

DISCAL® deaerator

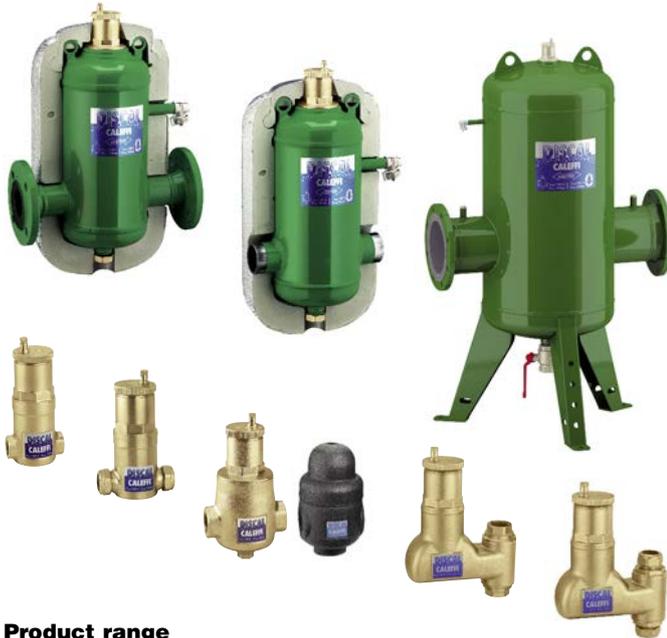


551 series



01060/14 GB

replaces 01060/10 GB



Function

Deaerators are used to continuously remove the air contained in the hydraulic circuits of heating and cooling systems. The air discharge capacity of these devices is very high. They are capable of automatically removing all the air present in the system down to micro-bubble level, with very low head losses.

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

The threaded connection product is available in versions for installation to horizontal or vertical pipes.

Flanged and weld-end DISCAL® deaerators are supplied complete with hot pre-formed shell insulation to ensure perfect thermal insulation when used in both hot and chilled water systems.

For threaded model with drain, size 3/4" to 2", an optional insulation is available.



Product range

551 series DISCAL® deaerator for horizontal pipes, compact version	size DN 20 (3/4")
551 series DISCAL® deaerator for horizontal pipes with olive connections, compact version	size DN 20 (Ø 22)
551 series DISCAL® deaerator for horizontal pipes with drain	size DN 20 (3/4"); DN 25 (1"); DN 32 (1 1/4"); DN 40 (1 1/2"); DN 50 (2")
551 series DISCAL® deaerator for vertical pipes, compact version	size DN 20 (3/4"); DN 25 (1")
551 series DISCAL® deaerator for vertical pipes with olive connections, compact version	size DN 20 (Ø 22)
551 series DISCAL® deaerator for horizontal pipes with flanged connections and pre-formed insulation with drain	size DN 50–DN 150
551 series DISCAL® deaerator for horizontal pipes with flanged connections and floor supports	size DN 200–DN 300
551 series DISCAL® deaerator for horizontal pipes with weld ends and pre-formed insulation with drain	size DN 50–DN 150

Technical specifications

series	551 threaded	551 flanged and weld ends
Materials: Body: brass EN 12165 CW617N Internal element: PA66G30; stainless steel (compact version) Float: PP Float guide: brass EN 12164 CW614N Stem: brass EN 12164 CW614N Float lever: stainless steel EN 10270-3 (AISI 302) Spring: stainless steel EN 10270-3 (AISI 302) Hydraulic seals: EPDM Drain cock: -		epoxy resin coated steel stainless steel PP brass EN 12164 CW614N brass EN 12164 CW614N stainless steel EN 10270-3 (AISI 302) stainless steel EN 10270-3 (AISI 302) EPDM brass EN 12165 CW617N, chrome plated
Performance: Medium: water, non-hazardous glycol solutions excluded from the guidelines of directive 67/548/EC Max. percentage of glycol: 50% Max. working pressure: 10 bar Max. discharge pressure: 10 bar Working temperature range: 0–110°C		water, non-hazardous glycol solutions excluded from the guidelines of directive 67/548/EC 50% 10 bar 10 bar 0–110°C
Connections: Main: 3/4", 1", 1 1/4", 1 1/2", 2" F with compression ends for Ø 22 mm copper pipe Probe holder: Drain: 1/2" F (with plug)		DN 50–DN 150, PN 16 DN 200–DN 300, PN 10 to be coupled with EN 1092-1 counterflanges DN 50–DN 150 weld ends DN 200–DN 300, inlet/outlet 1/2" F DN 50–DN 150, 1" M (with plug); DN 200–DN 300, 2" F

