SPIROTECH

Maximizing Performance for You

HIGH-EFFICIENCY VACUUM DEGASSING

NO CHANCE FOR AIR IN HEATING AND COOLING SYSTEMS

SPIROVENT® SUPERIOR

WHY IS AIR (ALMOST) UNAVOIDABLE IN HEATING AND COOLING WATER?

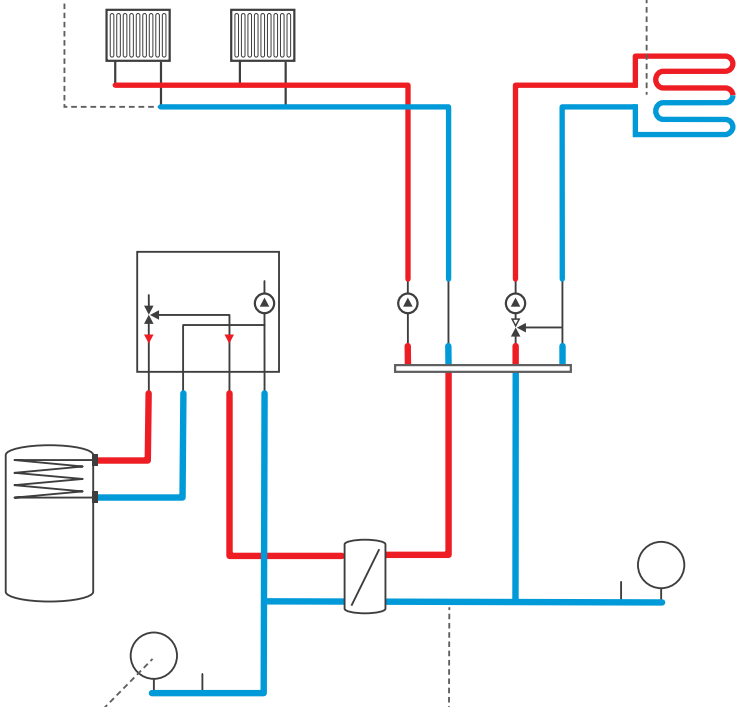
Even modern heating and cooling systems are never 100 percent airtight.
Just because a system is watertight does not mean that air cannot enter the system.
Air and gases enter the system in different ways:

AIR ENTRY AT

- Seals
- Insert and press fittings

AIR ENTRY AT

- Synthetic piping
- Rubber parts
- Reinforced hoses



Insufficient, incorrectly set or faulty pressure maintenance

Dissolved gases in make-up water

HOW DO YOU RECOGNIZE AIR PROBLEMS IN A SYSTEM?

Distinct circulation noises and gurgling sounds in:
- Pumps
- Heater elements
- Valves
- Pipes

Reduced operational efficiency of:
- Hydraulic valves
- Pumps
- Heat exchangers

Reduced heat transfer
- Heating elements remain cold or become only lukewarm
- Heat does not reach the user

Increases deposits in:
- Pipes
- Valves
- Pumps
- Heat exchangers due to increased corrosion

WHAT EFFECTS DOES AIR HAVE ON THE OPERATION OF THE SYSTEM?

- more frequent manual venting, which is time-consuming
- longer commissioning, because adjustment is difficult
- frequent system failures
- increased energy consumption and higher operating costs
- frequent complaints from end users

When a system is frequently non-operational due to these problems, it negatively affects all those responsible for the system: contractor, installer and the designer.

THE AIR HAS TO GET OUT!
HOW CAN AIR PRESENT IN HEATING OR COOLING SYSTEMS BE REMOVED?

VACUUM DEGASSERS

SPIROVENT® SUPERIOR

Removes, regardless of installation location, pressure and temperature in the system, all dissolved gases from the system water. After degassing, no further air problems can occur at any point in the heating or cooling system. In addition, the Spirovent Superior can be installed at almost any point in the system and optionally replenishes the system water deficit.

