Rev. 09/2009

# SELF-CLEANING FILTER

# SELF-CLEANING FILTER

## PRODUCTION RANGE

| Code | Connections | Standard Mesh [µm] | Filter surface [cm²] | Size | Kv [m³/h] |
|---|---|---|---|---|---|
| **126.03.10** | THREADED FF UNI-EN-ISO 228 | 100 | 52,28 | 3/8" | 1,80 |
| **126.04.10** | THREADED FF UNI-EN-ISO 228 | 100 | 52,28 | 1/2" | 3,10 |
| **126.05.10** | THREADED FF UNI-EN-ISO 228 | 100 | 68,14 | 3/4" | 5,80 |
| **126.06.10** | THREADED FF UNI-EN-ISO 228 | 100 | 68,14 | 1" | 8,55 |
| **126.07.10** | THREADED FF UNI-EN-ISO 228 | 100 | 128,58 | 1" 1/4 | 14,85 |
| **126.08.10** | THREADED FF UNI-EN-ISO 228 | 100 | 173,28 | 1" 1/2 | 24,40 |
| **126.09.10** | THREADED FF UNI-EN-ISO 228 | 100 | 173,28 | 2" | 26,10 |
| **126.10.10** | THREADED FF UNI-EN-ISO 228 | 100 | 764,93 | 2" 1/2 | 107,80 |
| **126.11.10** | THREADED FF UNI-EN-ISO 228 | 100 | 764,93 | 3" | 120,20 |
| **126.13.10** | THREADED FF UNI-EN-ISO 228 | 100 | 764,93 | 4" | 129,00 |

## DESCRIPTION

The **RBM self-cleaning filters** are ideal to solve problems resulting from pollution due to suspended particles in the systems and to protect equipment at the end of the circuit. The range of filters available is suitable for small, medium-sized and large systems.

### OPERATION

The fluid is forced to flow through the filter cartridge mesh where it is cleaned and then goes over towards the exit.

The body of the appliance is made of a copper alloy (brass) which performs a bactericidal action when the water remains in the filter for a long time.

The impurities caught by the filter are accumulated in the bottom of the filter and remain there until the discharge valve opens and expels them.

### USE

The **RBM self-cleaning filters** are used mainly in hydraulic systems where the primary fluid is hot or cold water. They can be inserted in flanged systems.

The use of self-cleaning filters on heating and air-conditioning systems prevents the formation of sludge resulting from the separation of the mineral salts present in water coming from thermal fluid systems and in recirculation water.

### INSTALLATION

The filter must be installed with the **impurity discharge valve directed downwards** as indicated by the **direction arrow on the filter body**.

For further information, please refer to page 9 of this data sheet.

### MAINTENANCE

The filtering cartridge is made of AISI 304 stainless steel, can be regenerated and also replaced for maintenance purposes; it can also be replaced with another cartridge with a different filtering size.

The filter keeps a high performance even when the clogging reaches a level of 50%. Above this level, it needs cleaning. -

The RBM self-cleaning filters must undergo a programmed ordinary maintenance (filtering mesh replacement) approximately every 6 months.

(please refer to page 9 of this data sheet for further information).

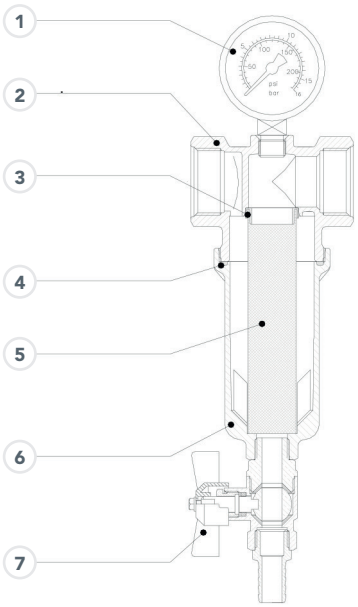
## CONSTRUCTION CHARACTERISTICS

| | |
|---|---|
| **Body** | Nickel-plated brass CW 617N UNI EN 12165 |
| **Filter holder** | Nickel-plated brass CW 617N UNI EN 12165 |
| **Filter** | AISI 304 stainless steel (UNI 6900-71) |
| **Seals** | Nitrile |
| **Threaded connections** | FF UNI-EN-ISO 228 |

