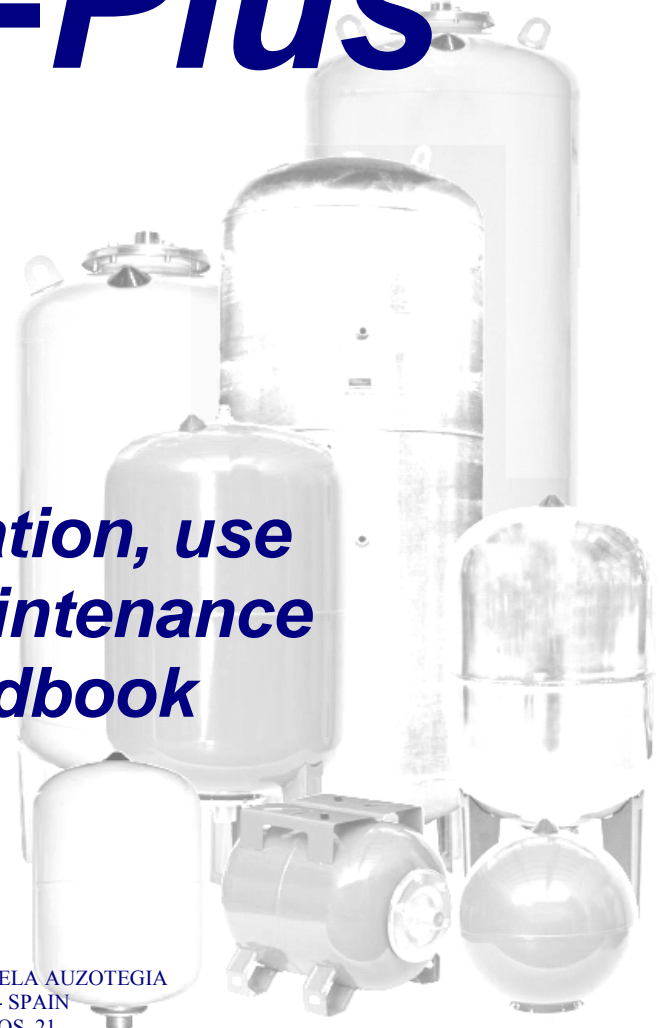




***Replaceable bladder
hydropneumatic tank***

AMR-Plus

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



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1. DESCRIPTION

Welded steel tanks manufactured according to the European Directive 97/23/EC for pressure equipments. They are made of two inlaid bottoms, joined together through welding cords following the proper procedure and according to the required authorized staff. They are loosely able to resist the working pressure for which they have been designed.

Some holes have been provided in the bottoms for the assembly and fixation of the bladder through a screwed cover and a threaded sleeve according to DIN-259 (see models).

The fully waterproof replaceable bladder is made of synthetic flexible rubber as a single piece, keeping constantly isolated water from nitrogen, avoiding any possibility of corrosion of the inner metal surface of the tank or the dilution of nitrogen in the water.

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

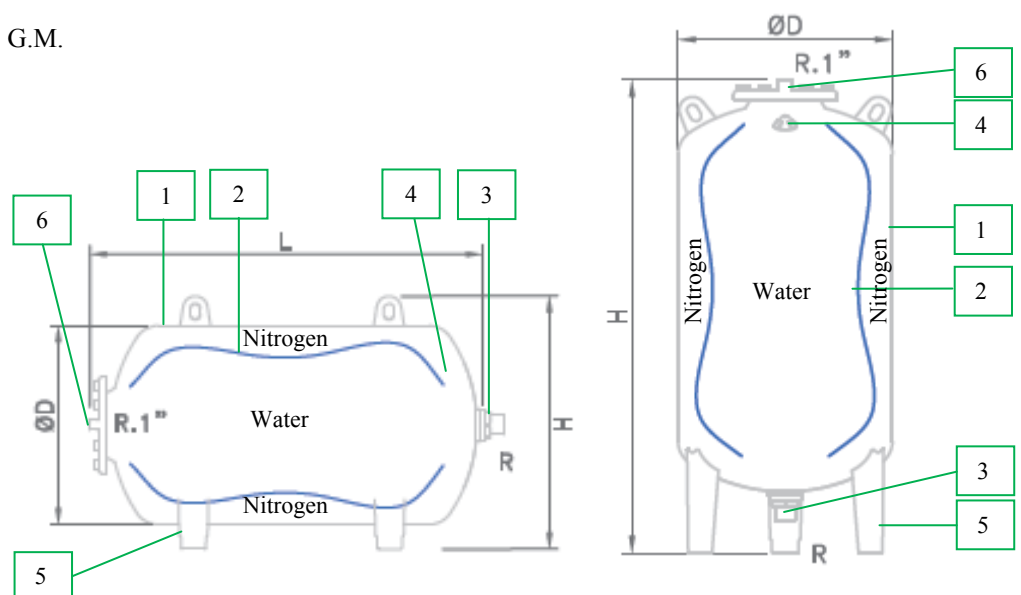
AMR-Plus hydropneumatic tanks are provided with a valve for the nitrogen-chamber pressure regulation and with threaded brass R1 ½”G.M water connection.

