INSTALLATION AND OPERATING INSTRUCTIONS

TML DSF WATER HEATERS

LEAVE THESE INSTRUCTIONS WITH THE USER

For Technical assistance, spare parts or service call:

RVR Energy Technology Limited, Kenmare, Co. Kerry. V93 F386.
Tel: 064 6641344, Email: info@rvr.ie

1.0 INTRODUCTION

1.1 Reading the Instructions

Please read and understand these instructions prior to installing the water heater.

Following installation and commissioning the operation of the heater should be explained to the customer and these instructions left with them for future reference.

2.0 GUARANTEE

This water heater is guaranteed for a period of 5 years provided that:

- It has been installed in accordance with these instructions and all the necessary inlet controls and safety valves have been fitted correctly.

- Any valves or controls are supplied or approved by RVR.

- The unit has not been tampered with and has been regularly maintained as detailed in these instructions.

- The unit has been used only for heating potable water.

- The magnesium anode must be checked twice a year and replaced if required.

- The unit is NOT guaranteed against damage by frost or due to the build up of scale.

This guarantee does not affect the statutory rights of the consumer.

Our policy is that of continuous improvement and development, therefore the right is reserved to change specification without notice.

All water heaters must be installed by a competent and qualified person, in accordance with relevant clauses of applicable standards and recommendations.

These include but may not be limited to the following:-

EN12897: 2006 Water Supply—Specification for indirectly heated unvented (closed) storage water heaters.
All relevant Building Regulations
Local Water Bye Laws
IEE Wiring Regulations
Health & Safety legislation

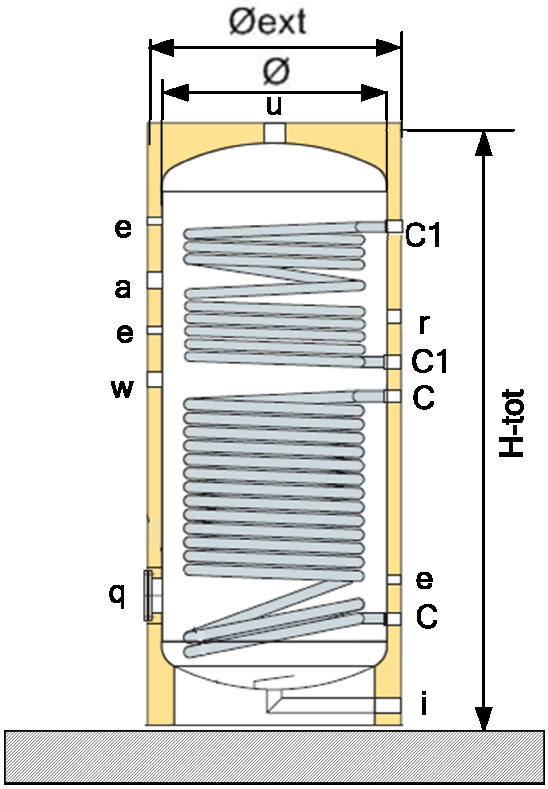
3.0 Technical Specifications

3.1 Capacity and Performance

		DSF 500	DSF 800	DSF 1000	DSF 1500
Nominal Capacity	Litres	500	800	1000	1500
Max. DHW Pressure	bar	6	6	6	6
Max. Primary Pressure	bar	3	3	3	3
Max. Operating Temperature	°C	95	95	95	95
Max. design pressure	bar	6	6	6	6
Adjustable DHW Temperature	°C	25-60	25-60	25-60	25-60
Recovery Time	Minutes	20	24	27.8	37
DHW Heat Exchanger Surface Area	m^2	2.1/1.2	2.7/1.5	4.3/1.9	5.00/2.3
Upper Coil Flow Rate	Litres/s	21.8	27.5	34.5	41.6
Lower Coil Flow Rate	Litres/s	38.3	49.2	54.7	67.5
Coil Water Content	Litres	14.7/8.4	18.9/10.5	21.0/13.3	25.9/16.1
Coil Pressure Drop Upper Coil	kPa	1.8	3.97	5.9	9.8
Coil Pressure Drop Lower Coil	kPa	9.85	19.2	27.5	39.1
Primary heating power input upper coil	kW	30.5	38.1	48.3	58.4
Primary heating power input upper coil	kW	53.5	68.6	109.8	127.6
Flow Rate (Temp rise 30°C)	l/m	25.55	32.78	52.4	60.93