## TECHNICAL CHARACTERISTICS

| | |
|---|---|
| **Max. operating pressure** | 16 bar (1600 KPa) |
| **Maximum operating temperature** | 100 °C (water) |
| **Used fluid** | water |
| **Standard filtration** | 100 µm |
| **Available filtering degree** | 100 µm - 300 µm - 800 µm |
| **Pressure gauge scale** | 0…16 bar |

## STRUCTURAL COMPONENTS




1. **Pressure gauge**
2. **Filter body**
3. **Seal ring**
4. **O-ring**
5. **Filtering cartridge**
6. **Self-cleaning holder**
7. **Valve assembly**

The **RBM self-cleaning filter** is made up of the following components:

- Filter holder with contamination discharge/drain valve;
- Filtering cartridge made of AISI 304 steel having the following characteristics:
  - Reinforced, for high pressure operation;
  - Filtering surface with a size corresponding to double the used DN section (in order to guarantee a higher cleaning performance);
  - Standard filtration degree: **100** micron; (**300** and **800** micron filter cartridge available as an accessory).
- Pressure gauge (scale 0…16 bar) for checking inlet pressure and filter obstruction.

## OPERATION PRINCIPLE

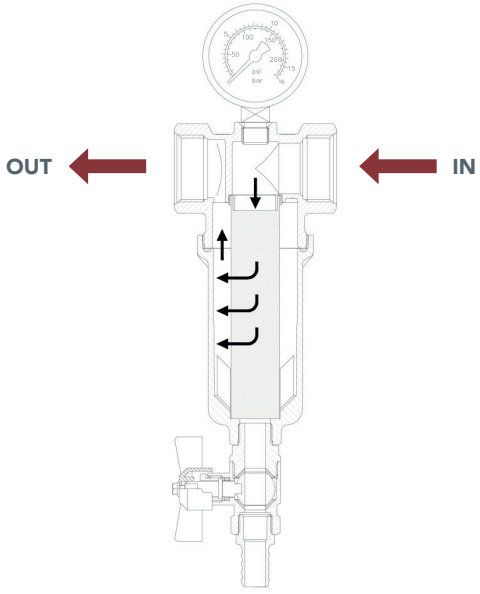
The fluid follows a set course: it is forced through the filter cartridge mesh where it is cleaned and then channelled to the exit.

Impurities caught by the filter are accumulated on the bottom of the filter until the discharge valve opens and impurities are expelled.

During this operation the outgoing liquid drags with it the impurities caught in the filter cartridge mesh and cleans its passage sections.

The pressure gauge located on the self-cleaning filter shows the input pressure and makes it possible to check if the filter cartridge is obstructed.

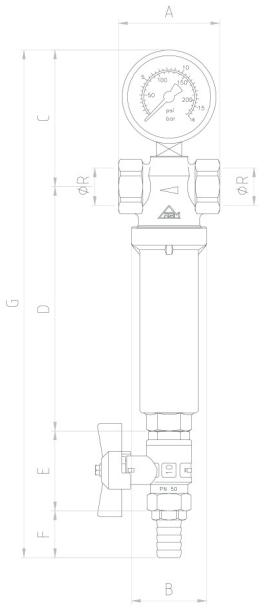
An obstruction may be present when the pressure loss indicated on the pressure gauge during use does not correspond to the value found during similar measurements taken under the same conditions.