AIR SEPARATORS

SPIROVENT®

Effectively removes air and micro-bubbles circulating in the circuit. Uses the effect of thermal degassing and is therefore installed at the warmest point in the system.

AIR VENTS

SPIROTOP®

Removes free air that collects at the highest point of the system. Is especially necessary for filling and emptying the system.

HOW DOES VACUUM DEGASSING WORK?

Air trapped in fluid systems causes decreased efficiency, excessive wear, and requires more frequent service. Symptoms of this condition are corrosion, noisy operation and fluctuating pressure readings. After being vented, a heating, cooling or process system still contains numerous micro air bubbles and dissolved gases. Moreover, air continues to enter the system through work on the installation, through (micro) leaks and through diffusion in, for example, plastic piping. If gases are not or are insufficiently removed, problems occur time after time during adjustment, frequent manual venting is required, pump capacity decreases and energy consumption increases. The presence of air and the continuous ingress of air and gases also cause corrosion products, which circulate through the system as particles. Ultimately, this leads to damage of expensive system components, system malfunctions or even complete failure. These are all avoidable consequences that require monitoring and cause unnecessary costs. Proper air separation is the only effective method of removing them from the system.

REMOVING GASES FROM AN INSTALLATION

There are two methods for extracting and removing gases from liquids.

- **Thermal degassing using temperature differences.** By increasing the temperature of the system fluid, dissolved gases are naturally released. With a Spirovent microbubble air separator, such released gases can be extracted from the liquid.
- **Vacuum degassing using forced negative pressure.** In vacuum degassing, a portion of the system fluid is temporarily placed in a state of negative pressure (vacuum). The gases dissolved in the fluid are released, separated and removed from the fluid. The treated fluid can then reabsorb air from the system for later removal.

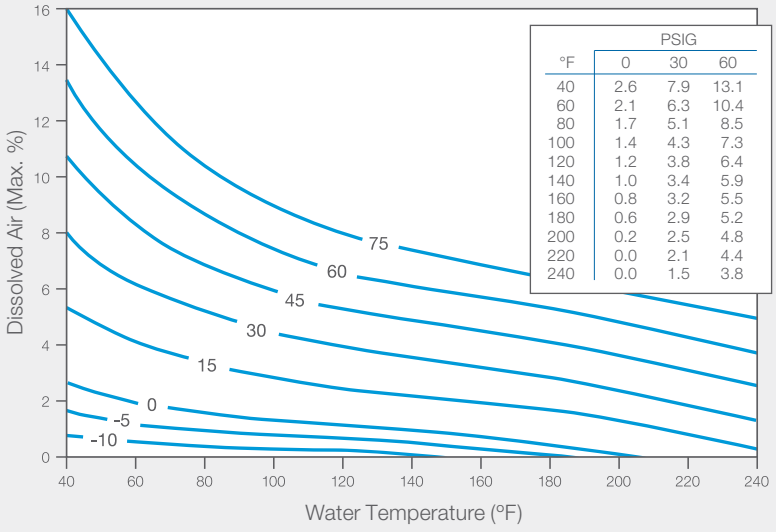
WHEN DOES VACUUM DEGASSING MAKE SENSE?

In installations with many branches and partially low flow rates. The free collected air is often not carried away with the volume flow in such systems. Deaerators cannot be installed at all necessary locations or only at excessive cost. With a vacuum degasser, the collected air disappears by itself thanks to the absorbed liquid.

HENRY'S LAW: DISSOLVED AIR IN WATER DEPENDENT ON TEMPERATURE AND PRESSURE

Henry's Law describes what happens as a hydronic system operates. Refer to the chart and note that it shows the exact amount of air the water will absorb as a function of temperature and pressure. For example, when water is under 45 psig pressure at 60°F (as it might be when you fill a hydronic system in a six-story building), there is 9.0% air dissolved in solution. However, when you heat that system water to 180°F (without a change in pressure), the water can hold only 4.2% air by volume. The difference of 4.8% (by volume) appears in the circulating water as microbubbles.

