

BOOSTER PUMP CONTROL INBAL VALVE SERIES 500-PB, 600-PB, 700-PB

511-PB

611-PB Threaded

711-PB

533-PB

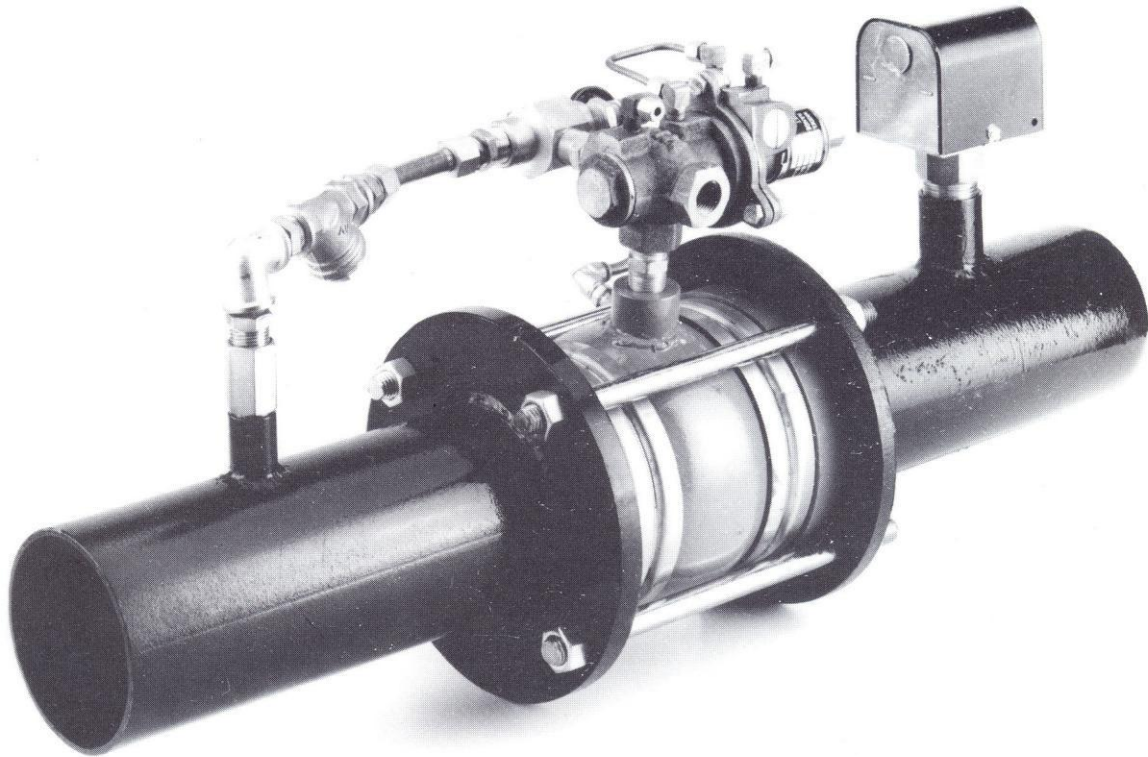
733-PB

Flanged

599-PB

699-PB Wafer

799-PB



The **Inbal** Booster Pump Control Valve, model XXX-PB, automatically eliminates lines surge when the booster pump is started and stopped. Should power failure occur the valve incorporates a check feature to protect the system from reverse flow.

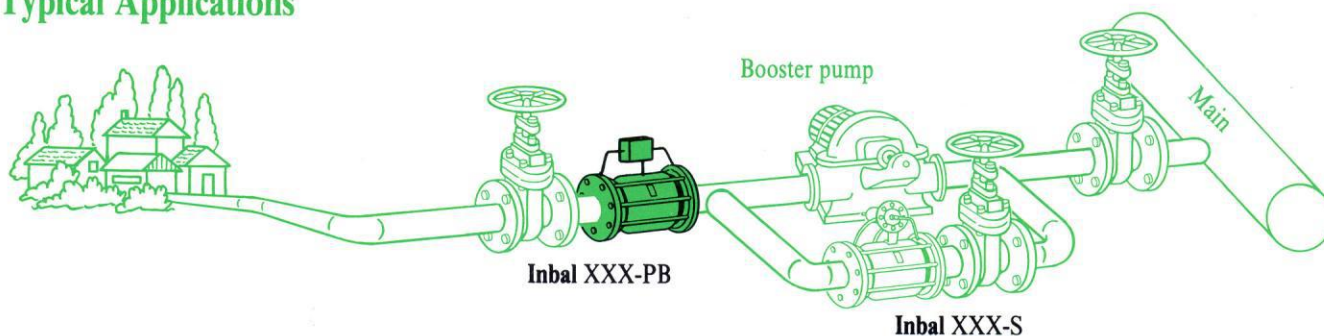
The Booster Pump Control Valve consists of **Inbal** Valve series 500, 600 or 700 and pilot control system.