**Scheme of the water passage inside the filter**

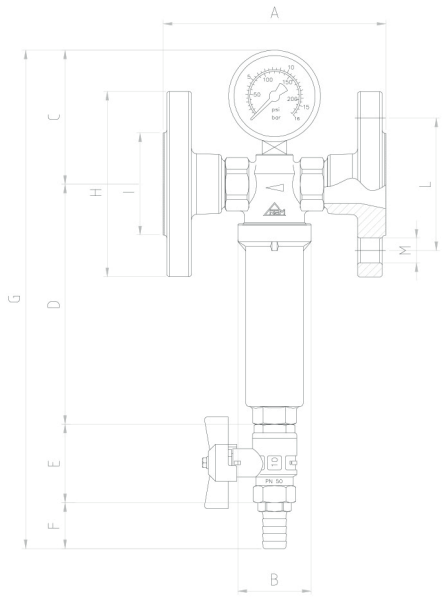
## DIMENSIONAL CHARACTERISTICS

### FF THREADED SELF-CLEANING FILTER




| Size (R) | A [mm] | B [mm] | C [mm] | D [mm] | E [mm] | F [mm] | G [mm] |
|---|---|---|---|---|---|---|---|
| 3/8" | 50 | 41,5 | 82 | 133 | 45 | 25 | 285 |
| 1/2" | 56 | 41,5 | 82 | 136 | 45 | 25 | 288 |
| 3/4" | 67 | 47 | 85 | 132 | 45 | 25 | 287 |
| 1" | 80 | 57 | 88 | 137 | 45 | 25 | 295 |
| 1" 1/4 | 92 | 68,5 | 93 | 169 | 52 | 29 | 343 |
| 1" 1/2 | 110 | 79 | 96 | 179 | 52 | 29 | 356 |
| 2" | 110 | 79 | 102 | 179 | 52 | 29 | 362 |
| 2" 1/2 | 180 | 186 | 130 | 377 | 61 | 35 | 603 |
| 3" | 188 | 186 | 130 | 377 | 61 | 35 | 603 |
| 4" | 202 | 186 | 130 | 377 | 61 | 35 | 603 |

**FLANGED SELF-CLEANING FILTER**




## PN 6 FLANGED SELF-CLEANING FILTER

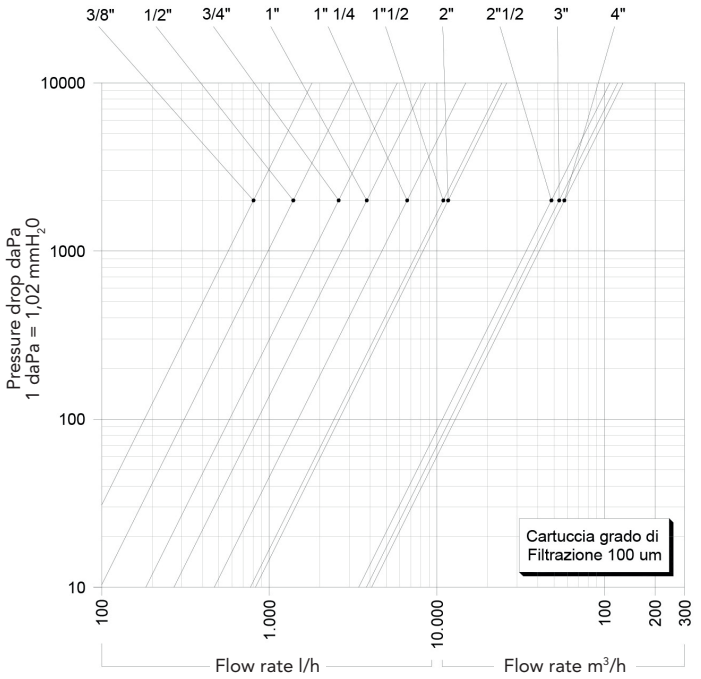
| DN | | A [mm] | B [mm] | C [mm] | D [mm] | E [mm] | F [mm] | G [mm] | H [mm] | I [mm] | L [mm] | M [mm] | No. of holes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 3/8″ | 98 | 41,5 | 82 | 133 | 45 | 25 | 285 | 75 | 35 | 50 | 11 | 4 |
| 15 | 1/2" | 104 | 41,5 | 82 | 136 | 45 | 25 | 288 | 80 | 40 | 55 | 11 | 4 |
| 20 | 3/4″ | 115 | 47 | 85 | 132 | 45 | 25 | 287 | 90 | 50 | 65 | 11 | 4 |
| 25 | 1″ | 134 | 57 | 88 | 137 | 45 | 25 | 295 | 100 | 60 | 75 | 12 | 4 |
| 32 | 1″ 1/4 | 152 | 68,5 | 93 | 169 | 52 | 29 | 343 | 120 | 72 | 90 | 14 | 4 |
| 40 | 1″ 1/2 | 170 | 79 | 96 | 179 | 52 | 29 | 356 | 130 | 82 | 100 | 14 | 4 |
| 50 | 2″ | 172 | 79 | 102 | 179 | 52 | 29 | 362 | 140 | 91 | 110 | 14 | 4 |
| 65 | 2″ 1/2 | 248 | 186 | 130 | 377 | 61 | 35 | 603 | 160 | 111 | 130 | 14 | 4 |
| 80 | 3″ | 260 | 186 | 130 | 377 | 61 | 35 | 603 | 190 | 127 | 150 | 18 | 4 |
| 100 | 4″ | 274 | 186 | 130 | 377 | 61 | 35 | 603 | 210 | 147 | 170 | 18 | 4 |