Solubility of Air in Water
as a function of temperature and pressure

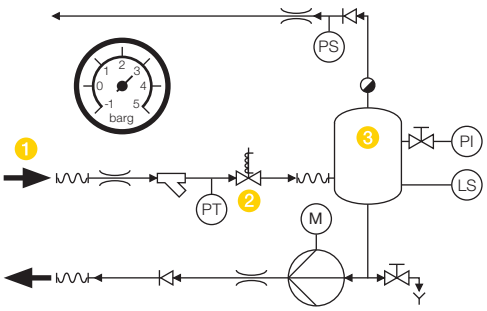


°F	PSIG 0	30	60
40	2.6	7.9	13.1
60	2.1	6.3	10.4
80	1.7	5.1	8.5
100	1.4	4.3	7.3
120	1.2	3.8	6.4
140	1.0	3.4	5.9
160	0.8	3.2	5.5
180	0.6	2.9	5.2
200	0.2	2.5	4.8
220	0.0	2.1	4.4
240	0.0	1.5	3.8

HOW DOES THE SUPERIOR VACUUM DEGASSER WORK?

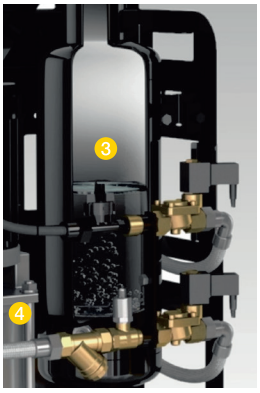
PHASE 1:

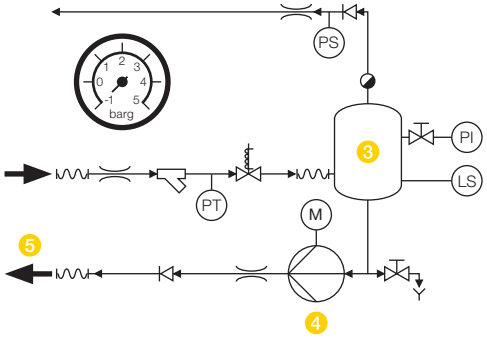
Some of the water in the system is fed via a bypass 1 into the degassing tank 3. When the tank is completely filled,the feed valve 2 closes. The pressure in the degassing tank is now the same as in the rest of the system.



PHASE 2:

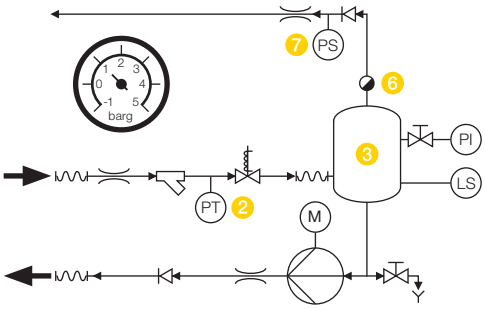
The integrated pump 4 continually draws water out of the degassing tank 3, causing underpressure (a vacuum) in the tank. The air that was dissolved in the water forms bubbles and rises to the top of the tank. The degassed water is pumped back into the system 5.





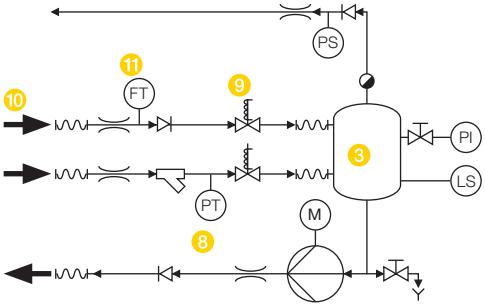
PHASE 3:

The feed valve 2 is opened and the degassing tank 3 is once more filled with water from the system. At the same time, the air that collected at the top of the tank is expelled via the venting mechanism 6. The Smart Switch 7 detects that air has been expelled and regulates the ongoing degassing process.



