Operating manual

Refractometer (Item no. 0020042549) for Vaillant solar fluid

1 General information

1.1 Notes on the documentation

The following information is intended to help you throughout the entire documentation.
Further documents apply in combination with this operating manual.
We accept no liability for any damage caused by failure to observe these instructions.

1.2 Other applicable documents

When using the refractometer observe all manuals for components of the system. These operating manuals are included with the individual structural parts of the installation and the ancillary components.

1.3 Storage of documents

Always store the operating manual with the refractometer.

1.4 Symbols used

Please observe the safety instructions in this operating manual when using the refractometer!
The symbols used in the manual are explained below:

Danger!
Immediate risk of serious injury or death!

Danger!
Danger of burning or scalding!

Caution!
Potentially dangerous situation for the product and environment!

Note!
Useful information and instructions.

• Symbol for a necessary task

1.5 Intended use

The refractometer is only intended for the testing of frost and corrosion protection in Vaillant solar fluid. Intended use includes the observance of the operating manual.

Caution!
Any improper use is forbidden.

2 Safety instructions

Danger!
Danger of scalding from hot solar fluid!
Check the temperature at the thermometer of the solar circuit. Only draw off solar fluid if its temperature is less than 50°C!

Danger!
Solar fluid can cause irritation of eyes and skin!
Avoid contact of solar fluid with the eyes and skin by wearing protective goggles and rubber or PVC gloves. Observe the information on the safety data sheet in the system description and on the packaging for the solar fluid.

Danger!
Irritation of eyes due to solar fluid!
If solar fluid comes into contact with the eyes rinse eyes thoroughly under running water for 15 minutes holding lids open.

Caution!
Danger of damage to refractometer as a result of glass breakage!
The refractometer is fragile. Handle it with care and put it back in the original packaging immediately after use.

Caution!
Danger of damage to the refractometer due to excess fluid!
Although the refractometer is splash water resistant it is not waterproof. Use a pipette to achieve metered application of the solar fluid. Do not clean the refractometer under running water.

3 Scope of delivery

- Check the delivery for completeness prior to using the refractometer for the first time.

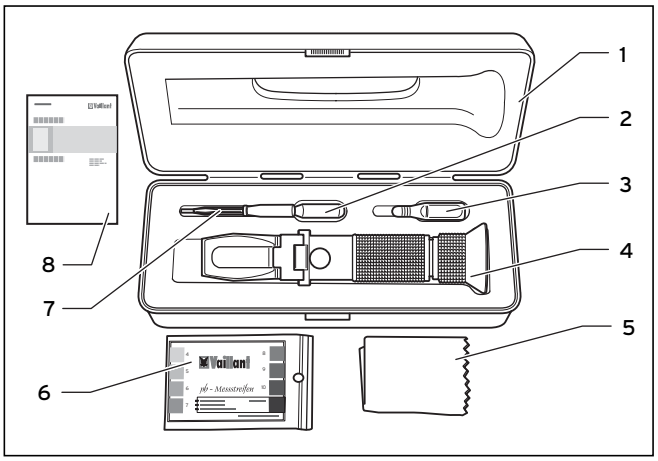

Fig. 3.1 Scope of delivery for refractometer

Key

1	Carrying case	5	Cleaning cloth
2	Pipette	6	pH indicator stick
3	Distilled water	7	Screwdriver
4	Refractometer	8	Operating manual

4 Operation

To provide reliable frost and corrosion protection the entire system must be filled with undiluted Vaillant solar fluid (Item no. 302 498, 20 l; 302 363, 10 l). The solar fluid must be checked using the Vaillant refractometer in the event of reduced frost and corrosion protection effectiveness of the solar fluid due to ageing or unauthorised dilution. Check the solar fluid after filling the system and then subsequently once a year.

Caution!
Danger of damage to collectors or other system parts!
Do not mix Vaillant solar fluid with water or other fluids.

Note!
The solar fluid may change to a yellow-brown colour or exhibit some discolouration after several years of operation.

4.1 Checking the frost protection of the solar fluid

Caution!
Use only the original Vaillant solar fluid refractometer (Item no. 0020042549) as otherwise the level of frost protection displayed may be incorrect.

Danger!
Danger of scalding from hot solar fluid!
Check the temperature at the thermometer of the solar station. Only draw off solar fluid if its temperature is less than 50°C!

Danger!
Solar fluid can cause irritation of eyes and skin!
Avoid contact of solar fluid with the eyes and skin by wearing protective goggles and rubber or PVC gloves. Observe the information on the safety data sheet in the system description and on the packaging for the solar fluid.

Danger!
Irritation of eyes due to solar fluid!
If solar fluid comes into contact with the eyes rinse eyes thoroughly under running water for 15 minutes holding lids open.

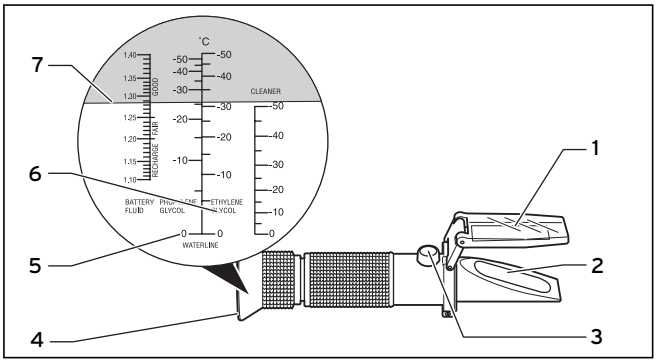

Fig. 4.1 Determining level of frost protection

Key

1	Cover plate	5	Water line (0°C line)
2	Prism surface	6	Propylene glycol scale
3	Adjusting screw	7	Limit line
4	Eyepiece		

Caution!
Danger of damage to the refractometer due to excess fluid!
Although the refractometer is splash water resistant it is not waterproof. Use a pipette to achieve metered application of the solar fluid. Do not clean the refractometer under running water.

