Diaphragm Automatic Hydraulic Valves

PLASTIC IDROMEMBRANA® VHF Very High Flow

(Nylon) (PVC)

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The **IDROMEMBRANA® VHF** plastic valve, manufactured in Italy by **TECNIDRO,** they are designed specifically for all agricultural irrigation and gardening applications.

The line of IDROMEMBRANA® valves assures:
- extreme facility of installation
- sensible reduction of maintenance operations
- long life in open field
- excellent compromise quality/price

The technical denomination of this line of valves is Diaphragm Automatic Hydraulic as:
- the opening, the closing and the main flow regulation operate by means of the water in pressure available in the same pipe (for the maneuvers do not require external energy sources);
- the control and the regulation act automatically on the main flow by means of the hydraulic control circuits;
- they modulate the flow by the movement of an elastic and waterproof closing element (diaphragm) that guarantees the total watertightness adapting to the valve seat.

The diaphragm design and the high hydrodynamic profile of the iron body it confers to the product a greater water passage regarding other typologies of valves, which results in a sensible minimization of pressure losses.
The closing by diaphragm offers a totally free section that does not constitutes obstacle to possible solid bodies that can obstruct the water passage.

The plastic materials (body in PVC or Nylon and covers in reinforced Nylon), used in substitution the traditional metallic, they confer to the product an excellent resistance in relation to the pressures, maintaining a very limited weight. The same materials also assure the total protection against corrosion and major resistance to chemical agent (like fertilizers, oils, chlorine, etc.).

The basic valves bodies can be equipped with several control options to satisfy all operations conditions that are in irrigation systems.
These options include remote hydraulic control, control by electrical solenoids, pressure reduction, pressure sustaining, pressure relief and combinations of the previous functions.

The line of VHF IDROMEMBRANA® valve is designed for a maximum pressure of 10.0 bar (PN10) and offers a great variety of measures and models that allow the selection of the most suitable product for any exigency of installation.

OPERATION PRINCIPLE

IDROMEMBRANA® valves operate by means of a system of closing and modulation very simple and efficient.

In the valve interior three components are lodged only: the diaphragm (4), the spring (5) and the support (6).

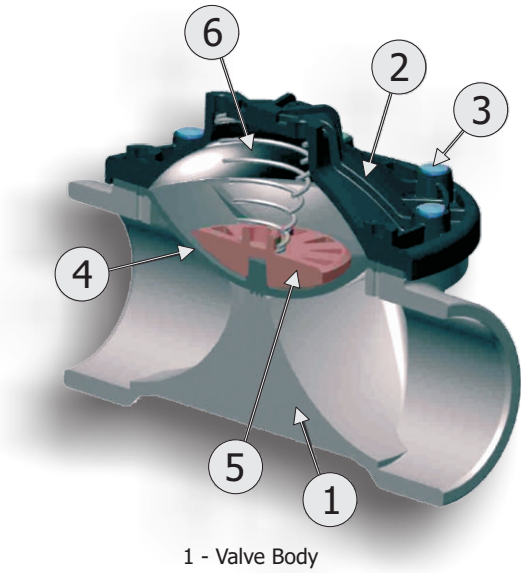
The diaphragm is realized in natural rubber (NR) and internally reinforced rubber with double nylon tissue .
Each model and vale diameter can be equipped with different diaphragmss and springs, to the aim to optimize performances regarding the operation pressure and the required hydraulic applications.
In each diaphragm the referring data are permanently noticeable, the material, the hardness and the manufacture reference number, visibles without disassembling the cover.

The stainless steel spring, frustum of cone designed, contribute to the closing phase of the valve and it helps to maintain the diaphragm centered in the seat.

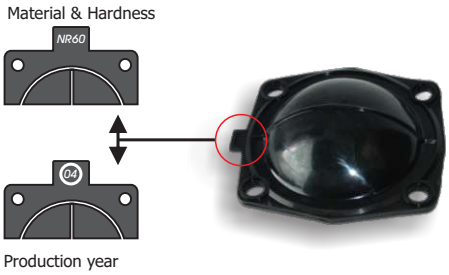
The spring superior extremity is restrained by the internal cover lodging, while the inferioir extremity is fixed to the diphragm by means of support.

In order to accede to the internals parts of the valve it is sufficient to disassemble the cover screws, without removing the valve from the pipeline.

All operations of disassembling and replacement of internal parts must be carried out without pressure in the line.



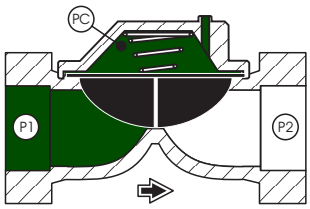
1 - Valve Body
2 - Cover
3 - Screws
4 - Diaphragm
5 - Support
6 - Spring



OPENING, CLOSING AND REGULATION

P1 Upstream pressure
P2 Downstream pressure
PC Chamber pressure
Flow direction

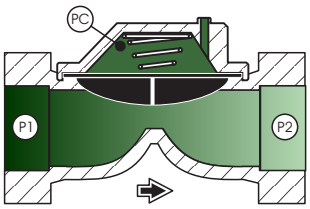
VALVE CLOSED



PC=P1>P2

For its operation, the valve requires a hydraulic circuit that controls the entrance and the exit of water to the camera.
Pressure PC exerts its force on the internal surface of the membrane that is greater from the external surface where the P1 pressure acts.
Thanks to this difference of active surfaces, when the pressure of the water in the camera (PC) above equals or exceeds the value pressure waters (P1), the valve closes the step totally.