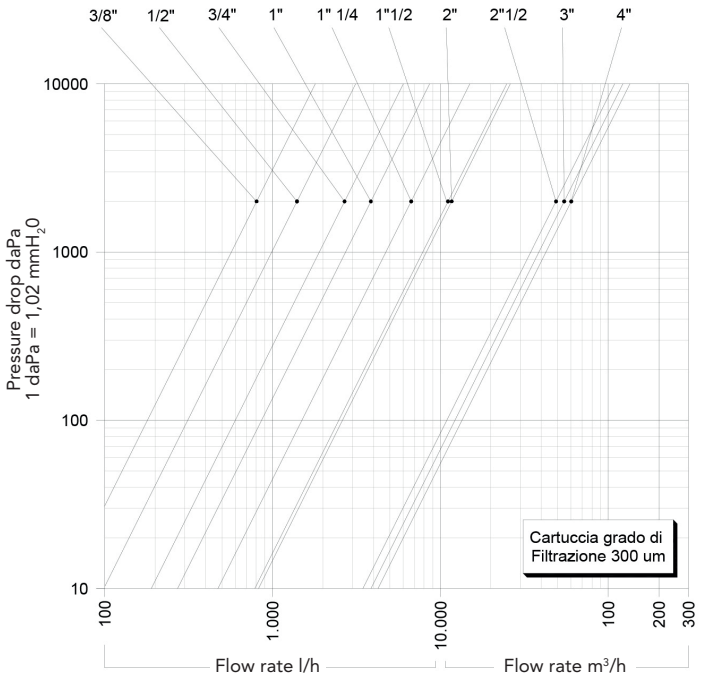
## PN 16 FLANGED SELF-CLEANING FILTER

| DN | | A [mm] | B [mm] | C [mm] | D [mm] | E [mm] | F [mm] | G [mm] | H [mm] | I [mm] | L [mm] | M [mm] | No. of holes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 3/8″ | 112 | 41,5 | 82 | 133 | 45 | 25 | 285 | 90 | 40 | 60 | 14 | 4 |
| 15 | 1/2" | 118 | 41,5 | 82 | 136 | 45 | 25 | 288 | 95 | 45 | 65 | 14 | 4 |
| 20 | 3/4″ | 133 | 47 | 85 | 132 | 45 | 25 | 287 | 105 | 58 | 75 | 14 | 4 |
| 25 | 1″ | 146 | 57 | 88 | 137 | 45 | 25 | 295 | 115 | 68 | 85 | 14 | 4 |
| 32 | 1″ 1/4 | 164 | 68,5 | 93 | 169 | 52 | 29 | 343 | 140 | 78 | 100 | 18 | 4 |
| 40 | 1″ 1/2 | 182 | 79 | 96 | 179 | 52 | 29 | 356 | 150 | 88 | 110 | 18 | 4 |
| 50 | 2″ | 186 | 79 | 102 | 179 | 52 | 29 | 362 | 165 | 102 | 125 | 18 | 4 |
| 65 | 2″ 1/2 | 260 | 186 | 130 | 377 | 61 | 35 | 603 | 185 | 122 | 145 | 18 | 4 |
| 80 | 3″ | 276 | 186 | 130 | 377 | 61 | 35 | 603 | 200 | 138 | 160 | 18 | 8 |
| 100 | 4″ | 290 | 186 | 130 | 377 | 61 | 35 | 603 | 220 | 158 | 180 | 18 | 8 |