Table 1 - Technical information

3.2 Dimensions



a	Anode
C1	Boiler Flow/Return
e	Thermometer Probe
i	Cold Water Inlet
q	Inspection flange
r	Recirculation
u	DHW Outlet
w	Electric Immersion Heater
C	Solar Flow/Return

Figure 1 - Location of connections on cylinder

Insulation:
300-500L Models are supplied with 50mm rigid insulation.
800-2000L Models are supplied with 100mm flexible, removable insulation.

Lt	Ø	Ø Ext	H tot	a	e	C-C1	i	u	r	W	q	Kg empty	Kg full
500	650	750	1730	1¼"	½"	1"	1"	1¼"	½"	1½"	120/180	120	620
800	790	990	1810	1¼"	½"	1"	1½"	1½"	1"	1½"	120/180	162	962
1000	790	990	2210	1¼"	½"	1"	1½"	1½"	1"	1½	120/180	195	1195
1500	1000	1200	2215	1¼"	½"	1"	2"	2"	1"	1½"	220/290	271	1771
2000	1100	1300	2525	1¼"	½"	1"	2"	2"	1"	1½"	220/290	385	2385

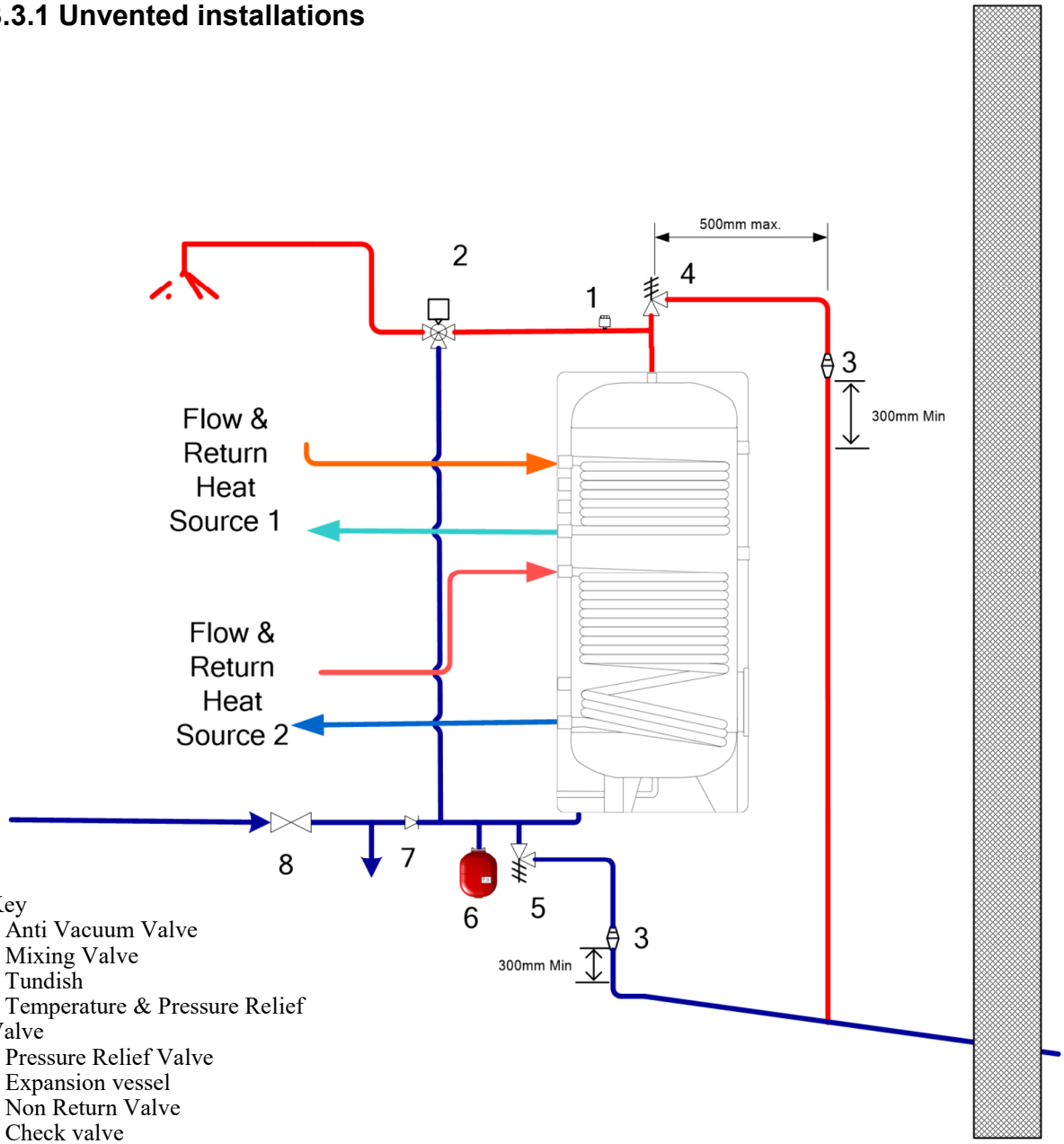
Table 2– Dimensions of Water Heaters

3.3 Installation options

This water heater may be used in open vented water heating systems or in an unvented installations.

When used in unvented installations, the appropriate unvented kit supplied by RVR must be used. This contains items 1,3,4,5 and 6 as shown in figure 3. Other items such as mixing valves and zone valves are also available from RVR.

3.3.1 Unvented installations



Key
1 Anti Vacuum Valve
2 Mixing Valve
3 Tundish
4 Temperature & Pressure Relief Valve
5 Pressure Relief Valve
6 Expansion vessel
7 Non Return Valve
8 Check valve

Figure 2 - Unvented System Schematic

Please see figure 2 for a general layout for an unvented water heater installation. The following safety devices must be fitted to the unvented water heater:

Thermostatic control — Energy Cut Out Device
The normal water storage temperature is 60° C. The water heater thermostat should be wired to ensure that the energy supply to the water heater is interrupted if the water temperature exceeds 60° C.

Temperature and Pressure Relief valve (T&P valve)
The T&P valve ensures that the temperature of the stored water cannot exceed 100°C by venting the

water heater under these conditions.

