



Rev. 03/2023

## **RINOXPLUS M E RINOXPLUSSMART M**

Membrane pressure reducer with inspectionable internal cartridge and filter.

# RINOXPLUS M E RINOXPLUSSMART M

Membrane pressure reducer with inspectionable internal cartridge and filter.

**+** Reduce the fluid pressure to optimal values

Inspectionable and easily interchangeable internal cartridge

Removable filter

For heating and sanitary systems with upstream pressure not higher than 16 bar



**kiwa**  
IT-TD-Ki0413  
KIP-087598



## PRODUCTION RANGE

### PRESSURE REDUCER WITH INSPECTIONABLE CARTRIDGE RINOXPLUS M

Code	Size	Connection	P <sub>max</sub> upstream	P <sub>downstream</sub> adjustable	P <sub>pre-calibration</sub>
2848.04.00	G 1/2"	FF UNI-EN-ISO 228	25 bar [2500 kPa] (cold water 40°C) 16 bar [1600 kPa] (hot water 80°C)	0,8÷7 bar [80÷700 kPa]	3 bar 300 [kPa]
2848.05.00	G 3/4"	FF UNI-EN-ISO 228	25 bar [2500 kPa] (cold water 40°C) 16 bar [1600 kPa] (hot water 80°C)	0,8÷7 bar [80÷700 kPa]	3 bar 300 [kPa]
2848.06.00	G 1"	FF UNI-EN-ISO 228	25 bar [2500 kPa] (cold water 40°C) 16 bar [1600 kPa] (hot water 80°C)	0,8÷7 bar [80÷700 kPa]	3 bar 300 [kPa]
2848.07.00	G 1 1/4"	FF UNI-EN-ISO 228	25 bar [2500 kPa] (cold water 40°C) 16 bar [1600 kPa] (hot water 80°C)	0,8÷7 bar [80÷700 kPa]	3 bar 300 [kPa]
2848.08.00	G 1 1/2"	FF UNI-EN-ISO 228	25 bar [2500 kPa] (cold water 40°C) 16 bar [1600 kPa] (hot water 80°C)	0,8÷7 bar [80÷700 kPa]	3 bar 300 [kPa]
2848.09.00	G 2"	FF UNI-EN-ISO 228	25 bar [2500 kPa] (cold water 40°C) 16 bar [1600 kPa] (hot water 80°C)	0,8÷7 bar [80÷700 kPa]	3 bar 300 [kPa]

\* Compliant with EN 1567 and certified Kiwa.




\*\* ACS conformity "Attestation de Conformité Sanitaire" (France) according to DGS/SD7A n°571 of 25/11/2002

## PRODUCTION RANGE

### PRESSURE REDUCER WITH INSPECTIONABLE CARTRIDGE AND CALIBRATION KNOB RINOXPLUSSMART M

Code	Size	Connection	P <sub>max</sub> upstream	P <sub>downstream</sub> adjustable	P <sub>pre-calibration</sub>
2909.04.00	G 1/2"	MM UNI-EN-ISO 228 union	25 bar [2500 kPa] (cold water 40°C) 16 bar [1600 kPa] (hot water 80°C)	0,8÷7 bar [80÷700 kPa]	3 bar 300 [kPa]
2909.05.00	G 3/4"	MM UNI-EN-ISO 228 union	25 bar [2500 kPa] (cold water 40°C) 16 bar [1600 kPa] (hot water 80°C)	0,8÷7 bar [80÷700 kPa]	3 bar 300 [kPa]
2909.06.00	G 1"	MM UNI-EN-ISO 228 union	25 bar [2500 kPa] (cold water 40°C) 16 bar [1600 kPa] (hot water 80°C)	0,8÷7 bar [80÷700 kPa]	3 bar 300 [kPa]
2909.07.00	G 1 1/4"	MM UNI-EN-ISO 228 union	25 bar [2500 kPa] (cold water 40°C) 16 bar [1600 kPa] (hot water 80°C)	0,8÷7 bar [80÷700 kPa]	3 bar 300 [kPa]
2909.08.00	G 1 1/2"	MM UNI-EN-ISO 228 union	25 bar [2500 kPa] (cold water 40°C) 16 bar [1600 kPa] (hot water 80°C)	0,8÷7 bar [80÷700 kPa]	3 bar 300 [kPa]
2909.09.00	G 2"	MM UNI-EN-ISO 228 union	25 bar [2500 kPa] (cold water 40°C) 16 bar [1600 kPa] (hot water 80°C)	0,8÷7 bar [80÷700 kPa]	3 bar 300 [kPa]
On request	G 1/2"	FF UNI-EN-ISO 228	25 bar [2500 kPa] (cold water 40°C) 16 bar [1600 kPa] (hot water 80°C)	0,8÷7 bar [80÷700 kPa]	3 bar 300 [kPa]
On request	G 3/4"	FF UNI-EN-ISO 228	25 bar [2500 kPa] (cold water 40°C) 16 bar [1600 kPa] (hot water 80°C)	0,8÷7 bar [80÷700 kPa]	3 bar 300 [kPa]
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On request	G 2"	FF UNI-EN-ISO 228	25 bar [2500 kPa] (cold water 40°C) 16 bar [1600 kPa] (hot water 80°C)	0,8÷7 bar [80÷700 kPa]	3 bar 300 [kPa]