Final application of epoxy coat over phosphate surface. Blue color RAL-5012.

The resistance of the tanks are tested at a pressure 1,5 times higher than the maximum working pressure.

2. VESSEL COMPONENTS

- 1.- Steel tank
- 2.- Bladder
- 3.- Threaded brass coupling R1½” G.M.
- 4.- Inflate valve
- 5.- Legs
- 6.- Flange R1”(Accessories)

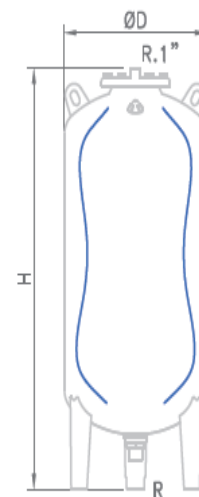


3. CHARACTERISTICS

- ④ **Name:** AMR-Plus
- ④ **Use:** Replaceable bladder hydropneumatic tank for booster sets
- ④ **Volume:** 80 – 1.000 liters
- ④ **Mode:** Vertical / Horizontal
- ④ **Maximum service pressure:** 10Bar
- ④ **Test pressure:** 15Bar
- ④ **Precharge pressure:** 3 Bar
- ④ **Gas:** Nitrogen
- ④ **Temperature Min / Max:** -10°C / +100°C
- ④ **Dimensions:** see below
- ④ **Threaded water connection:** Brass R 1 1/2" G.M
- ④ **Membrane:** Replaceable bladder
- ④ **Finish (painting):** External epoxy coating
- ④ **Color:** Blue RAL-5012
- ④ **Inflate valve:** Included
- ④ **Warranty:** 5 year
- ④ Designed and manufactured according to PED 97/23/EC

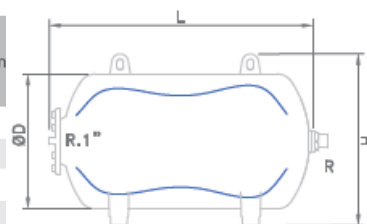
Modelos verticales 10 bar

Peso (Kg)	Código	Modelo	Capacidad (Lt)	Presión Máx. (bar)	Dimensiones		R Conexión agua
					Ø D (mm)	H (mm)	
16	01080115	80 AMR-PLUS	80	10	485	690	1 1/2"
33	01100115	100 AMR-PLUS	100	10	485	805	1 1/2"
38	03150031	150 AMR-PLUS	150	10	485	1155	1 1/2"
49	03220031	220 AMR-PLUS	200	10	485	1400	1 1/2"
60	03350031	350 AMR-PLUS	300	10	485	1965	1 1/2"
90	03500031	500 AMR-PLUS	500	10	600	2065	1 1/2"
158	03700031	700 AMR-PLUS	700	10	700	2145	1 1/2"
224	03900311	900 AMR-PLUS	900	10	800	2155	1 1/2"
274	03910033	1000 AMR-PLUS	1000	10	800	2375	1 1/2"