Pressure Relief valve
This is the most important safety device. All unvented water heaters must be fitted with a Pressure Relief Valve (Expansion valve) with a setting of 6 bars.

Pressure Reducing Valve
The cold water supply pressure must not exceed 3.5 bar. If the supply pressure is higher than this then a pressure reducing valve should be fitted.

Expansion vessel
Expansion must be accommodated using an Expansion Vessel. The Expansion vessel must be sized to accommodate the maximum expansion of the system and should be suitable for use with potable water. The size of the expansion vessel is proportional to the volume of the DHW system. The size of the vessel should be carefully calculated.

A rule of thumb for systems with a cold water supply pressure of 3.5 bars and a maximum heating temperature of 60°C is that the volume of the expansion vessel should be at least 10% of the total DHW system volume.

Backflow Prevention
To ensure all expansion takes place in the vessel, a Non Return Valve must be fitted on the cold water supply.

Anti Vacuum Valve
The Anti Vacuum Valve is installed to ensure that the water heater is vented and cannot collapse if exposed to an internal negative pressure.

Mixing Valve
The mixing valve limits the temperature of the delivered water by mixing it with cold water as required. The delivered water temperature should not exceed 50°C.

Failure to fit these essential safety devices will invalidate the warranty and create a dangerous installation. This may lead to property damage, injury or loss of life.

Open Vented Systems

Please see figure 3 for a general layout for an open vented water heater installation. The following safety devices must be fitted to the water heater:

1. Feed and Vent cistern.

2. Thermostatic control — Energy Cut Out Device
The normal water storage temperature is 60° C. The water heater thermostat should be wired to ensure that the energy supply to the water heater is interrupted if the water temperature exceeds 60° C.