## SPARE PARTS / ACCESSORIES

	Code	Suitable for measurement	Degree of filtration	Description
	8167.003	1/2" – 3/4"	800 micron	Removable internal cartridge complete with filter
	8201.003	1"	800 micron	Removable internal cartridge complete with filter
	8202.003	1"1/4	800 micron	Removable internal cartridge complete with filter
	8203.003	1"1/2 – 2"	800 micron	Removable internal cartridge complete with filter
	7367.005	1/2" – 3/4"	800 micron	Removable filter
	7387.005	1"	800 micron	Removable filter
	7401.005	1"1/4	800 micron	Removable filter
	7403.005	1"1/2 – 2"	800 micron	Removable filter
	1213.005	-	-	Radial pressure gauge ø 50. Full scale: 0 ÷ 16 bar. Connection: 1/4"

### DESCRIPTION

The **RBM RinoxPlus M pressure reducers** are membrane pressure reducers **with inspectionable and easily interchangeable internal cartridge, complete with removable filter.**

The cartridge is a compensated seat: upstream pressure variations do not affect the adjustment of the downstream pressure.

In addition, the **RinoxPlusSmart M reducer** is equipped with a graduated knob to carry out the calibration, without the use of a pressure gauge and tools.

### THE PURPOSE

The main purpose of the **RinoxPlus M** and **RinoxPlusSmart M** pressure reducers is to reduce the fluid pressure to optimal values, constantly below the maximum allowed in order to avoid damaging the utilities placed downstream of the reducer.

### THE USE

**RinoxPlus M** and **RinoxPlusSmart M** are **adjustment parts and not for safety.** For this purpose, provide the system with the appropriate safety devices.

They are particularly suited to be used in the plumbing, heating and sanitary systems. In particular, they are indicated for the final reduction of the pressure to the utility.

### THE CHOICE

**RinoxPlus M** and **RinoxPlusSmart M** pressure reducers re intended to be used in the plumbing, heating and sanitary systems with upstream pressure not higher than 16 bar.

The pressure reducer is pre-set in the factory with a output pressure adjustment: P = 3 bar (300 kPa).

The correct choice of number of pressure reducers necessary for the pressure reduction is important to avoid cavitation.

These phenomena, in fact, create an excessive noise in the reducer, with consequent problems for the utilities and possible damage of the reducer itself.

For this reason, please refer to the dedicated section inside the technical data sheet for the optimal choice of the number of reducers in relation to the pressure variation to be obtained.

## MAINTENANCE INTERVENTIONS

Before carrying out any maintenance operation, shut off the reducer.

For the replacement, control and cleaning of the reducer, simply unscrew the cap and remove the internal cartridge, which contains all the mobile parts and consumables.

When replacing the cartridge the reducer goes back to being like new.

It is possible to remove the filter from the cartridge to carry out cleaning or replacement.

During these operations, the body remains installed on the system.



- 1 Cap
- 2 Diaphragm
- 3 Internal cartridge
- 4 Filter
- 5 Reducer body

## CONSTRUCTION FEATURES

<b>Body</b>	DZR Brass (CR) CW602N
<b>Metal internal components</b>	DZR Brass (CR) CW602N *
<b>Internal cartridge</b>	POM
<b>Filter</b>	AISI 302
<b>Rod</b>	DZR Brass (CR) CW602N
<b>Seals</b>	Elastomer
<b>Exterior plastic parts</b>	Nylon 6 with 30% fibreglass
<b>Pressure gauge holder connection</b>	F G 1/4"