**Technical specification of insulation for threaded model
(code 551005-6-7-8-9)**

Material: closed cell expanded PE-X
 Thickness: 10 mm
 Density: inner part: 30 kg/m³; outer part: 80 kg/m³
 Thermal conductivity (ISO 2581): - a 0°C: 0,038 W/(m·K)
 - a 40°C: 0,045 W/(m·K)
 Coefficient of resistance to water vapour (DIN 52615): > 1.300
 Working temperature range: 0-110°C
 Reaction to fire (DIN 4102): class B2

**Technical specification of insulation for flanged models
from DN 50 to DN 100**

Inner part
 Material: rigid closed cell expanded polyurethane foam
 Thickness: 60 mm
 Density: 45 kg/m³
 Thermal conductivity (ISO 2581): 0,023 W/(m·K)
 Working temperature range: 0-105°C

External cover

Material: embossed unfinished aluminium
 Thickness: 0,7 mm
 Reaction to fire (DIN 4102): class 1

Head covers

Heat moulded material: PS

**Technical specification of insulation for flanged models
DN 125 and DN 150**

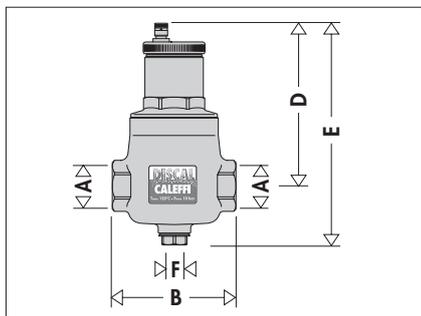
Inner part

Material: closed cell expanded PE-X
 Thickness: 60 mm
 Density: inner part: 30 kg/m³; outer part: 80 kg/m³
 Thermal conductivity (ISO 2581): - at 0°C: 0,038 W/(m·K)
 - at 40°C: 0,045 W/(m·K)
 Coefficient of resistance to water vapour (DIN 52615): > 1.300
 Working temperature range: 0-100°C
 Reaction to fire (DIN 4102): class B2

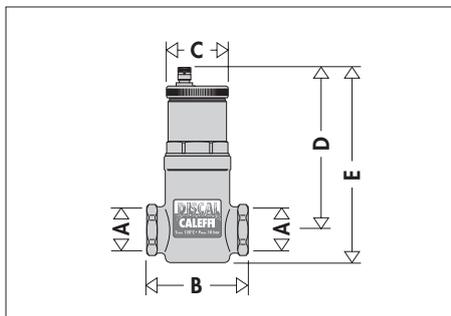
External cover

Material: embossed unfinished aluminium
 Thickness: 0,7 mm
 Reaction to fire (DIN 4102): class 1

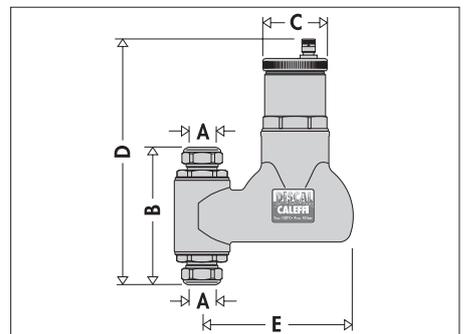
Dimensions



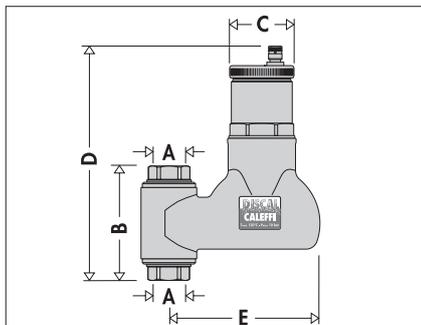
Code	Size	A	B	D	E	F	Mass (kg)
551005	DN 20	3/4"	110	146	205	1/2"	1,7
551006	DN 25	1"	110	146	205	1/2"	1,7
551007	DN 32	1 1/4"	124	166	225	1/2"	2,2
551008	DN 40	1 1/2"	124	166	225	1/2"	2,2
551009	DN 50	2"	130	160	225	1/2"	2,5



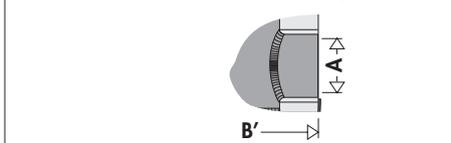
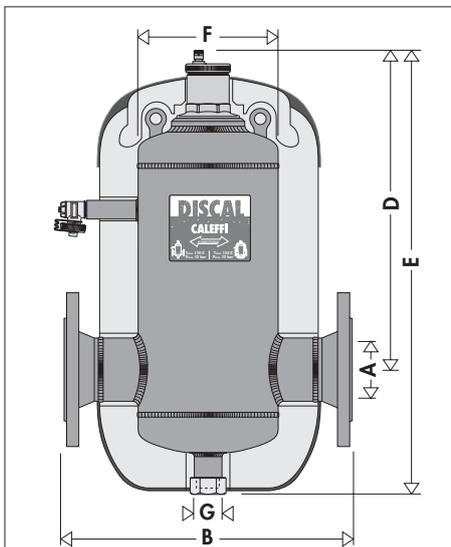
Code	Size	A	B	C	D	E	Mass (kg)
551003	DN 20	3/4"	78	55	143	162	0,9



