Automatic Water Control Valve
Series 700D

Model 799D

General Description

The **Inbal** Automatic Water Control Valve series 700D is a pressure operated, sleeve actuated, axial valve, designed from basic concepts, with a built-in actuator to function as control valve in fire protection system. The **Inbal** series 700D is used as deluge, preaction, dry pipe, remote control, pressure reducing, pressure relief, pump control, water level control, and other types of control valves. The standard material **Inbal** Valve is rated to 300 psi (21 bar) and requires a minimum line pressure of 20 psi (1.5 bar) for operation. Upon removal of the control pressure the **Inbal** Valve opens instantaneously, yet very smoothly, to prevent any water hammer in the piping system. The **Inbal** 700D performance and ease of resetting are not affected by vertical or horizontal installation.

The **Inbal** Automatic Water Control Valve utilizes the unique N.M.M.P. (No Moving Mechanical Parts) design. The only moving part when the **Inbal** Valve operates, is the reinforced sleeve which forms a drip-tight seal with the corrosion resistant core. The **Inbal** design also prevents false operation due to transient surges in water supply pressure. The N.M.M.P. design and variety of materials and coatings make the **Inbal** Automatic Water Control Valve ideally suitable for use with brackish or sea water similar to those found in chemical and petrochemical facilities or in offshore platforms. It can also be used as a foam concentrate control valve in foam/water systems.

The **Inbal** Automatic Water Control Valve series 700D is available in sizes 1½" (40 mm) to 12" (300 mm). The valves have threaded, flanged, or wafer inlet and outlet ends.

Technical Data

Approvals

The **Inbal** Automatic Water Control Valve is FM approved to 300 psi (21 bar) in sizes 3", 4", 6", and 8" (80, 100, 150, and 200 mm). Consult the FM Approval Guide for acceptable applications.
Inbal Deluge Valves have Lloyd's, DNV, and ABS TypeApprovals for all sizes and most models.

Model Numbers

Inlet End	*Outlet End*	*Model No.*
Threaded	Threaded	711D
Flanged	Flanged	733D
Wafer	Wafer	799D

Sizes

Threaded End:
1½", 2", 2½", & 3"(40, 50, 65, & 80 mm).
Flanged End:
2", 2½", 3", 4", 6", 8", 10", & 12" (50, 65, 80, 100, 150, 200, 250, & 300 mm).
Wafer End:
3", 4", 6", 8", 10", & 12" (80, 100, 150, 200, 250, & 300 mm).

End Standards

Threaded End:
NPT or BSPT.
Flanged End:
ANSI B16.5 class 150 & 300 ;
ISO 7005 - PN10, 16 & 25 ;*
BS 10 Table D & E ;**
AS 2129 Table D & E ;**
Jis B 2212, 2213, 2214 ;**
Wafer End:
Fits all above standards.**

** Compatible with DIN 2501 and BS 4504.*
** Exclude:
BS 10 Table E 6" (150 mm);
AS 2129 Table E 6" (150 mm);
Jis B2212 regular flange in sizes 4", 8", &12" (100, 200, & 300 mm).

Pressure Rating

Maximum working pressure*: 300 psi (21 bar). Minimum Working Pressure: 20 psi (1.5 bar).

** Standard material valve.*

Temperature Range

Water: Max. +150°F (+65°C).

Installation Position

Vertical or horizontal.

Materials

Standard

Valve Housing:
Carbon Steel (SAE 1021).
Valve Ends:
Ductile Iron (ASTM A536 65-45-12).
Sleeve:
SMR5 Elastomer reinforced with Polyester and Kevlar.

Optional

Cast Steel ;
Bronze ;
Nickel Aluminium Bronze ;
Stainless Steel AISI 316 ;
Super Austenitic Stainless Steel ;
Super Duplex Stainless Steel ;
Titanium.

Coating

Standard

Powder epoxy coated. Thickness: 0.004" (0.1 mm) external and internal surfaces.

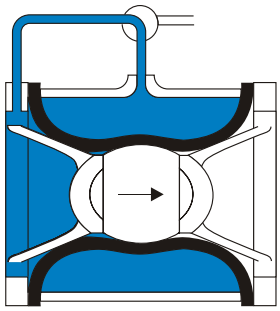
Optional

High built epoxy coated and polyurethane finish. Thickness: 0.01" (0.3 mm).
Halar® coated. Thickness: 0.02" (0.5 mm).

Halar ® is a registered trade mark of Ausimont USA Inc.

