



***Fix bladder
expansion vessel***

CMF

A collection of various expansion vessels, including vertical cylindrical tanks and horizontal cylindrical tanks, arranged in a cluster. The vessels are rendered in a light gray, semi-transparent style, serving as a background for the text.

***Installation, use
and maintenance
handbook***

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1. DESCRIPTION

Steel tanks manufactured according to the 97/23/EC European Pressure Equipment Directive. They are made of two inlaid bottoms joined through welding cords in accordance with the authorized process and staff, suited to resist loosely the operating pressure they have been designed for.

The CMF has a fixed synthetic rubber membrane incorporated which is waterproof, flexible of high elasticity and high temperature resistant. Its duration is virtually unlimited and it does not suffer the effects of the dilatation.

The design of the membrane and its dimension are calculated to fully occupy the inner surface of the tank avoiding thereby its breakage.

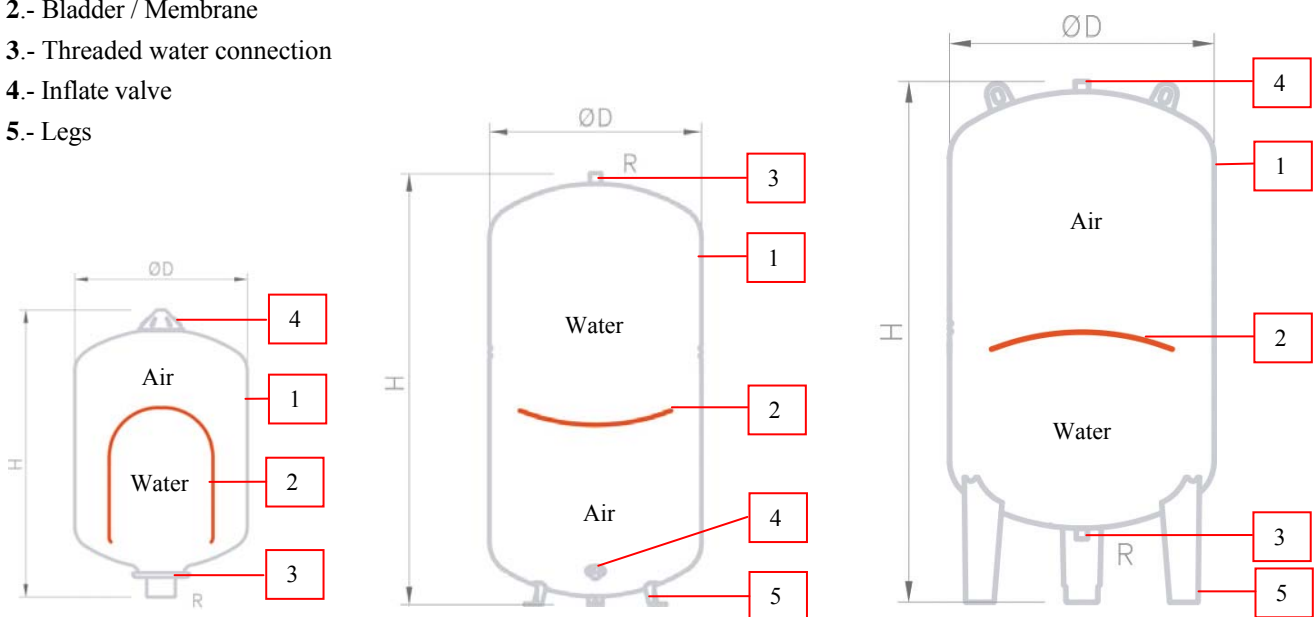
CMF expansion vessel is provided with a valve for the air-chamber pressure regulation and with threaded water connection (See models).

Final application of epoxy coat over phosphate surface. Red color RAL-3000.

The resistance of the tank are tested at a pressure 1,5 times above the maximum working pressure.

