TECNIDRO®

Diaphragm Automatic Hydraulic Valves

IDROMEMBRANA® Metallic Series

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The cast iron **IDROMEMBRANA®** valves, 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 internal and external valve surfaces are protected by a epoxic special polyester coating specific against corrosion.

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 valve line IDROMEMBRANA® offers a great variety of dimensions and models that allow to selecti the most suitable product for any installation exigency.

OPERATION PRINCIPLE

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

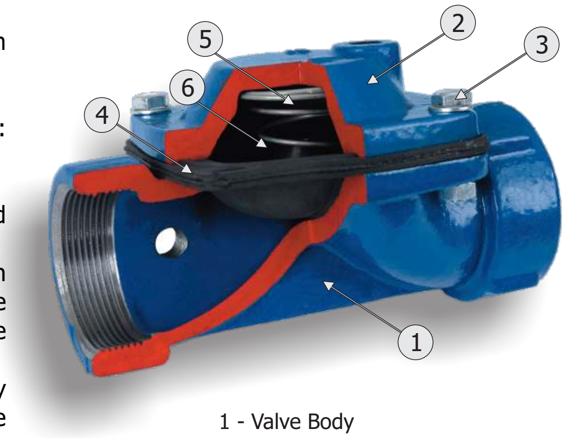
In the valve interior three components are lodged only: the diaphragm (4), the spring (5) and the support (6).

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.

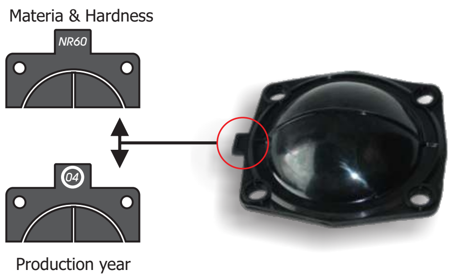
The stainless steel spring, frustum of cone designed, contribute to the closing phase of the valve and it helps to maintain the diaphragm centered in the seat.

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.



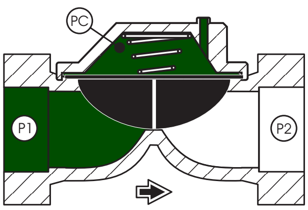
1 - Valve Body
2 - Cover
3 - Screws
4 - Diaphragm
5 - Support
6 - Spring



OPENING, CLOSING AND REGULATION

P1 Upstream pressure
P2 Downstream pressure
PC Chamber pressure
Flow direction

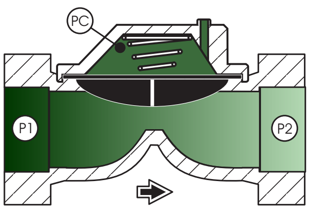
VALVE CLOSED



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.

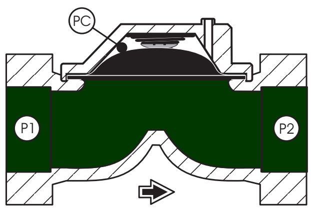
VALVE MODULATING



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.

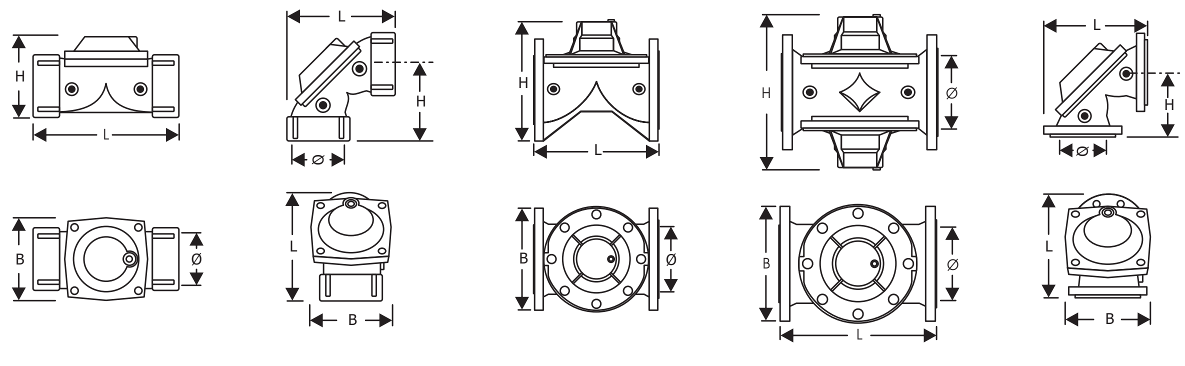
BASIC VALVE RANGE

La linea della valvola IDROMEMBRANA® offre grandi misure e modelli la varietà che concedono selezionare il prodotto più adatto per tutta l'esigenza dell'installazione.

