operation.

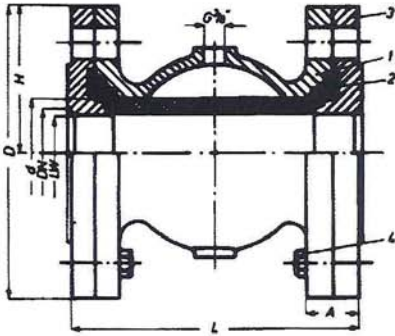
For specialised control applications custom pneumatic systems can be supplied which allow for air-fail close operation of pinch valves.

**When the 103 valves are used as PR/PL valves** the pre-charge pressure is visually confirmed by the pressure gauge mounted into the manifold. However, in remote situations damage to the sleeve by foreign bodies might go unnoticed so alarm switches can be incorporated to monitor pre-charge loss.

In remote situations PR valve vent alarms are often desirable so that the cause may be identified. For this purpose the 103 PR valves can be fitted with alarm switches to indicate a venting sequence. The switches can indicate both pre-charge loss and venting on the one valve and are normally 'VOLT FREE' contact type having IP65 protection (although other switch types can be fitted if required). The alarm mechanism is via the rise in pressure in the valve annular chamber during venting so the system may not be suitable for valves fitted with large auxiliary chambers. The venting alarm cannot easily be used on the 'live air' pre-charge system.

The valves can also be fitted with automatic solenoid charging valves to allow de-pressurisation cycles when line flushing is required as in the case of lime dosing.

## OVERALL DIMENSIONS (Std. basic valves)

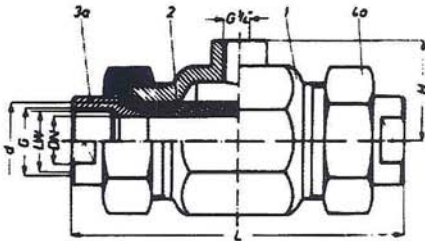


Model 103

DN	G	LW	L	DØ	dØ	H	A	B <sup>(1)</sup>	Sleeve length	Vol/lt <sup>(2)</sup>	Approx Wt.kg.
15	1/2"	15	120	-	24.5	31	-	-	84	0.1	0.9
20	3/4"	20	140	-	33	40	-	-	101	0.1	1.1
25	1"	25	150	-	37	42	-	-	110	0.1	1.9
32	1 1/4"	32	150	-	46	50	-	-	115	0.2	2.3
40	-	38	155	150	55	75	26.8	-	137	0.3	7.7
50	-	45	165	165	67	83	27.8	-	144	0.8	9.4
65	-	60	185	185	84	93	31.3	-	162	1.1	12.4
80	-	75	225	200	103	100	32.3	-	202	2.2	17.2
100	-	95	280	220	127	110	36.3	222	257	3.9	23.4
125	-	120	350	250	157	125	40.3	278	323	8.0	34.5
150	-	145	420	285	188	143	44.3	330	393	14.0	42.1
200	-	190	560	340	240	170	51.3	420	529	32.0	80.0

<sup>(1)</sup> Valve body diameter (only shown DN100 and above)

<sup>(2)</sup> Volume of Control Fluid Chamber with sleeve fully closed.



Model 103A

## QUOTATION INFORMATION.

In order to provide a quotation the following information is required:

- 1) Fluid nature, pressure, and flowrate.
- 2) On/off, control, or pressure relief/loading duty?
- 3) Construction materials preferred (if any).
- 4) Connections required and line size (if existing).

Prochem's policy of continued product improvement dictates that these specifications may change without notice