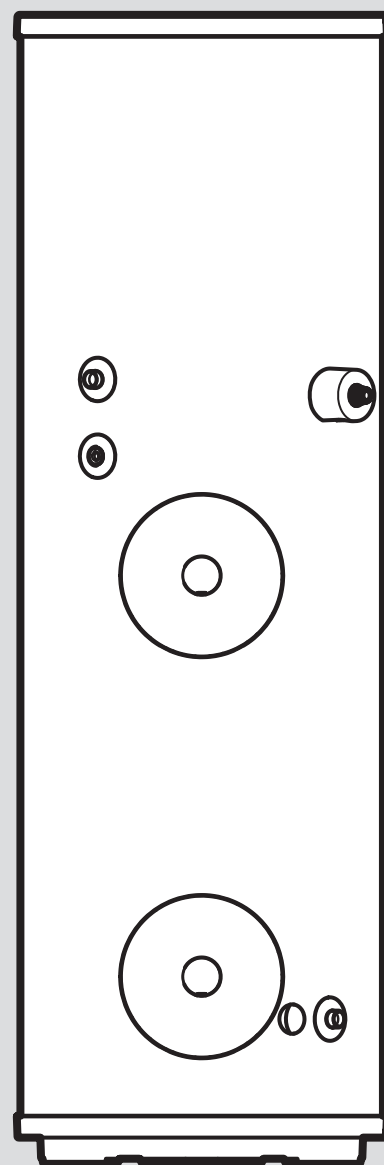




# uniSTOR pure, uniSTOR plus

VEH ...



en    **Operating instructions ..... 3**  
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# Operating instructions

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# 1 Safety

## 1.1 Intended use

There is a risk of injury or death to the user or others, or of damage to the product and other property in the event of improper use or use for which it is not intended.

The product is intended as a system component for domestic hot water generation and storage for closed central heating installations.

Intended use includes the following:

- observance of the operating instructions included for the product and any other installation components
- compliance with all inspection and maintenance conditions listed in the instructions.

This product can be used by children aged from 3 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the product in a safe way and understand the hazards involved.

Children from 3 to 8 years may only operate the fittings that are connected to the unit.

Children must not play with the product

Cleaning and user maintenance work must not be carried out by children unless they are supervised.

Any other use that is not specified in these instructions, or use beyond that specified in this document, shall be considered improper use. Any direct commercial or industrial use is also deemed to be improper.

### Caution.

Improper use of any kind is prohibited.

## 1.2 General safety information

### 1.2.1 Installation by skilled tradesmen only

The installation, inspection, maintenance and repair of the product, as well as the gas ratio settings, must only be carried out by a competent person.

### 1.2.2 Danger caused by improper operation

Improper operation may present a danger to you and others, and cause material damage.

- ▶ Carefully read the enclosed instructions and all other applicable documents, particularly the "Safety" section and the warnings.
- ▶ Only carry out the activities for which instructions are provided in these operating instructions.

### 1.2.3 Risk of death from live connections

Risk of death from electric shock when working on live connections. Work on live connections must only be carried out by a qualified electrician.

- ▶ Never carry out work on the AC or three-phase current connections.
- ▶ Employ a qualified electrician if the product is hard-wired to an AC or three-phase network.

### 1.2.4 Risk of death due to changes to the product or the product environment

- ▶ Never remove, bridge or block the safety devices.
- ▶ Do not tamper with any of the safety devices.
- ▶ Do not damage or remove any tamper-proof seals on components.
- ▶ Do not make any changes:
  - to the product itself
  - to the water and electricity supply lines
  - to the expansion relief valve
  - to the drain pipework
  - to constructional conditions that may affect the operational reliability of the product

### 1.2.5 Risk of injury and material damage due to maintenance and repairs carried out incorrectly or not carried out at all

- ▶ Never attempt to carry out maintenance work or repairs on your product yourself.
- ▶ Faults and damage should be immediately eliminated by a competent person.
- ▶ Adhere to the maintenance intervals specified.





### **1.2.6 Risk of burns or scalding caused by hot parts**

Parts of the product become hot during operation.

- ▶ Only touch the product and its parts once these have cooled down.

### **1.2.7 Risk of material damage caused by frost**

- ▶ Ensure that the heating installation always remains in operation during freezing conditions and that all rooms are sufficiently heated.
- ▶ If you cannot ensure the operation, have a competent person drain the heating installation.

### **1.2.8 Material damage due to limescale deposits in the expansion relief valve**

Hard water can cause limescale to accumulate in the expansion relief valve.

- ▶ Regularly check the expansion relief valve manually to ensure that it works correctly by turning the cap one turn anticlockwise. Water escapes.
  - ◀ Escaping water may be hot.

### **1.2.9 Material damage due to leaks**

- ▶ Ensure that there is no mechanical tension on the supply lines.
- ▶ Do not suspend any loads from the pipelines (e.g. clothing).
- ▶ If there are leaks in the water pipe between the product and draw-off points, close the cold water stop valve immediately.
- ▶ Have the leak repaired by a competent person.

### **1.2.10 Risk of material damage caused by dry fire**

- ▶ If the product is switched on when it has been drained, the immersion heater may be damaged by dry fire.
- ▶ Do not close any isolation valves in the water pipe leading to the product.
- ▶ If the product cannot be supplied with water, disconnect the power supply to the product.



## 2 Notes on the documentation

- ▶ Always observe all operating instructions enclosed with the installation components.
- ▶ Store these instructions and all other applicable documents for further use.

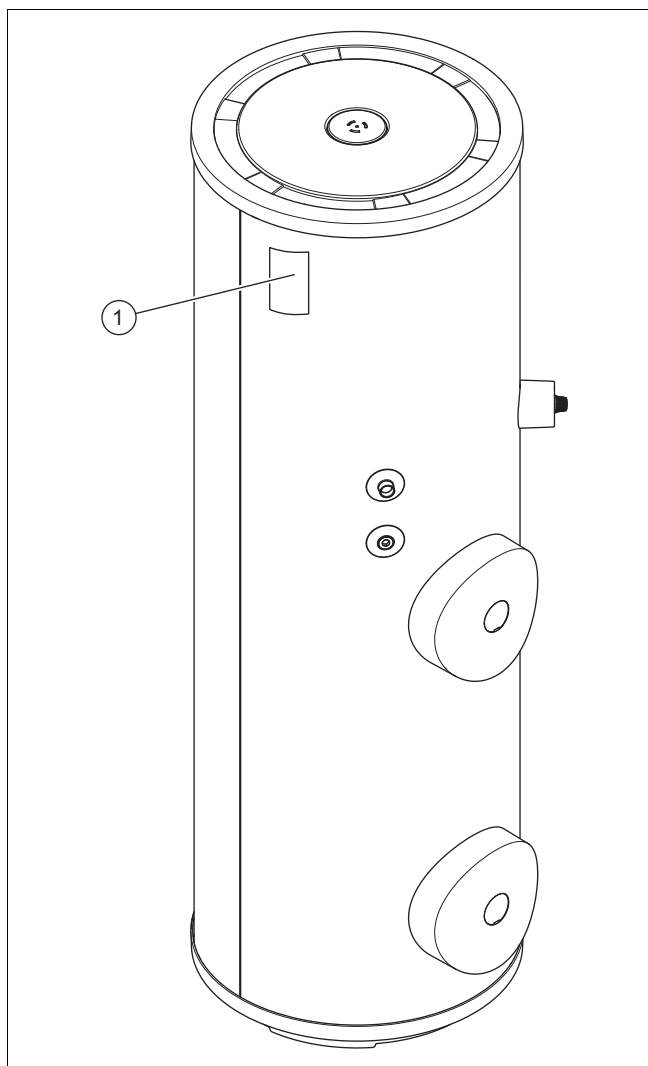
These instructions apply only to:

### Product article number

|                |            |
|----------------|------------|
| VEH 90/9-1 SL  | 8000011646 |
| VEH 120/9-1 SL | 8000011647 |
| VEH 150/9-1 SL | 8000011648 |
| VEH 175/9-1 SL | 8000011649 |
| VEH 210/9-1 SL | 8000011650 |
| VEH 250/9-1    | 8000011637 |
| VEH 300/9-1    | 8000011638 |

## 3 Product description

### 3.1 Serial number



The serial number can be found on the data plate (1).

### 3.2 Information on the data plate

The data plate is attached to the product at the factory.

| Information                                                                                                        | Meaning                                                                 |
|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| VEH ../9-..                                                                                                        | Product designation/product generation                                  |
| SL                                                                                                                 | Slimline                                                                |
| IPX4                                                                                                               | IP rating                                                               |
| <br>21073700201168840908005011N8 | Barcode and serial number<br>7th to 16th digit = product article number |

### 3.3 CE marking



The CE marking shows that the products comply with the basic requirements of the applicable EU laws as stated on the Declaration of Conformity.

The Declaration of Conformity can be viewed at the manufacturer's site.

### 3.4 UKCA mark



The UKCA marking shows that the products comply with the basic requirements of the applicable UK laws as stated on the Declaration of Conformity.

The Declaration of Conformity can be viewed at the manufacturer's site.

### 3.5 Benchmark



Vaillant is a licensed member of the Benchmark Scheme which aims to improve the standards of installation and commissioning of domestic heating and hot water systems in the UK and to encourage regular servicing to optimise safety, efficiency and performance.

Benchmark is managed and promoted by the Heating and Hotwater Industry Council. For more information visit [www.benchmark.org.uk](http://www.benchmark.org.uk).

- ▶ Please ensure that the installer has fully completed the Benchmark Checklist on the inside back pages of the installation instructions supplied with the product and that you have signed it to say that you have received a full and clear explanation of its operation. The installer is legally required to complete a commissioning checklist as a means of complying with the appropriate Building Regulations (England and Wales).

All installations must be notified to Local Area Building Control either directly or through a Competent Persons Scheme. A Building Regulations Compliance Certificate will then be is-

sued to the customer who should, on receipt, write the Notification Number on the Benchmark Checklist.

This product should be serviced regularly to optimise its safety, efficiency and performance. The service engineer should complete the relevant Service Record on the Benchmark Checklist after each service.

The Benchmark Checklist will be required in the event of any warranty.

### 3.6 Hot Water Association

Vaillant is a full member of the Hot Water Association and promotes the scheme in association with its cylinder range. Details are available on the web site [www.vaillant.co.uk](http://www.vaillant.co.uk)



The HWA Charter's Code of Practice requires that all members adhere to the following:

- To supply fit for purpose products clearly and honestly described
- To supply products that meet, or exceed appropriate standards and building and water regulations
- To provide pre and post sales technical support
- To provide clear and concise warranty details to customers

## 4 Function

### 4.1 Functionality

The product is a directly heated domestic hot water cylinder. Two heating elements that are integrated in the vessel heat the water. When hot water is drawn off at a draw-off point, cold water flows into the domestic hot water cylinder to replace it.

### 4.2 Setting the domestic hot water temperature



#### **Danger!**

#### **Risk of death from legionella.**

Legionella multiply at temperatures below 60 °C.

- ▶ Have a competent person inform you about the measures that should be taken to protect against Legionella in your installation.
- ▶ Do not set any water temperatures below 60 °C without consulting the competent person first.

**Condition:** With external control installed on-site

If you are using an external control, your competent person must turn the control dial for the internal thermostat of the domestic hot water cylinder clockwise as far as it will go.

- ▶ Observe the instructions for the control. Depending on the control, you can set the domestic hot water temperature on the control.

**Condition:** Without control

- ▶ Consult your competent person to adjust the domestic hot water temperature on the cylinder.
  - Temperature range of the internal thermostat: 10–68 °C ( $\pm 3$  °C)

### 4.3 Activating rapid heating

**Condition:** The competent person has installed an external boost switch.

If you have already used a lot of domestic hot water and need more domestic hot water for further use, you can switch on the upper immersion heater in the cylinder using the boost switch.

- ▶ Press the external boost switch.
  - ◁ After one hour, the upper immersion heater switches off automatically.

The domestic hot water temperature is controlled via the immersion heater thermostat.

- Adjustment range: 10–68 °C
- Factory setting: 59 °C

## 5 Troubleshooting

### 5.1 Detecting and eliminating faults

- ▶ If problems occur whilst operating the product, you can carry out certain self-checks with the aid of the table in the appendix. (→ Appendix A)
- ▶ If the product is not working correctly, decommission it and close the cold-water stopcock and notify a competent person. (→ Section 7.1)

## 6 Care and maintenance

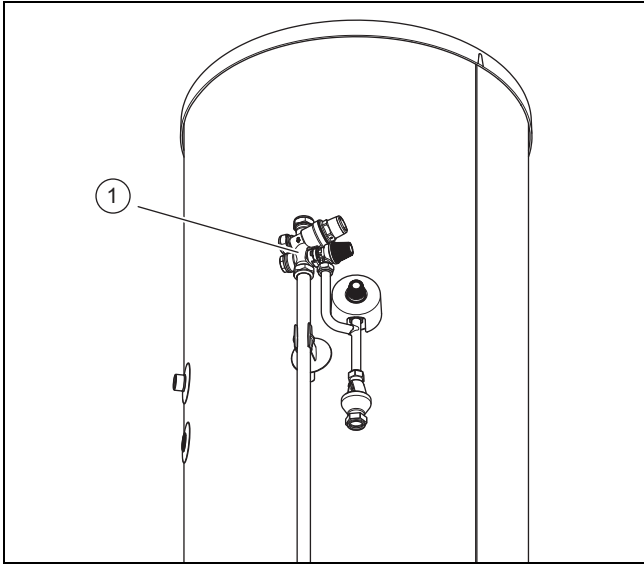
### 6.1 Maintenance

An annual inspection of the product carried out by a competent person is a prerequisite for ensuring that the product is permanently ready and safe for operation, reliable, and has a long working life.