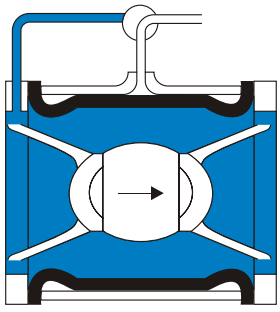
Features

- The **Inbal** Valve, designed for control valve service from basic concepts, utilizes a built-in sleeve actuator.
- No Moving Mechanical Parts (N.M.M.P.) construction ensures a long life of dependable operation, reducing the cost of maintenance.
- The N.M.M.P. Design assures frictionless operation. No sticking after staying for prolonged periods in a closed position. Suitable for brackish and sea water.
- Quick, yet soft opening performance - eliminates water hammer and consequent damage.
- The line pressure or an equivalent independent operating pressure, is sufficient to close the **Inbal** Valve tightly.
- Soft closure performance due to inherent characteristics of the **Inbal** Valve. Utilizes no spring to ensure surge-free closing.
- Pressure rating of 300 psi (21 bar) for standard materials valve due to rigid construction.
- Suitable for vertical or horizontal installation with no effect on **Inbal** Valve performance.
- Lightweight - easy to be installed and maintained.
- Available with threaded, flanged, and wafer ends to various standards.
- Unique principle of operation prevents false operations due to water surges.
- Wide range of sizes for an ideal system design.
- Compact design - minimum space for valve and trim. Enable installation in confined spaces.
- Epoxy coating supplied as standard-ensures excellent corrosion resistance.
- Variety of available materials - to ensure corrosion-free service even under severe conditions.
- Compatible with electric, pneumatic, and/or hydraulic release.
- Excellent regulating performance in a wide range of flows and line pressures.
- Wide selection of pilot valves, actuators, and accessories to design the ideal control valve for the purpose.
- A single **Inbal** Automatic Water Control Valve can perform multi-function controls.
- Every single valve is hydraulically tested in real flow and pressure conditions.
- Innovative design with a long record of proven performance.



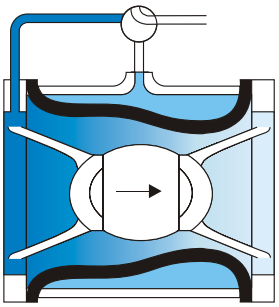
Tight closing operation
When pressure from the valve inlet (or an equivalent independent operating pressure) is applied to the Control Chamber, the **Inbal** *Valve closes drip tight. The fabric sleeve safely envelopes the resilient sleeve giving full support.*

Figure (1)



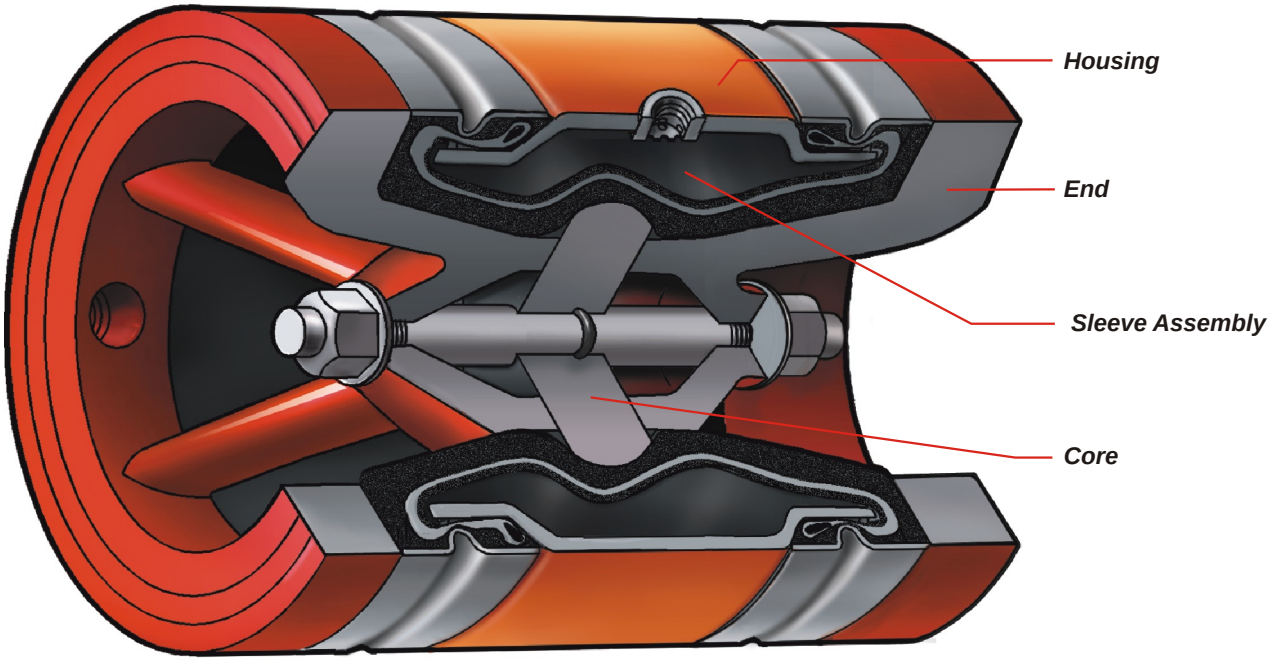
Full open operation
When pressure in the Control Chamber is relieved to the atmosphere, the **Inbal** *Valve opens wide. The sleeve assembly is safely enveloped by the housing.*

