

Maintenance instructions

revised on 21.02.2022
innovatek Protect IP / PRO

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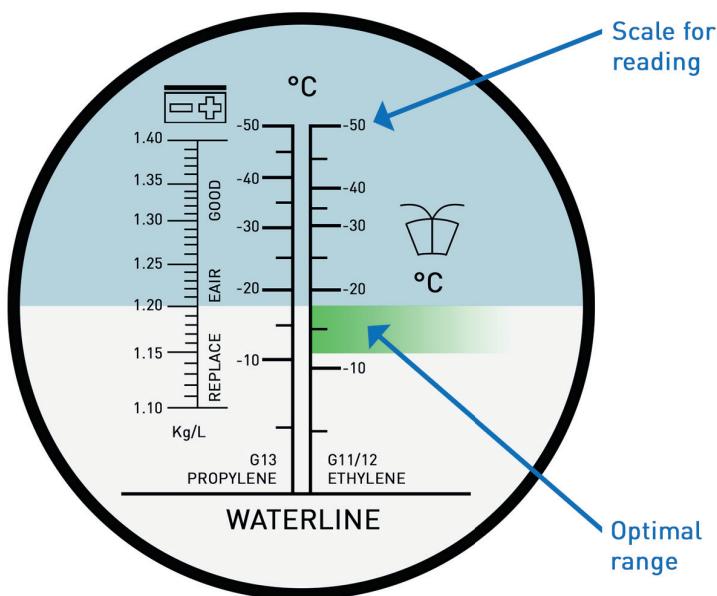
For the maintenance of water cooling systems, we recommend an annual check of the concentration and pH value of the coolant. The aim here is to maintain a sufficient active inhibitor content.

pH value

The optimum pH value is in the range 8 to 9.

Concentration

The optimum concentration value is in the range of 22 to 28 % Vol. Protect IP/PRO content. The test can be performed using an antifreeze density meter (e.g. spindle). Alternatively, we recommend testing with a refractometer.



Example of reading the antifreeze to determine the concentration
with the help of the tabular substance values

Concentration % Vol.	
< 18 % (Subconcentration)	Can cause damage to the cooling system as there is no longer sufficient protection against bacteria and corrosion.
18 - 22 %	Should be avoided for economic reasons, unless the function of frost protection is required. The concentration range is completely safe for operation.
22 - 28 %	Functionally as well as economically the optimum.
28 - 54 %	Should be avoided for economic reasons, unless the function of frost protection is required. The concentration range is completely safe for operation.
> 54 % (Overconcentration)	Must be avoided at all costs, as the cooling properties deteriorate significantly and the corrosion protection reverses.

