251 solar discal®

utomatic de-aerator

altecnic

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Application

Altecnic solar automatic air separators or de-aerators are used to continuously remove the air contained in the hydraulic circuits of solar heating systems.

They are capable of automatically removing all the air present in the system down to micro-bubble level, with very low head losses.

Discal® solar de-aerators have large collection chambers able to accommodate a large volume of air before being released automatically.

The circulation of fully de-aerated water enables equipment to operate under optimum conditions, free from any noise, corrosion, localised overheating or mechanical damage.

The Altecnic 251 solar de-aerators have been specifically designed to operate with glycol solutions, at the higher temperatures associated with solar heating systems.

Design

The solar Discal® de-aerator is manufactured from brass with an internal element and automatic air vent.

Available for installation in horizontal or vertical pipes.

Supplied with female threaded connections for horizontal and vertical pipes.

Supplied with female parallel threaded ends complying with BS EN ISO 228-1

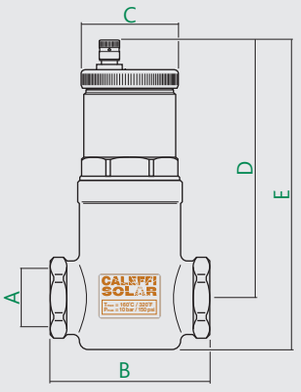
Drain connection threaded ½" female supplied with blanking plug.

Construction Details

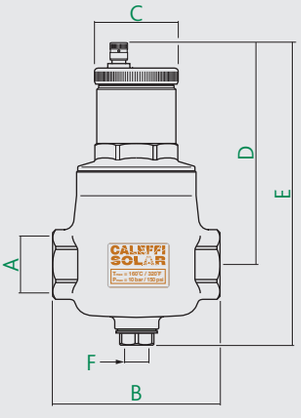
Component	Material	Grade
Body	Brass	BS EN 12165 CW617N
Cover	Brass	BS EN 12165 CW617N
Internal Element	Stainless steel	
Float	High resistance polymer	
Float Guide	Brass	BS EN 12164 CW614N
Stem	DZR	BS EN 12164 CW602N
Float Lever	Stainless steel	
Spring	Stainless steel	
Seals	High resistance elastomer	

Product Code	Pipe Orientation	Size
251003	Horizontal	¾"
251006	Horizontal	1"
251007	Horizontal	1¼"
251905	Vertical	¾"
251906	Vertical	1"

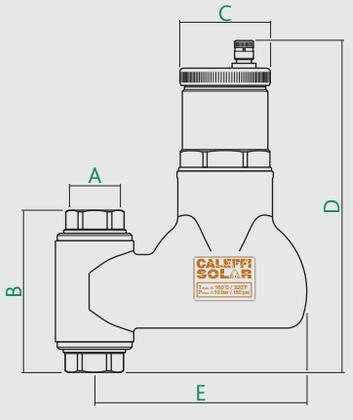
Dimensions



Prod Code	A	B	C	D	E	kg
251003	G¾	78	55	143	162	0.91



Prod Code	A	B	C	D	E	F	kg
251006	G1	110	55	146	205	G½	1.7
251007	G1¼	124	55	166	225	G½	2.2



Prod Code	A	B	C	D	E	kg
551905	G¾	102	55	211	130	2.05
551906	G1	107	55	214	130	2.05

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Solubility of Air in Water

The quantity of air which can remain dissolved in a water solution is a function of pressure and temperature.

This relationship is governed by Henry's Law, the graphs quantify the physical phenomenon of the volume of air released by the fluid.

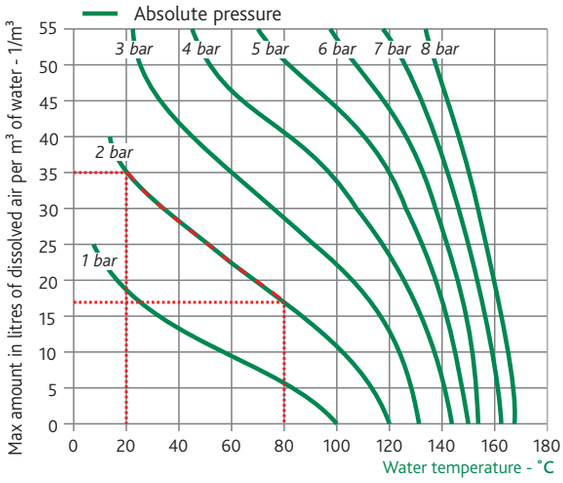
As an example, at a constant absolute pressure of 2 bar, if the water is heated from 20°C to 80°C, the quantity of air released by the solution is equal to 18 l per m^3 of water.