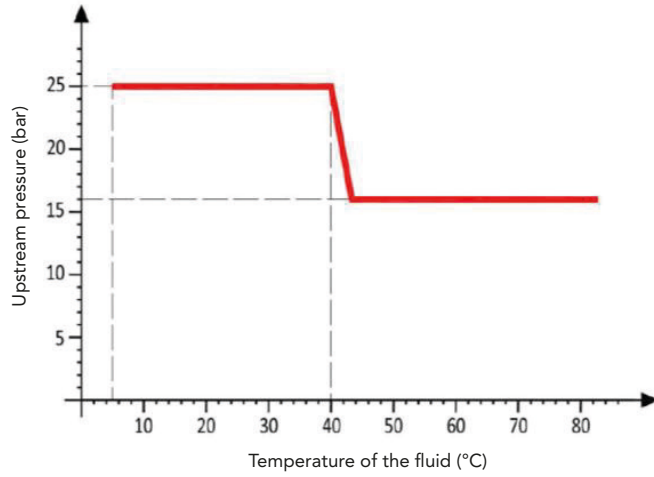
\* All the internal components water contact made of DZR Brass (CR) CW602N

## TECHNICAL FEATURES

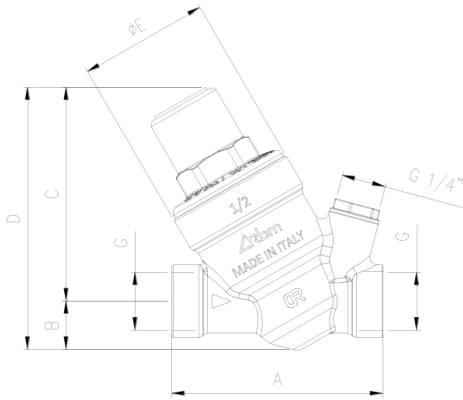
<b>Compatible fluid</b>	Water
<b>Nominal pressure</b>	PN25 (cold water 40°C) / PN16 (hot water 80°C) *
<b>Maximum upstream pressure</b>	25 bar (cold water 40°C) / 16 bar (hot water 80°C) *
<b>Adjustable downstream pressure</b>	0.8÷7 bar (80÷700 kPa)
<b>Default presetting</b>	3 bar (300 kPa)
<b>Thread</b>	FF UNI-EN-ISO 228 / MM UNI-EN-ISO 228 union (depending on the model)
<b>Maximum operating temperature</b>	80 °C

\* For more details please see section "Maximum upstream pressure related to the temperature" reported in this technical sheet.

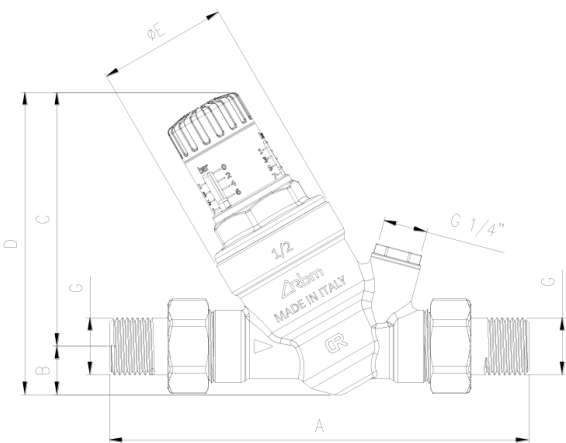
## MAXIMUM UPSTREAM PRESSURE RELATED TO THE TEMPERATURE



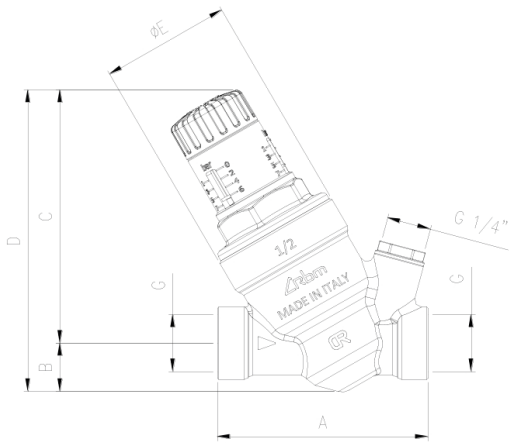
## DIMENSIONAL FEATURES



Code	Size	A [mm]	B [mm]	C [mm]	D [mm]	Ø E [mm]
2848.04.00	1/2"	75,0	18,0	76,0	94,0	46,0
2848.05.00	3/4"	78,0	16,0	77,0	93,0	46,0
2848.06.00	1"	103,0	25,0	115,0	140,0	61,0
2848.07.00	1" 1/4	115,0	27,0	119,0	146,0	61,0
2848.08.00	1" 1/2	119,0	28,0	125,0	153,0	61,0
2848.09.00	2"	131,0	34,0	127,0	161,0	61,0