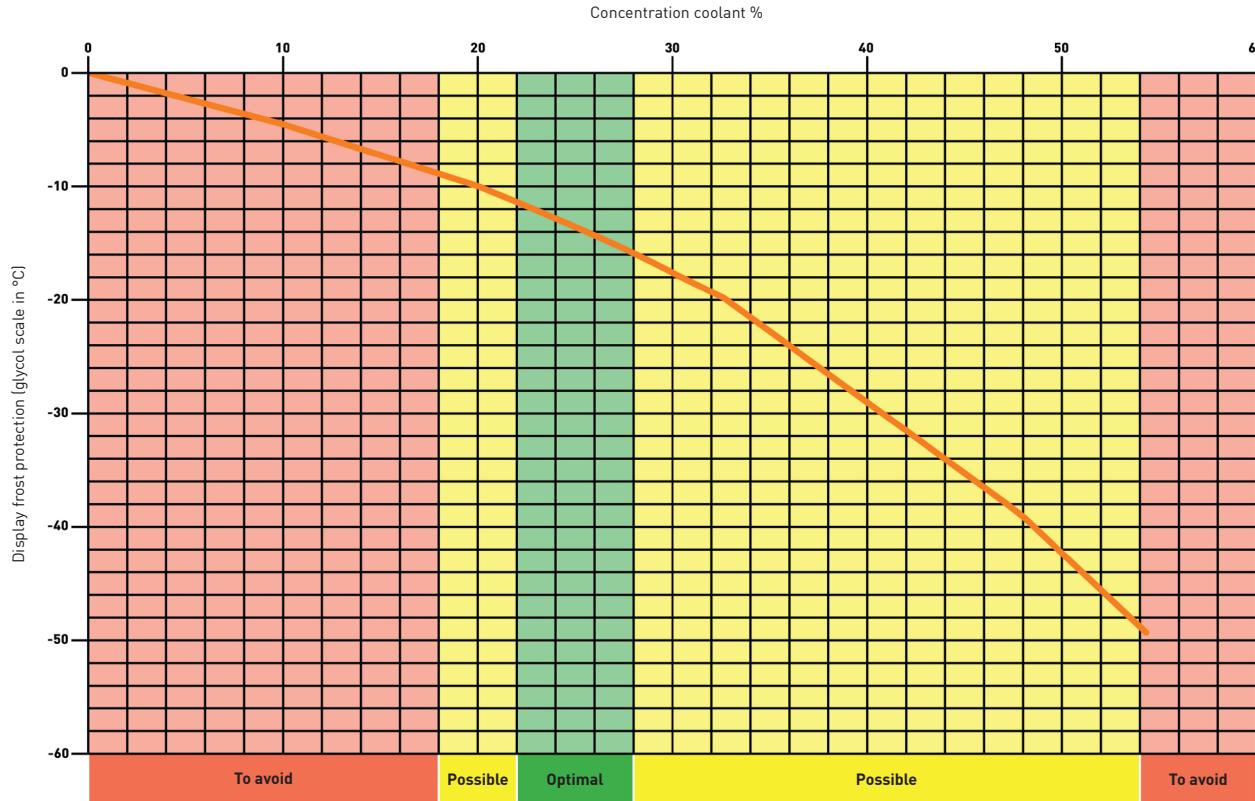
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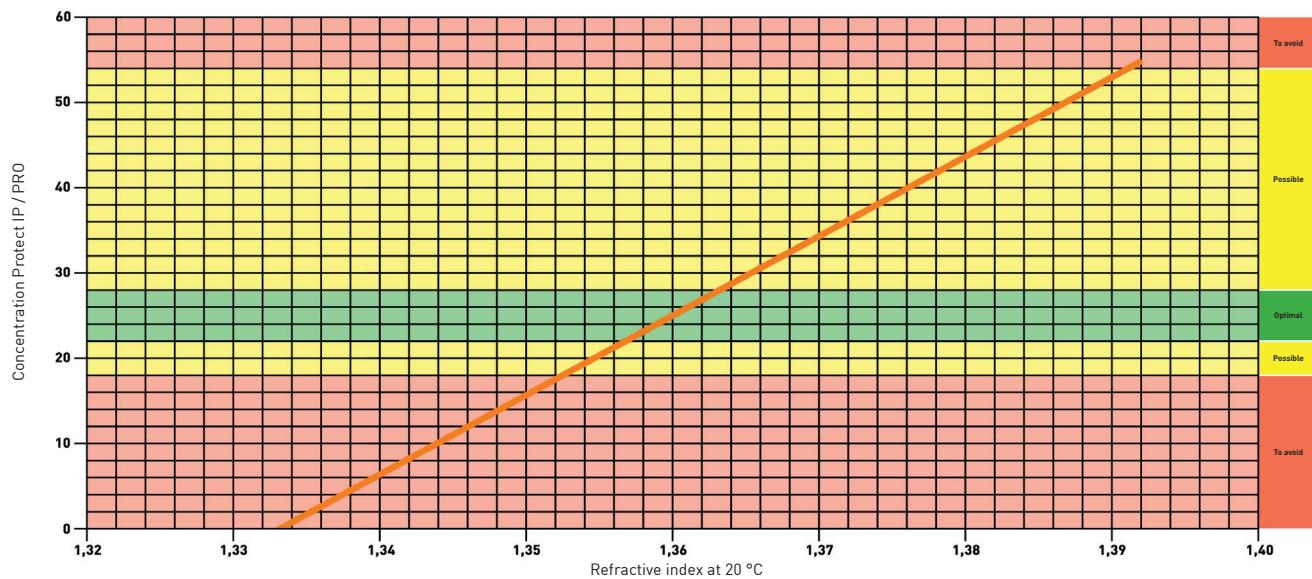
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Display value frost protection



Refractive index at concentration



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Substance values tabular

Vol.-% Protect IP/PRO	Density at 20 °C g/cm³	Refractive index n²...	Frost protection °C
20	1.029	1.3545	- 9.0
25	1.037	1.3599	- 12.3
30	1.044	1.3653	- 16.1
35	1.052	1.3707	- 20.4
40	1.059	1.3762	- 25.2
45	1.066	1.3816	- 30.8
50	1.073	1.3868	- 37.6
55	1.079	1.3918	- 45.4
58	1.082	1.3947	- 51.0

If the Protect IP/PRO proportion is in the optimum range after checking the concentration, the system should be topped up with the Protect IP application mixture if necessary.