# FLUID DYNAMIC CHARACTERISTICS

## PRESSURE DROP CHART




Analytical procedure for determining the filter size for liquids with $\rho \simeq 1$ kg/dm³

$$Kvs = Q * \left(\frac{10000}{\Delta P}\right)^{0,5}$$

suitable for water at a temperature from 0 to 30 °C

Kvs correction for fluids with ρ different from 1 kg/dm³

$$Kvs' = Kvs * \sqrt{\rho'}$$

Analytical procedure for determining the pressure drop for liquids with $\rho \simeq 1$ kg/dm³

$$\Delta P = \left(\frac{Q}{Kvs}\right)^2 \times 10.000$$

suitable for water at a temperature from 0 to 30 °C

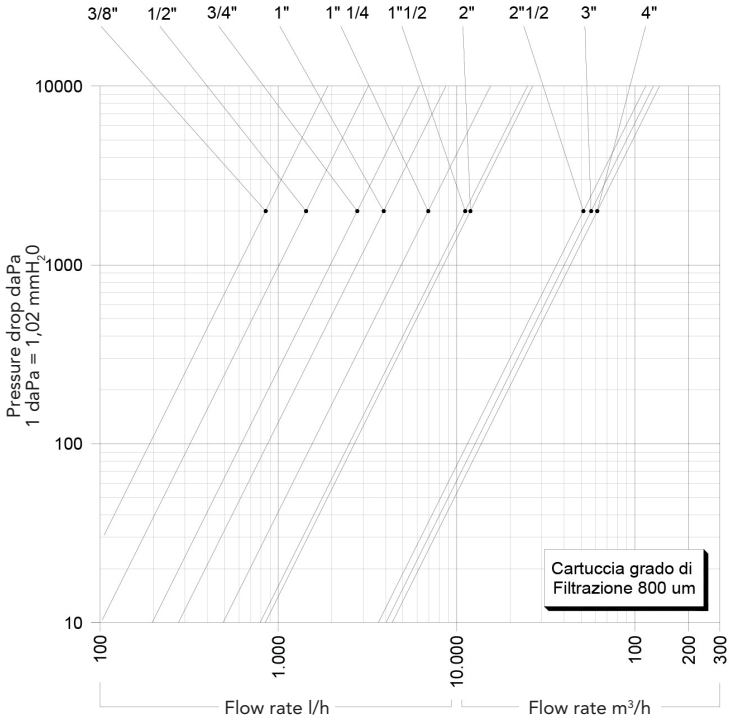
Correction of ΔP for fluids with ρ different from 1 kg/dm³

$$\Delta P' = \Delta P \times \rho'$$

## LEGEND

| | |
|---|---|
| ΔP | pressure drop in daPa (1daPa=10Pa) |
| ΔP' | corrected pressure drop in daPa (1daPa=10Pa) |
| $\Delta P_{max}$ | recommended pressure difference for correct operation |
| Q | flow rate in m³/h |
| Kvs | hydraulic characteristic value in m³/h (1m³/h=1.000 l/h) |
| ρ' | density of the liquid in kg/dm³ |

## PRESSURE DROP CHART

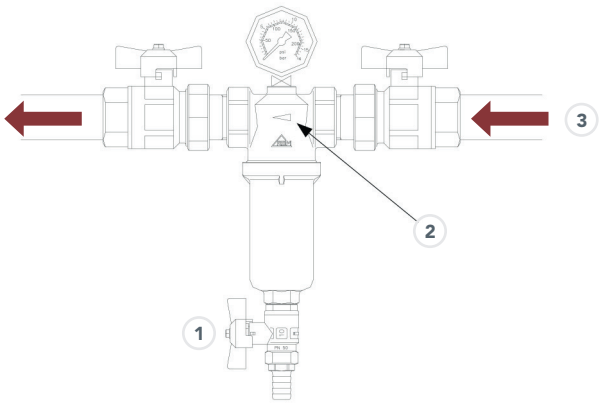



## INDICATIONS FOR A QUICK CHOICE OF THE SELF-CLEANING FILTER

| Size | FLOW RATE OF THE WATER FLOWING THROUGH [l/h] | | | | | |
|---|---|---|---|---|---|---|
| | 100 µm filter | | 300 µm filter | | 800 µm filter | |
| | with ΔP 1.000 Pa | with ΔP 10.000 Pa | with ΔP 1.000 Pa | with ΔP 10.000 Pa | with ΔP 1.000 Pa | with ΔP 10.000 Pa |
| 3/8" | 180 | 570 | 185 | 600 | 190 | 600 |
| 1/2" | 310 | 980 | 315 | 990 | 320 | 1.010 |
| 3/4" | 580 | 1.840 | 600 | 1.900 | 620 | 1.950 |
| 1" | 860 | 2.700 | 865 | 2.720 | 890 | 2.810 |
| 1" 1/4 | 1.490 | 4.700 | 1.500 | 4.740 | 1.550 | 4.900 |
| 1" 1/2 | 2.440 | 7.700 | 2.460 | 7.850 | 2.500 | 7.910 |
| 2" | 2.600 | 8.250 | 2.610 | 8.250 | 2.660 | 8.350 |
| 2" 1/2 | 10.780 | 34.100 | 11.010 | 34.500 | 11.500 | 36.000 |
| 3" | 12.000 | 38.000 | 12.200 | 38.600 | 12.700 | 40.000 |
| 4" | 12.900 | 40.800 | 13.400 | 42.500 | 13.500 | 42.700 |