Code	Size	A [mm]	B [mm]	C [mm]	D [mm]	Ø E [mm]
2909.04.00	1/2"	139,0	17,1	90,9	108,0	46,0
2909.05.00	3/4"	151,0	19,1	91,9	111,0	46,0
2909.06.00	1"	182,0	23,8	134,2	158,0	61,0
2909.07.00	1" 1/4	197,0	29,8	138,2	168,0	61,0
2909.08.00	1" 1/2	215,0	37,0	144,0	181,0	61,0
2909.09.00	2"	241,0	47,0	146,0	193,0	61,0



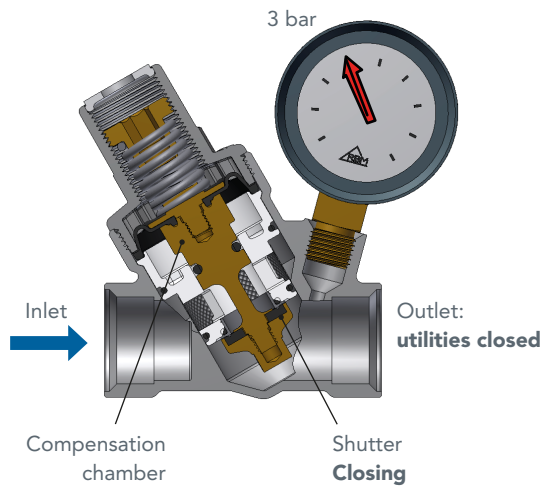
Code	Size	A [mm]	B [mm]	C [mm]	D [mm]	Ø E [mm]
On request	1/2"	75,0	17,1	90,9	108,0	46,0
On request	3/4"	78,0	19,1	91,9	111,0	46,0
On request	1"	103,0	23,8	134,2	158,0	61,0
On request	1" 1/4	115,0	29,8	138,2	168,0	61,0
On request	1" 1/2	119,0	37,0	144,0	181,0	61,0
On request	2"	131,0	47,0	146,0	193,0	61,0

## OPERATION

The **RinoxPlus M** and **RinoxPlusSmart M** pressure reducers base their operation on the balance between the counter-strength of the spring with the thrust carried out by the pressure of the fluid on the

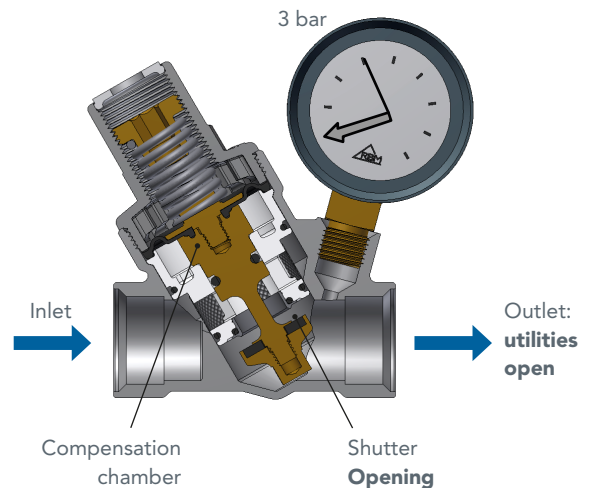
shutter. The spring, in fact, tends to open the shutter of the reducer, while the pressure on the surface of the membrane tends to close the shutter itself.

### PRESSURE STOPPED AT THE ADJUSTMENT VALUE OF 3 BAR



When the utilities to be served are closed, the downstream pressure increases by pushing the membrane of the reducer to the bottom. In this way, the shutter closes the passage section of the reducer, while maintaining the pressure constant at the calibration value, set on the spring; the minimum pressure difference existing across the shutter allows, in fact, the perfect closure of the latter.

### PRESSURE DROP: $P < 3 \text{ BAR}$



With the opening of the downstream utilities, the pressure exerted on the membrane is less in favour of the force exerted by the spring on the shutter allowing its opening with the consequent fluid passage. The higher the water request by the utility mains, the more the pressure on the membrane decreases and the greater will the water passage be.

## PRESSURE REDUCER CALIBRATION



The final calibration of the pressure reducer must be carried out with the hydraulic circuit completely full and with all utilities closed, otherwise values would be affected by the fact that, during the possible supply, the downstream pressure decreases in relation to the amount of required flow.

The pressure reducer is calibrated by acting on the inner ring nut, turning it clockwise increases the value, turning it anti-clockwise decreases it.