Measures in case of concentration deviations

Subconcentration (< 18 % Vol.)

This can be remedied by topping up with innovatek Protect IP/PRO concentrate. To do this, the concentrate is poured in while the system is running. A control measurement should be taken after approx. 5 to 10 minutes. The required amount of concentrate can be calculated according to the following example. However, if the residual volume is not sufficient to fill up a correspondingly calculated quantity of concentrate, a partial quantity should be taken from the cooling circuit beforehand.

Calculation:	Water quantity ACTUAL:	Fill quantity - Measured value (%)
	IP/PRO amount ACTUAL:	Fill quantity - Water quantity ACTUAL
	Total quantity (IP/PRO Target):	(Water quantity ACTUAL x Set point (%)) / Water content (%)
	Refill quantity:	Total quantity (IP/PRO Target) - IP/PRO amount ACTUAL

Example:	Fill quantity:	10 l
	Measured value:	-5 °C (approx. 12 %)
	Set point:	-13 °C (approx. 26 %)
	Total quantity (IP/PRO Target):	$(8,8 \text{ l} \times 26) / 74 = 3,09 \text{ l}$
	Refill quantity:	$3,09 \text{ l} - 1,2 \text{ l} = 1,89 \text{ l}$

In this calculation example, 1.89 l of Protect IP/PRO concentrate should therefore be refilled. A possible cause for underconcentration can be, for example, too much replenished water.

Overconcentration

An overconcentration is remedied by refilling with distilled or demineralized water. We strongly advise against filling up with drinking water, as this introduces carbonate hardness, which can lead to a blockage at the valves, for example. It is possible to top up with application mixture, but in the long term this leads to an increase in the Protect IP/PRO content, which can result in overconcentration. In practice, the amount of water to be topped up usually corresponds exactly to the observed loss of liquid, since the cause of the normal diffusion loss of the water content is due to the hose and plastics.

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pH value test

By testing the pH value, it is possible to check whether the protective substances (inhibitors) are sufficiently effective against corrosion. The test is carried out with suitable test strips for the alkali range.

Recommendation: pH test strips for coolant (100 pieces) (Art.No.: 501667)

Measuring range: pH value 6.5 to 10

Resolution: pH value 0.2 (7.7 to 9.0), above and below pH value 0.5

Measures in case of deviations of the pH value

In normal operation, it is not possible for the pH value to rise above 9. However, the active anti-corrosion substances can be used up during longer periods of use. This is reflected in a falling pH value. The optimum range is pH 8-9, if the pH value falls below pH 7.7, the coolant should be replaced. It is not necessary to replace the entire coolant; replacing the majority of the coolant is sufficient to restore protection.

Measures for discoloration

Slight discoloration of the coolant (yellowish - gray, etc.) is harmless as long as the pH value remains within the specifications. A blackening indicates permanently too high temperatures ($>180^{\circ}\text{C}$), the 1.2 ethylene glycol content decomposes.

Measures in case of flocculation / sedimentation

If flocculation and deposits occur in the system, the cooling circuit has been contaminated or the maximum operating time of the coolant has been exceeded to a greater extent (usually accompanied by pH values around pH 7). Complete draining is necessary. It is then recommended to rinse the cooling circuit with demineralized water. Flushing should be carried out as soon as possible after draining! The system can then be refilled with the application mixture.

Occurring slimy or gelatinous accumulations indicate a bio-infestation (frequent cause is an underconcentration which occurred at least temporarily). Complete draining is necessary. After draining, rinse the cooling circuit with demineralized **hot** water; if possible, rinsing should be carried out immediately after draining! Mechanical cleaning may be necessary, depending on the degree of contamination. Subsequently, the system can be refilled with application mixture.