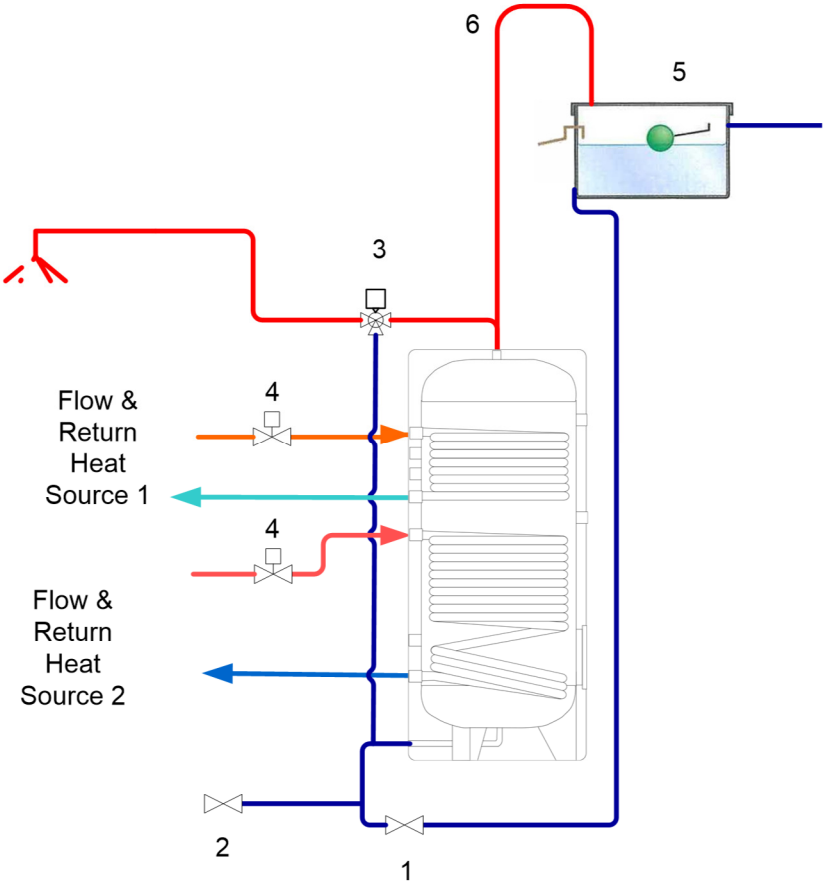


Figure 3 - Open Vented System

The following safety devices must be fitted to the water heater when used in an open system:

1 Stop Valve: This allows the system to be isolated from the cold water supply.

2 Drain Valve: This allows the water heater to be drained for service or removal.

3 Blending (Mixing) Valve: The blending valve limits the temperature of the delivered water by mixing it with cold water as required. The delivered water temperature should not exceed 50°C.

4 Zone Valve: The recommended water storage temperature is 60°C. The water heater thermostat should be wired to ensure that the energy supply to the water heater is interrupted if the water temperature exceeds 60°C. The zone valve is used for this purpose.

5 Cold Water Cistern: This is the cold water storage cistern. The Vent pipe is also returned to the cistern.

6 Vent pipe: This is also referred to as the expansion pipe and is used to safely vent expansion of the heated water.

Failure to fit these essential safety devices will invalidate the warranty and may cause a dangerous installation.

⚠ WARNING: All water heaters must be fitted with temperature control to ensure that the domestic water is not heated to excessive temperatures.

A blending (mixing) valve must be fitted to all installations to ensure water does not exceed 50°C at the point of use.

4.0 Installation - General Requirements:

Check the load bearing capacity of any floors or walls to ensure that they can support the weight of the water heater when filled to capacity. Refer to table 2 for full weight of the water heater.

Enough space should be left at the top and sides of the unit for pipe connections and access to the safety controls and valves. Refer to figure 1 and the dimensions table 2 to determine a suitable position for the heater.

DO NOT install the water heater where the unit may freeze.