2. VESSEL COMPONENTS

- 1.- Steel tank
- 2.- Bladder / Membrane
- 3.- Threaded water connection
- 4.- Inflate valve
- 5.- Legs

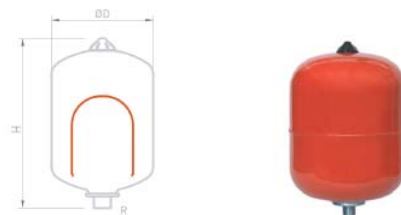


3. CHARACTERISTICS

- ④ **Name:** CMF
- ④ **Use:** Expansion vessels for heating and cooling systems
- ④ **Volume:** 5 - 1.000 liters
- ④ **Maximum service pressure:** 4 – 5 - 6Bar
- ④ **Test pressure:** 6 - 7,5 - 9Bar
- ④ **Precharge pressure:** 1,5Bar
- ④ **Gas:** Air
- ④ **Temperature Min / Max:** -10°C / +100°C
- ④ **Dimensions:** see below
- ④ **Threaded water connection:** see below
- ④ **Membrane:** Fix membrane / bladder
- ④ **Finish (painting):** Epoxy coating
- ④ **Inflate valve:** Included
- ④ **Warranty:** 2 year
- ④ **Designed and manufactured according to** PED 97/23/EC

Modelos sin patas 5 bar

Peso (Kg)	Código	Modelo	Capacidad (Lt)	Presión Máx. (bar)	Dimensiones		R Conexión agua
					Ø D (mm)	H (mm)	
2	02005343	5 CMF	5	5	200	250	3/4 "
2,5	02008343	8 CMF	8	5	200	340	3/4 "
3,2	02012343	12 CMF	12	5	270	310	3/4 "
4	02018343	18 CMF	18	5	270	415	3/4 "
4,5	02025343	25 CMF	25	5	320	430	3/4 "
7	02035343	35 CMF	35	5	360	475	3/4 "



Modelos con patas 4 - 6 bar (conexión superior)

Peso (Kg)	Código	Modelo	Capacidad (Lt)	Presión Máx. (bar)	Dimensiones		R Conexión agua
					Ø D (mm)	H (mm)	
7	02035345	35 CMF	35	4	360	480	3/4 "
7,5	02050343	50 CMF	50	4	360	630	3/4 "
16	04080351	80 CMF	80	6	485	570	1 "
18	04100351	100 CMF	100	6	485	650	1 "
24	04140351	140 CMF	140	6	485	935	1 "
36	04200351	200 CMF	200	6	600	860	1 "
44	04250351	250 CMF	250	6	600	1095	1 "
49	04300351	300 CMF	300	6	600	1240	1 "
56	04400351	400 CMF	400	6	600	1480	1 "



Modelos con patas 6 bar (conexión inferior)

Peso (Kg)	Código	Modelo	Capacidad (Lt)	Presión Máx. (bar)	Dimensiones		R Conexión agua
					Ø D (mm)	H (mm)	
63	04500351	500 CMF	500	6	750	1445	1 "
77	04600351	600 CMF	600	6	750	1700	1 "
95	04800351	800 CMF	800	6	750	2155	1 "
118	04101351	1000 CMF	1000	6	750	2555	1 "