Figure (2)



Modulating action
A stable throttling position is obtained when a quantity of pressurized fluid is held in the Control Chamber. It is the amount of fluid in the Control Chamber that determines the position of the sleeve assembly. The Control Chamber can be alternately filled or exhausted to achieve the desired operating condition.

Figure (3)



Operation

The Control Chamber of the **Inbal** Automatic Water Control Valve is the annular space between the valve Housing and the Sleeve. The valve is held in a closed position as long as inlet pressure is maintained in the Control Chamber.

In the set position, the water pressure is transmitted from the upstream through the valve trim to the Control Chamber, and the **Inbal** Valve stays closed. Actuation of the valve by a manual, hydraulic, pneumatic, or electric release system allows venting of the pressure in the **Inbal** Valve Control Chamber, and the valve opens wide, permitting a flow of water to the piping system. When a pressure or flow control is added, the Control Chamber is monitored to modulate a preset delivery pressure, maximum inlet pressure, or flow rate.

The principle of operation is illustrated in Figures (1) through (3). The nominal pressure losses are shown in Graph (1).

Installation

Refer to the Trim Chart applicable to the specific **Inbal** Valve model in use.

1. When the **Inbal** Valve is delivered, carefully unpack and visually check that there has been no damage to the operating components, piping, and fittings.
2. The **Inbal** Valve must be installed in an area not subject to freezing conditions.
3. Always flush the pipelines before installing the valve.
4. Place the **Inbal** Valve in the piping in the outlet of the Water Supply Valve. Verify that the arrow on the valve housing matches the actual flow direction. The **Inbal** Valve may be installed in any position. Determine which side the valve will be accessed from and locate all the components accordingly.
5. Install the **Inbal** Valve in the piping system. Refer also to the applicable Installation Guide.
   Threaded End Valve - connect the female threaded ends of the **Inbal** Valve to the male threads of the piping. Use the pipe joint compound sparingly on the male threads only.
   Flanged End Valve - connect with bolts and nuts, the valve flanges to the existing flanges in the piping system, using gaskets in between. Complete bolting with uniform tightening.
   Wafer End Valve - Install the **Inbal** Valve between the piping flanges. Place gaskets between the valve ends and the pipe flanges. Insert four of the stud bolts, 90° apart around the valve, through the bolt sleeves and the pipe's flanges, and tighten with nuts. Complete bolting with uniform tightening.
6. Complete the trim assembly by connecting the preassembled sections, or assemble the trim if ordered in loose component form. Refer to the applicable Trim Chart and Installation Guide.
7. The pressure supply to the trim must always be sourced from either inlet of Water Supply Valve or **Inbal** Valve upstream, through a ½" pipe.
8. Exhaust tube must be free of any back pressure. Provide an air gap between the exhaust tube and drain facility.
9. Set the **Inbal** Valve by following the applicable Resetting procedure.
10. Test the **Inbal** Valve, the trim, and alarms according to the applicable Testing procedure.

Resetting

The **Inbal** Automatic Water Control Valve system must be reset and restored to service as soon as possible after automatic, emergency, or manual actuation. Refer to the relevant bulletin for detailed procedure.