### Calibration operations:

- Close the shut-off valve downstream of the pressure reducer.
- Calibrate the pressure reducer by acting with the appropriate wrench depending on the models.
- The calibration operation is to be considered complete when the pressure gauge shows the desired pressure.



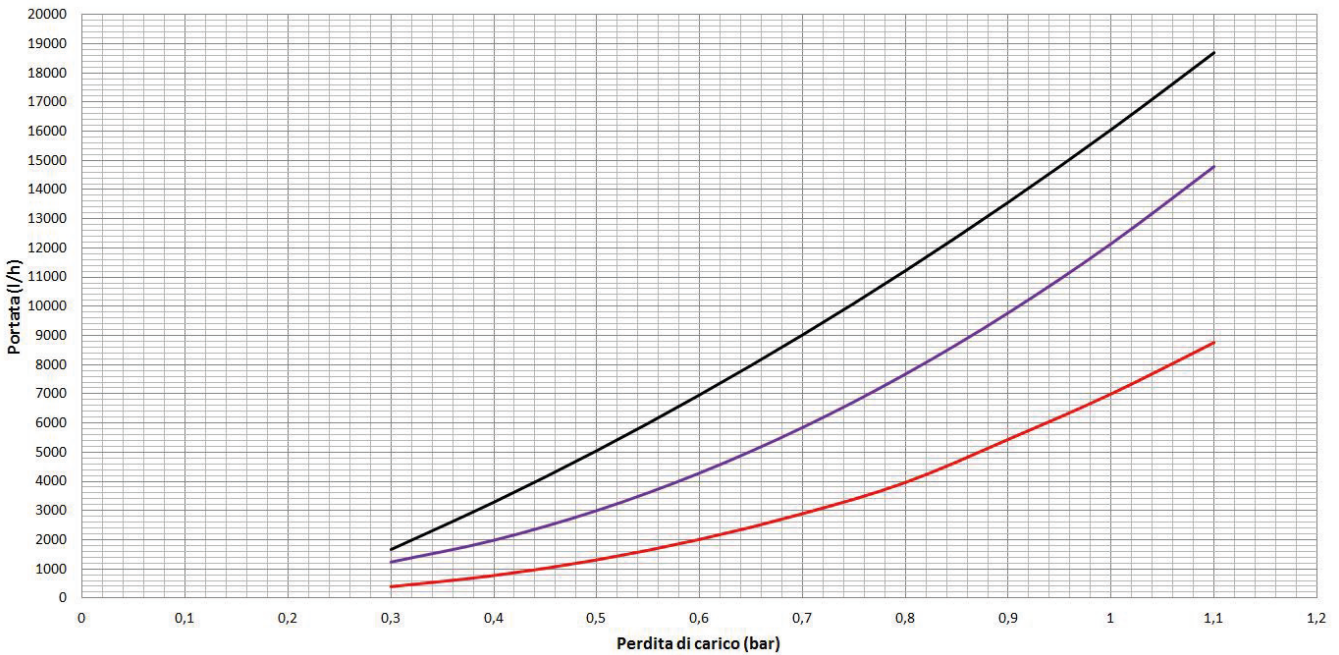
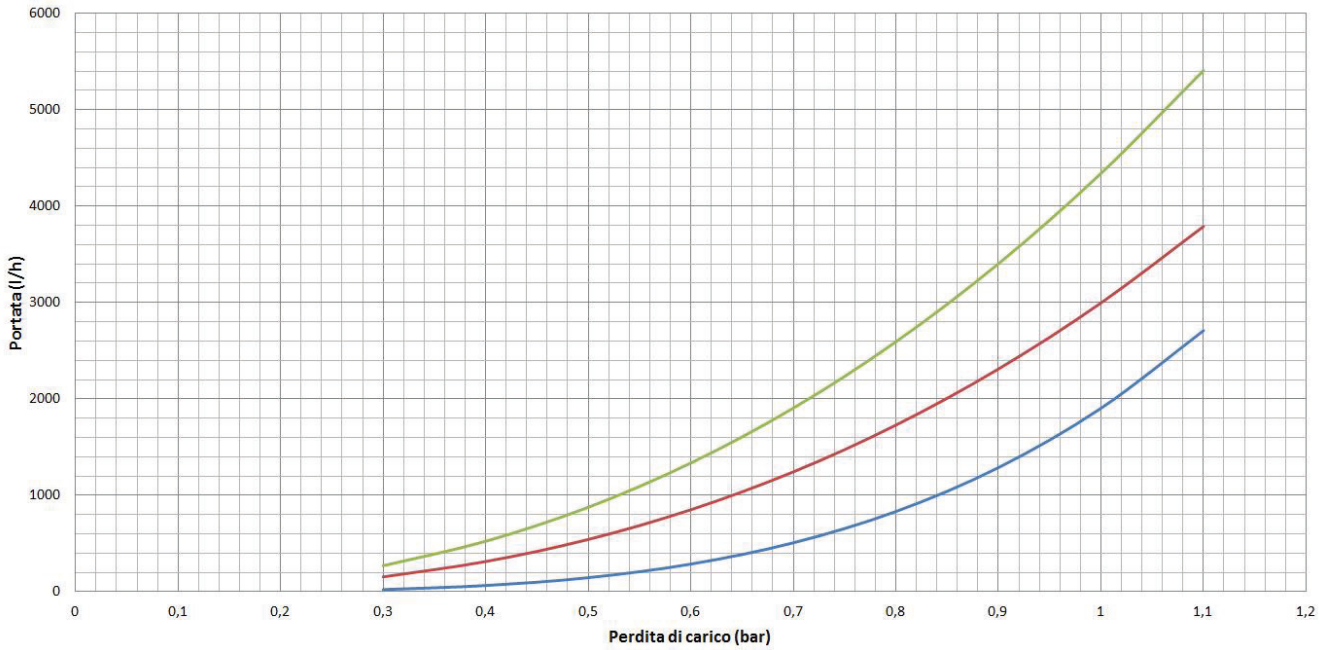
**WARNINGS:** Perform some discharge manoeuvres to check the stability of the calibration.