Refer to the section Installation Options to determine which valves and accessories are required. Plumb the valves as shown in the relevant diagrams (Figures 2 & 3). An isolating valve must be fitted on the cold water supply to the heater.

Do not use solder joints as this will damage the heater and may prevent servicing under warranty.

Ensure that there is adequate space surrounding the cylinder for maintenance.

5.0 Discharge Pipes from Safety Valves

5.1 Tundish Installation

The discharge pipes must be routed to a tundish.

The pipe diameter must 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 9m long.

I.e. Discharge pipes between 9m and 18m equivalent resistance length should be at least 2 sizes larger than the nominal outlet size of the safety device. Between 18m and 27m at least 3 larger, and so on.

Bends must be taken into account in calculating the flow resistance.

For more information please see table 3.

Tundish - The tundish must be positioned vertically within 500 mm of the unit, clearly visible to the user and away from electrical devices. The minimum size of the discharge pipe downstream of the tundish is given in TABLE 3.

Valve outlet size	Minimum size of discharge pipe D1	Minimum size of discharge pipe D2 from tundish	Maximum Resistance allowed (expressed as a length of straight pipe)	Resistance created by each elbow or bend
G 1/2	15mm	22mm 28mm 35mm	Up to 9m Up to 18m Up to 27m	0.8m 1.0m 1.4m
G 3/4	22mm	28mm 35mm 42mm	Up to 9m Up to 18m Up to 27m	1.0m 1.4m 1.7m
G 1	28mm	35mm 42mm 54mm	Up to 9m Up to 18m Up to 27m	1.4m 1.7m 2.3m

Table 3 – Discharge Pipe Sizing

The discharge pipework from the tundish:

Must fall continuously through its length.

Must be of a heat resistant material, e.g. metal.

Must not be fitted with any valves or taps.

Must discharge to a safe visible position, e.g. onto the surface of an external wall or into a gulley.

Must have a minimum of 300 mm straight pipework directly from the tundish.

Note: Where children may play or otherwise come into contact with discharges, a wire cage or similar guard must be positioned to prevent contact whilst maintaining visibility.

The diagrams on this page show recommended methods of routing and terminating the discharge pipe safely. Where a single pipe serves a number of discharges, such as in blocks of flats, the number served should be limited to not more than 6 systems so that any tundish installation can be traced easily.

If a single common discharge pipe is used then it should be at least one pipe size larger than the largest individual discharge pipe to be connected. If the system is installed where discharges from safety devices may not be apparent, i.e. in dwellings occupied by blind, infirm or disabled people, consideration should be given to the installation of an electronically operated device to warn when discharge takes place.

Figure 4 - Discharge Pipe routing

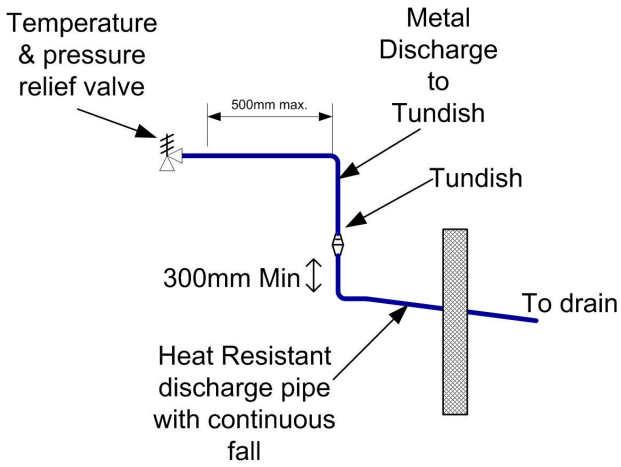
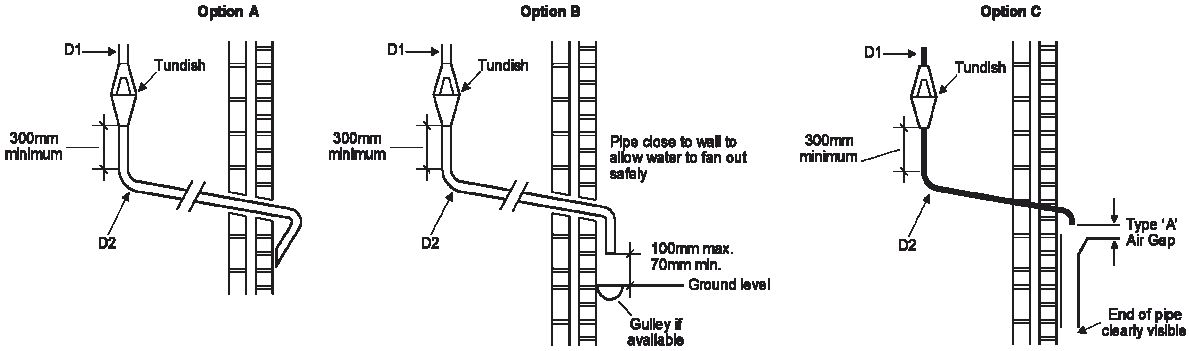