WATER REPLENISHMENT (OPTIONAL):

Should the pressure in the system fall below the minimum set level, this will be registered by the pressure controller 8. The degassing process is stopped and the replenishment process is started. The solenoid valve 9 is opened automatically and fresh water (or treated water) is fed into the degassing tank 3 via the inlet pipe 10. This replenishment water is degassed as described above. The replenishment process is stopped either when the pre-set pressure level is reached, or when the maximum amount of replenishment water (measured by the built-in water meter 11) has entered the tank. Once the replenishment process is completed, the inlet pipe is closed 9 and the degassing process continues as before.



The degassed water that returns to the system after each degassing cycle is undersaturated and is therefore able to absorb gases once more. In this way, any gases that may have entered the system can be collected and transported to the vacuum degasser. This guarantees the trouble-free operation of the system.

Vacuum degassers and oxygen: why is the degassing of replenishment water so important?

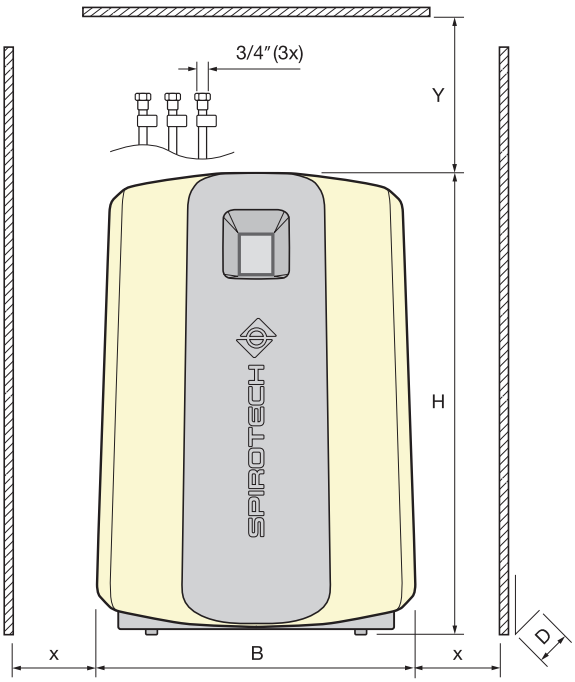
Unlike nitrogen, any oxygen that enters the heating or cooling system reacts very quickly with metal surfaces (causing corrosion), before the oxygen can be removed by the vacuum degasser. Normally the biggest source of additional oxygen comes via the replenishment water. It is therefore important to completely degas the replenishment water using the Superior, ensuring that no oxygen can enter the system.

It makes no difference whether the oxygen is dissolved in the water or if it has formed bubbles: corrosion reaction is going to happen.

TECHNICAL INFORMATION

Model Number	Type	H [inch]	B [inch]	D [inch]	x [inch]	y [inch]	Inlet Connection Female NPT	Outlet Connection Female NPT	Main Refill Connection Female NPT	Max. System Volume [gal]	Temp. Range [°F]	Oper. Pressure [PSI]	Weight [lbs]	Max. Glycol [%]
SPIROVENT® SUPERIOR S600														
MV06A60	S600	40	27	14	>20	>20	¾"	¾"	—	80,000	32-200	35-90	137	40
MV06AL60	S600-L	40	27	14	>20	>20	¾"	¾"	—	80,000	32-200	15-40	137	40
MV06B60	S600-B	40	27	14	>20	>20	¾"	¾"	¾"	80,000	32-200	35-90	141	40
MV06BL60	S600-BL	40	27	14	>20	>20	¾")	¾"	¾"	80,000	32-200	15-40	141	40
MV06R60	S600-R	40	27	14	>20	>20	¾"	¾"	¾"	80,000	32-200	35-90	139	40
MV06RL60	S600-RL	40	27	14	>20	>20	¾"	¾"	¾"	80,000	32-200	15-40	139	40

B = with Break tank
R = with Refill function
L = Low pressure



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