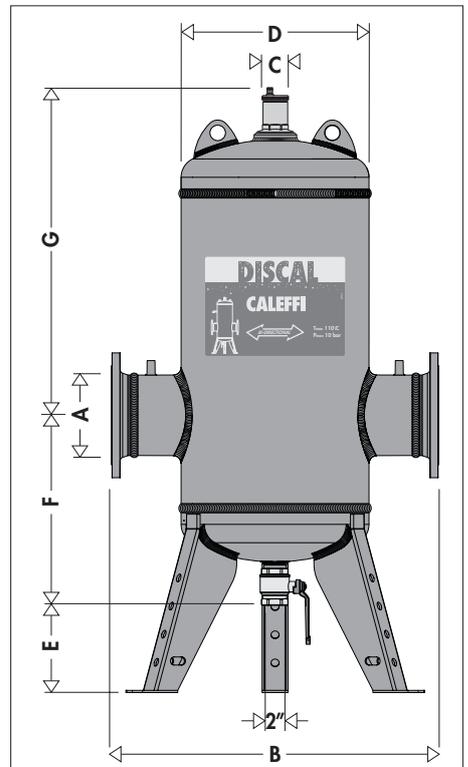
Code	Size	A	B	C	D	E	Mass (kg)
551902	DN 20	∅ 22	121	55	220,5	130	2,05



Code	Size	A	B	C	D	E	Mass (kg)
551905	DN 20	3/4"	102	55	211	130	2,05
551906	DN 25	1"	107	55	213,5	130	2,05



Code	A	B'	B	D	E	F	G	Mass (kg)
551052/3	DN 50	260	350	374	506	169	1"	15
551062/3	DN 65	260	350	374	506	169	1"	15,5
551082/3	DN 80	366	466	435	595	219	1"	28
551102/3	DN 100	366	470	435	595	219	1"	30
551122/3	DN 125	525	635	545	775	324	1"	48
551152/3	DN 150	525	635	545	775	324	1"	53



Code	A	B	D	E	F	G	Mass(kg)
551200	DN 200	900	508	215	510	825	1,52
551250	DN 250	1060	660	215	575	970	280
551300	DN 300	1180	762	215	645	1100	395

Code	Size	A	B	C	D	E	Mass (kg)
551002	DN 20	∅ 22	97	55	143	162	0,9

Size	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200	DN 250	DN 300
Volume (l)	7	7	18	18	52	52	211	415	639

The process of air formation

The amount 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 and the graph below allows the physical phenomenon of the air content release of the fluid to be quantified. As an example, at a constant absolute pressure of 2 bar, if the water is heated from 20°C to 80°C, the amount of air released by the solution is equal to 18 l per m³ of water.

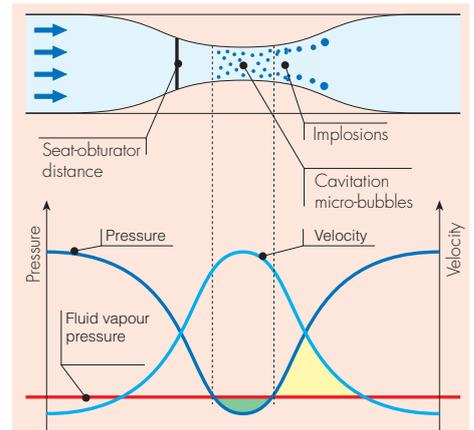
According to this law it can be seen that the amount of air released increases with temperature rise and pressure reduction. The air comes in the form of micro-bubbles of diameters in the order of tenths of a millimetre.

In heating and cooling systems there are specific points where this process of formation of micro-bubbles takes place continuously: in the boiler and in any device which operates under conditions of cavitation.