Figure 5 - Tundish installation

5.2 High Level Termination of Discharge



At high level, discharge onto a roof is acceptable providing the roof is capable of withstanding high temperatures and there is a distance of 3 m from any plastic guttering systems that would collect such discharge.

Note: The discharge may consist of scalding water and steam. Asphalt, roofing felt and non-metallic materials may be damaged by such discharges.

5.3 Discharge Pipe Sizing Example

This example shows how to select pipe diameter for a given discharge pipe.

For this example we will assume we are using a G½ temperature relief valve and require 4 elbows in the discharge pipe run. The length of the pipe run from tundish to point of discharge is 7 metres.

Begin by calculating whether 22mm pipe would be sufficient

Consult Table 3 and look up the maximum resistance allowed for this pipe size (9 metres)

Consult Table 3 and look up the resistance of an elbow in this pipe size (0.8 m) As we have 4 elbows or bends, multiply (0.8m * 4m) = 3.2m

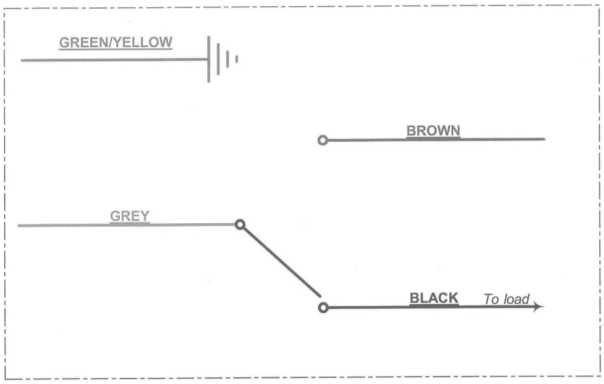
Subtract the resistance of the elbows from the maximum resistance (9m—3.2m) = 5.8m.

Is your length of pipe run less than or equal to the maximum permissible resistance for this pipe run?

6.0 Installation - Electrical Requirements

WARNING: This water heater must be earthed

If the water heater is fitted with a control thermostat. It is essential that the energy source to the water heater is under the control of this device.



NOTE: Contacts shown are in the heat demand situtation

Figure 6—Thermostat Control

The water heater may be optionally fitted with an electrical immersion heater. Ensure that any electric immersion heater is fitted with a high limit and control thermostat.

Where an immersion heater is fitted, the following information is relevant.

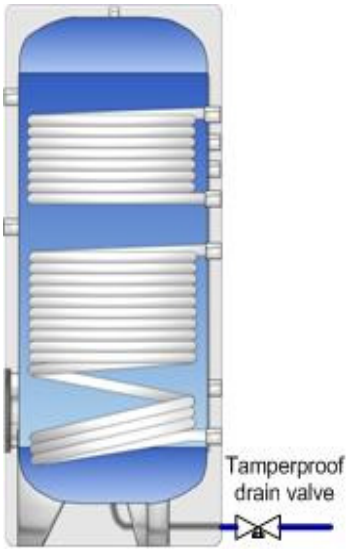
Disconnect the electrical supply before removing the terminal cover. Installation must be in accordance with the current I.E.E. Wiring Regulations.