### 6.2 Caring for the product

- ▶ Clean the casing with a damp cloth and a little solvent-free soap.
- ▶ Do not use sprays, scouring agents, detergents, solvents or cleaning agents that contain chlorine.

### 6.3 Checking the expansion relief valve



1. Once a month, drain the water via the expansion relief valve in order to prevent scale deposition.
  - The safety assembly (1) with the expansion relief valve is located on the cylinder, for example, as shown in the figure. If in doubt, ask your competent person where the expansion relief valve is located.
2. Ensure that water flows out of the expansion relief valve.

### 6.4 Scale deposition on the immersion heater

Immersion heaters may be damaged by scale deposition, especially at high temperatures.

If you regularly use the immersion heater, it may be useful to replace it with a titanium immersion heater (accessory).

- Consult your competent person.

With the standard immersion heater, the tap water must not exceed the limit values for calcium carbonate and chlorides:

- Calcium carbonate ( $\text{CaCO}_3$ )  $\leq 180$  mg/l
- Chlorides  $\leq 120$  mg/l

The titanium immersion heater can be used up to the following concentrations:

- Calcium carbonate ( $\text{CaCO}_3$ )  $\leq 180$  mg/l
- Chlorides  $\leq 250$  mg/l

If your tap water has higher values, the immersion heater must be serviced more frequently than every 12 months.

- In this case, contact your competent person.

## 7 Decommissioning

### 7.1 Temporarily decommissioning the product

- Temporarily decommission the product only if there is no risk of frost.
- Disconnect the product from the power supply.
  - Ensure that the power supply for both immersion heaters is switched off.

### 7.2 Permanently decommissioning the product

- Employ a competent person to permanently decommission the product.

## 8 Recycling and disposal

### Disposing of the packaging

- The competent person who installed your product is responsible for the disposal of the packaging.

### Disposing of the product



■ If the product is labelled with this mark:

- In this case, do not dispose of the product with the household waste.
- Instead, hand in the product to a collection centre for waste electrical or electronic equipment.

### Deleting personal data

Personal data may be misused by unauthorised third parties.

If the product contains personal data:

- Ensure that there is no personal data on or in the product (e.g. online login details or similar) before you dispose of the product.

## 9 Guarantee and customer service

### 9.1 Guarantee

For information on the manufacturer's guarantee, you can visit [www.vaillant.co.uk](http://www.vaillant.co.uk).

### 9.2 Customer service

For contact details for our customer service department, you can write to the address that is provided on the back page, or you can visit [www.vaillant.co.uk](http://www.vaillant.co.uk).

## Appendix

### A Troubleshooting

| Fault                                       | Solution                                                                                                                                                                                                                                                                                                     |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water escapes from the product              | <ul style="list-style-type: none"><li>– Disconnect the product from the power supply. Ensure that the power supply for both immersion heaters is switched off.</li><li>– Close the cold-water stopcock.</li><li>– If possible, collect the water in a vessel.</li><li>– Inform a competent person.</li></ul> |
| Domestic hot water temperature too low.     | <ul style="list-style-type: none"><li>– Check the setting for the domestic hot water temperature on the control.</li><li>– Check whether the power supply to the cylinder is switched on.</li><li>– If the problem persists, inform a competent person.</li></ul>                                            |
| Water escapes at the expansion relief valve | <ul style="list-style-type: none"><li>– Inform a competent person.</li></ul>                                                                                                                                                                                                                                 |

# Installation and maintenance instructions

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## 1 Safety

### 1.1 Risk caused by inadequate qualifications

The following work must only be carried out by competent persons who are sufficiently qualified to do so:

- Set-up
- Dismantling
- Installation
- Start-up
- Inspection and maintenance
- Repair
- Decommissioning
- ▶ Proceed in accordance with current technology.

### 1.2 Intended use

There is a risk of injury or death to the user or others, or of damage to the product and other property in the event of improper use or use for which it is not intended.

The product is intended as a system component for domestic hot water generation and storage for closed central heating installations.

The product must only be installed in a dry, permanently frost-free room.

Intended use includes the following:

- observance of accompanying operating, installation and maintenance instructions for the product and any other system components
- installing and setting up the product in accordance with the product and system approval
- compliance with all inspection and maintenance conditions listed in the instructions.

Any other use that is not specified in these instructions, or use beyond that specified in this document, shall be considered improper use. Any direct commercial or industrial use is also deemed to be improper.

#### **Caution.**

Improper use of any kind is prohibited.

## 1.3 General safety information

### 1.3.1 Risk of death due to lack of safety devices

The basic diagrams included in this document do not show all safety devices required for correct installation.

- ▶ Install the necessary safety devices in the installation.
- ▶ Observe the applicable national and international laws, standards and directives.

### 1.3.2 Risk of death from electric shock

There is a risk of death from electric shock if you touch live components.

Before commencing work on the product:

- ▶ Disconnect the product from the power supply by switching off all power supplies at all poles (electrical partition with a contact gap of at least 3 mm, e.g. fuse or circuit breaker).
- ▶ Secure against being switched back on again.
- ▶ Check that there is no voltage.

### 1.3.3 Risk of burns or scalding caused by hot components

- ▶ Only carry out work on these components once they have cooled down.

### 1.3.4 Risk of material damage caused by using an unsuitable tool

- ▶ Use the correct tool.

### 1.3.5 Risk of material damage during drilling work

The product may be damaged by drilling work, e.g. during the installation.

- ▶ Do not drill through the product.

### 1.3.6 Risk of material damage caused by frost

- ▶ Do not install the product in rooms prone to frost.

### 1.3.7 Material damage due to leaks

- ▶ Ensure that there is no mechanical stress on the connection pipes.
- ▶ Do not suspend any loads from the pipelines (e.g. clothing).





### **1.3.8 Risk of injury due to the heavy weight of the product**

- ▶ Make sure that the product is transported by at least two people.

### **1.3.9 Material damage due to unsuitable installation surface**

The installation surface must be even and have sufficient load-bearing capacity to support the total weight of the product. If the installation surface does not have sufficient load-bearing capacity, the product may topple.

An uneven installation surface may cause leaks in the product. Leaks at the connections may cause a risk of scalding.

If the installation surface is slightly sloped, you may use the enclosed tilt protection for slopes of up to 10°.

- ▶ Ensure that the product is level on the installation surface or that the tilt protection (up to 10° incline) is installed.
- ▶ Ensure that the installation surface has sufficient load-bearing capacity to bear the total weight of the product.

## **1.4 Regulations (directives, laws, standards)**

- ▶ Observe the national regulations, standards, directives, ordinances and laws.



## 2 Notes on the documentation

- Always observe all the operating and installation instructions included with the system components.
- Pass these instructions and all other applicable documents on to the end user.

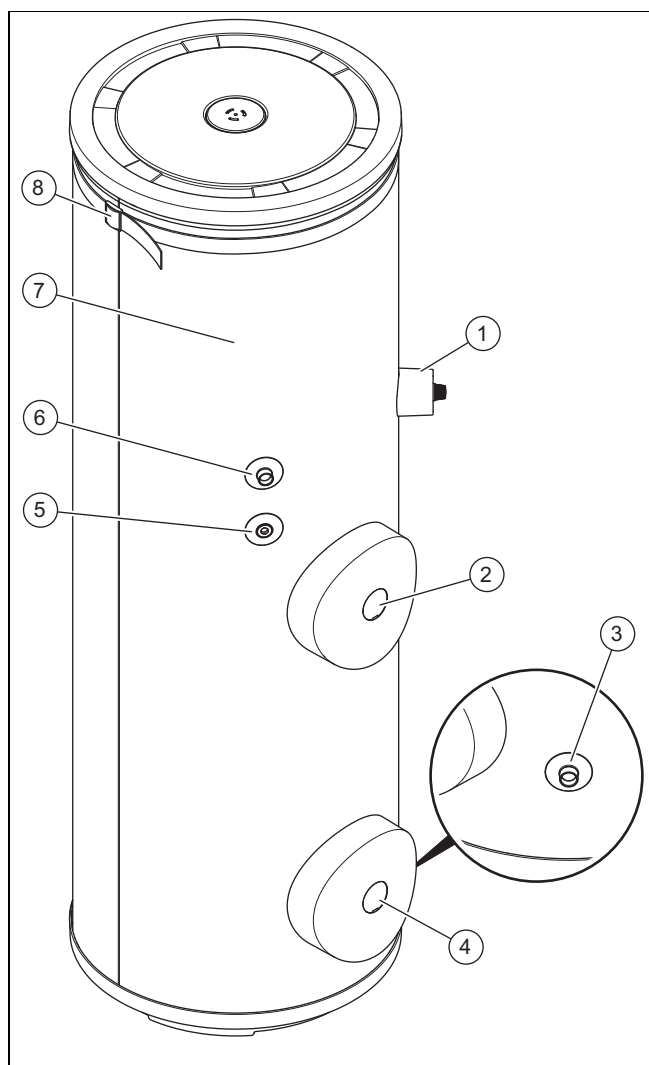
These instructions apply only to:

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|                |            |
|----------------|------------|
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| VEH 175/9-1 SL | 8000011649 |
| VEH 210/9-1 SL | 8000011650 |
| VEH 250/9-1    | 8000011637 |
| VEH 300/9-1    | 8000011638 |

## 3 Product description

### 3.1 Product design



- |                                                      |                                                                 |
|------------------------------------------------------|-----------------------------------------------------------------|
| 1 Temperature and pressure relief valve              | 4 Electronics box (interface for primary immersion heater)      |
| 2 Electronics box (boost immersion heater interface) | 5 Secondary return connection (only for cylinders $\geq 210$ l) |
| 3 Cold water connection                              |                                                                 |

6 Domestic hot water connection

7 Cylinder

8 Tilt protection

### 3.2 CE marking



The CE marking shows that the products comply with the basic requirements of the applicable EU laws as stated on the Declaration of Conformity.

The Declaration of Conformity can be viewed at the manufacturer's site.

### 3.3 UKCA mark



The UKCA marking shows that the products comply with the basic requirements of the applicable UK laws as stated on the Declaration of Conformity.

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### 3.4 Hot Water Association

Vaillant is a full member of the Hot Water Association and promotes the scheme in association with its cylinder range. Details are available on the web site [www.vaillant.co.uk](http://www.vaillant.co.uk)

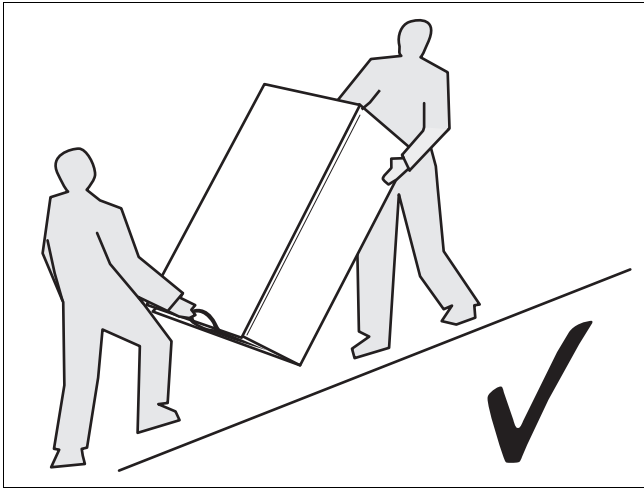


The HWA Charter's Code of Practice requires that all members adhere to the following:

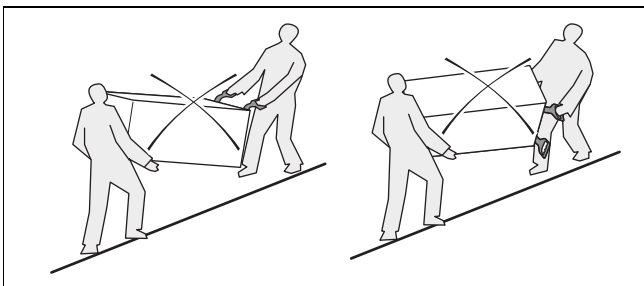
- To supply fit for purpose products clearly and honestly described
- To supply products that meet, or exceed appropriate standards and building and water regulations
- To provide pre and post sales technical support
- To provide clear and concise warranty details to customers

## 4 Set-up

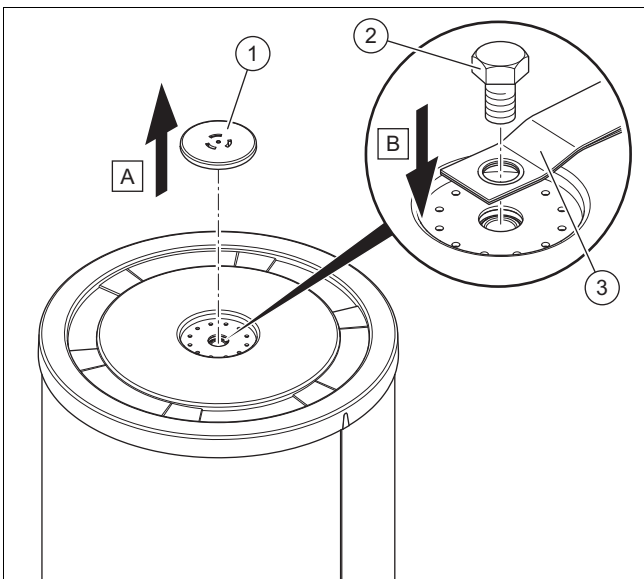
### 4.1 Transport



- Always transport the product as illustrated above.

