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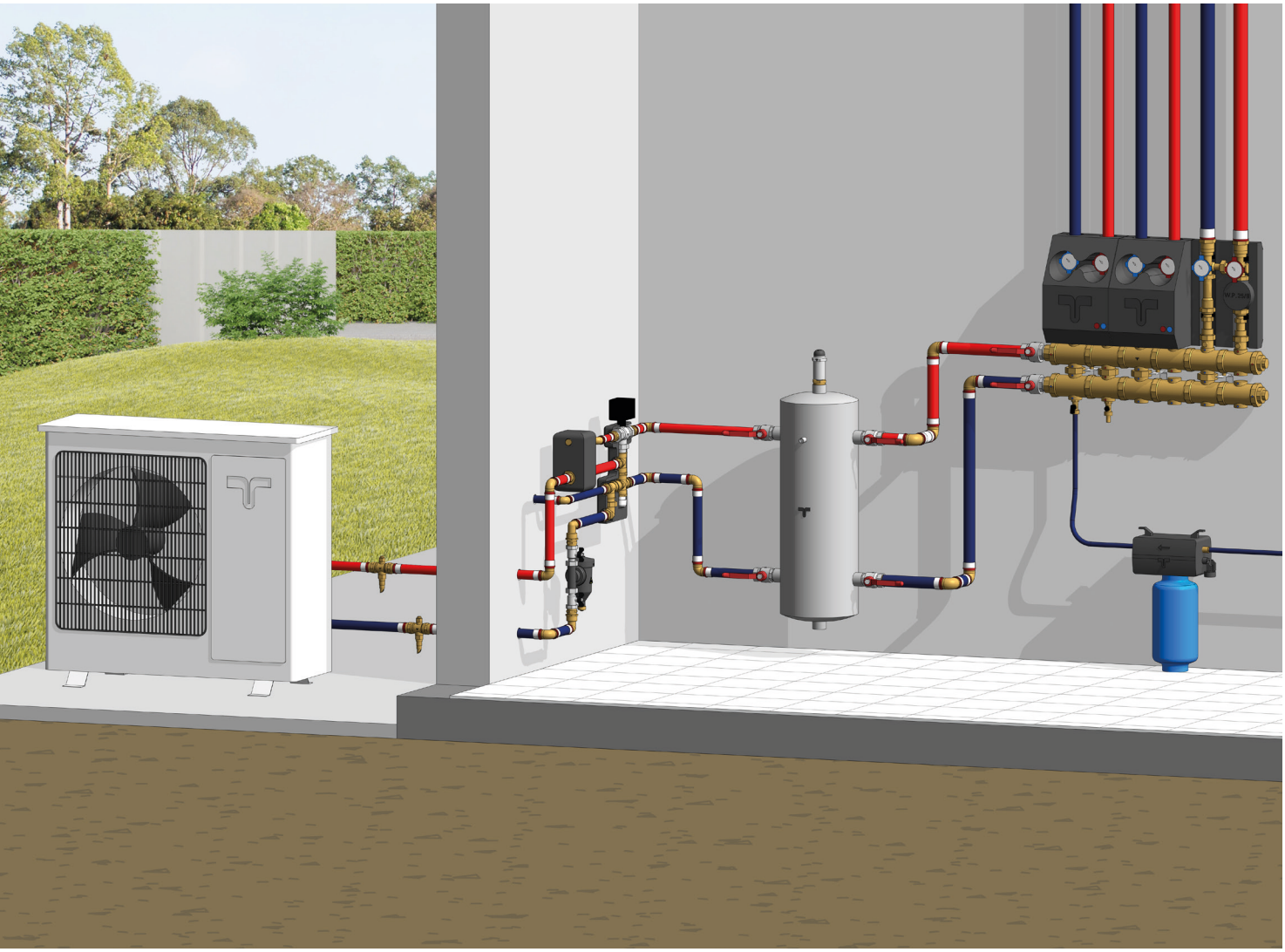


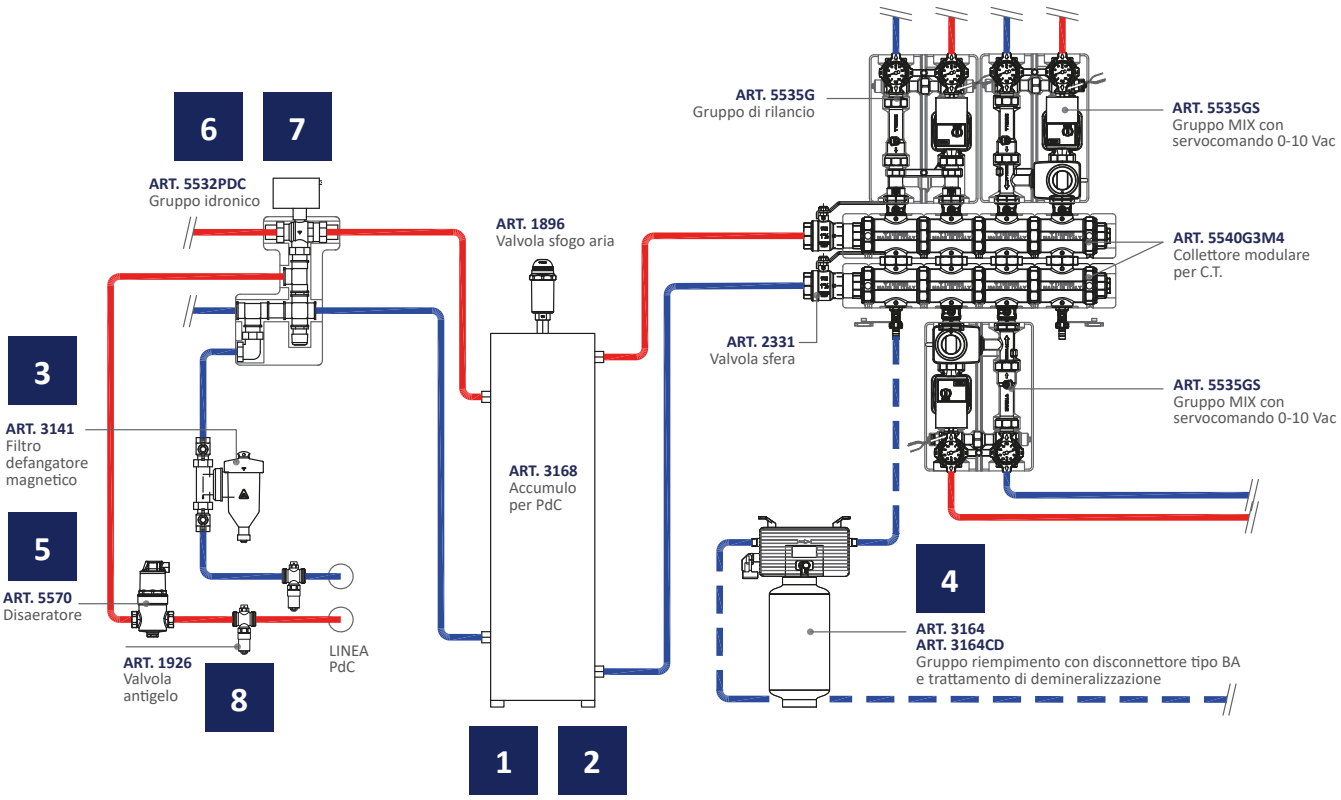
COMPONENTS FOR HEAT PUMPS

TIEMME
ORIGINAL ITALIAN TRADEMARK

ENERGY EFFICIENCY THROUGH HEAT PUMPS

Heat pumps are a fundamental solution in the fight against change, as the installation of these generators can lead to a significant reduction in CO_2 emissions.
Looking at the 2050 targets, electrification accounts for about half of the reduction in CO_2 emissions in the building sector; the European heat pump market is growing, especially for the air-water solution, which is preferred not only for its lower cost than geothermal, but also for its energy efficiency.

The EU REPowerEU Plan aims to diversify gas suppliers and promote electrification, in particular the replacement of gas boilers with heat pumps will have a definite impact on the reduction of natural gas consumption in buildings. Moreover, many EU countries have already shown political support for the installation of heat pumps.

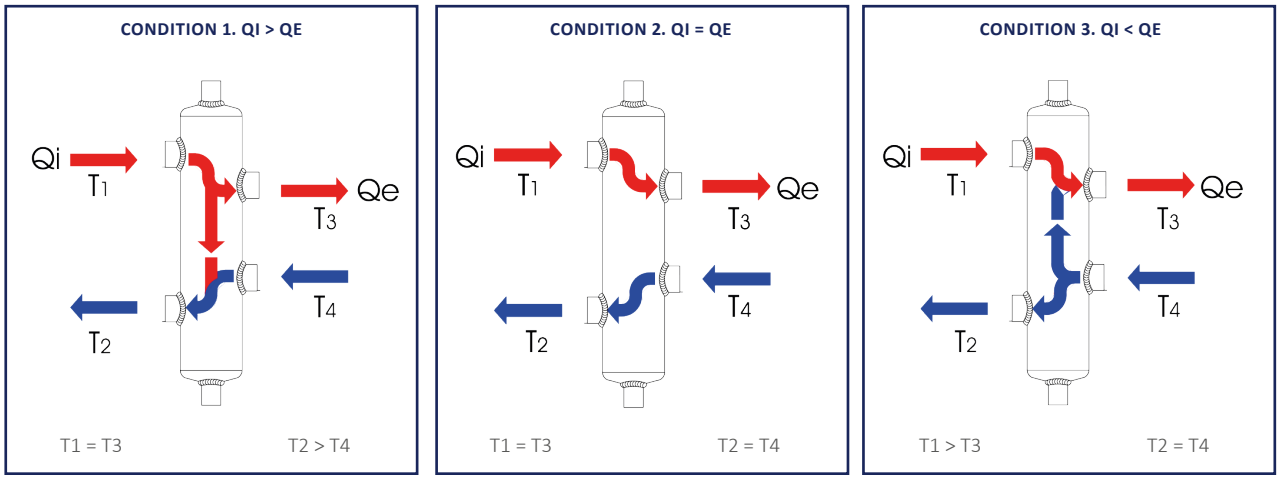


In the future, heat pumps will play a key role in achieving the objectives listed above: this is why Tiemme has implemented its offer with complementary products to allow perfect installation.

1 HYDRAULIC SEPARATOR

2 INERTIAL STORAGE TANK

The use of a hydraulic circuit breaker in systems equipped with recirculation circulating pumps is essential to distinguish and avoid interference of flow rate or hydraulic head between the primary and secondary circuits. The separation can be achieved by the installation of an inertial storage tank or a hydraulic separator, the latter suitable for small systems and with reduced volumes of water.
The variation of the flow rates and hydraulic heads caused by the operation of the circulation pumps present in the system, can generate interference and disturbances in the correct functioning of the same. Both types of circuit breaker, both inertial **storage tank** and **hydraulic separator,** are able to perform the function of circuit separation avoiding the occurrence of the problems described above.
The maximum flow rates in the system are the main factors for choosing the type of separator to be installed



Qi: primary circuit flow rate - Qe: secondary circuit flow rate
T1: primary delivery temperature - T2: primary return temperature
T3: secondary delivery temperature - T4: secondary return temperature

TIEMME'S SOLUTION

ART. 3144
Threaded Magnetic Hydraulic Separator

TECHNICAL SPECIFICATIONS

Body material	Fe 360 epoxy powder coated steel
Maximum working pressure	10 bar
Maximum operating temperature	110 °C

TIEMME INFORMS

When is it necessary to install an inertial accumulation with respect to a hydraulic separator?

- In the case of parallel installation of alternative heat sources to the heat pump (e.g. high temperature generators);
- Ensure the minimum water content (high flow plant terminals, fan coil units and radiators);
- Increase the thermal inertia of the plant, favouring control in modulation;
- Optimise operation during the defrosting process, avoiding cold water entering the system.

Correctly balancing the flow rates of the primary and secondary circuits is essential both in the presence of hydraulic separator, both in the presence of inertial accumulation.

In order to ensure the proper functioning of all functions of the heat pump (heating, cooling and defrosting) it is necessary to provide the correct minimum water volume required, under the most unfavourable conditions of use, with totally or partially closed areas.
The installation of an inertial storage tank can fulfil the function of ensuring the minimum volume required, placement and sizing of the storage tank will require special attention:

• **Connected as a hydraulic separator**
It makes the two circuits hydraulically independent and in the case of switching off the heat pump, it guarantees thermal reserve for individual users and thermal inertia at the system terminals;

• **Installed in line on return**
In combination with ON/OFF machines or machines with older generation inverters, it reduces compressor starting cycles and stresses on the machine. In the case of systems without circulation circuits.
During defrosting the evaporator is guaranteed a minimum water temperature favouring the operations.

• **Installed in line on the delivery**
As in the case of installation on the return line, it performs the same accumulation function, but acting as an energy reserve to the emission system requires more time for the system to run.

• **Connection to 3 pipes**
Similar to the installation version as a hydraulic separator, it provides thermal flywheel at the service of users allowing to hydraulically compensate the circuits.
The direct connection between machine and utilities, without the forced passage in accumulation, ensures the rapid commissioning of the system.

TIEMME'S SOLUTION

ART. 3168
Inertial tank in stainless steel with function of hydraulic separator in combination with systems with heat pump. Complete with air vent valve and M/F reduction. (Capacity 30-50-75 l)

ART. 3169
Hot water storage tank in painted steel with function of hydraulic separator and 4-inlet manifold for combination with hybrid systems. Complete with insulation, air vent and inlet/relief valve. (Capacity 50-100 l)

TIEMME INFORMS

The minimum amount of water indicated by the manufacturer of the heat pump, in order to ensure the correct operation of the machine even in the defrosting phase, constrains the choice of volume for inertial storage.

The value of the storage volume is influenced by additional factors dictated by the characteristics of the plant, the size of the same, the management mode and the installed components. This value must be guaranteed regardless of the water content of the generator and the distribution system, for example in the presence of a 2-way zone valve, when the ambient temperature is reached, the volume of water in the distribution system is excluded from the total volume.

It is essential to follow the information provided by the heat pump manufacturer, but an indicative sizing of the storage volume can be performed assuming a value between 5÷7 litres per kW of thermal power of the generator.

3 MAGNETIC DIRT SEPARATOR FILTER

Traditional systems with a generator consisting of a boiler and new generation systems with a generator in heat pump, meet the same legal obligations regarding the treatment of water, in Italy this legislative reference is represented by the Minimum Requirements Decree of 2015.
A correct water treatment guarantees a higher system performance, favouring the circulation in the thermal vector system and allowing an energy saving that can be up to 10%, also ensuring a longer life and durability of the components installed.

On the market there are heat pumps equipped with pre-mounted filter on board, located near the water inlet of the plate heat exchanger, with the dual function of preventing debris and impurities in suspension in the system can obstruct the same and to avoid the onset of corrosion of the components.
The installation outside the machine of an additional dirt separator filter, better if placed on the return line from the system to the generator, avoids the excessive occlusion of the filter inside the generator that causes the main decrease in flow rate or excessive increase in pressure drops.
The presence of an additional filter external to the machine, easier access facilitates maintenance operations and at the same time lightens the work of the internal filter (if already present) or provides additional protection to the internal heat exchanger if the heat pump is not equipped with a filter on the machine.

TIEMME'S SOLUTION

ART. 3141
TM-MAG PLUS Magnetic dirt separator filter

TECHNICAL SPECIFICATIONS

Degree of filtration	800 µm
Body material	PA66 + FV 30%
Maximum operating temperature	95°C

TIEMME INFORMS

GENERATORS WARRANTY:
If the impurities present in the thermal energy carrier fluid are not eliminated, they can compromise the operation of appliances or components, such as boilers or heat exchangers, especially during plant commissioning, already at the first passage.
This problem should not be underestimated, since boiler/heat pump manufacturers make the warranty conditions invalid if their product is not adequately protected with a filter, from the moment of commissioning.
For this reason, Tiemme always recommends the installation of a filter upstream of the boiler or heat pump.

4 WATER FILLING AND TREATMENT UNIT

Regardless of the system power or the hardness of the water present in the same, for heating or cooling systems chemical conditioning is always mandatory.

Presidential Decree 59 of 2009
Regulation implementing Article 4, paragraph 1, letters a) and b), of Legislative Decree No. 192 of 19 August 2005 on the implementation of Directive 2002/91/EC on the energy performance of buildings.
• Defines the obligation for thermal plants to have an adequate water treatment system.

UNI 8065:2019
Water treatment in winter and summer air conditioning systems, for the production of domestic hot water and in solar thermal systems.
• Fixes the chemical and chemical/physical characteristics of water in thermal plants for civil use;
• Description of water treatment systems and their description;
• Indications for the correct design and installation of water treatment systems;
• Washing and commissioning of new or modified systems;
• Indication for the rehabilitation of existing systems;
• Minimum indications for commissioning;
• Mode for control and frequencies.

The filling phases of a system require:
• **Use of water with criteria and parameters of potability;**
• **Compulsory cleaning of the system at the end of filling;**
• **Addition of protective product with anti-corrosive and anti-fouling characteristics** to maintain the conditions of the thermal vector unchanged, maintaining constant the system efficiency and yield values.

In systems that use heat pump generators, with low temperature heat vector, particular attention should be paid to the treatment of system water. The low temperatures favour more the formation of biological residues and suspensions, for this reason the combination of a biocide in addition to the protective prevents the growth of bacterial forms and microorganisms present in the water already during the system loading.

TIEMME'S SOLUTION

ART. 3164
Compact automatic filling and water treatment unit with type BA disconnector and insulation

TECHNICAL SPECIFICATIONS

Range	.5 - 5.5 bar (Factory setting 1.5 bar)
Max input pressure	10 bar
Maximum operating temperature	30 °C (inlet side)/ 65 °C (outlet side)
Body material	brass CW617N
Connection thread	male ISO 7/1 (EN 10226)
Disconnector	type BA according to EN 1717

ART. 3164CD
Water demineralization cartridge, including resin.

TIEMME INFORMS

The Ministerial Decree 26/06/2015 provides for the inclusion of chemical conditioning inside the heating systems, regardless of the thermal power of the installed generator.

5 DEAERATOR

The presence of air in the circuits is a common phenomenon that requires special measures, in order to ensure the correct operation of the system. The air not properly eliminated can cause different problems:

- Noise in pipes, terminals and valves;
- blocking of the circulation of the carrier fluid or insufficient flow rates at the emission terminals;
- corrosive phenomena of metal components.

In closed circuits is mandatory the presence of a device to promote the elimination of air, it is therefore necessary to install a deaerator downstream of the heat pump.
Please note that it is not enough to provide an air vent valve, except for systems with a water content of less than 300 litres.

TIEMME'S SOLUTION

ART. 5570

Automatic deaerator of air bubbles or micro-bubbles with insulation.

TECHNICAL SPECIFICATIONS

Body	brass
Internal elements	stainless steel
Insulation	EPP
Operating temperature range	- 10 °C ÷ + 110 °C
Maximum working pressure	10 bar

TIEMME INFORMS

The dimensioning of deaerators and dirt separators shall be based on the maximum fluid velocity at the device connections. It is recommended to maintain the maximum fluid velocity in the range of 1÷1.5 m/s.
The choice of the device is made in reference to the maximum recommended flow rate, to ensure proper operation.

DN	20	25	32	40
Connections	3/4"	1"	1"1/4	1"1/2
l/min	23,3	33,3	58,3	91,6
m^3/h	1,4	2,0	3,5	5,5

Recommended maximum flow rates for deaerators and dirt separators

6 3-WAY DIVERTER VALVE

In thermal plants with production of domestic hot water, the destination of the flows between air conditioning and sanitary system is managed by means of motorized diverter valves, generally the electronics of the heat pump is able to independently manage the flows, by detecting the temperature of the storage volume on the sanitary kettle.
For the effective management of the hot water flow it is important to reduce both the leakage of the valve and the time of manoeuvre, for this to the piston valves are preferable, for their characteristics, the 3-way diverter valves.
The actuation time of the valve must not exceed 50 seconds and preferably approach a value of 10 seconds, in order to optimize the flow management from the air conditioning system to the exchange system for domestic hot water production.

TIEMME'S SOLUTION

ART. 2134
Diverter ball valve including 3-way servo motor - Connections to 3 nozzles

TIEMME INFORMS

For the dimensioning of the diverter valve the reference value is Kv.
This value is a parameter of hydraulic resistance that identifies the pressure drop of the valve for the sizing of the same compared to the pressure drop available in the system.

Average pressure drop values in the plant
- Low pressure drop: 200 - 300 mm of water column
- High pressure drop: 500 - 600 mm of water column

DN	20	25
Connections	3/4"	1"
Kv	12	19

Values with Dp 1 bar

7 HP - DHW HYDRONIC MANAGEMENT UNIT

In heat pumps it is necessary to maintain the active circulation on the refrigerant/water exchanger to ensure proper disposal of the heat released by the heat exchangers themselves and to exploit the mass of water contained in the system during the defrosting cycles.
Blockage of circulation or insufficient flow rate of water can lead to serious malfunctions, sometimes leading to breakage of machine components.
To avoid these problems, manufacturers of heat pumps require the use of flow switches that, through a signal, allow the machines to stop if the flow rate falls below the safety limit value.

The following components ensure circulation to heat pumps:

1) Hydraulic separator

• It is simple and safe but you need to properly balance the flow rates between primary and secondary circuits and also requires secondary circulation systems;
• is the most widely used for medium to large distributions.

2) By-pass calibrated with balancing valve

• It is suitable for small distributions without secondary circuits;
• needs calibration and decreases the flow rate of the pump to the system by an amount equal to that conveyed in the by-pass;
• it is preferable to use this system when the circulators are set at constant hydraulic head, so that you can adjust the flow rate touched through the calibration valve.

3) By-pass with differential valve

• It is a solution that allows to open the relief valve by circulating water in the by-pass only when the flow towards the system decreases;
• The system is suitable for fixed and variable speed circulating pumps set at constant hydraulic head.
In the latter case it is important to position and calibrate the relief valve correctly, to avoid that it remains either always open or always closed.

TIEMME'S SOLUTION

ART. 5532PDC
Hydronic group for HP-DHW management

TECHNICAL SPECIFICATIONS

Diverter valve supply	230 Vac 50 Hz
Control	3 points
Differential by-pass adjustment range	50÷400 mbar

8 ANTIFREEZE VALVE

In the presence of harsh climates, or in conditions where the temperature drops to a critical value, during periods of shutdown of the heat pump, The heat generator implements the antifreeze procedures that allow the protection of the gas/water heat exchanger and the pipes of the hydraulic circuit. In these conditions, the circulating pumpof the machine is activated to move the water contained in it, in order to avoid freezing.
In the event that the temperature drops further below the critical value, set as internal safety to the machine, in addition to the above, the compressor is activated to raise the temperature of the fluid to an optimal freezing protection value.
Additional protections include the combination of electric heating systems and heat pump components. The combination of a heating element to the external air exchanger, in critical conditions of external temperature, allows the heating surface to be heated directly by melting the frost that can form on it. Another possibility is to combine heating cables directly to the hydronic pipes exposed outside.

Where it is not possible to install electrical protection systems, prevention systems can be implemented by adding monopropylene **GLYCOL** to the system water in order to avoid and prevent freezing phenomena. The concentration of the antifreeze fluid should be checked periodically and in the case of replenished losses. It should be considered that the viscosity of the antifreeze product generates an increase in pressure losses and in case of high temperatures can alter its structure becoming corrosive to sensitive parts of the system.

ANTI-FREEZE PROTECTION VALVE
To be used only:
• With monobloc heat pump (or hydrosplit)
• In case it is not possible to use **GLYCOL**.

Mechanical protection of passive type, the antifreeze valve allows the continuous and controlled discharge of water contained in the hydronic circuit. To prevent the slow and progressive emptying of the circuit, it must be installed in conjunction with an automatic filling unit.
As the temperature in the pipe goes down below 3 °C, the antifreeze valve shutter opens, starting the water drain from the circuit. The closing of the shutter occurs when the temperature of the fluid returns to a value of 4 ° C.

Installation precautions:
• The anti-freeze valve must be installed in a vertical position, no siphon connection must be made and at a distance of not less than 15 cm from the ground (avoid the formation of stratified ice columns that affect the operation of the valve);
• Setting the minimum set point in cooling operation with a value higher than 2 ° C compared to the valve temperature. This precaution prevents the valve from opening and discharging during cooling.
There are on the market anti-freeze valves with air temperature sensor for management with operation in the summer season.
• In the condition in which the external temperature is higher than 5 °C, the antifreeze valve is inhibited by an air temperature sensor on it. The sensor prevents the possibility of opening in the summer season during cooling.

TIEMME'S SOLUTION

ART. 1926
Antifreeze valve

TIEMME INFORMS

Sizing of antifreeze valve:
The discharge rate depends on the pipe size and not the valve size.
The size of the valve depends on the pipe.

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COMPONENTS AND INTEGRATED SYSTEMS FOR HEATING AND PLUMBING SYSTEMS

HYDRAULIC COMPONENTS

CENTRAL HEATING SYSTEM - METERING

RADIANT SYSTEMS

TAPS AND FITTINGS

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Rev. A - 11 2024