The electricity supply should be fused to protect the immersion heater circuit and it should be possible to isolate it via a double pole isolating switch with a contact separation of at least 3mm in both poles.

Draining and cleaning:

Ensure provision is made for draining and cleaning the water heater. If the water heater is fitted with a drain point, then connect to drain via a suitable valve to allow purging and cleaning. The drain point may be fitted with a plug which will need to be removed before connecting the drain pipe.

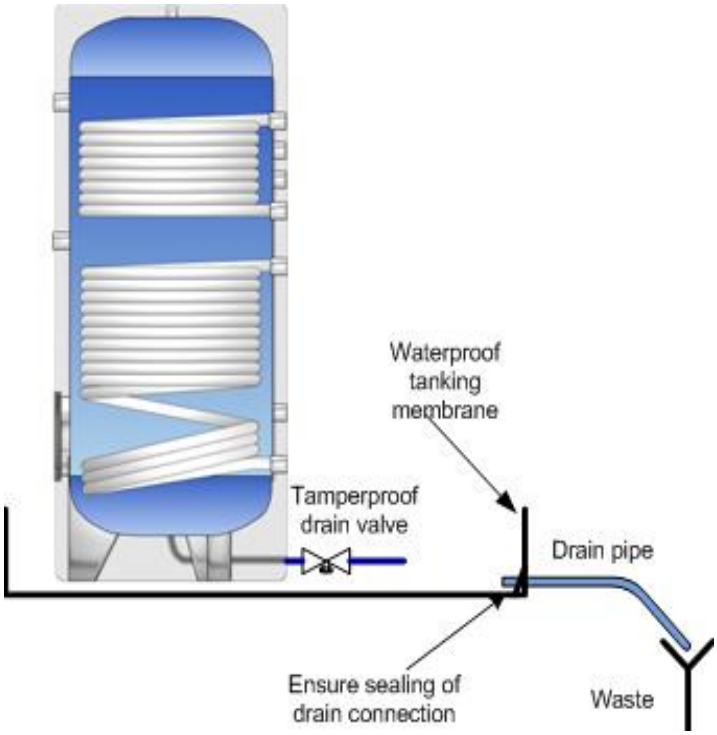
See example schematic below:



Protection against water damage:

This product should not be installed in a location where water leakage is likely to cause damage. If it is necessary to install this product in such a location such as an attic or higher floor of a building, a 'tanked', waterproof chamber should be created to ensure that any potential leaks from the product and associated fittings or pipes are contained and drained away safely.

See example schematic below:



7.0 Maintenance Procedures

The water heater should be inspected and serviced annually. As a minimum, check operation of both pressure relief valve and T&P valve, check system for leaks, check expansion vessel and check operation of thermostat.

7.1 Draining and Refilling the System

Draining

1. Switch off electrical power to immersion heater(s) and/or shut down the boiler.

2. Close the Stop Valve.

3. Open a hot water tap in order to reduce pressure in the water heater.

4. Drain from the drain cock at the base of the water heater.

Refilling

1. DO NOT switch on the immersion heaters or boiler until the system has been completely refilled.

2. Close the drain valve.

3. With hot tap open, turn on pumped cold water supply. When water flows from the hot tap allow to flow for a short while to purge air and to flush through any disturbed particles.

4. Close hot tap and then open successive hot taps in system to purge any air.

The electrical supply can now be switched on.

7.2 Checking the expansion vessel

The charge pressure of the expansion vessel should be checked annually.

Method

Switch off power to immersion heater(s) and shut down boiler.

Close the Stop Valve.

Open a hot water tap in order to reduce pressure in the cylinder.

Remove the black cap on the end of the expansion vessel. Check the pressure with a good quality tyre gauge.

The charge pressure can then be checked against the vessel nameplates by using a good tyre gauge. If it is low then replenish it by using a nitrogen gas bottle with regulating valve, or a foot pump. The pressure will normally be set to 3.5 bar.

Any fluid escaping from the expansion vessel valve indicates a leaking diaphragm and the vessel should be replaced.

7.3 Checking the operation of safety valves

Manually operate the valve lever on the Temperature & Pressure Relief Valve for a few seconds.