* The flow rate values indicated have been obtained with a perfectly clean non-obstructed filtering cartridge.
The table is only a quick general reference which makes it possible to match the chosen component with a given system size.
The values indicated in the table are not binding and do not represent any performance limits of the components.

## ASSEMBLY




**Self-cleaning filter installation scheme inside a hydraulic circuit**

The picture shows how to install an **RBM self-cleaning filter** inside a hydraulic circuit.

The filter must be installed with the **impurity discharge valve directed downwards**, so that suspended particles are deposited on the bottom.

The filter must be inserted inside the circuit according to the **direction arrow** printed on the filter body. This arrow shows the direction of the circuit flow.

When you develop the system, take into consideration that a shut-off valve should be placed upstream of the filter; this will facilitate maintenance and cleaning operations.

If flanged systems are inserted, it is possible to use a pair of threaded **PN6** or **PN 16** RBM flanges.

1. **Impurity discharge valve**
2. **Direction arrow**
3. **Water flow direction**

## MAINTENANCE

### WASHING OF THE FILTER CARTRIDGE

In order to wash the filter cartridge, carry out the fluid discharge by opening the discharge valve with drain connection

**N.B.: During this operation, shut-off valve 1 and shut-off valve 2 must be open.**

### REPLACE THE FILTERING CARTRIDGE

PRECAUTIONS: Install shut-off valves (ball valves) in the operation area in order to make the normal maintenance of the filter possible (replace the filter cartridge every 6 months) and to avoid emptying the system. A shut-off valve can be installed also at the bottom of the filter.

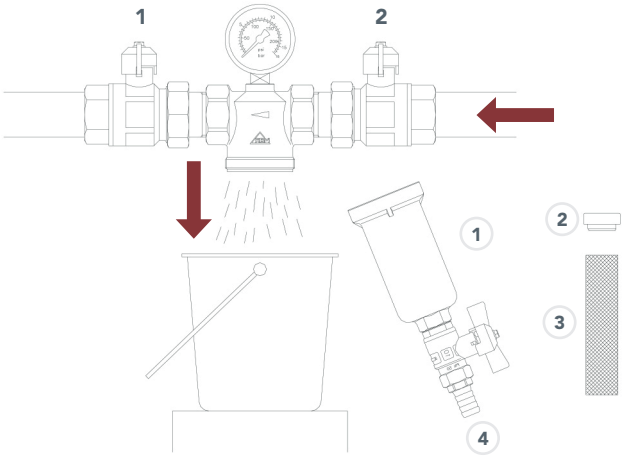
If you want to insert flanged systems, you can use a pair of RBM PN 16 threaded flanges.

**N.B. : It is not necessary to install the shut-off valves near the filter.**

Two valves in a well delimited circuit tract are sufficient to avoid an excessive run-out of water which could cause environmental problems (erosion).

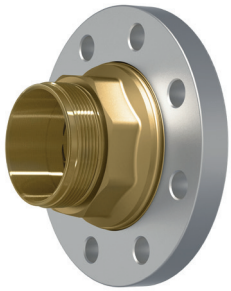
### OPERATIONS

- Bring the containers which will contain the discharged water as near as possible;
- Close cock **1** and cock **2**;
- Unscrew the holder (if the fluid circulating in the circuit has a high temperature, use suitable precaution and the protection measures to avoid direct contact with the fluid);
- Extract the used cartridge and replace it with a new one (filtering mesh available from **100** to **800** microns);
- Place the PTFE ring nut very carefully on the filter cartridge;
- Close the filter with the holder;
- Open the valve at the top of the filter again in order to open the hydraulic system.