The **Inbal** is a line pressure operated, in-line, sleeve type, axial valve. The control system consists of 3-way solenoid operated, spring loaded, diaphragm actuated, 3-way valve, flow

limit switch and auxiliary accessories.

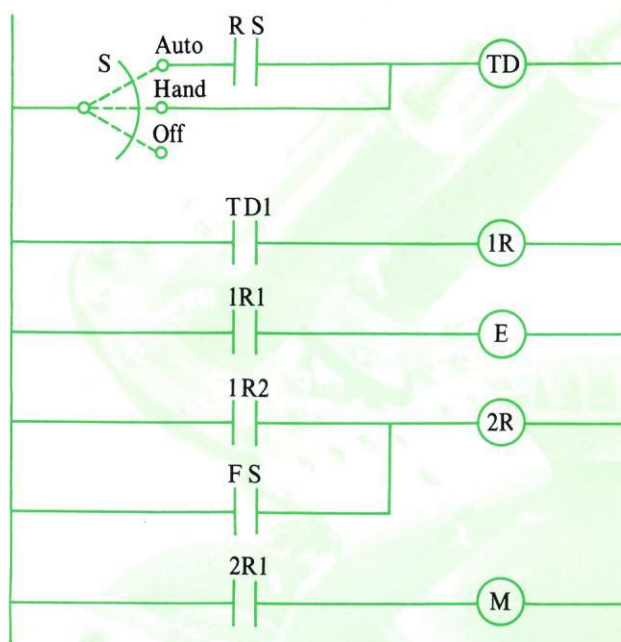
The **Inbal** XXX-PB is installed on the discharge of the booster pump. The pump and valve controls are synchronized to start and shut-off the pump while the valve is closed. When the pump control is signalled to shut-off, the de-energized solenoid control valve signals the **Inbal** valve is to begin closing at a predetermined speed. The flow limit switch keeps the pump running until the **Inbal** valve is closed drip-tight and then releases the pump starter, which causes the pump to stop.

Typical Applications



Wiring Diagram

S = Manual Selector Switch
 RS = Automatic remote switch
 TD = Time delay relay
 1R = Relay
 2R = Relay
 FS = Flow Switch
 E = Solenoid Valve
 M = Pump Motor Starter Relay



When Time Delay Relay is energized, after a preset time, the pump motor starts and the solenoid is energized. This exhausts pressure out of the control space of the **Inbal** valve through a needle valve. The **Inbal** valve then opens slowly. When the Time Delay Relay is de-energized the solenoid is de-energized and the upstream pressure is introduced to the control space through a needle valve. The **Inbal**

valve closes slowly. When the flow has stopped, the flow switch breaks the pump motor circuit and the pump shuts off.

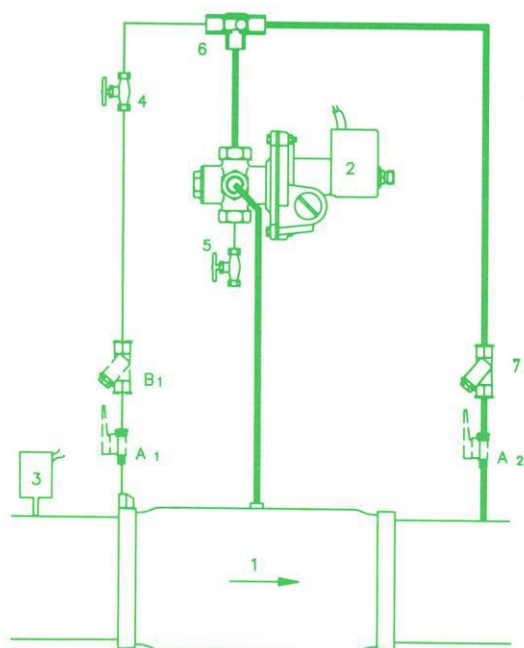
If there is a power failure the de-energizes solenoid and the pressure selector ensures the introduction of the higher pressure, from either the upstream or the downstream, to the control space of the **Inbal** valve to give positive closure and to prevent a reverse flow.