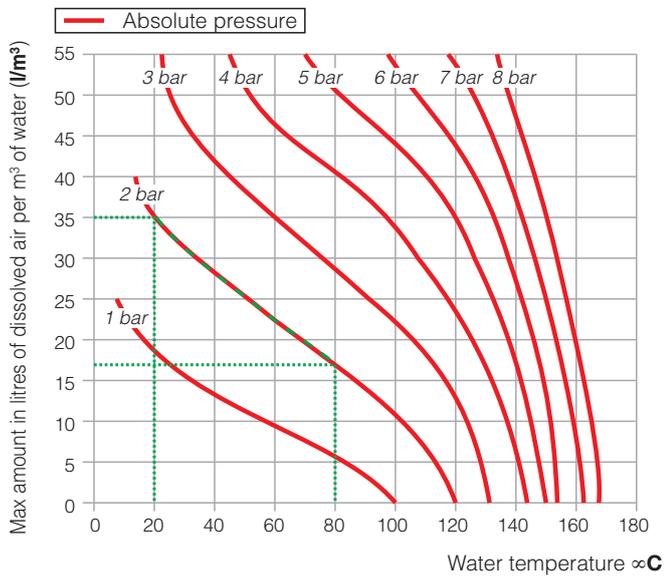
Cavitation micro-bubbles

Micro-bubbles develop where the fluid velocity is very high with the corresponding reduction in pressure.

These points are typically the pump impeller and the regulating valve seating. These air and vapour micro-bubbles, the formation of which is enhanced in the case of non de-aerated water, may subsequently implode due to the cavitation phenomenon.



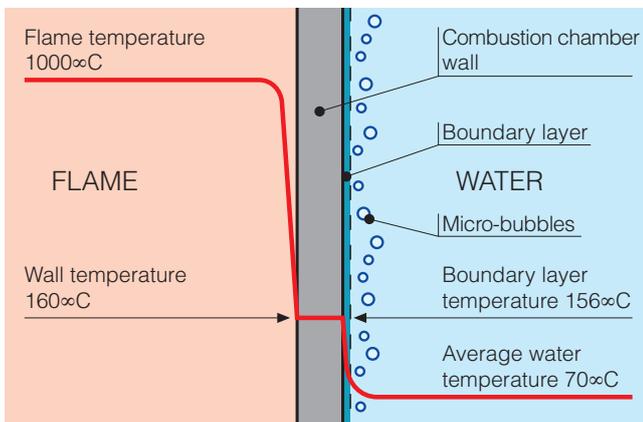
Graph: Solubility of air in water



Boiler micro-bubbles

Micro-bubbles are formed continuously on the surface separating the water from the combustion chamber due to the fluid temperature.

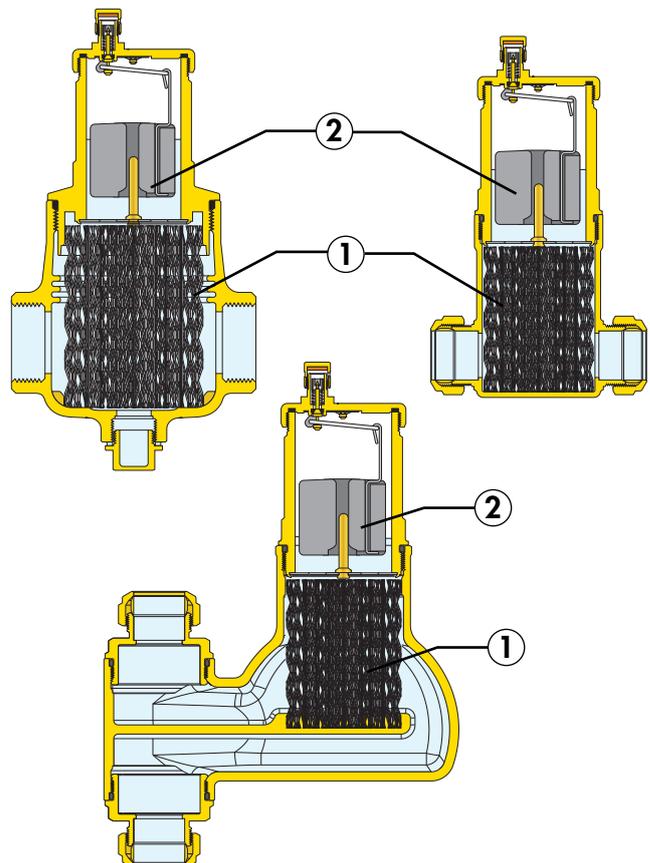
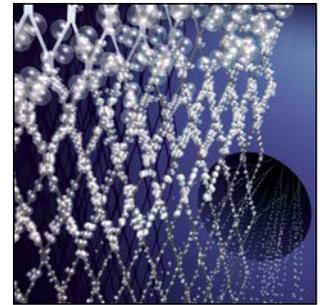
This air, carried by the water, collects in the critical points of the circuit from where it must be removed. Some of this air is reabsorbed in the presence of colder surfaces.

