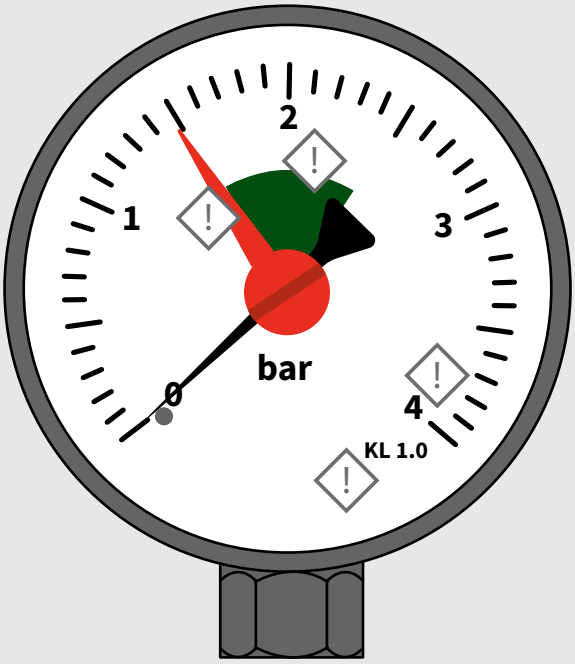
risycard

RICA 02 - The accuracy of a pressure gauge and the green zone

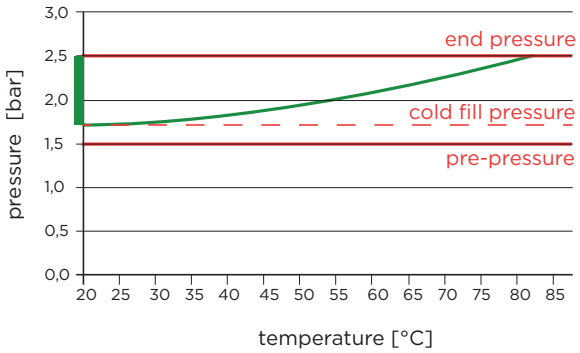


RISK OF OXYGEN ENTRY

A correct reading pressure gauge is very important and often a sore point in practice. Inaccurate pressure gauges, without green zone, or not adjustable, with reading errors provide poor information and cause misunderstandings. The result: troublesome and expensive consequences due to oxygen entry and thus corrosion sludge formation.

OPERATION (variable pressure expansion system; for constant pressure see RICA08)

The pointer of the pressure gauge indicates the measured pressure value on a scale. Thanks to the green zone, the user knows the limits within which the pressure may rise or fall depending on the occurring expansion or contraction. Any red pointer must be set to the pre-pressure value of the expansion vessel (the pressure must never fall below that value).



T-P graph: *System pressure at average temperature of the total installation*

The pressure of the installation usually varies much less in practice, because the actual variations in expansion/contraction are smaller than expected:

- the temperature varies less than expected
- some parts of the installation are not open to the system (eg radiator valves are closed), therefore the volume of water expanding is much smaller.

The idea that an installation can be set to a constant pressure is obviously not correct (as explained above, the pressure varies), unless the expansion vessel is greatly oversized in relation to the actual expansion/contraction, which of course is beneficial in avoiding negative pressure (RICA01).

Accuracy

The diameter of the pressure gauge must be large enough to allow a proper reading, the green zone must be adjustable (eg with discs). The dial of a pressure gauge lists the accuracy class as “Kl” or “Cl” + a number (% end value).

		Class *Kl x: error margin as a % of the final value*				
		Kl 0.6	**Kl 1.0**	**Kl 1.6**	**Kl 2.5**	**Geen klasse**
End value	**4 bar**	0,024 bar	0,040 bar	0,064 bar	0,100 bar	slechter dan Kl 2.5
	6 bar	0,036 bar	0,060 bar	0,096 bar	0,150 bar	slechter dan Kl 2.5
	10 bar	0,060 bar	0,100 bar	0,160 bar	0,250 bar	slechter dan Kl 2.5
	16 bar	0,096 bar	0,160 bar	0,256 bar	0,400 bar	slechter dan Kl 2.5
The colours indicate which tolerance is acceptable						

A correct pressure gauge corresponds to the calculation of the expansion vessel. An incorrect combination would be, for example, a pressure gauge final value of 10 bar with a safety valve at 3 bar. Since non-classified pressure gauges are often used in the heating sector, measurement errors are inevitable, moreover, there are no regulations regarding measuring accuracy for the gas fill pressure of an expansion vessel. In addition, the example below shows that the parallax error (reading error) may exacerbate the problem. And since built-in expansion vessels in boilers are usually not very generously sized, it is clear that problems are pre-programmed.

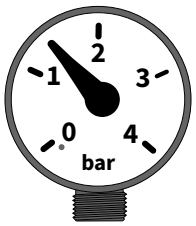


Fig.: *worthless pressure gauge*

Risk

- Without the correct green zone on the gauge, the user will not know within which range the pressure is allowed to vary, which greatly increases the risk of oxygen ingress.
- This also applies to a “standard” green zone (usually pre-printed on the dial): only if the calculated values of the expansion correspond to the green zone, is it acceptable. Unfortunately, this is often not the case.
- If the pressure gauge does not measure accurately or is not readable.