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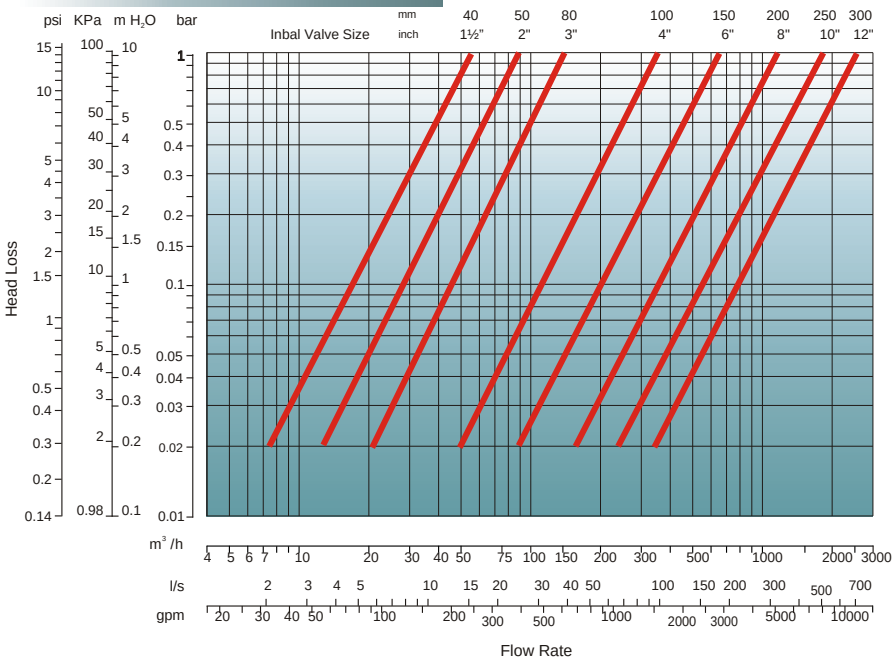
Flow Chart



Graph (1)

Maintenance, Inspection,& Testing

It is recommended that periodic inspections and tests be conducted by qualified personnel to ensure that the **Inbal** Automatic Water Control Valve and related equipment are in good operating condition. The inspection and testing activities should be done according to NFPA Standards, the guidelines and regulations of the authorities having jurisdiction, and the following instructions. It is recommended that the **Inbal** Valve be tested, operated, cleaned, and inspected on a routine basis.

A *Weekly* Visual Inspection shall include Water Supply Valve position, free pressure access, and major trim components as listed in the applicable data sheet of the specific application in which the **Inbal** Automatic Water Control Valve participates.

A *Quarterly* Testing shall include Alarm Testing, Strainer Cleaning, and major components testing as listed in the applicable data sheet of the specific application in which the **Inbal** Automatic Water Control Valve participates.

A *Semi-Annual* Testing shall include Trim Testing and/or Control Testing, as well as a Quarterly Testing as listed in the applicable data sheet of the specific application in which the **Inbal** Automatic Water Control Valve participates.

An *Annual* Testing shall include Trip Testing, Semi-Annual Testing, and Quarterly Testing as listed in the applicable data sheet of the specific application in which the **Inbal** Automatic Water Control Valve participates.

Removal

To remove the **Inbal** Valve:

1. Close all the pressure supply valves:
   a) Water Supply Valve
   b) Trim Shutoff Valve.
2. Open the Emergency Release Valve to release the water pressure from the **Inbal** Valve Control Chamber.
3. Open the drain valves to allow all the water to drain.
4. Remove the trim from the **Inbal** Valve.
5. Remove the **Inbal** Valve from the line for inspection.
6. To reinstall, follow the Installation procedure section (use new gaskets for flanged or wafer valve).

Flow Factor

The Flow Factor Cv (Kv) is defined as the flow rate in gpm (m^3/h) of liquid at 68^0F (20^0c), flowing at 1 psi (1bar) head loss.

Valve Size		Flow Factor	
mm	inch	Kv	Cv
40	1½"	60	70
50	2"	90	105
80	3"	140	162
100	4"	330	383
150	6"	610	708
200	8"	1150	1334
250	10"	1630	1891
300	12"	2365	2743

Table (1)

To define the head loss through an **Inbal** valve at a specific flow rate use the following equation (for water only):

$$DP = \left(\frac{Q}{Kv}\right)^2 \qquad DP = \left(\frac{Q}{Cv}\right)^2$$

DP = Head loss in bar. DP = Head loss in psi.

Q = Flow rate in m^3/h. Q = Flow rate in gpm.

Kv = Flow factor. Cv = Flow factor.

Use Table (1)

Control Chamber Displacement

Valve Size		Displacement	
mm	inch	liter	U.S. gallon
40	1½"	0.3	0.08
50	2"	0.3	0.08
80	3"	0.3	0.08
100	4"	0.5	0.13
150	6"	1.7	0.45
200	8"	3.5	0.92
250	10"	8.1	2.1
300	12"	12.7	3.4

Table (2)

Inquiries/Orders

The Data Sheet For Inquiries/Orders (bulletin F01-05-01) should be submitted.