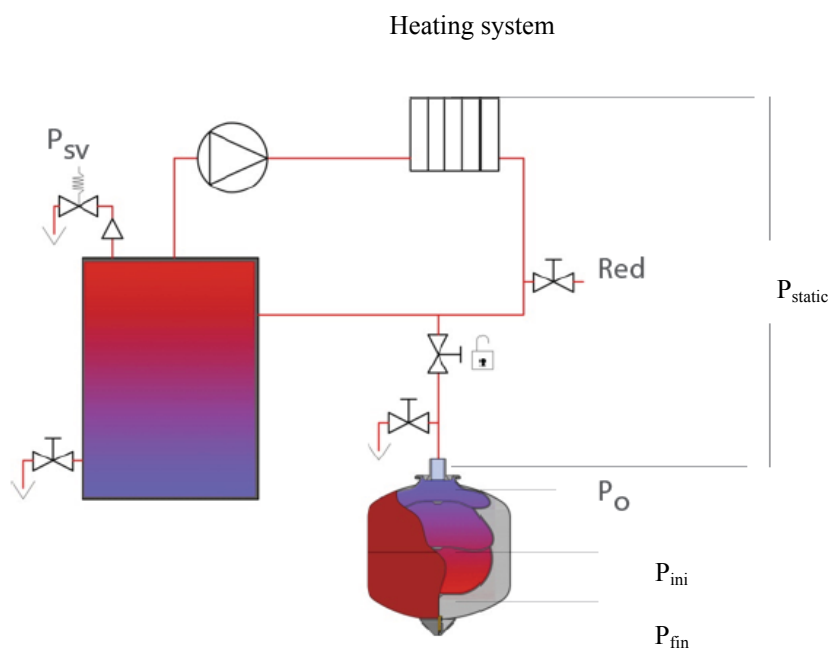


4. APPLICATION

Expansion tanks for use only in heating and cooling closed circuits, absorbing expansion of the water produced by the increase of temperature in the fluid and preventing the circuit pressure exceeds the pressure rating of its components.

Several possibilities,

1. Expansion vessel in the pump suction (suction)
2. Expansion vessel in high side of the recirculation pump
3. Expansion vessel in district heating systems



They are not suitable for use in open circuits with potable water or hydrocarbon fluids and those belonging to Group 1 in accordance with Directive 97/23 / EC. The content of glycol in water should not exceed 50%. Vessels are not suitable for placement outdoors.

Possible damage caused by placement in other circuits is not responsibility of I. IBAIONDO.

The most important technical characteristics of expansion vessels and other data relating to its manufacture are indicated on the label attached to the product. This label should never be deleted or modified. In addition, is provided an instruction handbook of the product.

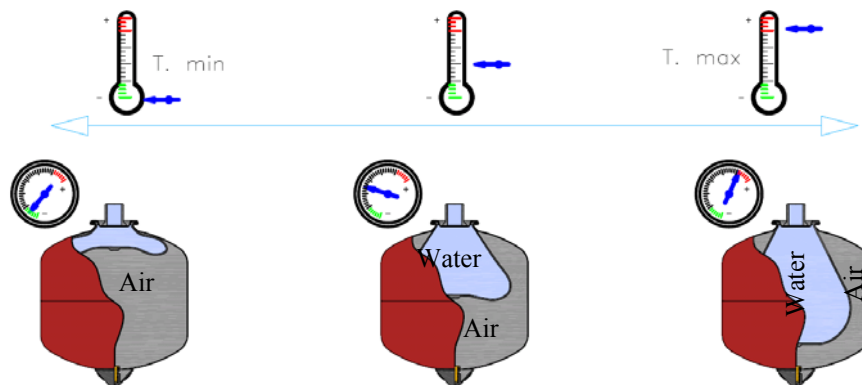


5. FUNCTIONING

The expansion vessel allows compensating the increase of water volume caused by the variations of temperature, avoiding the circuit pressure to exceed the allowed limits.

When the temperature of the water contained in the circuit increases, the volume expansion of the heating fluid, pushes the membrane, enters into the vessel and the mass of air is compressed. When the water temperature decreases, the energy stored in the air chamber forces water to return to the circuit. This allows the system to maintain the pressure, ensuring energy savings and prevents circuit from overpressures provided the sizing and selection of the vessel is appropriate.

The existence of an expansion vessel implies notably reducing water refills, because no leakage drip occurs due to increased pressure and consequently the triggering of the safety valve.



6. INSTALLATION

Check as soon as possible the equipment matches the order and that all components are free from damage, and the correct instructions are enclosed. It is especially important to inspect the pressure vessel for any deformities that could affect its strength. In the event of defects or damage contact the manufacturer.