With the system operational, the pressure read on the pressure gauge may be distorted by the overpressure of the thermal system, a possible correction must always be carried out with the system shut down and at ambient temperature.



## FLUID DYNAMICS FEATURES

### Load losses diagram



Graphics realised with the condition defined by Standard EN 1567

**(Upstream pressure: 8 bar - Downstream pressure: 3 bar)**

**NOTE** the project flow rate, it is possible to detect the loss of pressure.

#### READING THE DIAGRAM::

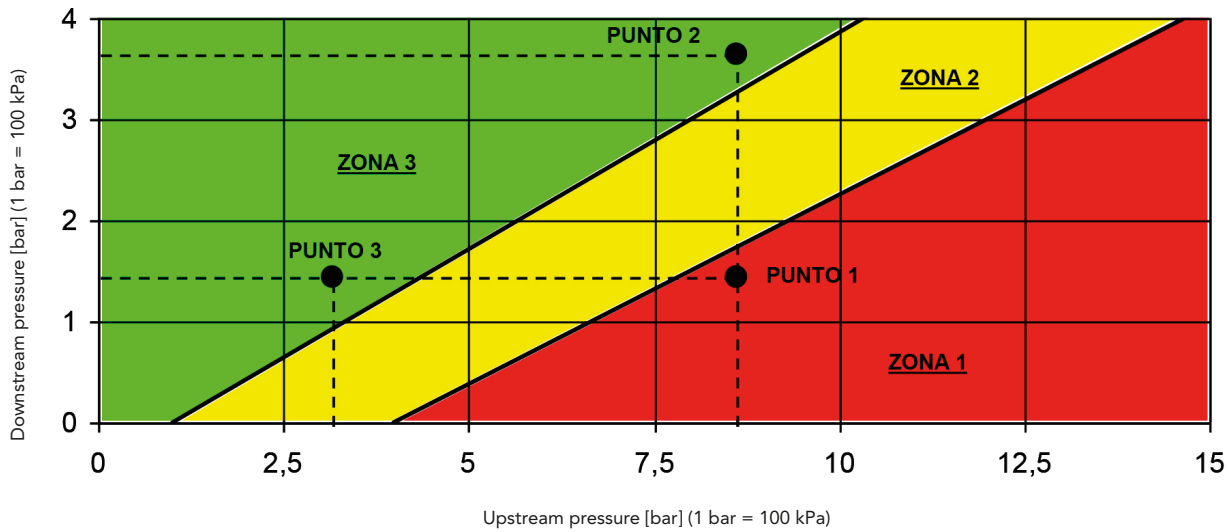
The diagram of the pressure reducer pressure drops shows the pressure drop based on the flow rate at the utilities outlet.

**Example:** Consider the 3/4" pressure reducer with pre-calibration pressure equal to  $P = 3$  bar (300 kPa) and hypothesise a flow rate  $Q =$

1300 l/h, at utility outlet. The diagram shows that for this flow rate  $Q$ , the pressure value is  $P_1 = 0.7$  bar (70 kPa). The pressure gauge on the pressure reducer reads the following pressure value  $P_0 = 3 - 0.7 = 2.3$  bar (300 - 70 = 230 kPa), which represents the utility outlet pressure value.