According to this law it can be seen that the amount of air released increases with temperature rise and pressure reduction.

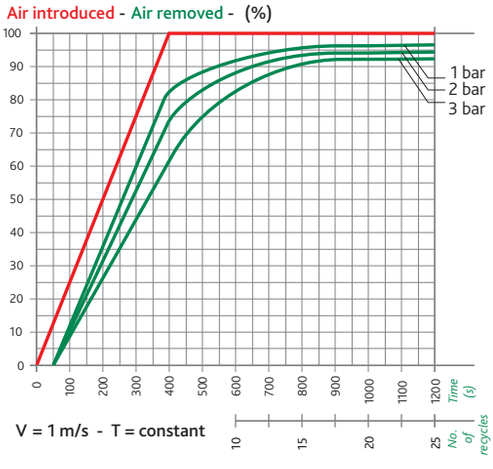
The air is in the form of micro-bubbles, a fraction of a millimetre in diameter.

Micro-bubbles form continuously in the water of solar thermal systems at the highest point of the solar panels, which is the point in th circuit where the highest temperatures are achieved.

The air is partially re-absorbed as the water reaches the parts of the circuit at a lower temperature, partly remaining in the water and therefore must be extracted.



Air Separation Efficiency



Air Separation Efficiency

Under a controlled test the Discal® de-aerator was capable of continuously removing the air contained within a hydraulic circuit, with a high degree of separation efficiency.

The amount of air which may be removed from a circuit depends on various parameters: it increases as the circulation speed and pressure values fall.

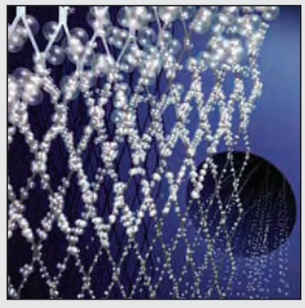
As illustrated on the graph, after be recycled just 25 times at the maximum recommended speed, almost all the air artificially introduced into the circuit is eliminated by the de-aerator, with variable percentages according to the pressure within the circuit.

The small amount of air which remains is then gradually eliminated during normal system operation.

In conditions where the flow velocity is lower or the temperature of the water is higher the amount of air separated will be even grater.

Operating Principles

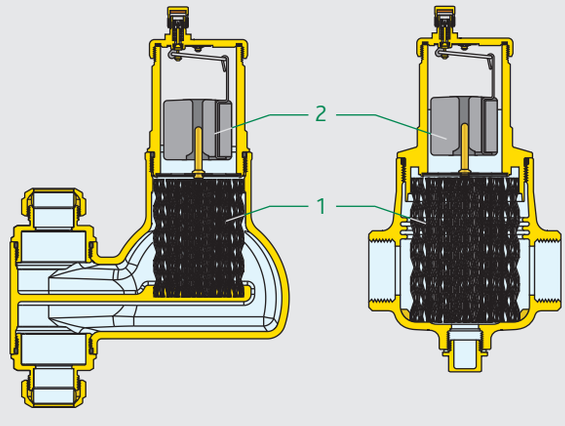
De-aerators use the combined action of several physical principles.



The active part consists of an assembly of concentric metal mesh surfaces (1). These elements create the whirling movement required to facilitate the release of micro-bubbles and their adhesion to these surfaces.

The bubbles, fusing with each other, increase in volume until the hydrostatic thrust is such as to overcome the adhesion force to the structure.

They rise towards the top of the unit from which they are released through a float-operated (2) automatic air release valve.It is designed in such a way that the direction in which the medium is flowing is not important.



Construction Details

Resistance to heat and high discharge pressures

Solar thermal systems require high performance de-aerators, which is guaranteed by the use of particularly heat resistant materials.

They allow the functional features of the de-aerator with glycol water temperatures up to 160°C to be maintained. The internal geometry of the de-aerator has been designed to be able to discharge the air up to a pressure of 10 bar.