Modelos horizontales 10 bar

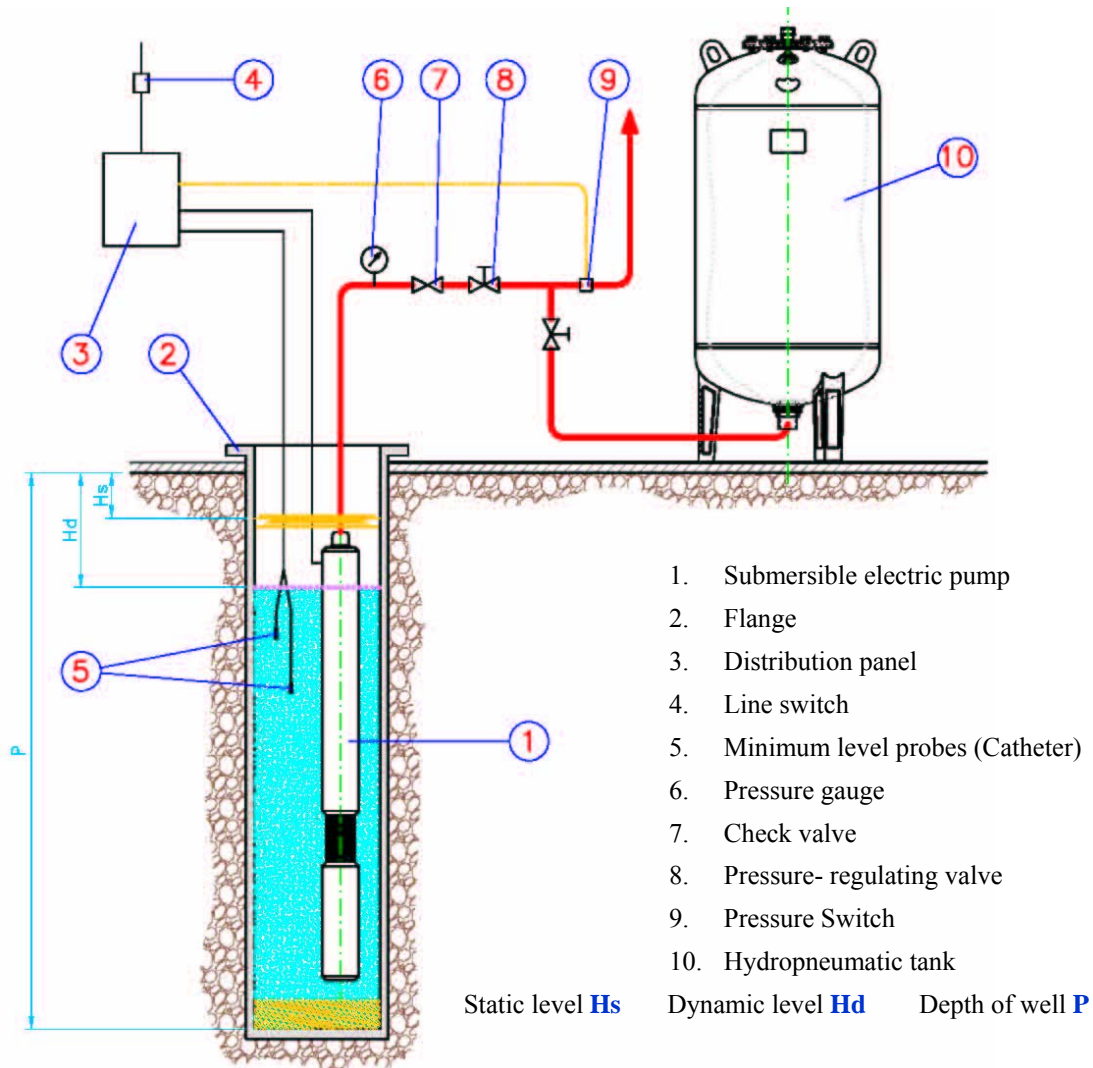
Peso (Kg)	Código	Modelo	Capacidad (Lt)	Presión Máx. (bar)	Dimensiones			R Conexión agua
					Ø D (mm)	H (mm)	L (mm)	
40	03150211	150 AMR-PLUS-H	150	10	485	655	1070	1 1/2"
49	03220211	220 AMR-PLUS-H	200	10	485	655	1320	1 1/2"
60	03350211	350 AMR-PLUS-H	300	10	485	655	1810	1 1/2"
90	03500211	500 AMR-PLUS-H	500	10	600	780	1930	1 1/2"
158	03700211	700 AMR-PLUS-H	700	10	700	880	2100	1 1/2"
224	03900321	900 AMR-PLUS-H	900	10	800	1000	2070	1 1/2"
274	03910021	1000 AMR-PLUS-H	1000	10	800	1000	2375	1 1/2"



4. APPLICATION

AMR-Plus hydropneumatic tanks are intended for use in water catchments, facilities for drinking water supply, as well as fire groups, forming an essential part of the booster sets. In addition to maintaining a water reservoir pressure and ensure optimal water supply, allow longer life of the booster sets, significantly reducing the number of operations start-stop pump and a significant energy savings.

A typical installation of a hydropneumatic tank could be as follows:



They are not suitable for use with hydrocarbon fluids and those belonging to Group 1 in accordance with Directive 97/23/EC.