## DIMENSIONING OF THE PRESSURE REDUCER

**Cavitation diagram\***



In order to avoid cavitation and therefore excessive noise of the component, it is recommended to dimension the number of pressure reducers required for a certain pressure drop as described in the "CAVITATION DIAGRAM".

The cavitation diagram shows three areas of operation of the pressure reducer depending on the upstream and downstream pressures:

- **ZONE 1: Malfunction zone.** The cavitation phenomena are clearly visible and present inside the reducer: avoid operating the reducer at these pressures.
- **ZONE 2: Critical zone.** It highlights the possible creation of cavitation inside the reducer. We advise against operating the reducer within this range of pressure values.
- **ZONE 3: Zone of operation.** The reducer works in optimal conditions and does not recess. The range of pressure values is optimal for the operation of the reducer.

In order to avoid cavitation phenomena, it is recommended to run the reducer inside ZONE 3 and, also, avoid that the ratio between the upstream maximum pressure and the downstream adjustment pressure

re of the reducer exceeds the value of 2.5.

### DIMENSIONING

You wish to run a reducer within the following pressure values:

- P upstream:  $P_M = 8.5$  bar
- P downstream:  $P_V = 1.5$  bar

As you may notice from the diagram (POINT 1), at these operating pressure values, the pressure reducer meets certain cavitation phenomena.

To avoid these phenomena, and taking into account that the ratio between the upstream maximum pressure and the downstream adjustment pressure must not exceed the value of 2.5, you can introduce a second pressure reducer in series, in order to obtain the same pressure drop through two distinct pressure jumps.

The possible solution, therefore, is to use two pressure reducers in series, that must both work in ZONE 3 of the diagram, split the pressure difference on two reduction stages, with a pressure ratio not over 2.5.

### POSSIBLE SOLUTION:

#### Pressure reducer A [POINT 2]:

- P upstream:  $P_{MA} = 8.5$  bar
- P downstream:  $P_{VA} = 3.5$  bar

**Pressure ratio:**  $8.5/3.5 = 2.4 < 2.5$

#### Pressure reducer B [POINT 3]:

- P upstream:  $P_{MB} = 3.5$  bar
- P downstream:  $P_{VB} = 1.5$  bar

**Pressure ratio:**  $3.5/1.5 = 2.3 < 2.5$

**N.B.: The pressure downstream of the reducer must never be greater than the maximum operating pressure of the components, which are downstream of the reducer itself, in order to avoid damage or malfunctioning.**

The cavitation of the pressure reducer can be checked, as well as by acting on the pressure difference, also by selecting an optimal value

of the speed of fluid passing through it.

It is advisable, therefore, to choose the diameter of the pressure reducer so that the speed of the fluid going through it, is contained within the following values:

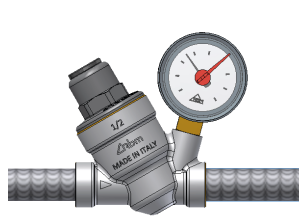
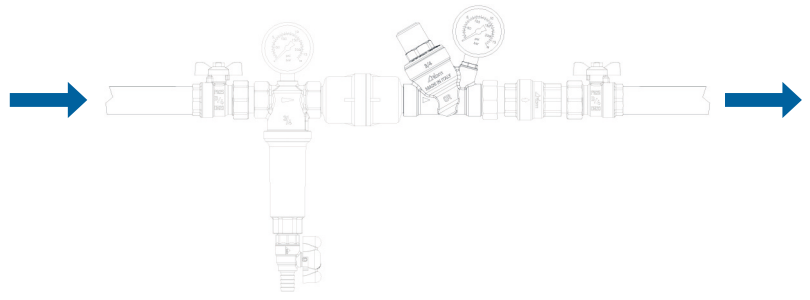
- **Per water:**  $V = 0.7 \div 1.5$  m / s (residential use)  
 $V = 1 \div 3.5$  m / s (industrial use)

\* **N.B: The cavitation diagram has the sole purpose of supplying the technician with a quick reference to match the chosen component with a given system size. The values shown in the table are not binding and therefore do not represent the performance limits of the components.**

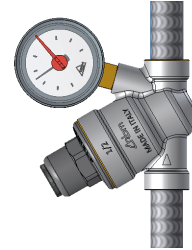
## ASSEMBLY

### ASSEMBLY PRECAUTIONS:

- Always install a filter upstream of the system.
- Carry out the routine maintenance of the filters.
- Follow the direction indicated by the flow direction arrow located on the body.
- Use shut-off valves to allow any maintenance work.
- Clean the pipes upstream and downstream of the pressure reducer to avoid damage.
- The reducer can be mounted horizontally and vertically.