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Construction Details

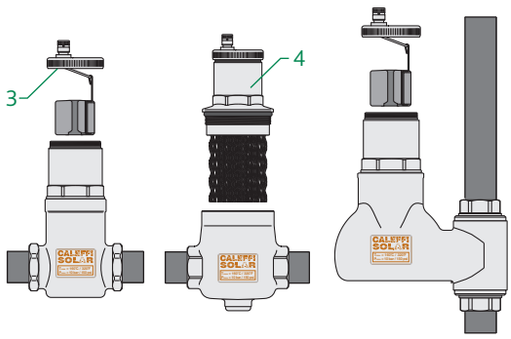
Maintenance

The automatic air vent is located at the top of the de-aerator.

The construction of the Discal® allows it to be maintained and cleaned without removing it from the system.

The components that control the air venting are accessed by removing the cover (3).

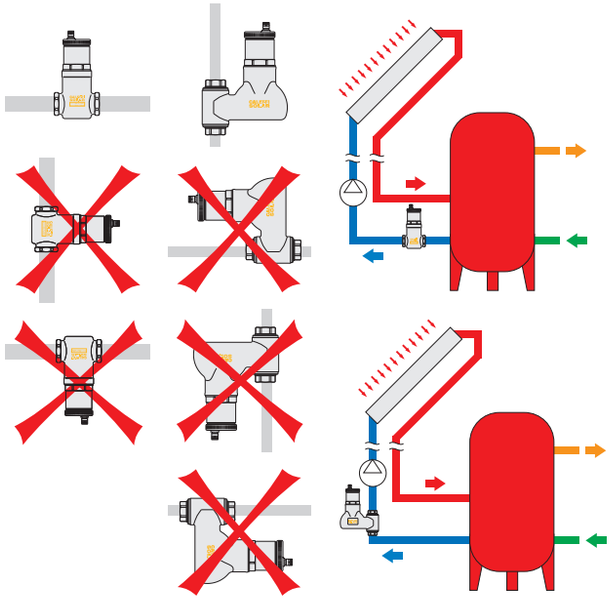
When cleaning simply unscrew that part of the body containing the automatic air vent(4).



Installation

Solar Discal® de-aerators must be installed in a vertical position, and preferably upstream of the pump where, due to the high speed of the medium and the ensuing drop in pressure, in this position air micro-bubbles develop more easily.

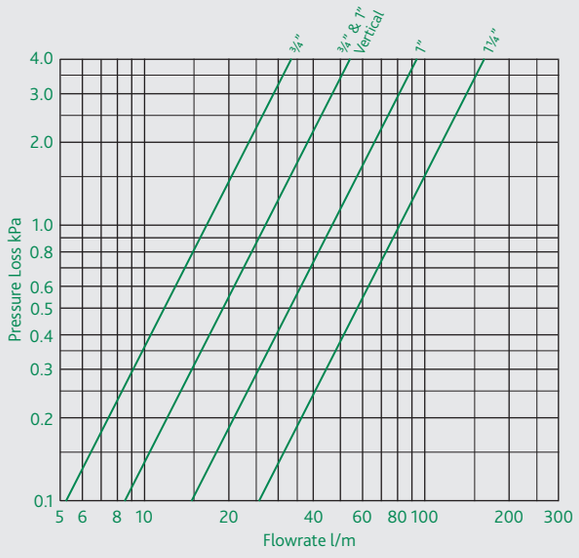
On the return and in the lower part of the solar thermal circuit, with no formation of steam.



Technical Data

Medium:	water glycol solution
Max. percentage of glycol:	50%
Max. working pressure:	10 bar
Max. discharge pressure:	10 bar
Temperature range:	-30 to 160˚C

Pressure Loss Chart



Size	¾"	All Vertical	1"	1¼"
Kv - m^3/h	10.0	17.0	28.1	48.8

The maximum recommended flow velocity inside the pipe is 1.2 m/s. The following shows the maximum flow rates to meet this requirement.

Size	¾"	All Vertical	1"	1¼"
l/m	25.6	25.6	40.9	71.6

Based on the minimum internal diameter of steel pipe to BS EN 10255

E & O.E

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