Caution!
Danger of damage to the refractometer!
The refractometer is made of glass and is easily breakable. Handle it with care and put it back in the original packaging immediately after use.

4.1.1 Calibrating the refractometer

- Take the refractometer (**4**, Fig. 3.1) out of the carrying case (**1**, Fig. 3.1).
- Open the cover plate (**1**, Fig. 4.1) of the refractometer and apply 1-2 drops of distilled water to the surface of the prism (**2**, Fig. 4.1). Now close the cover plate by pressing gently on the surface of the prism so that the distilled water spreads across the entire surface of the prism without forming air bubbles or leaving dry areas.
- Turn the sharp end of the refractometer to the light and look through the eyepiece (**4**, Fig. 4.1).
- Adjust the eyepiece by turning it so that the limit line (**7**, Fig. 4.1) that separates the light section from the dark section is clearly visible.
- Adjust the position of this line by turning the adjusting screw (**3**, Fig. 4.1) with the small screwdriver (**7**, Fig. 3.1) so that it coincides with the water line (**5**, Fig. 4.1).
- Carefully dry the surface of the prism and the cover plate immediately following the adjustment using the cleaning cloth (**5**, Fig. 3.1).
- Ensure the refractometer is clean and dry then put it back in the carrying case.

4.1.2 Determining the level of frost protection

- Take the refractometer (**4**, Fig. 3.1) out of the carrying case (**1**, Fig. 3.1).
- Take a sample of solar fluid from the solar system.
- Open the cover plate (**1**, Fig. 4.1) of the refractometer and use the pipette to apply 1-2 drops of solar fluid (**2**, Fig. 3.1) to the surface of the prism (**2**, Fig. 4.1). Now close the cover plate by pressing gently on the surface of the prism so that the solar fluid spreads across the entire surface of the prism without forming air bubbles or leaving dry areas.
- Turn the sharp end of the refractometer to the light and look through the eyepiece (**4**, Fig. 4.1).
- Adjust the eyepiece by turning it so that the limit line (**7**, Fig. 4.1) that separates the light section from the dark section is clearly visible. Determine the value by reading it off at the limit line on the propylene glycol scale (**6**, Fig. 4.1).

  The reading corresponds to the frost protection, also see Table 4.1.
- Carefully remove the solar fluid from the surface of the prism and cover plate immediately following the measurement by gently wiping it off using a soft cloth moistened with water and then drying it with the cleaning cloth (**5**, Fig. 3.1).
- Ensure the refractometer is clean and dry then put it back in the carrying case.

If the frost protection is insufficient the solar fluid must be renewed.

Filling (% by vol.)	Reading (°C)	Frost protection (°C)
100	- 28	- 28
Unauthorised dilution:		
95	- 25	- 25
90	- 23	- 23
85	- 20	- 20
80	- 18	- 18

Table 4.1 Readings and frost protection of Vaillant solar fluid

4.1.3 Cleaning refractometer

- Carefully dry the surface of the prism (**2**, Fig. 4.1) and the cover plate (**1**, Fig. 4.1) immediately following each calibration of the refractometer using the cleaning cloth (**5**, Fig. 3.1).
- Carefully remove the solar fluid from the surface of the prism and cover plate immediately following the measurement by gently wiping it off using a soft cloth moistened with water and then drying it with the cleaning cloth (**5**, Fig. 3.1).

If the surface of the prism and the cover plate are still dirty due to insufficient cleaning beforehand, the level of frost protection subsequently determined will be inaccurate as the sample is corrupted. In this case the surface of the prism and the cover plate should first of all be cleaned by carefully wiping them with a soft cloth moistened with water, then dried with the cleaning cloth (**5**, Fig. 3.1).

If the surface of the prism and the cover plate become contaminated with oil, grease or similar as a result of improper handling it will not be possible to determine the frost protection as the solar fluid sample will be repelled from the surface. In this case the surface of the prism and the cover plate should first of all be cleaned by carefully wiping them with a soft cloth moistened with spirit, then dried with the cleaning cloth (**5**, Fig. 3.1).

4.2 Checking the corrosion protection of the solar fluid

- Take a pH indicator stick (**6**, Fig. 4.1) out of the packaging and immediately close it.
- Dip the pH indicator stick briefly in the sample of solar fluid.

- Immediately check the discolouration against the colour chart on the packaging of the pH indicator sticks.
- Dispose of the solar fluid sample in the collecting tray of the expansion relief valve for the solar pump unit.

If the pH value is less than 7.0, the solar fluid must be renewed.
The solar fluid must be renewed if the frost protection is not at least -18°C in order to ensure sufficient corrosion protection.

5 Disposal

The refractometer must not be disposed of in the regular waste. Make sure that the refractometer is disposed of properly.

6 Customer service

Vaillant Service
To ensure regular servicing, it is strongly recommended that arrangements are made for a Maintenance Agreement. Please contact Vaillant Service Solutions (0870 6060 777) for further details.

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