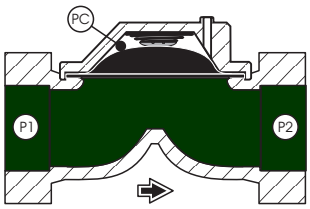
VALVE MODULATING



P1>PC>P2

By means of a regulation pilot the pressure can be controlled enla camera, determining an intermediate position of the membrane finalized to the regulation of the requerridos hydraulic parameters (pressure, volume or both).
When the pressure in the camera (PC) balances with the average value of the existing pressure in the valve ([P1+P2] ÷2), the membrane stays in an intermediate position with respect to its total route.

VALVE OPEN



P1≅P2 PC=0

Isolating the circuit of feeding and putting the camera to the atmosphere, the membrane rises and leaves to the open step totalemnte.
When the pressure in the camera (PC) is equal to zero, the force exerted by the pressure waters above (P1) is able to compress the means and to raise the membrane totally.
In this position, the pressure when coming out of the valve (P2) will be equal to the inlet pressure (P1) except the lost ones from load determined by the instantaneous cuadal.

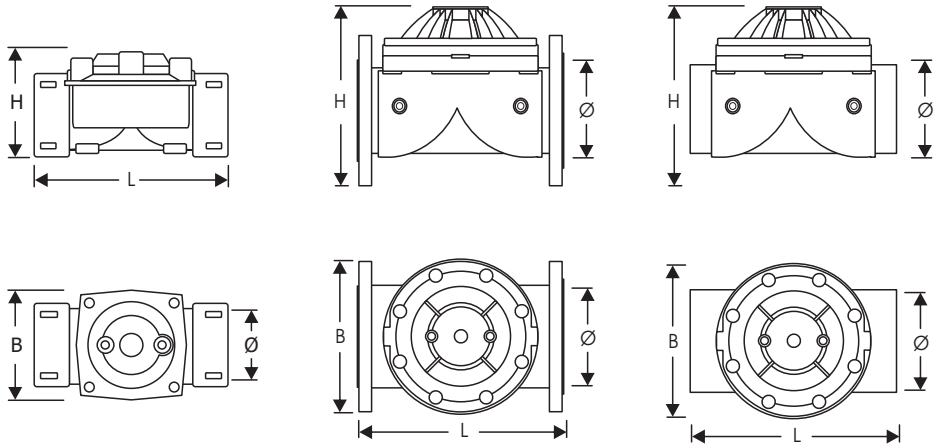
BASIC VALVE RANGE

The IDROMEMBRANA® VHF valve line offers a great measures and models variety that allow to select the most suitable product for any installation exigency.

The basic models of valves are different by:
- diameter and type of connections to the pipe (threads, solvent cement, flanges)
- connection standards (ISO, ANSI, etc…)
- inner section step

In the table below the characteristics of standard valves models availables are listed.
The models with flanged connection they are available on demand.

		Nylon	PVC							
		Thread NPT - BSP	Weld ISO - ASTM	Flanged ANSI150 ISO PN16/10	Dimentions and weights				Recommended Flow	
Ø	Mod.				L (mm)	H (mm)	B (mm)	P (Kg)	ON-OFF (m³/h)	REG. (m³/h)
1"½	1"½ BSP	●			175	120	122	0.9	40	80
	1"½ NPT	●								
2"	2" BSP	●			175	120	122	0.9	40	80
	2" NPT	●								
	63 ISO		●							
	63 ASTM		●							
3"	3"A BSP	●			260	140	115	1.0	48	95
	3"A NPT	●								
	90R ISO		●							
	90R ASTM		●							
	3"F BSP	●			345	227	280	3.2	80	160
	3"F NPT	●								
	90 ISO		●							
	90 ASTM		●							
4"	4"F BSP	●			345	227	280	3.3	96	192
	4"F NPT	●								
	110 ISO		●							
	110 ASTM		●							
	4"F PN10			●	480	227	280	3.9	96	192
	4"F ANSI			●						



DIAMETERS SELECTION

The internal valve body hydrodynamic profile and the section variations they generate a located pressure drop, that consists in a diminution of the pressure value between inlet and outlet.
The loss generated by the valve it is directly proportional to the flow speed that crosses it and it is increased growing the instantaneous flow (Flow = [speed] x [section]).
Each model of valve is characterized by a own pressure loss curve represented in the below Pressure Drops diapgram.

Pratically hydraulic networks common design usually admit a pressure drop between 0.20 and 0.25 bar for valves destined to On-Off function and between 0.5 and 0.8 bar for regulation valves.
In order to chose the correct diameter and model of valve it is needed to know the water volume that usually passes in the valve and the required hydraulic function.

The selection of the most opportune model of basic valve is fundamental to obtain the best services of the valve once installed.
In this sheet there are outlined the steps that lead to the individuation of valve correct as two criteria of selection:
- from a size of the pipeline already correctly dimensioned
- from a value of well-known wealth

Example:
In a water distribution irrigation network it is required to install a pressure reducing valve that admits an instantaneous flow rate of 90 m³/h (25 l/s).

1. Identify the required volume of 90 m³/h in the horizontal axis of the Pressure drops diagram.
2. Individuate those curves of loss that cross the line of the 90 m³/h and that are into the superior dark green colour zone (Regulation) or in the inferior light green colour zone (On-Off).
3. In this example the optimal diameters that are suitable to the required function are diameters Ø3"A and Ø3"F.
4. The right diameter optimal for the Reduction function it results to be Ø3"A, that allows to install a valve very small and cheaper, assuring in the mean time the required flow in the installation.
5. In the case that the same valve is required for On-Off applications, it is opportunes that the pressure drops are reduced to the minimum. The selected diameter has to be greater, selecting in this example the diameter Ø3" F.

Pressure Drops Diagram
(Values measured with cold water and valve totally opened)