Product Features

- * The **Inbal** Valve contains no mechanical moving parts. It is epoxy coated as standard and is compact and lightweight. The valve can be installed at any angle without affecting its performance.
- * The valve prevents any line surges or hammering when the pump starts and stops.
- * The opening and closing speed rates of the valve are positively controlled.

- * When the **Inbal** valve is fully open or drip-tight closed the control system is designed to be "no-flow".
- * At all line pressures there is a positive drip-tight closure. No spring is used to ensure closure.
- * The use of a high quality solenoid valve assures reliable operation and a high resistance to corrosion.
- * The valve comes complete with self-cleaning strainer as a standard fitting.

Schematic Control Diagram



Item	Description	Model
1	Inbal Valve with A2L Port & Self Cleaning Strainer	500; 600 or 700
2	High Capacity Solenoid Pilot Valve	PJ2; PK2
3	Flow Switch	141
4	Flow Control - Closing Speed Control	361
5	Flow Control - Opening Speed Control	361
6	Shuttle Valve	271
7	Y Pattern Strainer	31

Optional Features:

A	Shut-off cocks - isolate pilot system	351
B	Y Pattern Strainer	31

PJ2 is recommended for Inbal Valve up to size 150 mm (6"). PK2 for sizes 200 mm (8") and larger. Request relevant catalogue.

Purchase Specifications

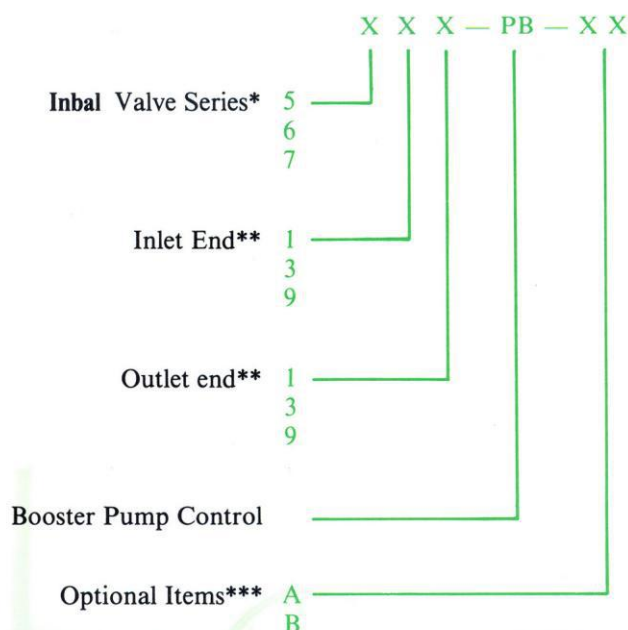
This valve shall automatically eliminate line surges when the pump is started and stopped. The valve shall be in a closed position when the pump starts and shall then, open gradually at an adjustable speed. On an electrical signal to shut-off the pump, the valve shall close first and slowly at an adjustable speed. The pump shall stop only after the valve is completely closed. The valve shall also act as a check valve. If a power failure should occur the valve shall close to prevent reverse flow. It shall be a hydraulically operated, pilot controlled, sleeve type, in-line, axial valve.

The main valve shall have only one moving part, which is the resilient sleeve. No stem, diaphragm assembly or spring are permitted at the main valve. There are to be no other sealing facilities apart from the sleeve itself.

The control of the valve operation shall be by means of an externally mounted 3-way solenoid pilot valve, an auxiliary control valve, a flow switch and throttling valves. Self cleaning strainers shall be used to protect the control system.

This valve shall be similar in all respects to an Inbal Booster Pump Control Valve, model 500-PB; 600-PB or 700-PB as manufactured by Mil Limited or approved equal.

Designation Data



* Request catalog on each series

** Ends: 1-threaded
3-flanged
9-wafer

*** See optional features in the left hand column.

Example: Inbal 799-PB-A is Booster Pump Control 700 series, wafer type valve with shut-off cocks.

Discharge capacity from control space

Size		series 500		series 600		series 700	
mm	inch	litre	gal	litre	gal	litre	gal
50	2	0.45	0.12	0.45	0.12	0.12	0.03
80	3	0.60	0.16	0.6	0.16	0.3	0.08
100	4	1.05	0.28	1.05	0.28	0.5	0.13
150	6	2.1	0.55	2.1	0.55	1.7	0.45
200	8	4.3	1.14	4.3	1.14	3.5	0.92
250	10	8.7	2.3			8.1	2.1
300	12	15.8	4.2			12.7	3.4

Flow Characteristics

Inbal Valve Size		500-PB		Flow Factor 600-PB		700-PB		Maximum Continuous Flow Rate*	
mm	inch	Kv	Cv	Kv	Cv	Kv	Cv	M ³ /h	gpm
40	1½"	45	52	45	52	54	63	40	175
50	2	75	87	75	87	90	104	45	200
80	3	180	209	180	209	140	162	105	460
100	4	290	336	290	336	330	383	180	790
150	6	650	754	650	754	610	708	400	1760
200	8	1150	1334	1150	1334	1150	1334	700	3080
250	10	1425	1653			1630	1891	1100	4840
300	12	2055	2384			2365	2743	1600	7040

* Based on pipe line velocity of 6 m/sec (20 ft/sec).