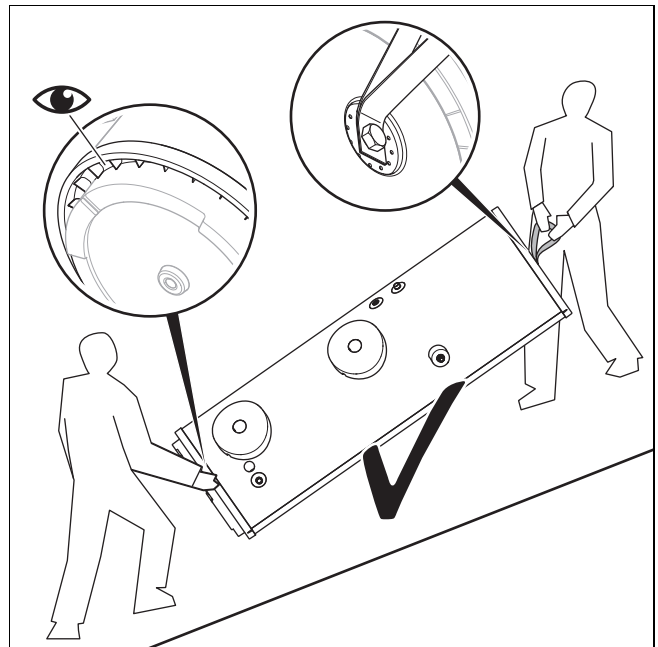


- Never transport the product horizontally.



- 1 Cover
- 2 Transport aid screw
- 3 Transport aid

- If you are transporting the product without packaging, install the transport aid from the scope of delivery.



- Use the transport aid from the scope of delivery on the upper side and the recessed handle on the underside to transport the product.

### 4.2 Unpacking the product



#### Caution.

**Risk of material damage caused by unpacking incorrectly.**

The components could become damaged when unpacking the product.

- Carefully unpack the product.

- Remove the product from its box.

### 4.3 Checking the scope of delivery

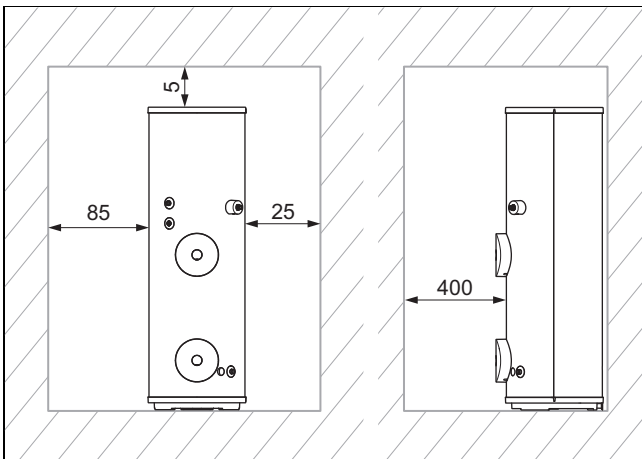
- Check that the scope of delivery is complete.

| Quantity | Designation                                                    |
|----------|----------------------------------------------------------------|
| 1        | Domestic hot water cylinder                                    |
| 1        | Enclosed documentation                                         |
| 1        | Temperature and pressure relief valve                          |
| 1        | Safety assembly with pressure reducer                          |
| 1        | Tundish                                                        |
| 1        | Potable water drain valve                                      |
| 1        | Nut and sealing cutting ring for domestic hot water connection |
| 1        | Tilt protection                                                |
| 1        | Transport aid set                                              |
| 1        | Self-adhesive cable holder                                     |
| 1        | Rubber stopper for temperature sensor                          |
| 1        | Expansion vessel                                               |

## 4.4 Installing the product

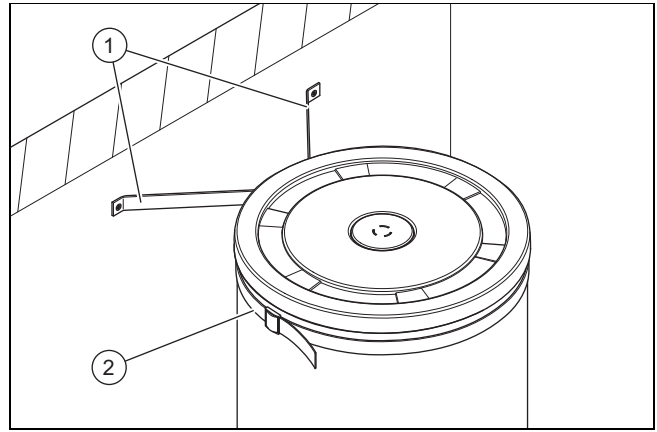
- ▶ Only place the product indoors where it will remain frost-free at all times.
- ▶ When selecting the installation site, take into consideration the routing of the pipework system.
- ▶ Set up the product in a suitable location and, when doing so, pay attention to the following points:
  - Plan the installation of the tundish and the drain pipework. (→ Section 5.1.6)
  - The installation surface must be level and must not have an incline greater than 10%.
  - The installation surface must have sufficient load-bearing capacity to support the total weight of the product. If required, reinforce the installation area.
  - Install the product in such a way that the thermostat and immersion heater can be accessed easily. Minimum clearance to the front: 400 mm
  - Select the installation site so that, in the event of damage, large volumes of water can be drained safely (e.g. into a floor drain).
  - On products with an external expansion vessel: Leave sufficient space around the product for installing, maintaining and replacing the expansion vessel.
- ▶ To prevent heat losses, insulate the pipework system in accordance with the applicable energy-saving regulations.

### 4.4.1 Minimum clearances



## 4.5 Installing the tilt protection

1. Place the product against the wall with a clearance of 5–125 mm.



2. Place the belt (2) at the top around the product so that the two loose ends (1) point in the direction of the wall.
3. Tighten the belt.
4. Secure the two loose ends to the wall using suitable fixing material.
  - Use screws, washers and wall plugs that are suitable for the condition of the wall.

## 5 Installation

### 5.1 Hydraulic installation



#### Caution.

#### Risk of material damage due to heat transfer during soldering.

The heat that is transferred during soldering may damage the cylinder and its components as well as the connection seals.

- ▶ Protect the product and its components.
- ▶ Only solder connectors if the connectors are not yet screwed to the fittings.



#### Caution.

#### Risk of material damage to the cylinder.

If an unvented hot water cylinder is fitted at a high level (eg, loft space), potential damage to the cylinder may occur if the correct method of draining is not followed.

- ▶ In certain circumstances and at the discretion of the installer, install a WRAS approved automatic air vent on the hot water outlet at the highest point.



#### Caution.

#### Material damage due to escaping water

Improper installation may cause water to leak from the cylinder.

- ▶ Tighten all hydraulic connections until the system is tight.

During the installation, check the factory-installed piping and tighten the screwed connections.

### 5.1.1 Preliminary works

- ▶ Thoroughly clean and flush all central heating and primary hot water circuits.
- ▶ In hard water areas, take suitable measures to treat the feed water to water heaters and the hot water circuit of combination boilers to reduce limescale accumulation.
- ▶ Prepare and commission domestic central heating systems in accordance with BS 7593.

### 5.1.2 Descaling the water

Scale deposition increases as the water temperature increases.

- ▶ Descale the water as required.

### 5.1.3 Installing the drain valve

- ▶ Install the drain valve at the cold water connection.

### 5.1.4 Connecting the cold water pipe

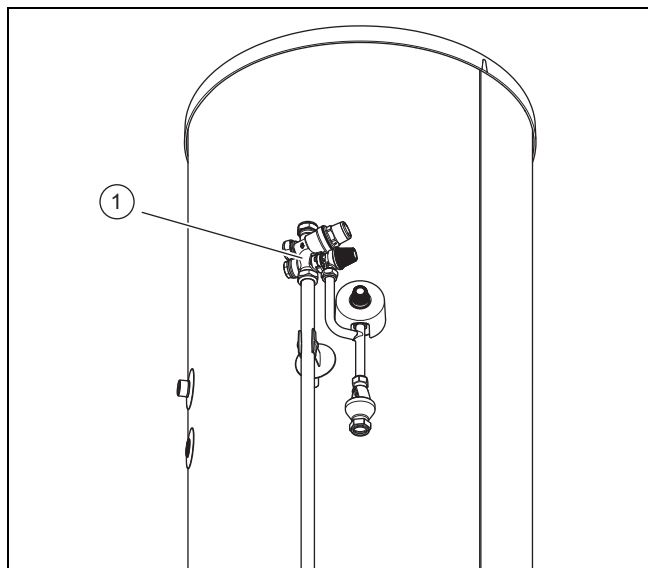


#### Caution.

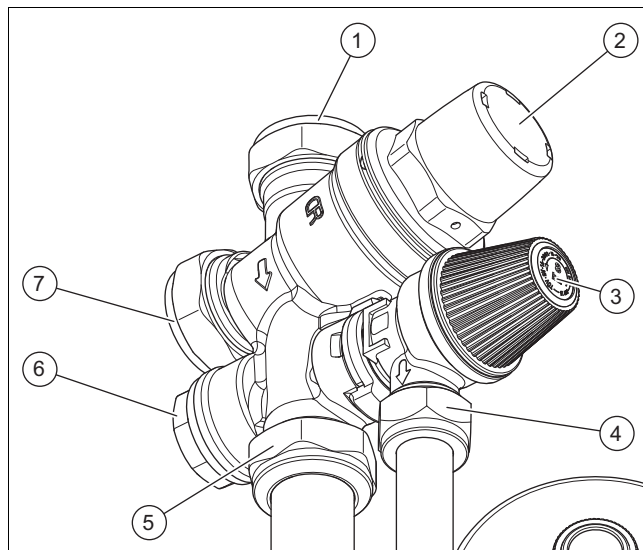
#### Excessive pressure in the domestic hot water cylinder

Excessive pressure in the domestic hot water cylinder may cause the cylinder to burst.

- ▶ Ensure that the expansion relief valves are not blocked.
- ▶ Ensure that there is no isolation valve between the safety group and the cylinder.



1. Before installation, flush the pipes in order to clear any contamination and prevent the build up of dirt.
2. Install the safety assembly with pressure reducer (1) horizontally and install the expansion relief valve so that it is facing upwards, e.g. as shown in the figure.
3. Note the flow direction, which is specified by an arrow.

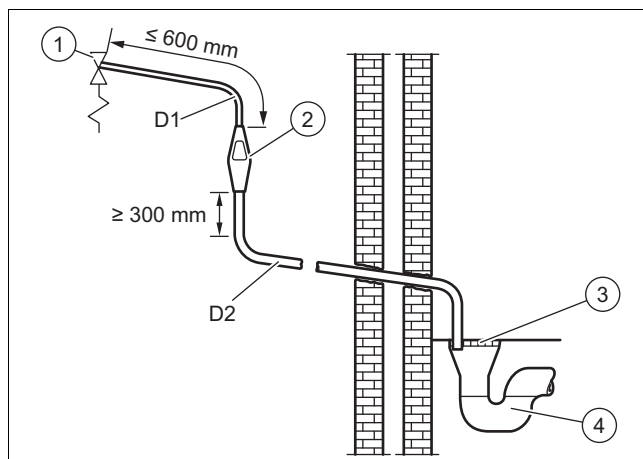


- |   |                              |   |                                               |
|---|------------------------------|---|-----------------------------------------------|
| 1 | Cold water connection        | 5 | Flow of the cold water supply to the cylinder |
| 2 | Pressure reducer             | 6 | Connection for the expansion vessel           |
| 3 | Expansion relief valve       | 7 | Offset cold water connection                  |
| 4 | Expansion relief valve drain |   |                                               |
4. Connect the drain for the expansion relief valve (4) to the tundish.
  5. Connect the cold water pipe to the connection (1) for the safety assembly with pressure reducer.
    - Diameter of the cold water pipe:  $\geq 22$  mm
  6. Secure the heat insulation to the safety assembly with pressure reducer.