I modelli di base delle valvole sono differenti vicino:
- forma del corpo (linea o tipo di angolo)
- diametro e tipo di collegamenti al tubo (flangia, fili, victaulic, ecc…)
- norme del collegamento (iso, ANSI, ecc…)
- punto interno della sezione

Nella tavola sotto le caratteristiche dei modelli standard delle valvole i availables sono elencati.
I modelli con il collegamento victaulic ed altri modelli derivati dalla norma sono su richiesta disponibile.

		Thread NPT - BSP		Flange ANSI150 ISO PN16/10		Dimentions & weights				Reccomended flow	
Ø	Mod.					L (mm)	H (mm)	B (mm)	P (Kg)	ON-OFF (m³/h)	REG. (m³/h)
1"	1"	●				116	50	70	1.5	12	25
1"1/4	1"1/4	●				175	100	120	4.1	30	60
1"1/2	1"1/2	●				175	100	120	3.7	33	65
2"	2"	●				175	100	120	3.5	40	80
	2"E		●			128	90	120	4.0	44	90
	DN 50			●		175	165	165	7.5	40	80
2"1/2	2"1/2	●				200	115	120	4.5	48	95
	DN 65			●		175	165	165	7.5	48	95
3"	3"A	●				205	115	120	5.8	48	95
	3"C	●				230	135	165	8.0	70	150
	DN 80P			●		220	200	200	11.0	70	150
	3"E		●			188	139	150	9.0	75	160
	DN 80E				●	220	120	200	12.0	75	160
	3"F	●				285	170	210	15.0	85	170
	DN 80			●		280	200	210	18.5	85	170
4"	DN100P			●		220	220	220	13.0	90	180
	4"F	●				300	170	210	17.0	95	195
	DN100E				●	245	135	220	14.0	100	200
	DN 100			●		300	220	220	20.5	95	195
5"	DN 125			●		325	250	250	24.5	110	210
6"	DN 150			●		350	320	320	46.0	190	375
8"	DN 200			●		400	340	340	50.0	210	425
10"	DN 250			●		450	470	405	90.0	350	700
12"	DN 300			●		500	500	460	135.0	450	900
14"	DN 350			●		550	520	520	155.0	750	1.600
16"	DN 400			●		600	580	580	170.0	900	1.800
20"	DN 500			●		700	680	680	195.0	1.000	2.000



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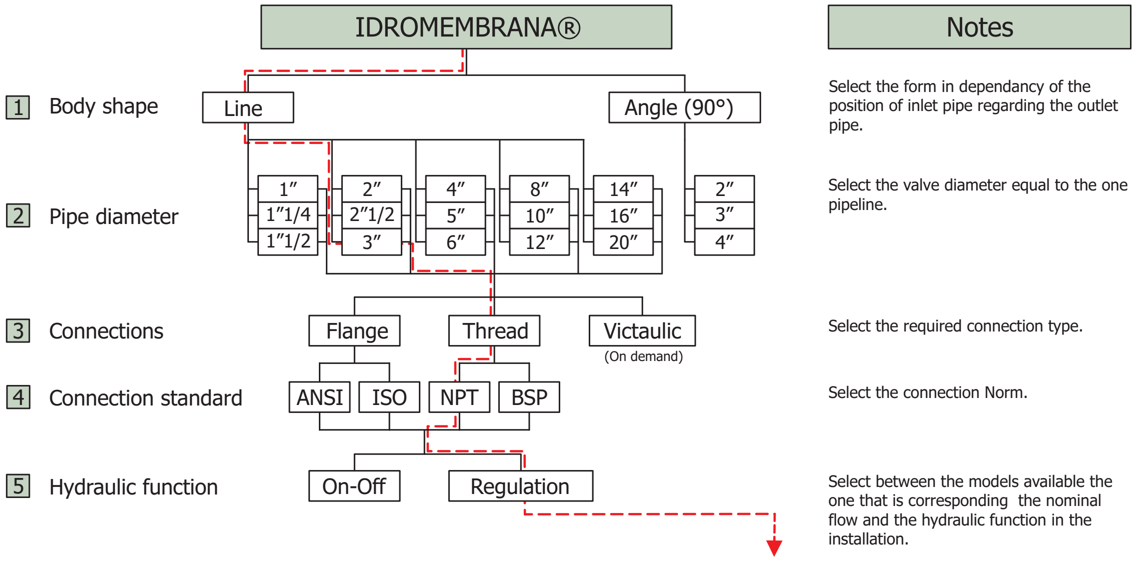
DIAMETER SELECTION

The selection of the more suitable basic valve model it is essential to obtain the best performancess from the valve itself once installed.
In this leaf are outlined the steps that induce to identify the correct valve accordingly two differents selection criteria:

- A - from a diameter of a pipe already fixed
- B - from a well-known value of flow

A Selection from the Pipe Diameter



Ø	Mod.	Thread (NPT - BSP) – Line	Thread (NPT - BSP) – Angle	Flange (ANSI150, ISO PN16/10) – Line	Flange (ANSI150, ISO PN16/10) – Angle	Reccomended flow ON-OFF (M³/h)	Reccomended flow REG. (M³/h)
1″	1″	●				12	25
1"1/4	1"1/4	●				30	60
1"1/2	1"1/2	●				33	65
2″	2″	●				40	80
	2″E		●			44	90
	DN 50			●		40	80
2″1/2	2"1/2	●				48	95
	DN 65			●		48	95
3″	3"A	●				48	95
	3"C	●				70	150
	DN 80P			●		70	150
	3"E		●			75	160
	DN 80E				●	75	160
	3"F	●				85	170
	DN 80			●		85	170
4″	DN100P			●		90	180
	4"F	●				95	195
	DN100E				●	100	200
	DN 100			●		95	195
5″	DN 125			●		110	210
6″	DN 150			●		190	375
8″	DN 200			●		210	425
10″	DN 250			●		350	700
12″	DN 300			●		450	900
14″	DN 350			●		750	1.600
16″	DN 400			●		900	1.800
20″	DN 500			●		1.000	2.000

B Selection regarding the Flow

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.

Example:
In a water distributionirrigation network it is required to install a pressure reducing valve that admits an instantaneous volume of 80 m³/h (22 l/s).

1 Identify the required volume of 80 m³/h in the horizontal axis of the Pressure drops diagram.

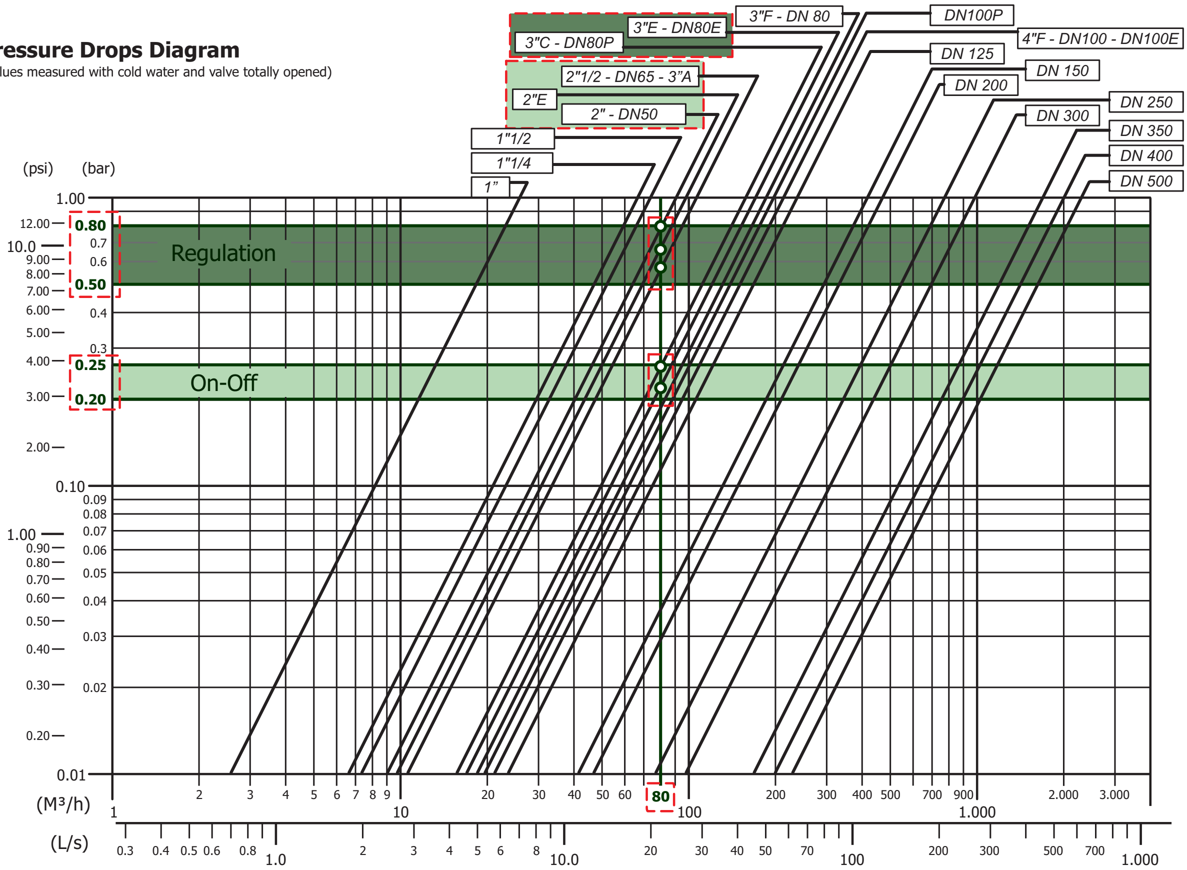
2 Identify those losses curves that cross the 80 m³/h line and that are into the superior green colour band (Regulation).
In this example the required function is identified by the following diameters:
- Ø 2" (mod. 2" threaded and DN50 in line flanged and mod. 2" threaded angle type)
- Ø 2" 1/2 (mod. 2" 1/2 thread and DN65 in line flanged)
- Ø 3" (mod. 3" threaded with connection of 3" and reduced body 2" 1/2 in line)