To define the headloss through a specific Inbal Valve series at a given flow rate, use the following equation (for water only).

$$\Delta P = \left(\frac{Q}{K_v} \right)^2$$

When:

ΔP = Pressure drop in bar

Q = Flow rate in m³/h

K_v = Flow factor (see table).

$$\Delta P = \left(\frac{Q}{C_v} \right)^2$$

When:

ΔP = Pressure drop in psi

Q = Flow rate in U.S. gpm

C_v = Flow factor (see table)

Dimensions & Weights

	Valve model	40	1½"	50	2"	80	3"	VALVE SIZE									
								100	4"	150	6"	200	8"	250	10"	300	12"
L mm/inch	5-6-711-PB	190	7½	190	7½	200	7⅞										
	5-733-PB					158	6¼	190	7½	245	9⅝	308	12¼	363	14⅞ ₃₂	451	17¼
	5-6-799-PB					155	6⅞	187	7⅞	235	9¼	302	11⅞	350	13¾	445	17½
D mm/inch	5-6-711-PB	162	6⅜	162	6⅜	181	7⅞										
	5-733-PB					200	7⅞	220	8⅞ ₁₆	285	11¼	340	13⅜	405	15⅞ ₁₆	460	18⅞
	5-6-799-PB					128	5⅞ ₁₆	160	6⅞ ₁₆	218	8⅞ ₁₆	272	10⅞ ₁₆	324	12¼	385	15⅞ ₁₆
A mm/inch	5-6-711-PB	270	10⅝	270	10⅝	270	10⅝										
	5-733-PB					270	10⅝	270	10⅝	270	10⅝	270	10⅝	270	10⅝	270	10⅝
	5-6-799-PB					270	10⅝	270	10⅝	270	10⅝	270	10⅝	270	10⅝	270	10⅝
B mm/inch	5-6-711-PB	247	9¾	247	9¾	255	10										
	5-733-PB					255	10	270	10⅝	300	12	332	13	354	14	384	15⅞
	5-6-799-PB					255	10	270	10⅝	300	12	332	13	354	14	384	15⅞
Weight Kg/lb	711-PB	13	29	13	29	14½	32										
	733-PB					16½	36	20½	45	37½	83	57½	126	90½	199	106½	234
	799-PB					12½	27	15½	34	26½	58	43½	96	54½	120	80½	177
	511-PB	12	27	12½	28	14½	32										
	533-PB					16	35	18½	41	36½	80	52½	115	76½	168	87½	193
	599-PB					11	24	12½	27	22½	49	34½	76	47½	105	60½	133
	699-PB					9	20	10¼	22	16½	36	25	55				

The outside dimensions (D) comply with flange standard dimension. Figures demonstrated comply with DIN PN16 standard. Figures are varied according to the flange standard diameter.

Specifications:

Sizes:

40 thru 80 mm (1 1/2"-3") screwed.
50 thru 300 mm (2"-12") flanged.
50 thru 300 mm. (2"-12") wafer
(2"-500 series only)

End details:

Threading: B.S.P.; N.P.T standards.
Flanged: ANSI B16.1 Class 125 and 250.
DIN PN 10, 16 & 25 (BS 4504).
BS 10 Table D & E.
JIS B 2212, 2213 & 2214.

Wafer:

Mounts between all standard flanges, as listed above.

Pressure Ratings:

Inbal Valve:

Grade A Sleeve:
21 Bar (300 psi) max (700 series).
16 Bar (235 psi) max (500, 600 series).
1.5 Bar (20 psi) min.
Grade F Sleeve:
5 bar (75 psi) max.
0.8 bar (12 psi) min.

Solenoid Control:

16 bar (225 psi) orifice 3/64"
10 bar (150 psi) orifice 1/16"
Higher pressure rates available on request.

Temperature Range:

Water to +65°C (150°F).