Check that water is discharged and that it flows freely through the tundish and discharge pipework.

Check that the valve reseats correctly when released.

Repeat the procedure for the Expansion Relief Valve.

Note: The water discharged may be very hot.

7.3 Checking the magnesium anode

A magnesium anode must be installed to prevent corrosion failure.

The magnesium anode will sacrifice itself in order to protect the metal part of the boiler from corrosion.

The magnesium anode has to be checked periodically (at least 2 times per year) and changed if it is threadbare.

Warranty is only valid if the magnesium anode has been installed and is checked twice a year.

Important: After servicing, preliminary electrical system checks must be carried out to ensure electrical safety (i.e. polarity, earth continuity, resistance to earth and short circuit).

8.0 Commissioning

It is important to follow the steps outlined below during commissioning.

Do not switch on the electrical supply, solar station or boiler until the unit has been filled with water and checked for leaks.

Check that all installation, electrical and discharge pipe requirements have been met.

Check that all water and electrical connections are tight and properly connected.

Check charge pressure of expansion vessel.

Flush the lines before filling the heater.

Open a hot water tap, turn on mains water supply to the heater.

Allow unit to fill and leave hot tap running for a short while to purge any air and flush out the pipework. Close the hot tap and check the system for leaks.

Manually test the operation of the Temperature/Pressure Relief Valve and Pressure Relief Valve. Ensure water flows freely from the valve(s) and through the discharge pipes.

Switch on the electrical supply and boiler.

Verify that water is heated and that the thermostatic controls work correctly.

9.0 Decommissioning

Taking the cylinder out of use

1. Disable DHW heating in accordance with the operating instructions of the heating appliance.
2. When there is a risk of frost and the cylinder is taken out of use, drain the cylinder completely, including it's lower section.

Draining the cylinder

To drain either the domestic water system or the cylinder:

1. Ensure all connected heat source(s) and the electrical immersion heater are isolated to prevent damage occurring as a result of heating the cylinder while it is drained down.
2. Isolate the cold water supply.
3. Open all hot water draw off points.
4. Attach a hose to the drain valve. The drain valve installed at the cold water supply inlet to the cylinder must be used where practicable.
5. Drain the cylinder.

IMPORTANT: After draining the cylinder do not close the hot water draw off points until the cylinder has fully cooled. Failure to observe this instruction may result in damage to the cylinder that is not covered by this guarantee.

When the cylinder has reached the end of it's life, it must be disposed of by a waste company for recycling. The cylinder is recyclable.

9.0 Troubleshooting

FAULT	POSSIBLE CAUSES	REMEDIAL MEASURES
Water not heating	Electrical supply fault	Check electrical supply. Verify the operation of boiler and controls.
	Thermal cut-out tripped	Check cut-out. If it has activated then reset and check thermostat operation. If necessary replace thermostat/thermal cut-out (see Wiring Diagram)
	Thermostat fault	Check thermostat operation, re-place if necessary
Discharge of water from Pressure Relief Valve (continuously)	Excessive supply water pressure	Fit Pressure Reducing Valve (see section Installation Options)
	Failure of Pressure Relief Valve	Check valve is seating properly. Replace if necessary.
Discharge of water from Pressure Relief Valve (intermittently)	Inadequate expansion in system	Check expansion vessel size and precharge pressure.
	Water supply pressure exceeds 3.5 bar	Fit a pressure reducing valve with integral line strainer (see section Installation Options)
Water or steam from Pressure Relief Valve	Thermostat and thermal cut-out fault	Replace thermostat and thermal cut-out
No water flow	Inlet valves incorrectly fitted	Check all valves are correctly in-stalled in accordance with flow direction arrows
	Supply water not turned on	Check water supply is on
	Blockage in water supply	Check for obstructions. If a pres-sure reducing valve is fitted check strainer is not blocked.
Milky water	Oxygenated water	Water from a pressurised system releases oxygen bubbles when flowing. The milkiness will disap-pear after a short time.

Table 4 - Faults and remedial measures

Manufacturer details:
TML

64010 CIVITELLA DEL TRONTO (TE)
ITALY