3 The optimal diameter results to be the Ø 2" 1/2, that offers a good compromise loss/volume and that can hold higher volumes in the eventuality of a future extension in the controlled hydraulic network. Nevertheless, the diameter Ø2" is too close the upper limit of the advised rank and can be too fit for this installation.

4 Once determined the optimal diameter it is necessary to select the more suitable model of valve accordingly to its constructive characteristics, this means:
- the body shape (in line or angle) regarding the reciprocal positions of the inlet and outlet pipes ;
- the connection type (threaded, flanged or other) based on the necessity to install other contiguous equipments or to easly remove the valve from the pipe.

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 diameters that were selected will have to be increased, having to falll inside the respective green band "On-Off".
The selection will take place between the models 3" C, DN80P, 3"E and DN80E using the same above criteriato select the more suitable shape and connection type.

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



DIAPHRAGMS SELECTION

IDROMEMBRANA® basic valves are designed in class PN16, to work in a very extensive pressures ranges, up to a maximum pressure of 16.0 bar (232.0 psi).
In mostly applications, the pressure value available before the valve is sufficiently high (normally superior to 2,0-3,0 bar), but it is also frequent to have installations where the pressure available it is lower.
These cases are typical of installations that do not require high pressures or where the power plant (pumping) it estimates a cost proportional the given pressure.
For these reasons Tecnidro proposes for each model of valve two different s diaphragms:

- standard diaphragm for standardspressures (type ST)
- smooth diaphragm for low pressures (LP type).

To each diaphragm a spring is always associated, whose characteristics change accordingly to the pressures.
The compatibility of diaphragms and springs with the different models of basic valves and the respective ranges of pressure are synthesized in the below table.
It is advisable to use only the smooth diaphragms for on-off applications or very slight pressure regulations, while it is advisable to maintain the standard diaphragm for all the otherregultion applications.

NOTE: - The minimum pressure value corresponds to the necessary pressure to obtain the total opening of the valve. As the valve stays totally open, this minimal condition must subsist in dynamics, that is in the presence of flow.

Mod.	Type	DIAPHRAGMS		SPRINGS		P min		P max	
		Code	[Sh]	Code	[Ø]	[bar]	[psi]	[bar]	[psi]
1″	ST	RIMMEM070NR50	50	-	-	0.8	11.6	16.0	232.0
1″1/4 - 1″1/2 - 2″ - 2″E	LP	RIMMEM113NR40	40	RIMMOL0203020	20	0.6	8.7	6.0	87.0
2″1/2 - 3″A - DN50 - DN65	ST	RIMMEM113NR60	60	RIMMOL0203020	20	1.5	21.7	16.0	232.0
3″C - 3″E	LP	RIMMEM150NR50	50	RIMMOL030C045	45	0.9	13.0	6.0	87.0
DN80P - DN80E - DN100P	ST	RIMMEM150NR60	60	RIMMOL030C045	45	1.5	21.7	16.0	232.0
3″F - 4″F - DN80	LP	RIMMEM200NR50	50	RIMMOL8010050	50	0.7	10.2	6.0	87.0
DN100 - DN100E - DN125	ST	RIMMEM200NR70	70	RIMMOL8010060	60	1.7	24.6	16.0	232.0
DN150 - DN200	LP	RIMMEM294NR50	50	RIMMOL1520050	50	0.7	10.2	6.0	87.0
	ST	RIMMEM294NR70	70	RIMMOL1520080	80	1.4	20.3	16.0	232.0
DN250 - DN300	LP	RIMMEM380NR50	50	RIMMOL2540080	80	0.8	11.6	6.0	87.0
DN350 - DN400 - DN500 (*)	ST	RIMMEM380NR70	70	RIMMOL2540100	100	1.4	20.3	16.0	232.0

(*) The valves of DN350, DN400 and DN500 take to double diaphragm and means, one by each cover.

The below diagram allows to individuate the most appropriate diaphragm quickly.

Pressures ranges