OK



OK

## MAIN COMPONENTS THAT CAN BE USED WITH RINOXPLUS M PRESSURE REDUCER

Code	Description
 <b>3.03÷13.00, 3.03÷13.10, 3.03÷09.70, 3.03÷13.20</b>	Line filter with removable filtering cartridge. Max. operating pressure: 16 bar. Thread UNI-EN-ISO 228. Filtering capacity from 800 µm to 50 µm.
 <b>858.04÷09.12, 858.04÷09.02, 858.04÷09.72</b>	Y-filter with removable filtering cartridge. Max operating pressure: 16 bar. Thread UNI-EN-ISO 228. Filtering capacity from 800 µm to 100 µm.
 <b>126.03÷13.10</b>	Self-cleaning filter for water with removable filtering cartridge, complete with dial pressure gauge and discharge ball valve with hose connection. Max. operating pressure: 16 bar. Thread UNI-EN-ISO 228. Filtering capacity 100 µm.
 <b>Series 929, 930, 931, 959, 1041, 1156, 1171, 1172, 1173, 1200, 1201, 1215, 6059, 6062, 6065, 6068, 6071, 6074</b>	Spare cartridge for line, Y, self-cleaning filters.
 <b>304.04÷13.00</b>	Magnetic water softener for physical treatment of water. Max. operating pressure: 16 bar. Thread UNI-EN-ISO 228.
 <b>67.04÷07.02, 67.04÷07.12</b>	Full bore ball valve for water, butterfly handle operated, MF connections. Thread UNI-EN-ISO 228.
 <b>67.05.70, 67.06.70, 67.05.00, 67.06.00</b>	Full bore ball valve for water, butterfly knob operated, MF connections with OR seal fitting. Thread UNI-EN-ISO 228.
 <b>72.04÷09.00, 72.06.50</b>	Three-piece MM joint straight fitting. Max. operating pressure: 10 bar. Thread UNI-EN-ISO 228.
 <b>1100.05.00, 1100.06.00</b>	Three-piece MM straight joint fitting with OR seal on connections. Max. operating pressure: 10 bar. Thread UNI-EN-ISO 228.

## SPECIFICATION ITEMS

### SERIES 2848

Adjustable pressure reducer, membrane operated plywood, model **RinoxPlus M**. Inspectionable and easily interchangeable internal cartridge, complete with removable filter. Anti-dezincification brass body (CR). Seals in elastomer. Threaded connections FF UNI-EN-ISO 228. Pressure gauge holder connection F 1/4". Max upstream pressure of 25 bar (cold water 40 °C) 16 bar (hot water 80°C). Adjustable downstream pressure 0.8 ÷ 7 bar. Max operating temperature 80°C. Filtering grade 800 µm. Available sizes 1/2" ÷ 2".

### SERIES 2909

Adjustable pressure reducer, membrane operated plywood, with calibration knob, model **RinoxPlusSmart M**. Inspectionable and easily interchangeable internal cartridge, complete with removable filter. Anti-dezincification brass body (CR). Seals in elastomer. MM Threaded union connections UNI-EN-ISO 228. Pressure gauge holder connection F 1/4". Max upstream pressure of 25 bar (cold water 40°C) 16 bar (hot water 80°C). Adjustable downstream pressure 0.8 ÷ 7 bar. Max operating temperature 80 °C. Filtering grade 800 µm. Available sizes 1/2" ÷ 2".

### SERIES XXXX (On request)

Adjustable pressure reducer, membrane operated plywood, with calibration knob, model **RinoxPlusSmart M**. Inspectionable and easily interchangeable internal cartridge, complete with removable filter. Anti-dezincification brass body (CR). Seals in elastomer. MM Threaded connections FF UNI-EN-ISO 228. Pressure gauge holder connection F 1/4". Max upstream pressure of 25 bar (cold water 40°C) 16 bar (hot water 80°C). Adjustable downstream pressure 0.8 ÷ 7 bar. Max operating temperature 80°C. Filtering grade 800 µm. Available sizes 1/2" ÷ 2".

*RBM spa reserves the right to improve and change the described products and related technical data at any moment and without prior notice: always refer to the instructions attached with the supplied components; this sheet is an aid, should the instructions be extremely schematic. Our technical office is always at your disposal for any doubt, problem or explanation.*

#### RBM Spa

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