### 5.1.5 Installing an expansion vessel

1. Install the expansion vessel close to the product.
2. Install a pipe at the expansion vessel and connect the terminal to the safety group.
3. Adjust the pressure in the expansion vessel to the installation's requirements.

### 5.1.6 Installing the drain pipework



- |   |                                       |    |                                                                                    |
|---|---------------------------------------|----|------------------------------------------------------------------------------------|
| 1 | Temperature and pressure relief valve | D1 | Metal drain pipe between the temperature and pressure relief valve and the tundish |
| 2 | Tundish                               | D2 | Drain pipe routed behind the tundish with a downward gradient                      |
| 3 | Mesh                                  |    |                                                                                    |
| 4 | Drain with siphon                     |    |                                                                                    |

It is a requirement of Building Regulation G3 that any discharge from an unvented system is conveyed to where it is visible but will not cause danger to persons in or about the building. The tundish and discharge pipes should be fitted in accordance with the requirements and guidance notes of Building Regulation G3. The G3 Requirements and Guidance section 3.50 - 3.63 are reproduced in the following sections of this manual. For discharge pipe arrangements not covered by G3 Guidance advice should be sought from your local Building Control Officer. Any discharge pipe connected to the pressure relief devices (expansion valve and temperature/pressure relief valve) must be installed in a continuously downward direction and in a frost free environment. Water may drip from the discharge pipe of the pressure relief device. This pipe must be left open to the atmosphere. The pressure relief device is to be operated regularly to remove lime deposits and to verify that it is not blocked. The tundish should not be placed adjacent to electrical outlets or devices in case any splashing occurs during discharge that may cause an electrical hazard.

| Size of the outlet valve | Minimum diameter of the drain pipe D1 | Minimum diameter of the drain pipe from the tundish D2 | Maximum permissible resistance, information on the length of a straight pipe | Resistance per elbow or bend |
|--------------------------|---------------------------------------|--------------------------------------------------------|------------------------------------------------------------------------------|------------------------------|
| G1/2"                    | 15 mm                                 | 22 mm                                                  | ≤ 9 m                                                                        | 0.8 m                        |
|                          |                                       | 28 mm                                                  | ≤ 18 m                                                                       | 1.0 m                        |
|                          |                                       | 35 mm                                                  | ≤ 27 m                                                                       | 1.4 m                        |
| G3/4"                    | 22 mm                                 | 28 mm                                                  | ≤ 9 m                                                                        | 1.0 m                        |
|                          |                                       | 35 mm                                                  | ≤ 18 m                                                                       | 1.4 m                        |
|                          |                                       | 42 mm                                                  | ≤ 27 m                                                                       | 1.7 m                        |
| G1"                      | 28 mm                                 | 35 mm                                                  | ≤ 9 m                                                                        | 1.4 m                        |
|                          |                                       | 42 mm                                                  | ≤ 18 m                                                                       | 1.7 m                        |
|                          |                                       | 54 mm                                                  | ≤ 27 m                                                                       | 2.3 m                        |

Note: The above table is based on copper tube. Plastic pipes may be of different bore and resistance. Sizes and maximum lengths of plastic should be calculated using data prepared for the type of pipe being used.

#### 5.1.6.1 Discharge pipe D1

3.50 Each of the temperature relief valves or combined temperature and pressure relief valves specified in 3.13 or 3.17 should discharge either directly or by way of a manifold via a short length of metal pipe (D1) to a tundish.

3.51 The diameter of discharge pipe (D1) should be not less than the nominal outlet size of the temperature relief valve.

3.52 Where a manifold is used it should be sized to accept and discharge the total discharge from the discharge pipes connected to it.

3.53 Where valves other than the temperature and pressure relief valve from a single unvented hot water system discharge by way of the same manifold that is used by the safety devices, the manifold should be factory fitted as part of the hot water storage system unit or package.

#### 5.1.6.2 Tundish

3.54 The tundish should be vertical, located in the same space as the unvented hot water storage system and be fitted as close as possible to, and lower than, the valve, with no more than 600 mm of pipe between the valve outlet and the tundish. Note: To comply with the Water Supply (Water Fittings) Regulations, the tundish should incorporate a suitable air gap.

3.55 Any discharge should be visible at the tundish. In addition, where discharges from safety devices may not be apparent, e.g. in dwellings occupied by people with impaired vision or mobility, consideration should be given to the installation of a suitable safety device to warn when discharge takes place, e.g. electronically operated.

3.56 The discharge pipe (D2) from the tundish should: (a) have a vertical section of pipe at least 300 mm long below the tundish before any elbows or bends in the pipework (see diagram); and (b) be installed with a continuous fall thereafter of at least 1 in 200.

#### 5.1.6.3 Discharge pipe D2

3.57 The discharge pipe (D2) should be made of: (a) metal; or (b) other material that has been demonstrated to be capable of safely withstanding temperatures of the water discharged and is clearly and permanently marked to identify the product and performance standard (e.g. as specified in the relevant part of BS 7291).

3.58 The discharge pipe (D2) should be at least one pipe size larger than the nominal outlet size of the safety device unless its total equivalent hydraulic resistance exceeds that of a straight pipe 9 m long, i.e. for discharge pipes between 9 m and 18 m the equivalent resistance length should be at least two sizes larger than the nominal outlet size of the safety device; between 18 and 27 m at least 3 sizes larger, and so on; bends must be taken into account in calculating the flow resistance. See diagram, Table and the worked example. Note: An alternative approach for sizing discharge pipes would be to follow Annex D, section D.2 of BS 6700:2006 Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.

3.59 Where a single common discharge pipe serves more than one system, it should be at least one pipe size larger than the largest individual discharge pipe (D2) to be connected.

3.60 The discharge pipe should not be connected to a soil discharge stack unless it can be demonstrated that the soil discharge stack is capable of safely withstanding temperatures of the water discharged, in which case, it should:

(a) contain a mechanical seal, not incorporating a water trap, which allows water into the branch pipe without allowing foul air from the drain to be ventilated through the tundish;

(b) be a separate branch pipe with no sanitary appliances connected to it;

(c) if plastic pipes are used as branch pipes carrying discharge from a safety device they should be either polybutylene (PB) to Class S of BS 7291-2:2006 or cross linked polyethylene (PE-X) to Class S of BS 7291-3:2006; and

(d) be continuously marked with a warning that no sanitary appliances should be connected to the pipe.

Note: 1. Plastic pipes should be joined and assembled with fittings appropriate to the circumstances in which they are used as set out in BS EN ISO 1043-1. 2. Where pipes can-

not be connected to the stack it may be possible to route a dedicated pipe alongside or in close proximity to the discharge stack.

#### 5.1.6.4 Termination of discharge pipe

3.61 The discharge pipe (D2) from the tundish should terminate in a safe place where there is no risk to persons in the vicinity of the discharge.

3.62 Examples of acceptable discharge arrangements are:

- (a) to a trapped gully with the end of the pipe below a fixed grating and above the water seal;
- (b) downward discharges at low level; i.e. up to 100mm above external surfaces such as car parks, hard standings, grassed areas etc. are acceptable providing that a wire cage or similar guard is positioned to prevent contact, whilst maintaining visibility; and
- (c) discharges at high level: e.g. into a metal hopper and metal downpipe with the end of the discharge pipe clearly visible or onto a roof capable of withstanding high temperature discharges of water and 3 m from any plastic guttering system that would collect such discharges.

3.63 The discharge would consist of high temperature water and steam. Asphalt, roofing felt and non-metallic rainwater goods may be damaged by such discharges.

#### 5.1.6.5 Sample calculation

The following example corresponds to a G1/2 temperature and pressure relief valve with a (D2) drain pipe with four 22 mm elbows and a length of 7 m from the tundish to the drainage point. According to the table, the following applies:

Maximum resistance allowed for a straight length of 22 mm copper discharge pipe (D2) from a G1/2 temperature relief valve is 9.0 m.

Subtract the resistance for 4 No. 22 mm elbows at 0.8 m each = 3.2 m.

Therefore the permitted length equates to: 5.8 m.

5.8 m is less than the actual length of 7 m therefore calculate the next largest size.

Maximum resistance allowed for a straight length of 28 mm pipe (D2) from a G1/2 temperature relief valves equates to 18 m.

Subtract the resistance of 4 No. 28 mm elbows at 1.0 m each = 4.0 m.

Therefore the maximum permitted length equates to: 14 m.

As the actual length is 7 m, a 28 mm (D2) copper pipe will be satisfactory.

#### 5.1.6.6 Drain for expansion relief valve

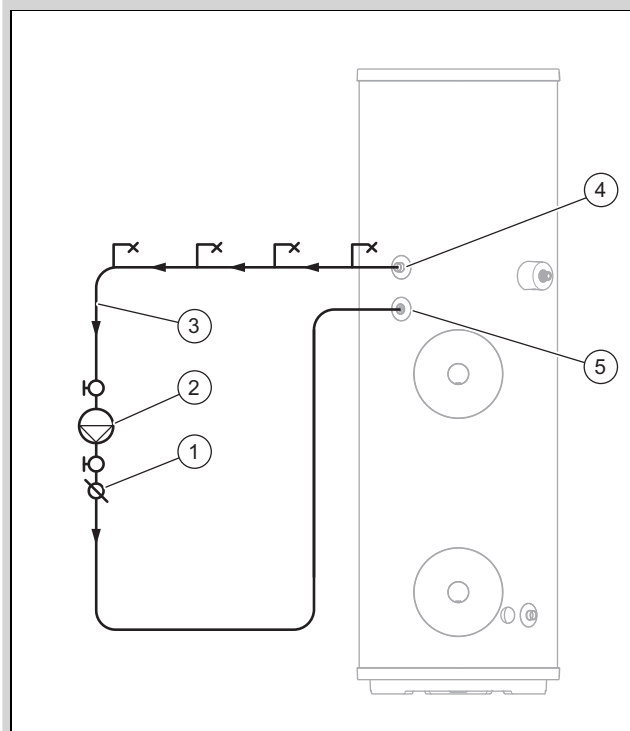
The installation of the drain on the expansion relief valve is permitted as long as this does not present a danger to anyone inside or out side the building at the drainage point. During the installation, note the following:

- The possibility (taking the wind into account) that a person might stay in the area where the water is drained for a prolonged period of time.
- The temperature of the drained water.
- The position of the windows and other openings.
- The probability of prams being under the drain opening.
- The resistance of the surface to hot water.

- The possibility of ice formation if water drains onto access paths.

### 5.1.7 Installing the secondary return

Validity: Product with secondary return



- |   |                  |   |                               |
|---|------------------|---|-------------------------------|
| 1 | Non-return valve | 4 | Domestic hot water connection |
| 2 | Circulation pump | 5 | Secondary return connection   |
| 3 | Secondary return |   |                               |

Carry out the installation in accordance with the basic diagram above.

## 5.2 Electrical installation

The electrical installation must only be carried out by a qualified electrician.



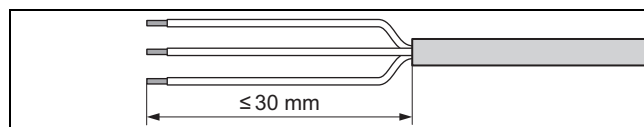
**Danger!**  
**Risk of death from electric shock!**

The power supply terminals L and N are live:

- Switch off the power supply.
- Secure the power supply against being switched back on.

### 5.2.1 Stripping the flexible lines

1. If required, shorten the connection cables.



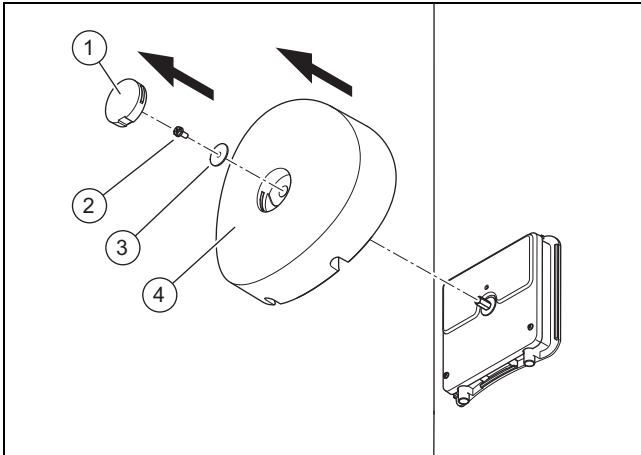
2. Strip the flexible line as shown in the figure. In doing so, ensure that the insulation on the individual conductors is not damaged.

## 5.2.2 Opening the electronics box

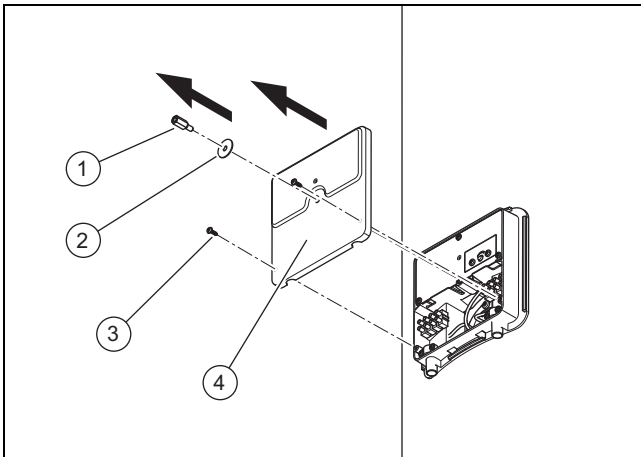


### Note

The screwed connection of the electronics box insulation enables ingress protection rating IPX4.



- |               |                              |
|---------------|------------------------------|
| 1 Screw cover | 3 Washer                     |
| 2 Screw       | 4 Electronics box insulation |



- |                |                                |
|----------------|--------------------------------|
| 1 Screw-in nut | 3 Electronics box cover screws |
| 2 Washer       | 4 Electronics box cover        |

1. Open the electronics box as shown in the figures.

## 5.2.3 Connecting the cable



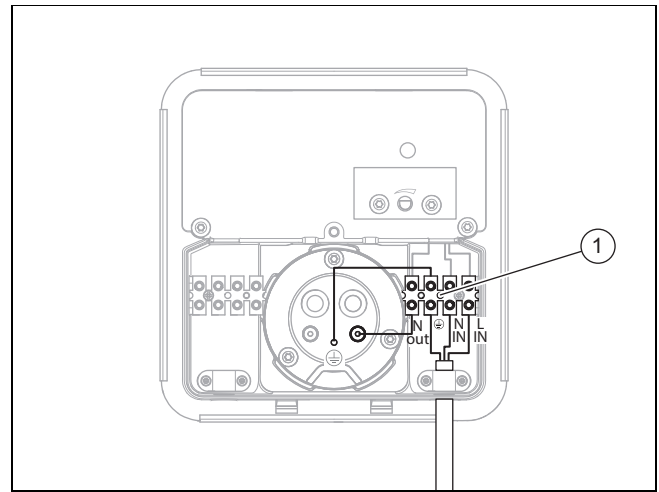
### Note

The lower immersion heater is the primary immersion heater. The upper immersion heater is only switched on as required via the boost switch that is provided on-site.



### Note

You can use either the left- or right-hand grommet for the power supply cable.



- 1 Connection terminal for immersion heater power supply
1. Install a separate power supply for each of the immersion heaters in accordance with the applicable standards.
2. Use heat-resistant cables, e.g. sheathed cables (NYM):
  - Cable conductor cross-section: 1.5 to 2.5 mm<sup>2</sup>
3. Use conductor end sleeves for flexible cables.
4. Install a boost switch for the upper immersion heater on-site that meets the following requirements:
  - Boost switch for domestic hot water generation
  - Electrical voltage: 230–240 V~/50 Hz
  - Contact loading: 13 A (for immersion heaters up to 3 kW)
  - Switch type: Double-pole switch
  - Boost times: 1 or 2 hours
  - Ingress protection rating: Min. IP30
  - Standards: BS-EN 60730-2-7
5. Install a double-pole disconnecter with a contact gap of at least 3 mm at both poles on the main power supply.
6. Protect the electrical circuit using a fuse for each immersion heater and a residual-current circuit breaker.
  - Fuses: 13 to 16 A
  - Residual-current circuit breaker: 30 mA
7. Connect the power supply for the immersion heater to connections L, N and  $\ominus$  for connection terminal (1).
8. Secure the cables in the electronics box using the strain reliefs.

## 6 Start-up



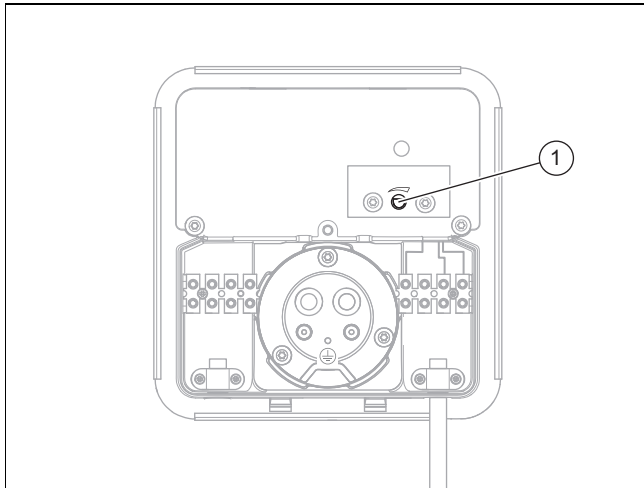
### Caution.

#### Risk of material damage caused by dry fire

If the product is switched on when it has been drained, the immersion heater may be damaged by dry fire.

- You must disconnect the product from the power supply every time before you drain it.
- Before starting up the product, fill it completely.

## 6.1 Setting the thermostat for the immersion heater



The domestic hot water temperature is controlled via the immersion heater thermostat (1).

- Adjustment range: 10–68 °C
- Factory setting: 59 °C
- Only use the immersion heater if the following values for the water quality are complied with:
  - Calcium carbonate ( $\text{CaCO}_3$ )  $\leq 180$  mg/l
  - Chlorides  $\leq 120$  mg/l (standard immersion heater)
  - Chlorides  $\leq 250$  mg/l (titanium immersion heater, accessories)
- Observe the applicable regulations regarding legionella prevention.
- Set the domestic hot water temperature as you require on the immersion heater's thermostat.

## 6.2 Cold water inlet pressure

The efficiency of the domestic hot water supply depends on the cold water inlet pressure and the flow rate.

We recommend a pressure of at least 1.5 bar and a flow rate of at least 20 l/min.

If multiple draw-off points are to be supplied at the same time, we recommend a correspondingly higher pressure and flow rate.

## 6.3 Filling and purging the product



### Note

It is not permitted to use valves or expansion relief valves for the purging.

1. Ensure that the drain valve is closed.
2. Open the hot water taps at the draw-off points.
3. Open the cold-water stopcock.
4. If present, open the automatic air vent that is installed on-site in the potable water system.
5. Let the water flow in order to remove any air bubbles.
6. Close the automatic air vent as soon as the air has escaped.
7. Close the hot water taps.
8. Check whether there are any leaks. In particular, check the sealing area of the immersion heater inside the electronics box.

9. Open the hot water tap at the highest draw-off point, then the hot water tap at the lowest draw-off point, and allow the water to flow.
  - Water running time:  $\geq 5$  min
10. Close all of the hot water taps.

## 6.4 Insulating piping, connections and external parts

1. To guarantee the energy efficiency, insulate the products fully and professionally:
2. Determine the required thickness of the insulation in accordance with the following table:

| Pipe internal diameter     | Thickness of the insulation    |
|----------------------------|--------------------------------|
| $\leq 22$ mm               | 20 mm                          |
| $> 22$ mm<br>$\leq 35$ mm  | 30 mm                          |
| $> 35$ mm<br>$\leq 100$ mm | Equal to the internal diameter |
| $> 100$ mm                 | 100 mm                         |

3. Insulate the piping.
4. Insulate the connections.
5. Insulate the external parts, e.g. the safety assembly.

## 7 Handing the product over to the end user



### Danger!

#### Risk of death from legionella.

Legionella multiply at temperatures below 60 °C.

- Ensure that the end user is familiar with all of the Anti-legionella measures in order to comply with the applicable regulations regarding legionella prevention.

- Complete the commissioning checklist in the appendix.
- Once the installation is complete, show the end user where the safety devices are and how they work.
- Inform the end user how to handle the product.
- In particular, draw attention to the safety warnings which the end user must follow.
- Inform the end user of the necessity to have the product maintained according to the specified intervals.

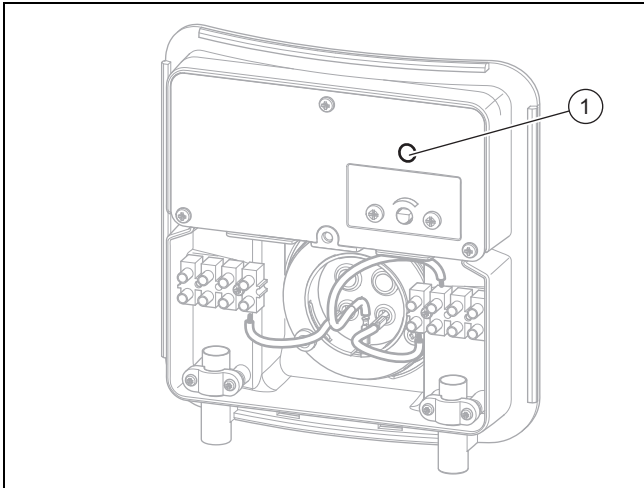
## 8 Troubleshooting

### 8.1 Detecting and eliminating faults

- ▶ If problems occur whilst operating the product, check certain points with the aid of the table in the appendix. Detecting and eliminating faults (→ Appendix A)

### 8.2 Resetting the safety cut-out

- ▶ Check the table in the appendix to find out why the safety cut-out was triggered. Troubleshooting – safety cut-out (→ Appendix B)
- ▶ Eliminate whatever is causing the safety cut-out to be triggered.



- ▶ In the opening (1), press the reset button for the safety cut-out, e.g. using a screwdriver.

### 8.3 Procuring spare parts

The original components of the product were also certified by the manufacturer as part of the declaration of conformity. If you use other, non-certified or unauthorised parts during maintenance or repair work, this may result in the product no longer meeting the applicable standards, thereby voiding the conformity of the product.

We strongly recommend that you use original spare parts from the manufacturer as this guarantees fault-free and safe operation of the product. To receive information about the available original spare parts, contact the contact address provided on the back page of these instructions.

- ▶ If you require spare parts for maintenance or repair work, use only the spare parts that are permitted for the product.

## 9 Inspection and maintenance

### 9.1 Observing inspection and maintenance intervals

Adhere to the minimum inspection and maintenance intervals. The inspection may require maintenance to be carried out earlier, depending on the results.

Inspection and maintenance work – Overview (→ Appendix C)

The immersion heater can be removed in order to inspect the inside of the cylinder.

### 9.2 Draining the product



#### Caution.

#### Risk of material damage caused by dry fire

If the product is switched on when it has been drained, the immersion heater may be damaged by dry fire.

- ▶ You must disconnect the product from the power supply every time before you drain it.
- ▶ Before starting up the product, fill it completely.

1. Disconnect the product from the power supply.
  - Ensure that the power supply for both immersion heaters is switched off.
2. Close the cold-water stopcock.
3. Secure a hose to the drain valve.
4. Position the hose at a suitable drain.
5. Open the highest hot water tap in the installation.
6. Open the automatic air vent (if present).
7. Open the drain valve and drain the product completely.
8. Close the hot water tap and the drain valve.
9. Remove the hose.

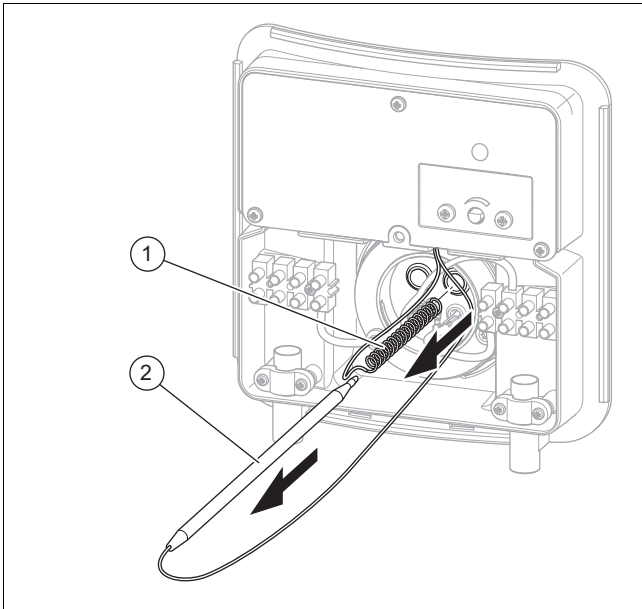
### 9.3 Servicing the immersion heater



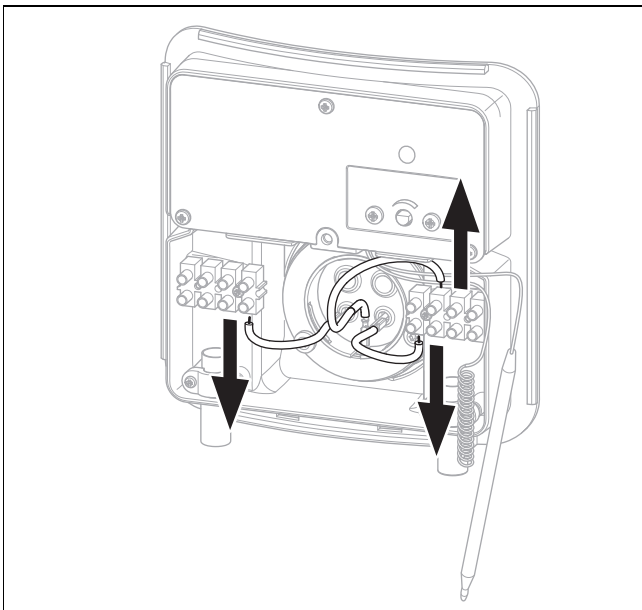
#### Note

If the immersion heater frequently exhibits heavy scale deposition, we recommend installing a titanium immersion heater.

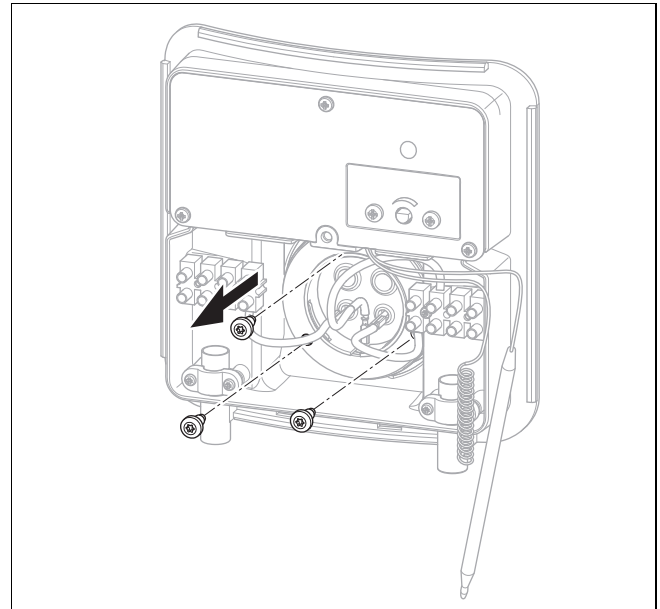
1. Switch off the power supply to the immersion heater and secure it against being switched back on.
  - Ensure that the power supply for both immersion heaters is switched off.
2. Drain the product. (→ Section 9.2)
3. Open the electronics box. (→ Section 5.2.2)



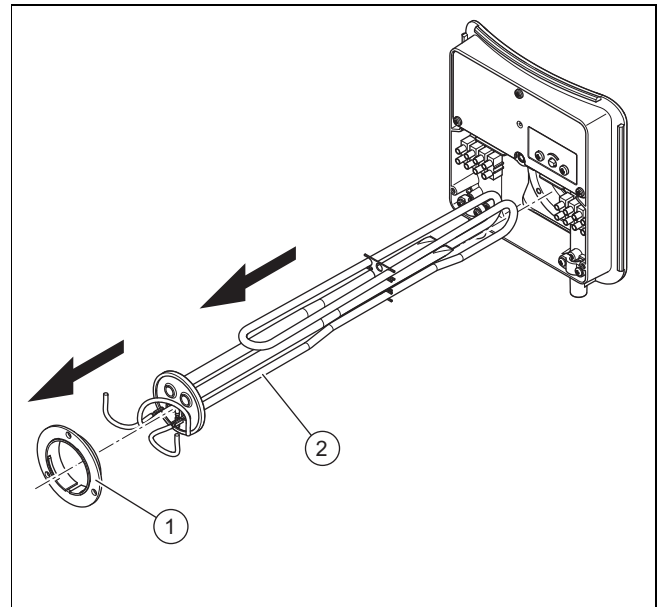
4. Pull the temperature sensor **(2)** out of the sensor sleeve.
  - In doing so, ensure that the capillary tube does not bend too much.
5. Pull the spiral-shaped part **(1)** of the temperature sensor out of the sensor sleeve.



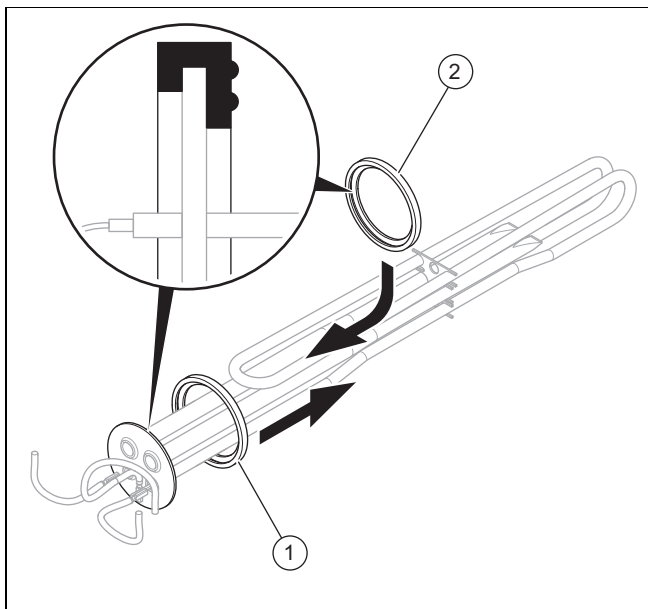
6. Undo the cables from the terminals.



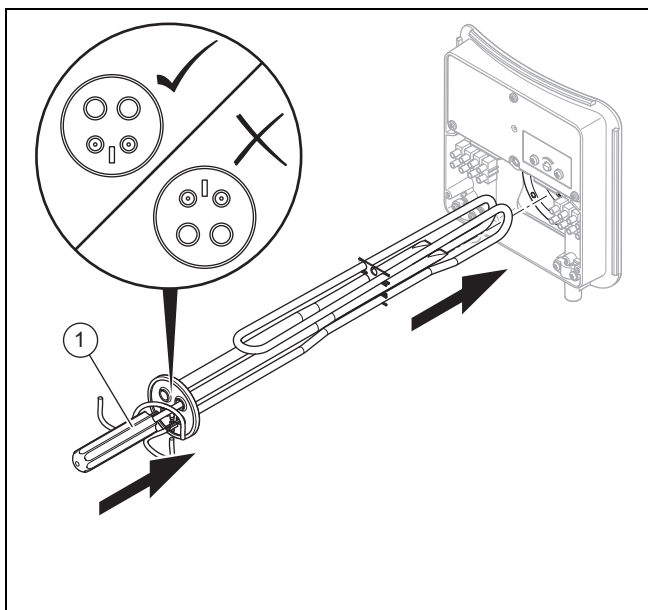
7. Remove the three screws.



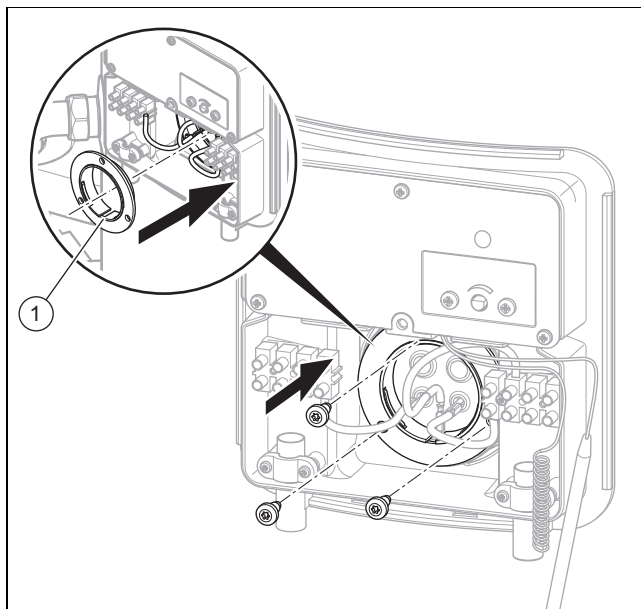
8. Remove the retaining ring **(1)**.
9. Remove the immersion heater **(2)**.



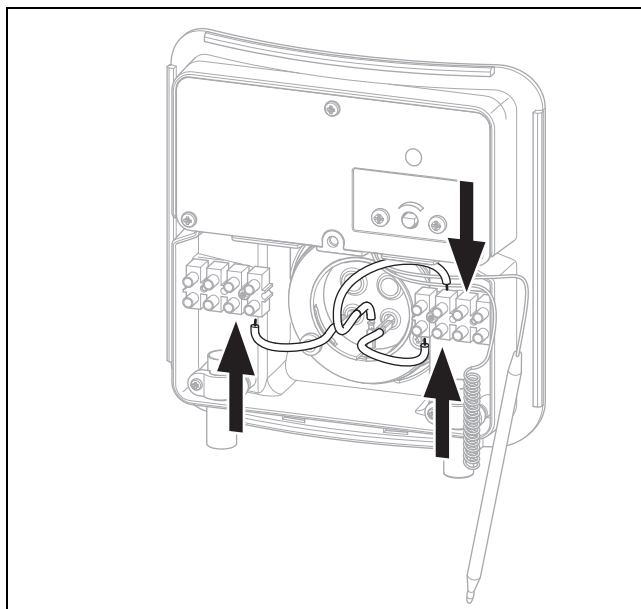
10. Dispose of the old seal (1).
11. Check the immersion heater for damage and scale deposition.
12. If required, remove the scale with a wire brush, a flat scraper or by placing it into a citric acid/vinegar solution.
13. Install a new seal (2) and ensure that the seal is seated correctly.



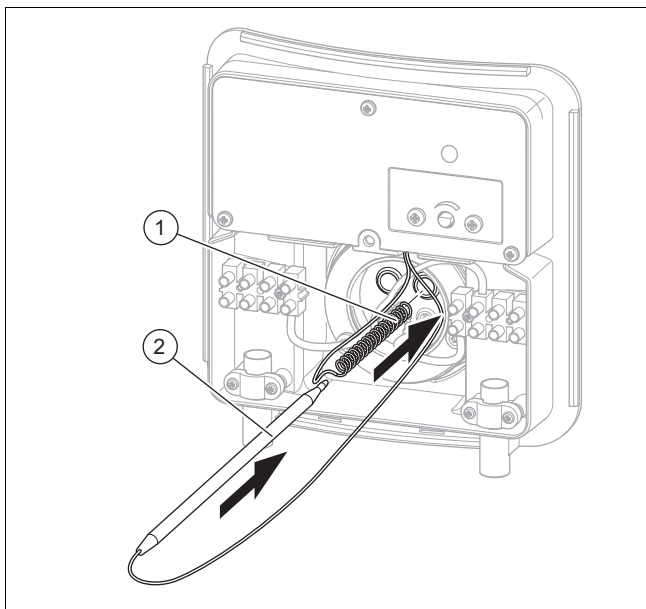
14. Install the immersion heater.
15. Align the immersion heater correctly by placing a screwdriver (1), for example, into one of the sensor sleeves and using this to keep the immersion heater horizontal.



16. Install the retaining ring .
  - Ensure that the cut-out (1) in the retaining ring points downwards.
17. Use the three screws to secure the retaining ring.
  - Torque:  $6 \pm 1$  Nm



18. Reconnect the cables.
  - Yellow-green on  $\oplus$
  - Black on **L OUT**
  - Blue on **N OUT**



19. On both sides, slide only the spiral-shaped part of the temperature sensor **(1)** for the safety cut-out into the sensor sleeve.
20. Then also insert the temperature sensor **(2)** for the control into the sensor sleeve.
21. Slide both temperature sensors together into the sensor sleeve as far as the insulation.
22. Install the cover (electronics box cover and insulation with screw cover) for the electronics box.
  - ◁ The cover guarantees the safety of the product.
  - ◁ The cover enables the ingress protection rating (IPX4).

#### 9.4 Checking the safety assembly's expansion relief valve and the cylinder's temperature and pressure relief valve

1. Open all expansion relief valves by turning the rotary knob.
2. Check whether the water is flowing into the tundish.
3. Check that the expansion relief valves are in the correct position and then check the pressure.
4. Check and, if required, clean the pressure reducer.

#### 9.5 Checking the pre-charge pressure of the expansion vessel

1. Drain the product. (→ Section 9.2)
2. Measure the pre-charge pressure of the expansion vessel at the vessel valve.

**Condition:** Pressure <0.3 MPa (3 bar)

- ▶ Top up the expansion vessel in accordance with the static height of the heating installation, ideally with nitrogen, otherwise with air.
3. If water escapes from the valve of the expansion vessel, you must replace the expansion vessel.
  4. Fill and purge the product. (→ Section 6.3)

## 10 Decommissioning the product

- ▶ Disconnect the product from the power supply.
  - Ensure that the power supply for both immersion heaters is switched off.
- ▶ Close the cold-water stopcock.
- ▶ Drain the product. (→ Section 9.2)
- ▶ Remove the hydraulic connections and the temperature sensor.
- ▶ Remove the cables for the temperature sensor from the control or multi-functional module.

## 11 Disposing of the packaging

- ▶ Dispose of the packaging correctly.
- ▶ Observe all relevant regulations.
- ▶ For detailed information refer to [www.vaillant.co.uk](http://www.vaillant.co.uk).

## 12 Customer service

For contact details for our customer service department, you can write to the address that is provided on the back page, or you can visit [www.vaillant.co.uk](http://www.vaillant.co.uk).

## Appendix

### A Detecting and eliminating faults

| Fault                                                                                     | Possible cause                                                                                                                                                                                                                                        | Remedy                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No water at the draw-off point                                                            | <ol style="list-style-type: none"> <li>1. Cold-water stopcock closed</li> <li>2. Filter in pressure reducer blocked</li> <li>3. Safety assembly not installed correctly</li> </ol>                                                                    | <ol style="list-style-type: none"> <li>1. Open the cold-water stopcock.</li> <li>2. Close the cold-water stopcock, and clean the filter and the pressure reducer.</li> <li>3. Check whether the safety assembly has been installed correctly.</li> </ol>                                                                                                                                                             |
| Low flow rate and pressure at a draw-off point                                            | <ol style="list-style-type: none"> <li>1. Cold water inlet pressure insufficient</li> <li>2. Filter in pressure reducer blocked</li> </ol>                                                                                                            | <ol style="list-style-type: none"> <li>1. Ensure that the cold water inlet pressure complies with the minimum requirements. (→ Section 6.2)</li> <li>2. Close the cold-water stopcock, and clean the filter and the pressure reducer.</li> </ol>                                                                                                                                                                     |
| Water in the draw-off point is cold                                                       | <ol style="list-style-type: none"> <li>1. Domestic hot water generation is switched off</li> <li>2. Immersion heater is switched off</li> <li>3. Immersion heater does not work</li> <li>4. Immersion heater thermal cut-out has triggered</li> </ol> | <ol style="list-style-type: none"> <li>1. Set the domestic hot water generation on the control.</li> <li>2. Set the domestic hot water generation with immersion heater on the control.</li> <li>3. Measure the resistance of the immersion heater.<br/>Target value: 19 Ω</li> <li>4. Eliminate the cause for the overheating.<br/>Use a thin object to press the reset knob inside the electronics box.</li> </ol> |
| Domestic hot water temperature too low                                                    | <ol style="list-style-type: none"> <li>1. Domestic hot water temperature on control is set too low</li> <li>2. Heat generator switched off</li> <li>3. Power supply to cylinder switched off</li> </ol>                                               | <ol style="list-style-type: none"> <li>1. Check the setting for the domestic hot water temperature on the control.</li> <li>2. Check whether the heat generator is switched on.</li> <li>3. Check whether the power supply to the cylinder is switched on.</li> </ol>                                                                                                                                                |
| Domestic hot water temperature too high                                                   | <ol style="list-style-type: none"> <li>1. Thermostat set too high</li> <li>2. Defective thermostat</li> <li>3. Temperature sensors in the electronics box not fully inserted</li> </ol>                                                               | <ol style="list-style-type: none"> <li>1. Use a thermometer to check the temperature. Recommended temperature: 60 °C<br/>If required, reduce the temperature at the thermostat.</li> <li>2. Replace the thermostat.</li> <li>3. Slide both temperature sensors together into the sensor pockets as far as the insulation.</li> </ol>                                                                                 |
| Water drips out of the safety assembly's expansion relief valve                           | <ol style="list-style-type: none"> <li>1. External expansion vessel: Pre-charge pressure in the expansion vessel is too low</li> </ol>                                                                                                                | <ol style="list-style-type: none"> <li>1. Check the pre-charge pressure in the external expansion vessel and top up the air. (→ Section 9.5)</li> </ol>                                                                                                                                                                                                                                                              |
| Water runs out of the safety assembly's expansion relief valve                            | <ol style="list-style-type: none"> <li>1. Pressure reducer does not work correctly</li> <li>2. Seal at the expansion relief valve is damaged or dirty</li> </ol>                                                                                      | <ol style="list-style-type: none"> <li>1. Check the pressure at the safety assembly's outlet.<br/>If the pressure is &gt; 0.3 MPa (3 bar), replace the pressure reducer's cartridge.</li> <li>2. Check the seal for the expansion relief valve at the safety assembly.<br/>Clean or replace the seal.</li> </ol>                                                                                                     |
| Water drips out of the temperature and pressure relief valve                              | <ol style="list-style-type: none"> <li>1. External expansion vessel: Pre-charge pressure in the expansion vessel is too low</li> <li>2. Temperature and pressure relief valve defective</li> </ol>                                                    | <ol style="list-style-type: none"> <li>1. Check the pre-charge pressure in the external expansion vessel and top up the air. (→ Section 9.5)</li> <li>2. Check that the temperature and pressure relief valve is working correctly.<br/>If required, replace the temperature and pressure relief valve.</li> </ol>                                                                                                   |
| Extremely hot water (> 90 °C) is running out of the temperature and pressure relief valve | <ol style="list-style-type: none"> <li>1. Temperature and pressure relief valve open due to a defective thermal cut-out</li> </ol>                                                                                                                    | <ol style="list-style-type: none"> <li>1. Switch off the power supply to the immersion heater.<br/>Do NOT close the cold-water stopcock.<br/>If water no longer flows out, check the thermal cut-outs and, if required, replace them.</li> </ol>                                                                                                                                                                     |
| Water drips out of the temperature and pressure relief valve's thread                     | <ol style="list-style-type: none"> <li>1. Component was not screwed in far enough</li> <li>2. Seal defective</li> </ol>                                                                                                                               | <ol style="list-style-type: none"> <li>1. Screw the component clockwise deeper into the thread.<br/>Observe whether the leak persists.</li> <li>2. Replace the component.</li> </ol>                                                                                                                                                                                                                                 |

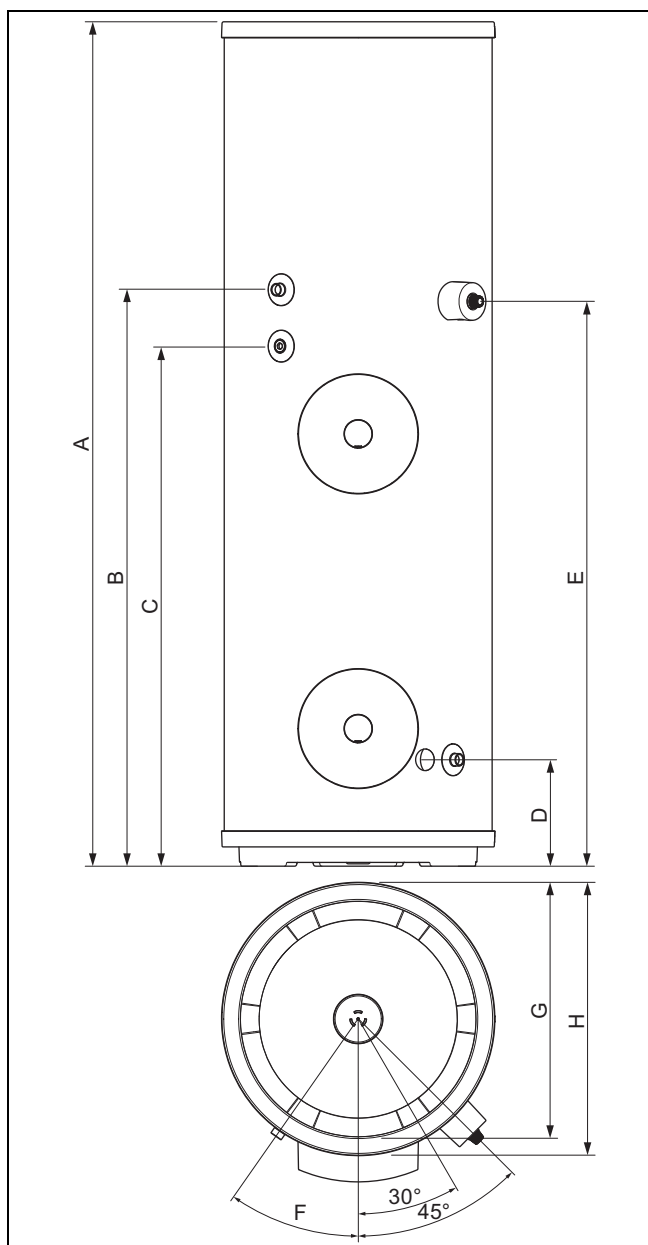
## B Troubleshooting – safety cut-out

| Fault                                                                                                                          | Possible cause                                                                                                                     | Remedy                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>– The safety cut-out has been tripped</li> <li>– No dry fire</li> </ul>                 | Immersion heater is calcified                                                                                                      | <ol style="list-style-type: none"> <li>1. Check the immersion heater.</li> <li>2. Descale the immersion heater.</li> </ol>                                                      |
| <ul style="list-style-type: none"> <li>– Safety cut-out is triggered again after resetting</li> </ul>                          | <ul style="list-style-type: none"> <li>– Immersion heater not installed correctly</li> <li>– Immersion heater defective</li> </ul> | <ol style="list-style-type: none"> <li>1. Check the installation depth of the temperature sensors.</li> <li>2. Check and, if required, replace the immersion heater.</li> </ol> |
| <ul style="list-style-type: none"> <li>– The safety cut-out has been tripped</li> <li>– Immersion heater overheated</li> </ul> | Dry fire                                                                                                                           | <ol style="list-style-type: none"> <li>1. Check and, if required, replace the immersion heater.</li> <li>2. Replace the safety cut-out.</li> </ol>                              |

## C Inspection and maintenance work – Overview

| N° | Work                                                                                                    | Maintenance interval                                                                                             |
|----|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| 1  | Check the connections for tightness.                                                                    | 12 months                                                                                                        |
| 2  | Check the temperature and pressure relief valve.                                                        | 12 months                                                                                                        |
| 3  | Actuate the expansion relief valve to check that it is working and to remove any scale deposition.      | 12 months                                                                                                        |
| 4  | Products with external expansion vessel: Check the pressure in the expansion vessel.<br>(→ Section 9.5) | 12 months                                                                                                        |
| 5  | Check the heat output for domestic hot water generation at the valve (if required, clean the filter).   | 12 months                                                                                                        |
| 6  | Check the target domestic hot water temperature.                                                        | 12 months                                                                                                        |
| 7  | Service the immersion heater. If required, remove any scale deposition.                                 | At least every 12 months,<br>depending on the operating conditions<br>(settings, draw-off cycles, water quality) |
| 8  | Replace the seal for the immersion heater.                                                              | 12 months                                                                                                        |
| 9  | Fill out the cylinder's benchmark checklist.                                                            | 12 months                                                                                                        |

## D Product dimensions



Dimensions (mm)

|                | A     | B     | C     | D   | E     | F   | G   | H   |
|----------------|-------|-------|-------|-----|-------|-----|-----|-----|
| VEH 90/9-1 SL  | 990   | 773   | –     | 208 | 748   | 40° | 490 | 520 |
| VEH 120/9-1 SL | 1,400 | 1,183 | –     | 208 | 1,158 | 40° | 490 | 520 |
| VEH 150/9-1 SL | 1,520 | 1,303 | –     | 208 | 1,278 | 40° | 490 | 520 |
| VEH 175/9-1 SL | 1,745 | 1,528 | –     | 208 | 1,503 | 40° | 490 | 520 |
| VEH 210/9-1 SL | 2,000 | 1,783 | 1,683 | 208 | 1,758 | 40° | 490 | 520 |
| VEH 250/9-1    | 1,796 | 1,556 | 1,436 | 226 | 1,531 | 35° | 580 | 636 |
| VEH 300/9-1    | 2,021 | 1,781 | 1,661 | 226 | 1,756 | 35° | 580 | 636 |

## E Technical data

### Technical data – General

|                                                                    | VEH 90/9-1 SL        | VEH 120/9-1 SL       | VEH 150/9-1 SL       | VEH 175/9-1 SL       |
|--------------------------------------------------------------------|----------------------|----------------------|----------------------|----------------------|
| Volumetric capacity                                                | 90 l                 | 120 l                | 150 l                | 175 l                |
| Domestic hot water volumetric capacity in accordance with EN 12897 | 97 l                 | 127 l                | 156 l                | 182 l                |
| Min. volume of the external expansion vessel                       | 3 l                  | 4 l                  | 5 l                  | 6 l                  |
| Maximum operating pressure                                         | 0.8 MPa<br>(8.0 bar) | 0.8 MPa<br>(8.0 bar) | 0.8 MPa<br>(8.0 bar) | 0.8 MPa<br>(8.0 bar) |
| Pressure of the pressure reducer                                   | 0.3 MPa<br>(3.0 bar) | 0.3 MPa<br>(3.0 bar) | 0.3 MPa<br>(3.0 bar) | 0.3 MPa<br>(3.0 bar) |
| Opening pressure in the expansion relief valve                     | 0.8 MPa<br>(8.0 bar) | 0.8 MPa<br>(8.0 bar) | 0.8 MPa<br>(8.0 bar) | 0.8 MPa<br>(8.0 bar) |
| Temperature and pressure relief valve                              | 1 MPa<br>(10 bar)    | 1 MPa<br>(10 bar)    | 1 MPa<br>(10 bar)    | 1 MPa<br>(10 bar)    |
| Temperature and pressure relief valve                              | 90 °C                | 90 °C                | 90 °C                | 90 °C                |
| Load pressure in the expansion vessel                              | 0.3 MPa<br>(3.0 bar) | 0.3 MPa<br>(3.0 bar) | 0.3 MPa<br>(3.0 bar) | 0.3 MPa<br>(3.0 bar) |
| Maximum domestic hot water temperature                             | 85 °C                | 85 °C                | 85 °C                | 85 °C                |
| Standby heat loss/24 hours (informative)                           | ≈ 1.31 kWh           | ≈ 1.39 kWh           | ≈ 1.44 kWh           | ≈ 1.76 kWh           |
| Tapping profile                                                    | L                    | L                    | L                    | L                    |
| Energy efficiency class                                            | C                    | C                    | C                    | C                    |
| Energy efficiency                                                  | 38.2 %               | 37.2 %               | 37.7 %               | 38.0 %               |
| Annual consumption                                                 | 2,683 kWh            | 2,751 kWh            | 2,718 kWh            | 2,694 kWh            |
| V40 volume                                                         | 138.5 l              | 198.5 l              | 232.6 l              | 272.4 l              |
| Net weight                                                         | 23 kg                | 30 kg                | 35 kg                | 39 kg                |
| Weight when filled                                                 | 120 kg               | 157 kg               | 191 kg               | 221 kg               |

|                                                                    | VEH 210/9-1 SL       | VEH 250/9-1          | VEH 300/9-1          |
|--------------------------------------------------------------------|----------------------|----------------------|----------------------|
| Volumetric capacity                                                | 210 l                | 250 l                | 300 l                |
| Domestic hot water volumetric capacity in accordance with EN 12897 | 210 l                | 261 l                | 294 l                |
| Min. volume of the external expansion vessel                       | 7 l                  | 9 l                  | 10 l                 |
| Maximum operating pressure                                         | 0.8 MPa<br>(8.0 bar) | 0.8 MPa<br>(8.0 bar) | 0.8 MPa<br>(8.0 bar) |
| Pressure of the pressure reducer                                   | 0.3 MPa<br>(3.0 bar) | 0.3 MPa<br>(3.0 bar) | 0.3 MPa<br>(3.0 bar) |
| Opening pressure in the expansion relief valve                     | 0.8 MPa<br>(8.0 bar) | 0.8 MPa<br>(8.0 bar) | 0.8 MPa<br>(8.0 bar) |
| Temperature and pressure relief valve                              | 1 MPa<br>(10 bar)    | 1 MPa<br>(10 bar)    | 1 MPa<br>(10 bar)    |
| Temperature and pressure relief valve                              | 90 °C                | 90 °C                | 90 °C                |
| Load pressure in the expansion vessel                              | 0.3 MPa<br>(3.0 bar) | 0.3 MPa<br>(3.0 bar) | 0.3 MPa<br>(3.0 bar) |
| Maximum domestic hot water temperature                             | 85 °C                | 85 °C                | 85 °C                |
| Standby heat loss/24 hours (informative)                           | ≈ 2.06 kWh           | ≈ 1.69 kWh           | ≈ 1.8 kWh            |
| Tapping profile                                                    | L                    | XL                   | XL                   |
| Energy efficiency class                                            | C                    | C                    | C                    |
| Energy efficiency                                                  | 38.6 %               | 38.9 %               | 39.5 %               |
| Annual consumption                                                 | 2,651 kWh            | 4,309 kWh            | 4,243 kWh            |
| V40 volume                                                         | 294.6 l              | 363.6 l              | 421.0 l              |
| Net weight                                                         | 45 kg                | 49 kg                | 60 kg                |
| Weight when filled                                                 | 255 kg               | 310 kg               | 354 kg               |

## Technical data – Hydraulic connection

|                                                           | VEH 120/9-1 SL | VEH 150/9-1 SL | VEH 175/9-1 SL | VEH 210/9-1 SL |
|-----------------------------------------------------------|----------------|----------------|----------------|----------------|
| Cold water connection                                     | 3/4"           | 3/4"           | 3/4"           | 3/4"           |
| Domestic hot water connection                             | 3/4"           | 3/4"           | 3/4"           | 3/4"           |
| Secondary circuit return                                  | –              | –              | –              | 3/4"           |
| Diameter of the immersion heater                          | 44 mm          | 44 mm          | 44 mm          | 44 mm          |
| Maximum calcium carbonate content CaCO <sub>3</sub>       | 180 mg/l       | 180 mg/l       | 180 mg/l       | 180 mg/l       |
| Maximum chloride content in the standard immersion heater | 120 mg/l       | 120 mg/l       | 120 mg/l       | 120 mg/l       |
| Maximum chloride content in the titanium immersion heater | 250 mg/l       | 250 mg/l       | 250 mg/l       | 250 mg/l       |

|                                                           | VEH 250/9-1 | VEH 300/9-1 |
|-----------------------------------------------------------|-------------|-------------|
| Cold water connection                                     | 3/4"        | 3/4"        |
| Domestic hot water connection                             | 3/4"        | 3/4"        |
| Secondary circuit return                                  | 3/4"        | 3/4"        |
| Diameter of the immersion heater                          | 44 mm       | 44 mm       |
| Maximum calcium carbonate content CaCO <sub>3</sub>       | 180 mg/l    | 180 mg/l    |
| Maximum chloride content in the standard immersion heater | 120 mg/l    | 120 mg/l    |
| Maximum chloride content in the titanium immersion heater | 250 mg/l    | 250 mg/l    |

## Technical data – Electrics

|                                   | VEH 120/9-1 SL        | VEH 150/9-1 SL        | VEH 175/9-1 SL        | VEH 210/9-1 SL        |
|-----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Power supply per immersion heater | 230 ... 240 V / 50 Hz | 230 ... 240 V / 50 Hz | 230 ... 240 V / 50 Hz | 230 ... 240 V / 50 Hz |
| Power per immersion heater        | 2.7 to 3.0 kW         | 2.7 to 3.0 kW         | 2.7 to 3.0 kW         | 2.7 to 3.0 kW         |
| IP rating                         | IPX4                  | IPX4                  | IPX4                  | IPX4                  |

|                                   | VEH 250/9-1           | VEH 300/9-1           |
|-----------------------------------|-----------------------|-----------------------|
| Power supply per immersion heater | 230 ... 240 V / 50 Hz | 230 ... 240 V / 50 Hz |
| Power per immersion heater        | 2.7 to 3.0 kW         | 2.7 to 3.0 kW         |
| IP rating                         | IPX4                  | IPX4                  |

## Technical data – Material

|                                    | VEH 120/9-1 SL        | VEH 150/9-1 SL        | VEH 175/9-1 SL        | VEH 210/9-1 SL        |
|------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Cylinder material                  | Duplex steel (1.4162) | Duplex steel (1.4162) | Duplex steel (1.4162) | Duplex steel (1.4162) |
| Insulation material                | Polyurethane          | Polyurethane          | Polyurethane          | Polyurethane          |
| Insulation thickness               | 50 mm                 | 50 mm                 | 50 mm                 | 50 mm                 |
| Propellant for insulating material | GWP < 5               | GWP < 5               | GWP < 5               | GWP < 5               |
| ODP                                | 0                     | 0                     | 0                     | 0                     |

|                                    | VEH 250/9-1           | VEH 300/9-1           |
|------------------------------------|-----------------------|-----------------------|
| Cylinder material                  | Duplex steel (1.4162) | Duplex steel (1.4162) |
| Insulation material                | Polyurethane          | Polyurethane          |
| Insulation thickness               | 60 mm                 | 60 mm                 |
| Propellant for insulating material | GWP < 5               | GWP < 5               |
| ODP                                | 0                     | 0                     |

## F Potable water quality

| Parameter                                          | Maximum value |
|----------------------------------------------------|---------------|
| Water hardness for operation with immersion heater | 10 °dH        |
| Electrical conductivity at 20 °C                   | 2,500 µS/cm   |
| Electrical conductivity at 25 °C                   | 2,790 µS/cm   |
| Iron                                               | 0.2 mg/l      |
| Solute oxygen                                      | 10 mg/l       |
| Fluoride                                           | 1.5 mg/l      |
| pH value                                           | 6.5 to 9.5    |
| Sulphates                                          | 240 mg/l      |
| Calcium carbonate                                  | 180 mg/l      |
| Chloride                                           | 250 mg/l      |
| Nitrate                                            | 50 mg/l       |
| Sodium                                             | 200 mg/l      |
| Ammonia                                            | 0.5 mg/l      |

## **Benchmark Commissioning and Servicing Section**

It is a requirement that the cylinder is installed and commissioned to the manufacturers instructions and the data fields on the commissioning checklist completed in full.

To instigate the cylinder guarantee the cylinder needs to be registered with the manufacturer within one month of the installation.

To maintain the cylinder guarantee it is essential that the cylinder is serviced annually by a competent person who has been trained on the cylinder installed. The service details should be recorded within Benchmark.



**[www.benchmark.org.uk](http://www.benchmark.org.uk)**

## MAINS PRESSURE HOT WATER STORAGE SYSTEM COMMISSIONING CHECKLIST

This Commissioning Checklist is to be completed in full by the competent person who commissioned the storage system as a means of demonstrating compliance with the appropriate Building Regulations and then handed to the customer to keep for future reference.

Failure to install and commission this equipment to the manufacturer's instructions may invalidate the warranty but does not affect statutory rights.

Customer Name \_\_\_\_\_ Telephone Number \_\_\_\_\_  
 Address \_\_\_\_\_  
 Cylinder Make and Model \_\_\_\_\_  
 Cylinder Serial Number \_\_\_\_\_  
 Commissioned by (print name) \_\_\_\_\_ Registered Operative ID Number \_\_\_\_\_  
 Company Name \_\_\_\_\_ Telephone Number \_\_\_\_\_  
 Company Address \_\_\_\_\_ Commissioning Date \_\_\_\_\_

**To be completed by the customer on receipt of a Building Regulations Compliance Certificate\*:**

Building Regulations Notification Number (if applicable) \_\_\_\_\_

### ALL SYSTEMS PRIMARY SETTINGS (indirect heating only)

Is the primary circuit a sealed or open vented system? Sealed ☐ Open ☐  
 What is the maximum primary flow temperature? \_\_\_\_\_ °C

### ALL SYSTEMS

What is the incoming static cold water pressure at the inlet to the system? \_\_\_\_\_ bar  
 Has a strainer been cleaned of installation debris (if fitted)? Yes ☐ No ☐  
 Is the installation in a hard water area (above 200ppm)? Yes ☐ No ☐  
 If yes, has a water scale reducer been fitted? Yes ☐ No ☐  
 What type of scale reducer has been fitted? \_\_\_\_\_  
 What is the hot water thermostat set temperature? \_\_\_\_\_ °C  
 What is the maximum hot water flow rate at set thermostat temperature (measured at high flow outlet)? \_\_\_\_\_ l/min  
 Time and temperature controls have been fitted in compliance with Part L of the Building Regulations? Yes ☐  
 Type of control system (if applicable) Y Plan ☐ S Plan ☐ Other ☐  
 Is the cylinder solar (or other renewable) compatible? Yes ☐ No ☐  
 What is the hot water temperature at the nearest outlet? \_\_\_\_\_ °C  
 All appropriate pipes have been insulated up to 1 metre or the point where they become concealed Yes ☐

### UNVENTED SYSTEMS ONLY

Where is the pressure reducing valve situated (if fitted)? \_\_\_\_\_  
 What is the pressure reducing valve setting? \_\_\_\_\_ bar  
 Has a combined temperature and pressure relief valve and expansion valve been fitted and discharge tested? Yes ☐ No ☐  
 The tundish and discharge pipework have been connected and terminated to Part G of the Building Regulations Yes ☐  
 Are all energy sources fitted with a cut out device? Yes ☐ No ☐  
 Has the expansion vessel or internal air space been checked? Yes ☐ No ☐

### THERMAL STORES ONLY

What store temperature is achievable? \_\_\_\_\_ °C  
 What is the maximum hot water temperature? \_\_\_\_\_ °C

### ALL INSTALLATIONS

The hot water system complies with the appropriate Building Regulations Yes ☐  
 The system has been installed and commissioned in accordance with the manufacturer's instructions Yes ☐  
 The system controls have been demonstrated to and understood by the customer Yes ☐  
 The manufacturer's literature, including Benchmark Checklist and Service Record, has been explained and left with the customer Yes ☐

Commissioning Engineer's Signature \_\_\_\_\_

Customer's Signature \_\_\_\_\_

(To confirm satisfactory demonstration and receipt of manufacturer's literature)

\*All installations in England and Wales must be notified to Local Authority Building Control (LABC) either directly or through a Competent Persons Scheme. A Building Regulations Compliance Certificate will then be issued to the customer.

It is recommended that your hot water system is serviced regularly and that the appropriate Service Record is completed.

Before completing the appropriate Service Record below, please ensure you have carried out the service as described in the manufacturer's instructions.

|                                           |            |
|-------------------------------------------|------------|
| <b>SERVICE 10</b>                         | Date _____ |
| Engineer Name _____                       |            |
| Company Name _____                        |            |
| Telephone Number _____                    |            |
| Comments _____<br>_____<br>_____<br>_____ |            |
| Signature _____                           |            |

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**Supplier****Vaillant Group UK Ltd.**

Nottingham Road ■ Belper ■ Derbyshire ■ DE56 1JT ■ Great Britain

Telephone 0330 100 3143

info@vaillant.co.uk ■ www.vaillant.co.uk



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**Publisher/manufacturer****Vaillant GmbH**

Berghauser Str. 40 ■ 42859 Remscheid ■ Deutschland

Tel. +49 (0)2191 18 0 ■ Fax +49 (0)2191 18 2810

info@vaillant.de ■ www.vaillant.de

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