The expansion vessel bears a designation plate containing all important and necessary data. Check that this matches the stipulated requirements and is appropriate for the system.

Before installation, make sure that the expansion vessel volume has been calculated by authorized staff. Ensure that technical staff has an appropriate profile and training at the facilities of this type of equipment. In any case it should be considered local regulations for the operation of the expansion vessel. Installation and operation must be carried out according to good practice by professional installers and qualified technicians.

They may be installed only vessels whose appearance does not provide damage to the body of the expansion vessel. It is prohibited drilling, welding on the vessel or in any item attached to it.

Make sure there is an adequate access around vessel to allow subsequent maintenance and servicing. The equipment must not be over-insulated in any way.

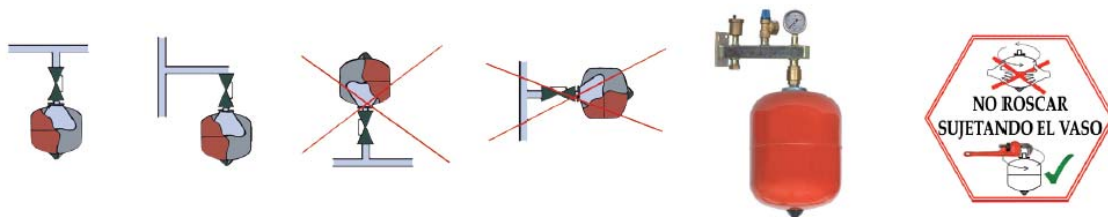
The facility in which the expansion tank is placed should provide for the installation a security system that limit the pressure and ensure that the pressure does not exceed the maximum working pressure of the expansion vessel. The safety valve shall be installed in the boiler, as close as possible to it and above its highest level. It will be calibrated according to the maximum system pressure and not exceed the maximum allowable pressure of expansion vessel.

It is recommended to connect expansion vessel in the return line, as close as possible to the boiler, preferably on the suction side of the recirculation pump. When the return temperature exceeds 70°C and / or below 0°C is recommended to place an intermediate VI vessel.

Avoid direct radiations over expansion vessel to protect the membrane of possible overheating.

Between the boiler and the expansion must not exist any valve that can isolate and unintentionally override the operation of the expansion vessel.

The expansion vessels without legs are installed directly to the pipe or preferably through a support designed for this purpose provided with sleeve water inlet at the top, to avoid creating air pockets. We recommend installing air separators to prevent air accumulation.



Make sure the hoses and couplings are tight and the working temperature or pressure for which is designed the expansion tank is never exceeded. Under no circumstances exceed the maximum pressure indicated on the label of the expansion vessel. The expansion tank could explode.

The pipes must be sized and installed in accordance with the specific requirements according to current national and local regulations.

The pre-commissioning, subsequent fundamental changes in the installation and periodic reviews should be initiated by the user in accordance with regulations in operational safety test.

7. OPERATION

The expansion vessels are supplied from the factory with the inflation pressure specified on the label attached to the product (1.5 Bar - Air). To ensure the proper functioning of the system, this value should be set to a pressure value P_0 , taking into account the characteristics of each installation, by filling air to the preload value P_0 or purging through the valve to reduce the initial air preload to the value P_0 .

Adjusting inflation pressure to P_0 : To ensure proper operation of the expansion vessel is necessary to check and adjust the pressure. In cases in which the expansion vessel is placed on the high side of the circulating pump of the system, take into account the differential pressure (ΔP) of the circulating pump when obtaining P_0 and prevent vacuum in high points of the heating system.

Suction Pump side	High side of recirculation pump
$P_0 = P_{st} + P_v + 0,2 \text{ (Bar)}; P_0 \geq 1 \text{ Bar}$	$P_0 = P_{st} + P_v + \Delta P \text{ (Bar)}; P_0 \geq 1 \text{ Bar}$

Water filling of the system: Get the initial pressure P_{ini} . Lowest pressure in the operating range of the heating system. It is one of the values that can influence the optimum operation of the expansion vessel.