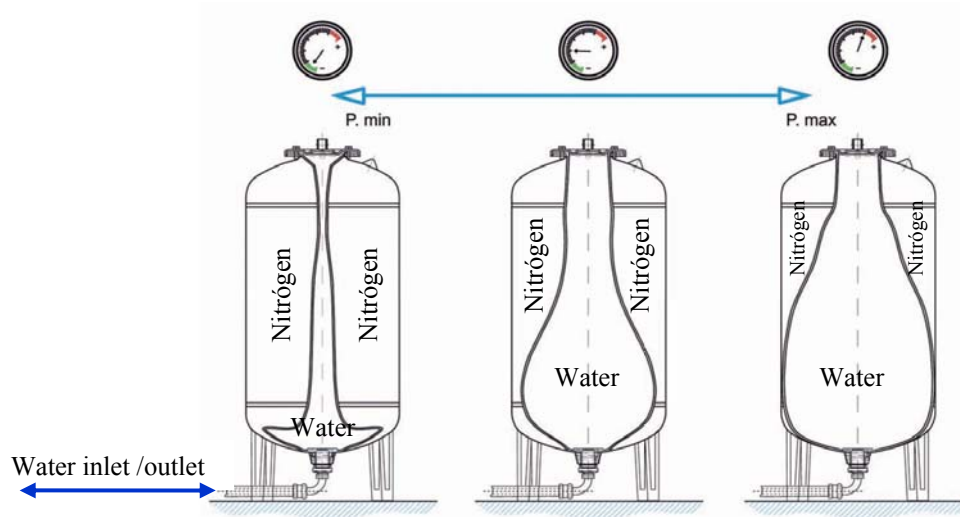
The most important technical characteristics of AMR-Plus hydropneumatic tanks and other data relating to its manufacture are indicated on the label attached to the product. This label should never be deleted or modified. In addition, is provided an instruction handbook of the product.



5. FUNCTIONING

Drinking water collected from the network, a reservoir, etc., is driven into the accumulator by the pump unit.

As the water enters the tank, it is stored inside of the bladder which separates hermetically the nitrogen chamber from the water chamber. The entry of water into the AMR-Plus hydropneumatic tank involves a reduction of the initial volume of the captive nitrogen in the vessel and therefore the pressure increase.



When the maximum required pressure is reached (pump stop pressure), the pressure switch cuts off the flow of water between the pump and AMR-Plus hydropneumatic tank. At this moment there will be a volume of water stored inside of the hydropneumatic tank at a pressure equal to the stopping pressure of the pump.

Depending on the needs and user requirements, the stored energy through the captive nitrogen will push the water contained into the bladder toward the points of consumption.

As a result of the demand and the various supplies from the vessel to the system, the bladder of the tank which contains the water gets empty and the nitrogen chamber pressure decreases consequently. As soon as the pressure falls below the pressure at which the pressure switch is calibrated (Pump star pressure), the pressure unit starts working, providing again the necessary water according to the current need and also recovering the normal operating conditions.

While the nitrogen chamber pressure is maintained, the cycle runs automatically, as many times as the maximum and minimum pressures are reached. It is therefore essential to implement and verification a periodic maintenance of the nitrogen preload pressure in the tank (See Section 7 & 8).

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 hydropneumatic tank 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 hydropneumatic tank 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 hydropneumatic tank. 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 hydropneumatic tank. 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 hydropneumatic 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 hydropneumatic tank.

It is prohibited drilling, welding on the vessel or any item attached to it.

Do not place any valve whose closure may unintentionally cancel the operation of the hydropneumatic accumulator.

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

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

AMR-Plus hydropneumatic tanks are supplied from the factory with the inflation pressure specified on the label attached to the product (3 Bar - Nitrogen). 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 nitrogen to the preload value P_0 or purging through the valve to reduce the initial nitrogen preload to the value P_0 .

Adjusting inflation pressure to P_0 : To ensure proper operation of the hydropneumatic tank is necessary to check and adjust the pressure. In the case in which the hydropneumatic tank is placed on the high side of the pump (Drive), the precharge pressure P_0 has to be adjusted as follow:

$$P_0 \text{ (Bar)} = \text{Pump start pressure} - 0,2 \text{ Bar}$$

In the case in which the hydropneumatic tank is placed on the low side of the pump, the precharge pressure P_0 has to be adjusted as follow:

$$P_0 \text{ (Bar)} = \text{Accumulator inlet pressure} - (0,5 \div 1) \text{ Bar} \geq 1 \text{ Bar}$$

If the initial P_0 required precharge pressure is higher than 3 bar, before reloading nitrogen, it is necessary to,

- *Introduce water through the inlet/outlet connection of the hydropneumatic tank to cover the bottom coupling or orifice.*
- *Isolate the hydropneumatic tank from the installation.*
- *Once this is done, charge or refill with nitrogen through the inflation valve up to calculated P_0 pressure.*

After adjusting the pressure according to the instructions outlined above and taking appropriate precautions, it proceeds to communicate the accumulator with the pressurized installation. Its operation is automatic.

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 a year, 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 hydropneumatic tank from the installation.
- Drain water from hydropneumatic tank.
- 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 +/- 20%, adjusted to the original value P_0 , following the instructions given in section 7 of the instruction handbook.

At the time of depressurizing hydropneumatic tank 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 bladder 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 hydropneumatic tank is never exceeded.

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

Periodic tests should be conducted according to the provisions of Pressure Equipment Regulations.

9. DISASSEMBLY

Never disassemble hydropneumatic tank without having depressurized previously the installation and the vessel.

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

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

AMR-Plus series vessels are replaceable bladder models. In case of bladder rupture it can replace.