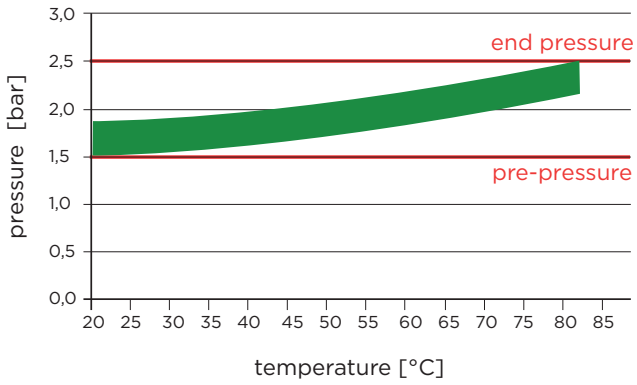
The often-heard “if the arrow is in the green zone, everything is OK, isn’t it? Is not necessarily correct.

RISK OF OXYGEN ENTRY

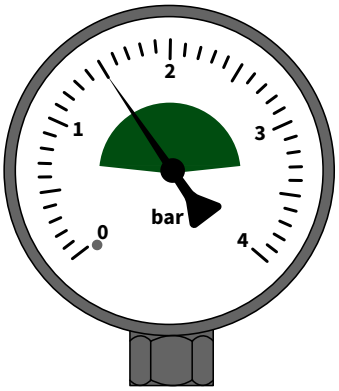
If at a certain moment the prevailing pressure is lower than what it should be according to the TP graph, after cooling (=contraction) the pressure in the installation will probably become too low, causing the expansion vessel to empty, and so pressure control is no longer guaranteed. **The negative pressure that then occurs sucks in air through automatic air vents, resulting in oxygen ingress** (RICA01). In the case of a exactly dimensioned expansion vessel, the TP graph is therefore a line that clearly establishes the relationship between average system temperature and pressure.

An over-sized expansion vessel is very favourable, because the TP graph becomes a “broad line”, and the “correct” installation pressure is therefore no longer one exact value, but acquires a certain bandwidth that becomes wider the more over-dimensioned the expansion vessel is.

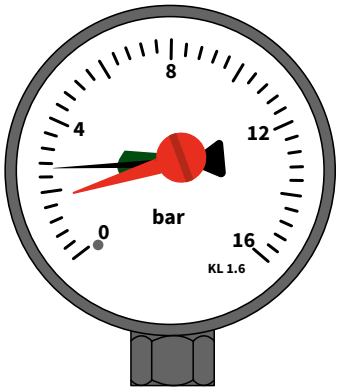
There are several case studies available from Resus that illustrate the Risks covered in the Risycard series.



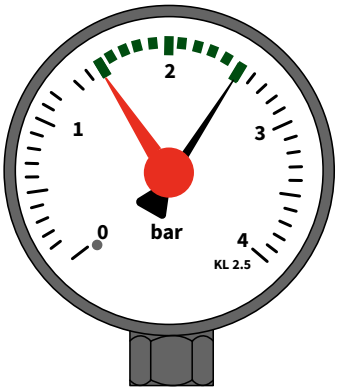
The reality is therefore more complex than that the arrow has to be “somewhere” in the green zone:



No red pointer
No class
Green zone too big



End value too high
Green zone too small
High measurement error



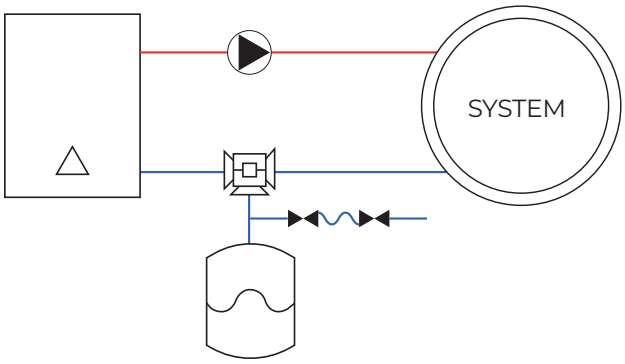
Red pointer not adjustable
No adjustable green zone
High measurement error

THE IMPORTANCE OF RISYCOR

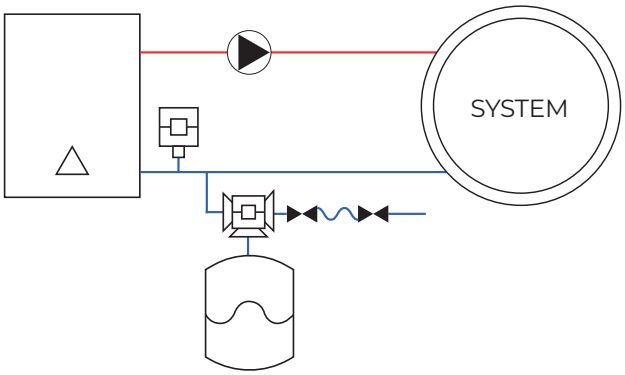
For the correct installation of a Risycor, please refer to the Application Guideline.

For a good follow-up of the entire installation, the recorded data should be checked using the Resus dashboard at least once a year.

≤ 70 kW



> 70 kW



ABOUT US

Resus is the manufacturer of Risycor, a system for continuous corrosion monitoring in closed heating and cooling systems. Like a smoke detector, a Risycor is an early warning system that prevents problems by providing an early warning.

Corrosion is ALWAYS the result of oxygen ingress, which in 90% of the cases
Is the result of poor pressure control. The remainder of the cases are often the result of failing risk components. Read more about this in our Risycards and Risybasics.
The application of Risycor is explained in the Risycor Application Guidelines.

READ ALSO

RICA 01 - automatic air vents
RICA 02 - green zone
RICA 03 - neutral point
RICA 04 - failing air non return valve
RICA 05 - oxygen diffusion open bladder
RICA 06 - breakdown of PWH water
RICA 07 - oxygen diffusion
RICA 08 - content indication constant pressure
RICA 09 - clopen systems
RICA 10 - pre-pressure

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