Installation & Storage

- * Always flush the pipelines to clean before installation of the Valve.
- * Arrow on the valve housing and on the side of the flow switch must match the actual flow direction.
- * Tighten bolts to the recommended torque values for the specific size and model of valve. Do not over torque.
- * Tighten bolts alternately 180° apart.
- * Exhaust tube must be free of any back pressure. Provide an air gap between the exhaust tube and to drain facility.
- * Use 1/2" O.D. copper tubing (up to Inbal Valve size 150 mm - 6") or 3/4" (200 mm - 8" and larger) to connect shuttle valve to downstream 1/2" or 3/4" nipple.
- * Flow switch should be located in a horizontal section of pipe where there is a straight horizontal run of a least five pipe diameters on each side of the flow switch.
- * Connect solenoid control and flow switch to control circuit according to wiring diagram.
- * A pressure relief valve (Inbal 500-K) is recommended for power failure protection.
- * If the valve is for use in ambient or fluid temperature below freezing, consult your nearest Inbal distributor. If shut down during cold weather the valve control space and the control system must be drained.

Materials:

Inbal Valve:

Threaded ends: Cast Iron ASTM A48-40B

(DIN 1691 GG-25) Epoxy coated.

Flanges and Ribs: Cast Iron ASTM A48-40B (DIN 1691 GG-25) Epoxy coated.

Housing: Carbon Steel ASTM G 10200

(DIN C22) Epoxy coated.

Sealing disc: PP, PVC.

Sleeve: SMR 5; EDPM.

Control ports: Stainless Steel 303.

Self cleaning strainers and pressure ports: Brass ASTM B21 (DIN CUZN40).

Self cleaning screen: Stainless Steel 316.

Solenoid Control:

Plunger: Stainless Steel with molded soft synthetic Buna-N inserts.

Spring: Stainless Steel.

Coil: Precision molded and are completely encapsulated with an Epoxy resin.

Body: Bronze ASTM B62

Stem: Stainless Steel 303.

Chambers: Bronze ASTM B62

Diaphragm: Neoprene, nylon fabric reinforced.

Seals: Buna N or Neoprene.

Optional Materials:

Inbal Valve:

Threaded ends: Cast Stainless Steel 303 or 316L.

Flanges and Ribs: Carbon Steel ASTM

A-216 WCB (DIN GS-45), Epoxy coated;

Stainless Steel 303 or 316L;

Cast Bronze ASTM B62;

Cast Aluminium QQ-A-601 (A356-T6);

Al-Mg ASTM C 86300 (DIN 1725-2);

Bronze Aluminium ASTM B148 (CA 955);

Cast Iron Rubber Lined.

Housing: Cast Iron ASTM A48-40B (DIN 1691 GG-25), Epoxy coated.

Cast Aluminium QQ-A-601 (A356-T6);

Al-Mg ASTM C 86300 (DIN 1725-2);

Stainless Steel 303 or 316L.

Pilot valve:

Wetted parts: Stainless Steel 316L;

Al-Mg ASTM C 86300 (DIN 1725-2);

Bronze Aluminium ASTM B148 (CA 955).

Solenoid control details:

Coil: waterproof class A (105 C).

Operation: De-energized to close

Electrical Rating Voltage: DC: 6; 12; 24; 32; 74; 120; 250.

50Hz: 24; 115; 220; 240; 380.

60Hz: 12; 24; 120; 240; 480.

Latching voltage: 60Hz: 24; 120; 240.

DC: 6; 12; 24.

Power consumption: 10 watts

2; 5 and 7.5 watts (on request).

Inrush current: 1.4 Amp at 24VAC

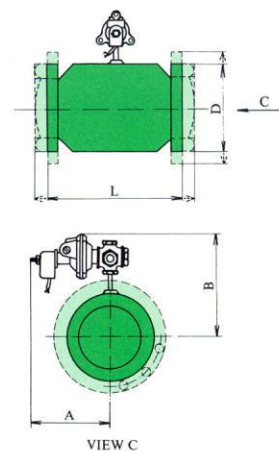
0.8 Amp at 24VAC

Nema classifications: General purpose Nema Type 1

Hazardous locations Nema Type 7; 9A explosion proof.

Water-tight Nema Type 4

Weather resistant Nema Type 3.



When ordering please specify:

- 1) Inbal Control Valve Model No:
- 2) Inbal Valve size (see sizing of valve).
- 3) Working Pressures (min; max).
- 4) Flow rate (min; max).
- 5) Fluid specifications.
- 6) Voltage & Hertz.
- 7) Options desired.

MIL LTD reserves the right to make such alterations in design, dimensions, specifications and manufacture as are deemed necessary to ensure continued improvement.

REPRESENTED BY:

