

/ Use

The function of the Icma anti-freeze valve for heat pumps is to activate situations of cold temperatures and heat pump shutdown for a period of time so that the thermovector fluid approaches freezing temperature exposing the system to possible freezing damage. A typical scenario for using the antifreeze valve is during a power failure for long periods (breakdown or blackout).

The possibility of the heat transfer fluid temperature dropping below 3°C during normal operation of the heat pump is very remote.

In case of power failure to the heat pump, check the system pressure.

The antifreeze valve allows the system heat transfer fluid to drain when its temperature reaches a nominal value of approximately 3°C. This prevents the formation of ice in the system circuit, thus avoiding possible damage to equipment such as heat exchangers or pipes.

When the temperature of the heat transfer fluid returns to a nominal temperature of approximately 4°C, the antifreeze valve closes and the tightness of the system is restored.

The nickel-plating treatment prevents corrosive phenomena due to exposure to atmospheric agents.



/ Product range

Art.	Code	Size	Description
609	90609AF06	1"	Antifreeze valve with threaded connections
609	90609AG06	1"1/4	
609	90609FA06	28 mm	Antifreeze valve with fittings for copper pipe EN 1057 R220, R250, R290

/ Technical features

MATERIALS

Body:	nickel-plated brass
Springs:	stainless steel
Seals:	EPDM - The moulded gasket (2 – see the 'Components' section on page 3) has a non-stick coating applied using plasma nanotechnology.

PERFORMANCE

Working fluid:	water*	
Max. working pressure:	10 bar	
Working temperature range:	0 ÷ 90°C	
Ambient temperature range:	-40 ÷ 60°C	
Opening temp. of the fluid at a max. operating temp. of 90°C:	3,4 - 5,4 °C	
Opening temp. of the fluid at a max. operating temp. of 80°C:	3,2 - 5,0 °C	
Opening temp. of the fluid at a max. operating temp. of 65°C:	2,9 - 4,5 °C	
Fluid closing temperature:	3,9 - 6,5 °C	
Kv (straight path):	1"	46 in the field Re = 1,5*10 ⁵ - 2,7*10 ⁵
	1"1/4	61 in the field Re = 1,1*10 ⁵ - 2,1*10 ⁵
Max. tightening torque:	1"	80 Nm
	1"1/4	100 Nm

**The anti-freeze valve is also tested for use with glycol water. N.B.: Heat pumps reduce their efficiency when filled with glycol water; moreover, glycol water accelerates material degradation.*

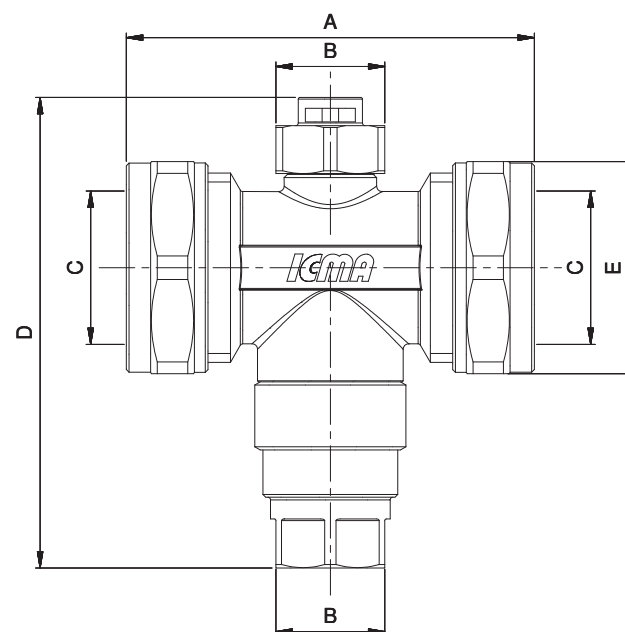
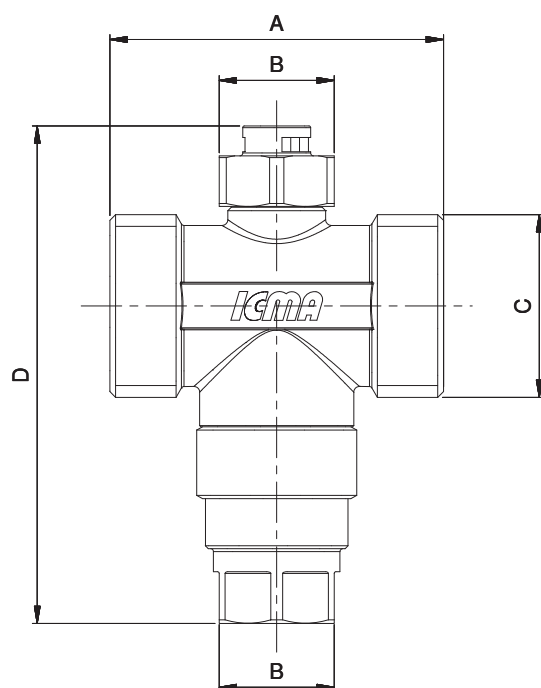
/ Maximum discharge flow rate

P (bar)	T outside (°C)	Flow rate (l/h) case A	Flow rate (l/h) case B
Atmosferic	-5	0.28	0.44
	-20	0.68	0.92
	-40	1.24	1.66

Test conditions:

- straight pipe (Ø12 mm, length 60 cm) placed outside;
- water temperature inside the building 23±2°C (case A) and 18±2°C (case B) during microcirculation.

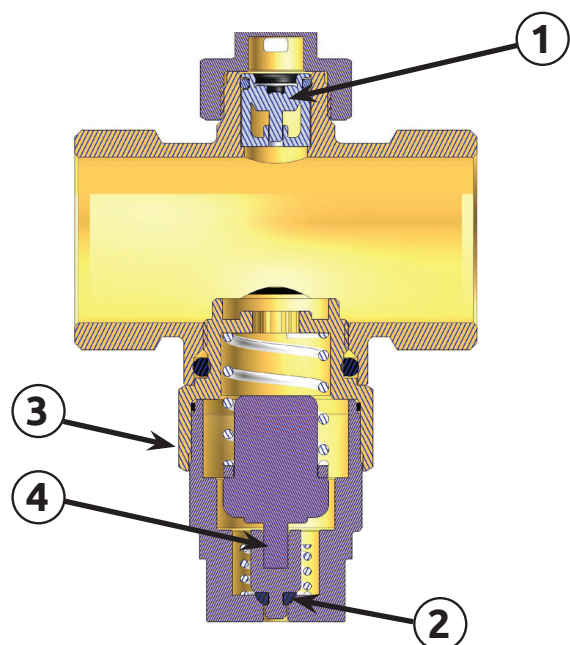
/ Dimensions



Code	A	B	C	D
90609AF06	58	ch. 20	1"	86.5
90609AG06	58	ch. 20	1" 1/4	95

Code	A	B	C	D	E
90609FA06	75	ch. 20	Ø28	86.5	ch. 39

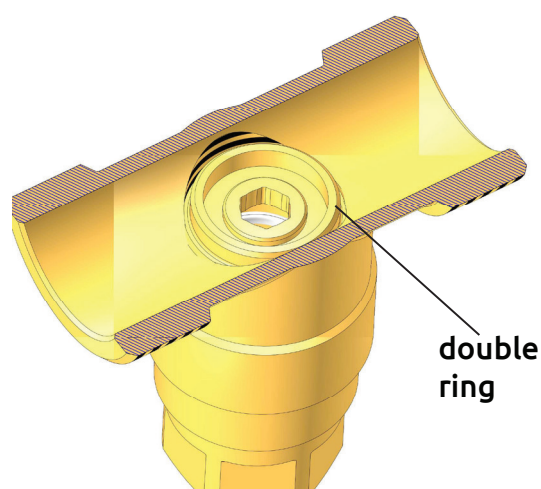
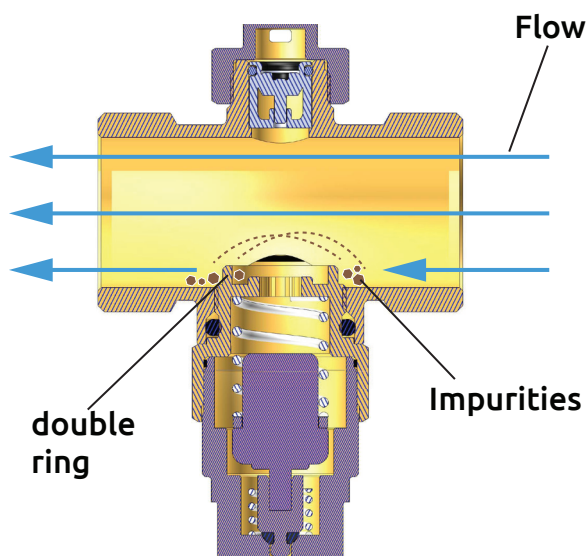
/ Components



1. Vacuum breaker.
2. Moulded gasket with a non-stick coating (see "Moulded gasket" on page 4) and specifically designed for this type of application, allowing for "drip-feed" operation even at low temperatures such as -40°C.
3. Water sensor cartridge.
4. Water temperature sensor.

/ Construction features

The anti-freeze valve has a double circular ring that reduces the passage of impurities through the thermostatic cartridge. This prevents the impurities from accumulating in the lower part of the valve, which otherwise could compromise the normal liquid flow.



Moulded gasket

The innovative non-stick coating, applied using plasma nanotechnology to the seal of the antifreeze cartridge, extends the product's lifespan, improves its performance and reduces the build-up of impurities inside it.



Untreated gasket. You can see that impurities have accumulated on it.



Treated seal. A significant reduction in impurities can be observed.

/ Operation

In the situation where the antifreeze valve is closed, the discharge remains closed until the fluid temperature falls to the nominal value of 3°C. If the antifreeze valve is open and discharging the heat transfer fluid, it remains open and continues to discharge until the fluid temperature returns to the nominal value of 4°C.

Thanks to the fluid dynamics and mechanical cautions of the antifreeze valve, it prevents the system from emptying, maintaining a dripping flow that is as uniform as possible during discharge, with a very low Reynolds number, rather than a constant "continuous" flow at a high Reynolds number.

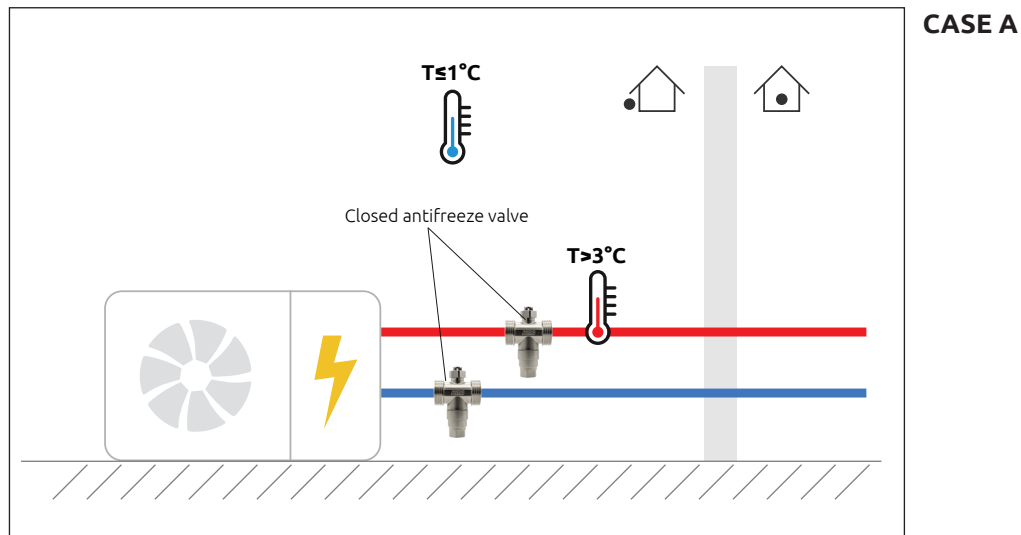
In the most severe situation, at a temperature of -40°C with the microcirculation water in the system at 18°C, the valve discharges a maximum of 1.66 L/h.

With a 2-hour blackout, approximately 3 liters of water are discharged, which does not create emptying issues for the system, as the typical amount of water in a heat pump system is:

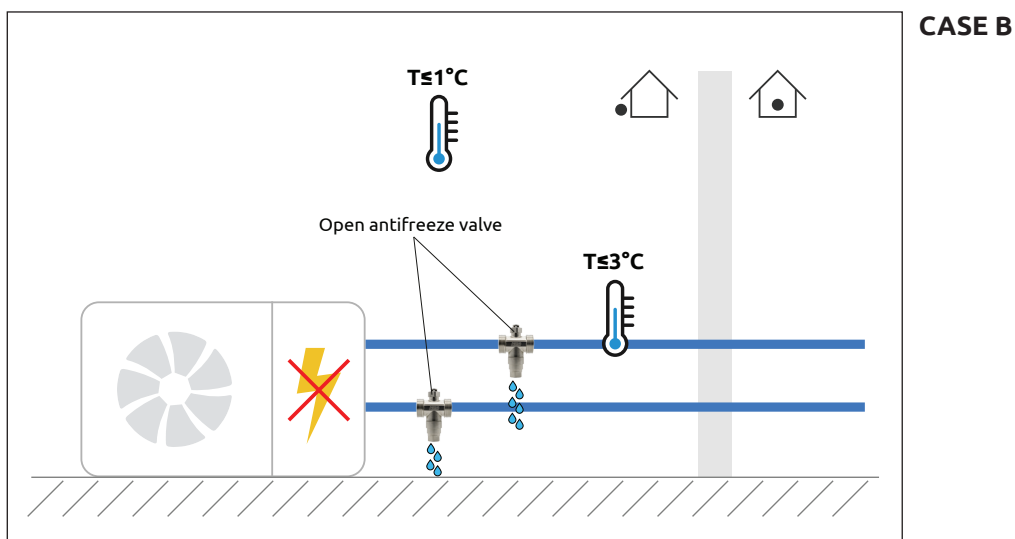
1. for low-temperature radiators: 50 to 110 liters for each kW of installed thermal power.
2. for underfloor heating: 30-40 liters of water for each kW of thermal power. For example, for a 10 kW heat pump, 300 to 400 liters of water would be needed.
3. accumulation tank: the capacity depends on the size of the tank itself, which usually ranges from 100 to 500 liters.

/ Operation phases

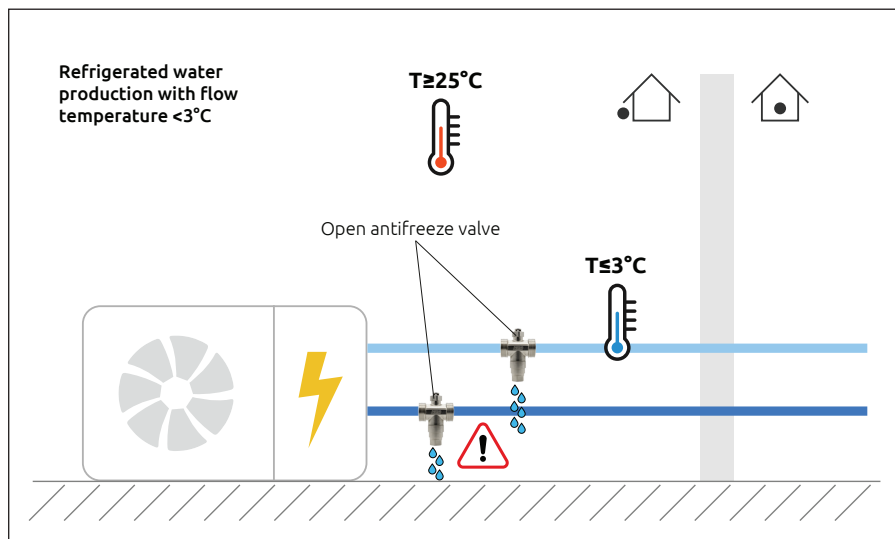
Winter operation in heating mode



Winter operation in case of power failure



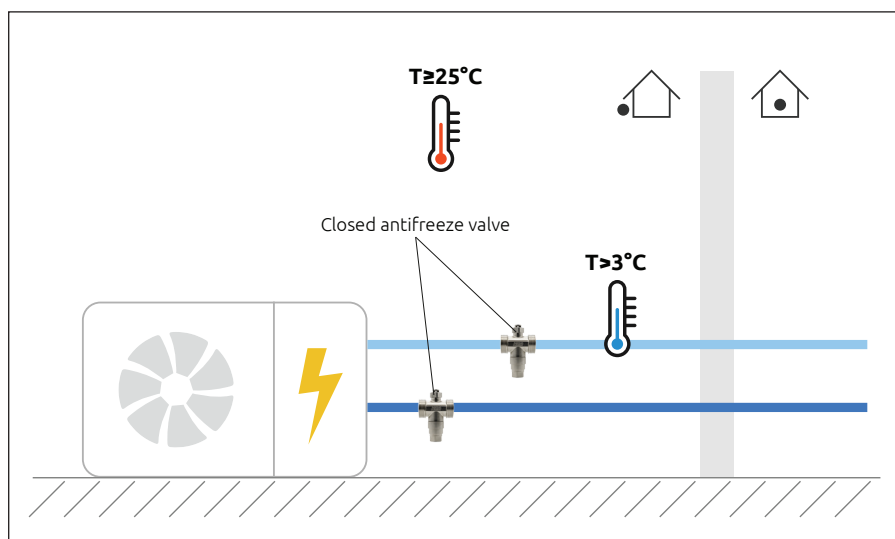
Summer operation in cooling mode



CASE A



In most heat pumps, unwanted dripping does not occur. The operating limits for flow temperature in cooling mode are usually $5^{\circ} \div 25^{\circ}\text{C}$. Read the instructions of the installed heat pump.



CASE B

/ Details of 28 mm valve

The 28 mm version of the valve is equipped with brass compression fittings. These fittings are designed to mechanically form a joint between the fitting and the pipe. When the nut is tightened, the pipe ogive is compressed, creating a permanent seal.

Pipe compatibility

Make sure that the dimensions of the fitting match those of the pipe and that both are in good condition and free of damage and imperfections.

The fittings are designed to connect EN 1057 water pipes in heating and sanitary systems.

/ Replacements

- **RG0609AF06:** ANTIFREEZE CARTRIDGE 609 REPLACEMENT
- **RA4609AF33:** VACUUM BREAKER VALVE 609 REPLACEMENT

/ Technical specifications

Article 609

Antifreeze valve. Threaded connections G 1' M (ISO 228-1) (G 1' and G1"1/4). Brass body. Maximum operating pressure 10 bar. Operating temperature range 0-90 °C. Ambient temperature range -40-60 °C. Water temperature for outlet opening: 3 °C. Water temperature for outlet closing: 4 °C

Article 609

Antifreeze valve with fittings for copper pipe Ø 28. Brass body. Maximum operating pressure 10 bar. Operating temperature range 0-90 °C. Ambient temperature range -40-60 °C. Water temperature for outlet opening: 3 °C. Water temperature for outlet closing: 4 °C.

We reserve the right to make improvements and changes to the described products and their technical data at any time and without prior notice. The information contained in this technical document does not exempt the user from scrupulously following existing regulations and standards of good practice.