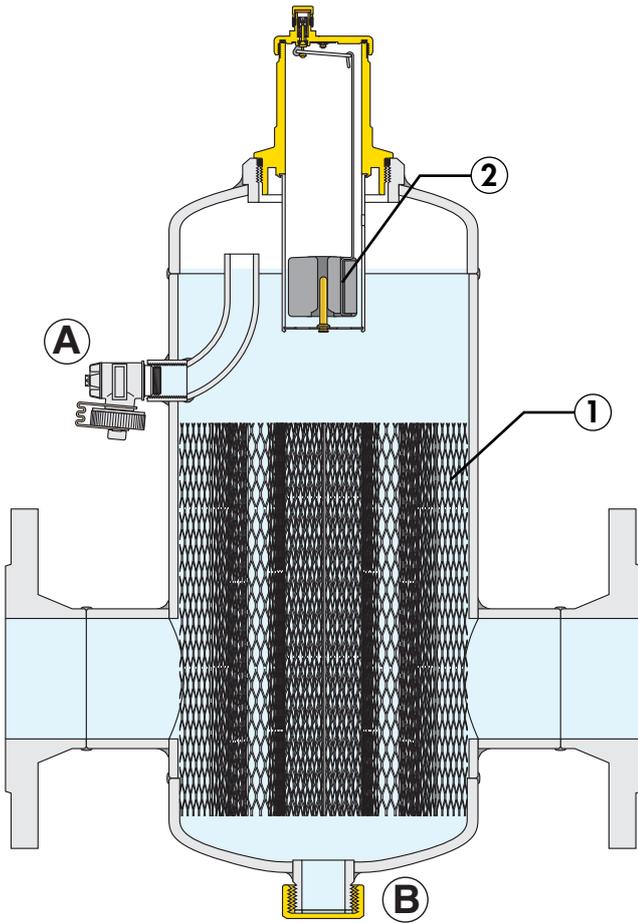


Operating principle

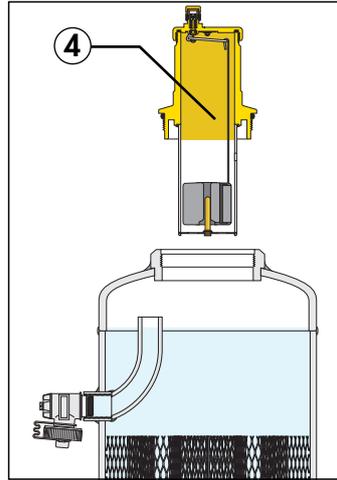
The deaerator uses the combined action of several physical principles. The active part consists of an assembly of concentric metal mesh surfaces (1). These elements create the whirling movement required to facilitate the release of micro-bubbles and their adhesion to these surfaces.

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 automatic air release valve (2). It is designed in such a way that the direction in which the medium is flowing inside it makes no difference.



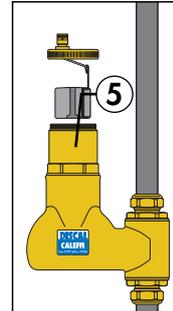


- When cleaning, simply unscrew the part of the body containing the automatic air vent (4). On threaded models without a drain, this part cannot be removed (5).



Flanged and weld-end deaerators are equipped with a cock (A) that has the dual function of releasing large quantities of air when the system is being filled and of removing the impurities that float on top of the water.

A drain valve (B) can be connected at the bottom of the unit to drain the impurities that have collected at the bottom of the deaerator.

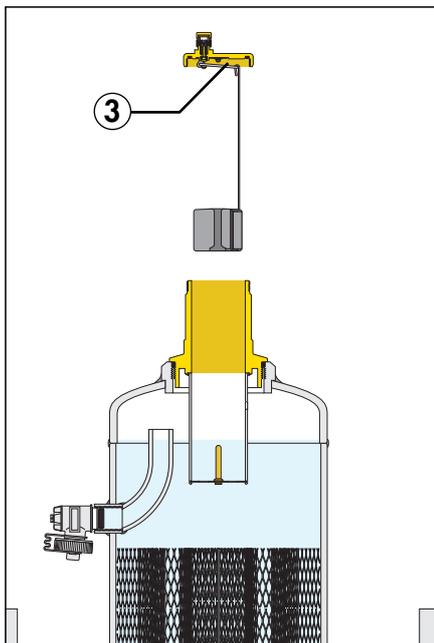
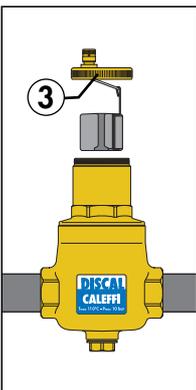


Construction details

The automatic air vent is located at the top of the unit and is equipped with a long chamber for the floating action. This feature prevents the impurities present in the water from reaching the seal seat.