It is recommended in the case of diaphragm expansion vessels adjust P_{ini} at least 0.3 bar above the preset gas pressure P_0 . In addition P_{ini} should be adjusted so that the pressure measured at any point of the heating system is always higher than 0.5Bar.

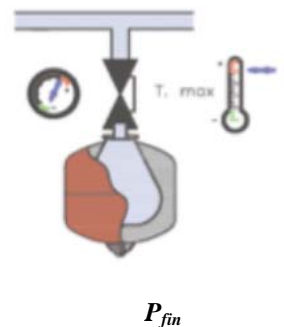
The expansion vessel should always contain a minimum volume of water. For this purpose, fill slowly the system with cold water, purging air contained. The initial pressure P_{ini} at the height of expansion vessel should exceed 0.3 bar P_0 .



Water refilling: Run the heating system at maximum operating temperature, bleeding air regularly. Turn off the pump and purge. Fill the system with water up to the final pressure P_{fin} at the height of expansion vessel.

P_{fin} , the higher pressure in the operating range of the heating system, should not be greater than the P_{VS} set pressure.

$$\begin{aligned} \text{If } P_{vs} \leq 5 \text{ Bar} \quad & P_{fin} \text{ (Bar)} \leq P_{vs} - 0,5 \\ \text{If } P_{vs} > 5 \text{ Bar} \quad & P_{fin} \text{ (Bar)} \leq P_{vs} \times 0,9 \end{aligned}$$



P_{st} : Static pressure

P_v : Evaporation pressure

P_{vs} : Safety valve pressure

Once pressurized expansion vessel and taken appropriate precautions, we proceed to communicate the expansion vessel to the system. Once installed works automatically.

8. MAINTENANCE

The maintenance must be performed only by the authorized staff. Never disassemble the vessel without having depressurized the unit and the inner pipe or air chamber to safe values previously.

At least once every six months, check that the value of the precharge pressure P_0 of the vessel is maintained within the values indicated in the previous section, taking care to do by the contrast of values at the same temperature, preventing unnecessary and prevent abnormal operation. For this purpose, it is necessary,

- Isolate the expansion vessel from the heating system.
- Drain water from expansion vessel.
- Once emptied of water, check pressure through the valve. If the deviation of the measured pressure respect the precharge pressure P_0 is greater than $\pm 20\%$, adjusted to the original value P_0 , following the instructions given in section 7 of the instruction handbook.

At the time of depressurizing expansion vessel and emptying of water, ensure that the vessel has enough water to cover the coupling (inlet) so that the water holds a backpressure which protects the membrane from extrusion.

Make sure that the precharge pressure never exceed the design pressure of the equipment, coupling hoses and couplings are tight and the working temperature and pressure for which is designed the expansion vessel is never exceeded.

To prevent corrosion of the expansion vessel periodically purge the circuit. The possible entry of air must be minimized through periodic maintenance.

As spare parts may be used only the original components of manufacturer.

9. DISASSEMBLY

Never disassemble the expansion vessel without having depressurized previously the installation and the vessel.

Before proceeding to removal expansion vessel, make sure that all parts exposed to pressure are depressurized. Insulate the vessel from the heating system. If the measured pressure through the inflation valve is more than 4 bar, firstly reduce the pressure through the purge valve (air chamber) up to 4 Bar. Then, drain water from expansion vessel. Finally, bleed through the air inflation valve, reducing the air pressure to depressurize the expansion vessel completely. Remove expansion vessel and change.

When replacing the expansion vessel will be disassembled having depressurized the installation and the water temperature below 35°C.

CMF series vessels are fixed membrane models. In case of membrane rupture must be replaced.

10. NOTES