1. **Holder**
2. **PTFE ring nut**
3. **Cartridge to be replaced**
4. **Discharge with drain valve**

## ACCESSORIES



**THREADED FLANGE**

- Body made of nickel-plated brass;
- Threaded connection M UNI-EN-ISO 228;
- Flanged connection UNI 2223 PN 16
  DIN 2566 PN 16;
- Flanged connection UNI 2223 PN 6
- Maximum operating pressure ($P_{max}$): 16 bar;
- Maximum temperature: 150 °C

| Product | Code | Size | DN |
|---|---|---|---|
| | **PN 16 THREADED FLANGE** | | |
| | **120.04.00** | 1/2" | DN 15 |
| | **120.05.00** | 3/4" | DN 20 |
| | **120.06.00** | 1" | DN 25 |
| | **120.07.00** | 1" 1/4 | DN 32 |
| | **120.08.00** | 1" 1/2 | DN 40 |
| | **120.09.00** | 2" | DN 50 |
| | **120.10.00** | 2" 1/2 | DN 65 |
| | **120.11.00** | 3" | DN 80 |
| | **120.13.00** | 4" | DN 100 |
| | **PN 6 THREADED FLANGE** | | |
| | **121.04.00** | 1/2" | DN 15 |
| | **121.05.00** | 3/4" | DN 20 |
| | **121.06.00** | 1" | DN 25 |
| | **121.07.00** | 1" 1/4 | DN 32 |
| | **121.08.00** | 1" 1/2 | DN 40 |
| | **121.09.00** | 2" | DN 50 |
| | **121.10.00** | 2" 1/2 | DN 65 |
| | **121.11.00** | 3" | DN 80 |
| | **121.13.00** | 4" | DN 100 |

## SPARE PARTS

| CARTRIDGE OF THE SELF-CLEANING FILTER | | | | | |
|---|---|---|---|---|---|
| Product | Size | Filtering values | | | Filter surface |
| | | 800 [µm] | 300 [µm] | 100 [µm] * | |
| | | Code | Code | Code | [cm²] |
| | 3/8" | **1171.003** | **1071.013** | **1071.023** | 52,28 |
| | 1/2" | **1171.003** | **1071.013** | **1071.023** | 52,28 |
| | 3/4" | **1172.003** | **1172.013** | **1172.023** | 68,14 |
| | 1" | **1173.003** | **1173.013** | **1173.023** | 68,14 |
| | 1" 1/4 | **1200.003** | **1200.013** | **1200.023** | 128,58 |
| | 1" 1/2 | **1201.003** | **1201.013** | **1201.023** | 173,28 |
| | 2" | **1201.003** | **1201.013** | **1201.023** | 173,28 |
| | 2" 1/2 | **1215.003** | **1215.013** | **1215.023** | 764,93 |
| | 3" | **1215.003** | **1215.013** | **1215.023** | 764,93 |
| | 4" | **1215.003** | **1215.013** | **1215.023** | 764,93 |

### CHOICE OF THE FILTER

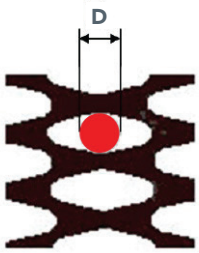
The choice of the filtering mesh is at the user's discretion.

We can recommend the following:

- 50-100-300-800 micron for drinking water
- 300 micron for well water
- 300 micron for diesel oil in general
- 100-300 micron for fuel gases

* Standard filtration degree

## FURTHER INFORMATION




The filtering cartridge is the most important element of the filter.

The filtering cartridge has a cylindrical body with diamond-shaped mesh made of AISI 304 stainless steel.

The number of meshes per cm² is an essential factor for a correct choice of the filter. Filtering cartridges differ from one another according to the number of meshes they have. The tighter the filter mesh, the more compact is the filter and therefore the higher the number of meshes per cm² the higher the filtering capacity of the filter. It is therefore necessary to know the size of the opening of each single mesh in order to understand how many meshes are present per cm².

Next to each filtering cartridge there is a number expressed in micron [1µ = 0,001 mm]. This number refers to its filtering capacity and represents the diameter of the circle [D: see picture] inside the diamond-shaped mesh of the filtering cartridge. The higher the value expressed in micron, the wider the filter mesh and the lower the number of meshes per cm² (lower filtering capacity).

*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.*

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