The construction of the DISCAL® deaerator allows it to be maintained and cleaned without removing the device from the system. Note the following:

- The moving parts that control the air venting are accessed simply by removing the upper cover (3).



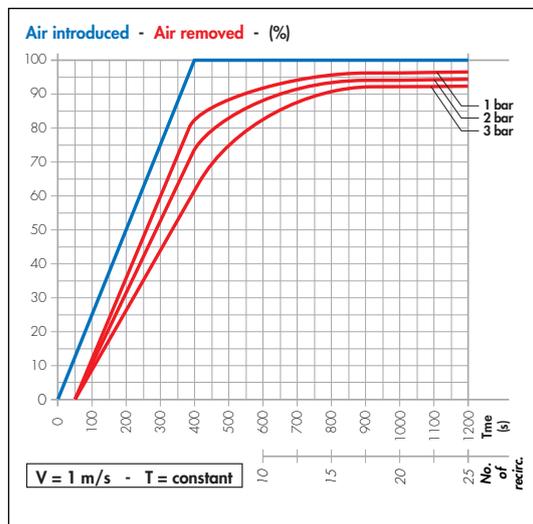
Air separation efficiency

DISCAL® devices are 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 below, after just 25 recirculations at the maximum recommended speed, almost all the air artificially introduced into the circuit is eliminated by the deaerator, with variable percentages according to the pressure within the circuit.

The small amount which remains is then gradually eliminated during normal system operation. In conditions where the speed is slower or the temperature of the medium is higher, the amount of air separated is even greater.



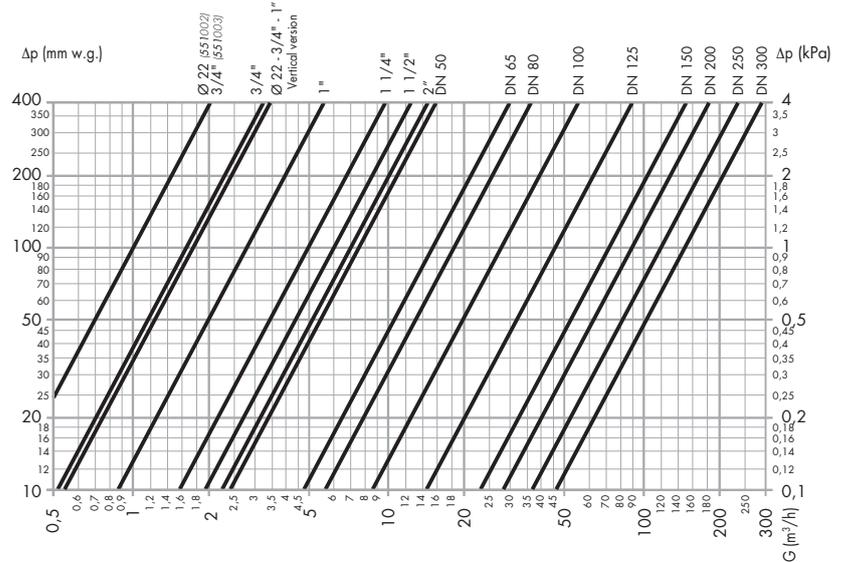
Insulation

Flanged and weld-end DISCAL® devices (DN 50–DN 150) are supplied complete with hot pre-formed shell insulation. Threaded models codes 551005-6-7-8-9 can be equipped with hot pre-formed shell insulation as optional.

This system ensures not only perfect thermal insulation, but also the tightness required to prevent atmospheric water vapour from entering the unit. For this reason, this type of insulation may also be used in cooling water circuits as it prevents condensation from forming on the surface of the valve body.



Hydraulic characteristics



DN	20	25	20 / 25 Vertical version	25	32	40	50
Connections	Ø 22 - 3/4"	3/4"	Ø 22 - 3/4" / 1"	1"	1 1/4"	1 1/2"	2"
Kv (m³/h)	10,0	16,2	17,0	28,1	48,8	63,2	70,0

DN	50	65	80	100	125	150	200	250	300
Kv (m³/h)	75,0	150,0	180,0	280,0	450,0	720,0	900,0	1200,0	1500,0

The maximum recommended speed of the medium at the device connections is ~ 1,2 m/s. The following table gives the maximum flow rates to meet this condition.

DN	20 / 25	20	25	32	40	50
Connections	Ø 22 - 3/4" / 1"	3/4"	1"	1 1/4"	1 1/2"	2"
l/min	22,7	22,7	35,18	57,85	90,33	136,6
m³/h	1,36	1,36	2,11	3,47	5,42	8,20

DN	50	65	80	100	125	150	200	250	300
l/min	141,20	238,6	361,5	564,8	980,0	1436,6	2433,0	3866,0	5416,0
m³/h	8,47	14,32	21,69	33,89	58,8	86,2	146,0	232,0	325,0

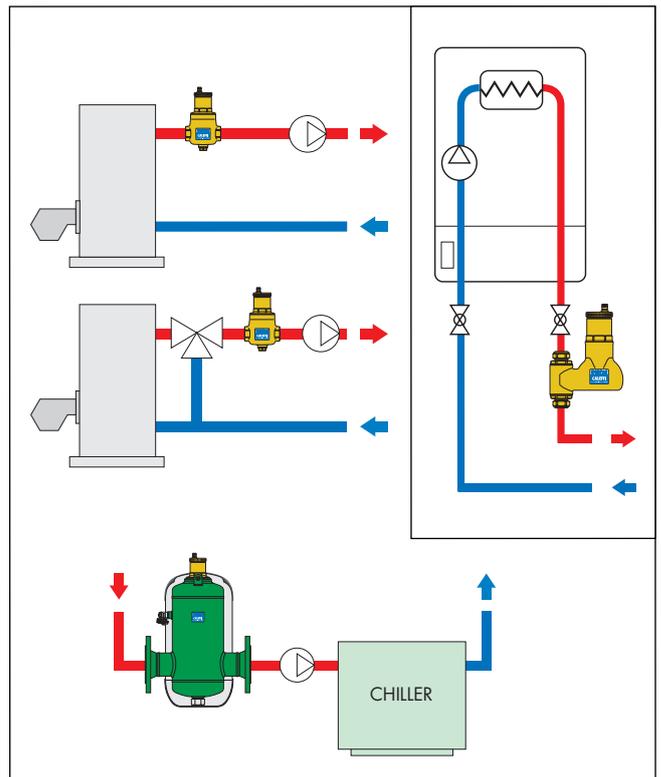
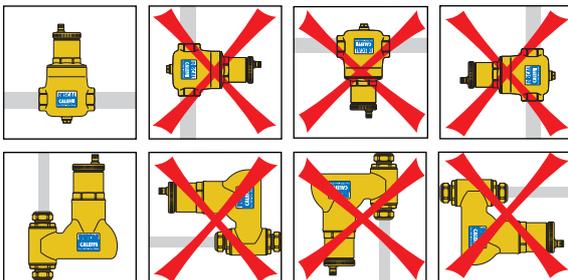
Installation

DISCAL® units may be used in both heating and cooling systems, to ensure the progressive removal of air which is continuously formed. The units should preferably be installed after the boiler and on the pump suction side, as these are the points where the formation of micro-bubbles is greatest. DISCAL® deaerators must be installed in a vertical position, and preferably:

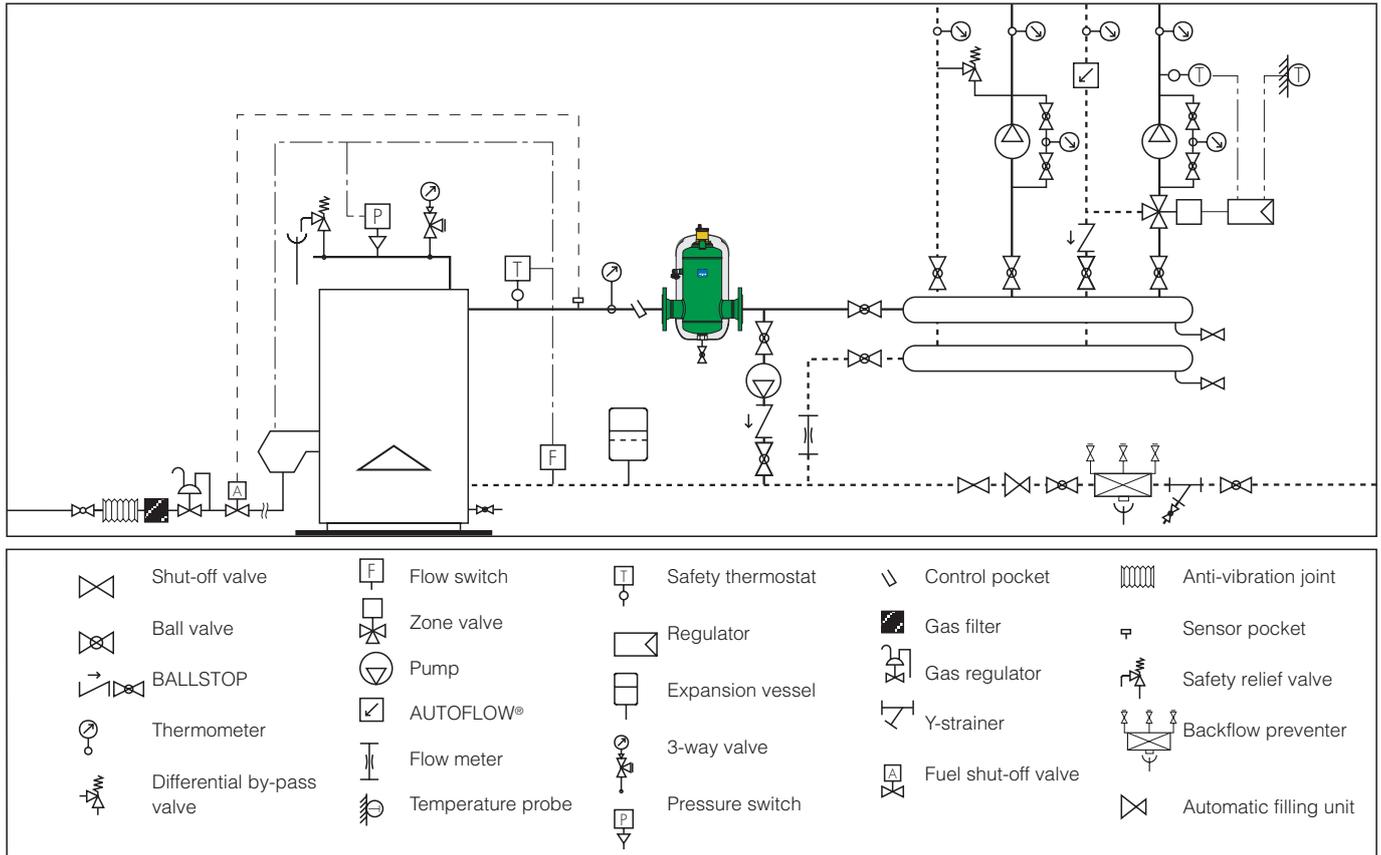
- upstream of the pump where, due to the high speed of the medium and the ensuing drop in pressure, air micro-bubbles develop more easily.

The flow direction of the medium is not important in DISCAL® devices.

In installation sites where inspection is not possible, it is recommended that the air vent cap is replaced with a Caleffi 5620 series hygroscopic safety cap.



Application diagram



SPECIFICATION SUMMARY

DISCAL® 551 series

Deaerator, version for horizontal pipes, with drain. Size DN 20 (from DN 20 to DN 50); connections 3/4" F (from 3/4" to 2") with union. Drain 1/2" F with plug. Brass body. PA66G30 internal element. PP float. Brass float guide and stem. Stainless steel float lever and spring. EPDM hydraulic seals. Optional insulation in rigid closed cell expanded PE-X for code 551005-6-7-8-9. Medium water and non-hazardous glycol solutions excluded from the guidelines of EC directive 67/548; maximum percentage of glycol 50%. Maximum working pressure 10 bar. Maximum discharge pressure 10 bar. Working temperature range 0–110°C.

DISCAL® 551 series

Deaerator. Flanged connections DN 50 (from DN 50 to DN 150) PN 16; flanged connections DN 200 (from DN 200 to DN 300) PN 10; to be coupled with counterflanges EN 1092-1. Weld end connections DN 50 (from DN 50 to DN 150). Drain 1" M with plug (2" M with plug from DN 200 to DN 300). Epoxy resin coated steel body. Stainless steel internal element. EPDM hydraulic seals. Medium water and non-hazardous glycol solutions excluded from the guidelines of EC directive 67/548; maximum percentage of glycol 50%. Maximum working pressure 10 bar. Maximum discharge pressure 10 bar. Working temperature range 0–110°C. Automatic air vent: brass body, PP float, brass float guide and stem, stainless steel float lever and spring. Rigid closed cell expanded polyurethane foam insulation for sizes up to DN 100 (closed cell expanded PE-X for DN 125 and DN 150) and embossed unfinished aluminium external cover. Working temperature range 0–105°C (0–100°C for DN 125 and DN 150).

DISCAL® 551 series

Deaerator, compact version. Size DN 20 (from DN 20 to DN 32); connection for horizontal or vertical pipes with compression ends for Ø 22 copper pipe, threaded connections 3/4" F (and 1") for vertical pipes, threaded connections 3/4" F for horizontal pipes. Brass body. Stainless steel internal element. PP float. Brass float guide and stem. Stainless steel float lever and spring. EPDM hydraulic seals. Medium water and non-hazardous glycol solutions excluded from the guidelines of EC directive 67/548; maximum percentage of glycol 50%. Maximum working pressure 10 bar. Maximum discharge pressure 10 bar. Working temperature range 0–110°C.

We reserve the right to change our products and their relevant technical data, contained in this publication, at any time and without prior notice.