

Unit 206: Domestic hot water systems

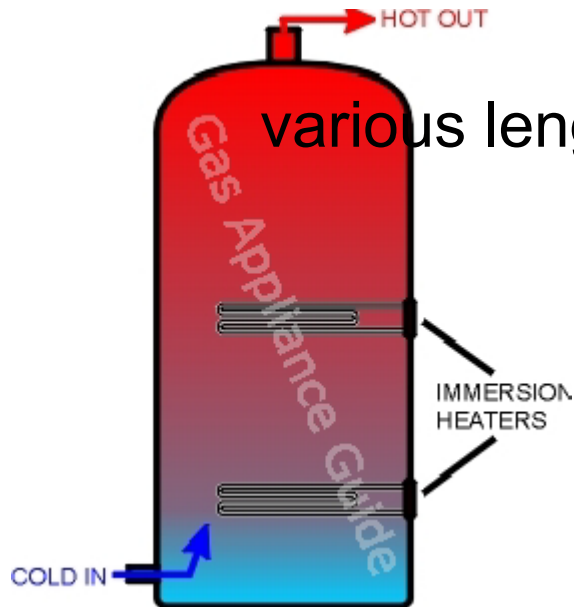
Outcome 1 (part 2)

Types of domestic hot water systems

Types of systems

Immersion heaters

- All immersion heaters installed today require a reset button or cut-out device
- The thermostat is easily replaced in an immersion heater
- Domestic immersion heaters are rated at 3kW



Immersion heaters are bought in various lengths:

27" and 14" are common sizes but 11", 18", 30" and 36" are available.

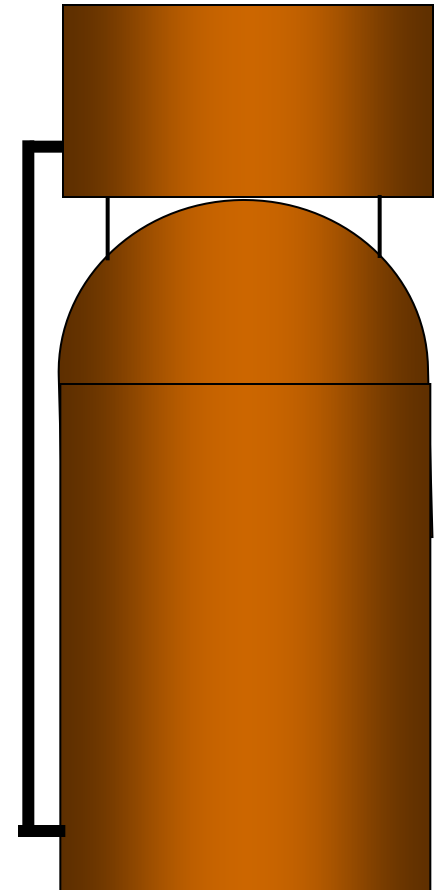


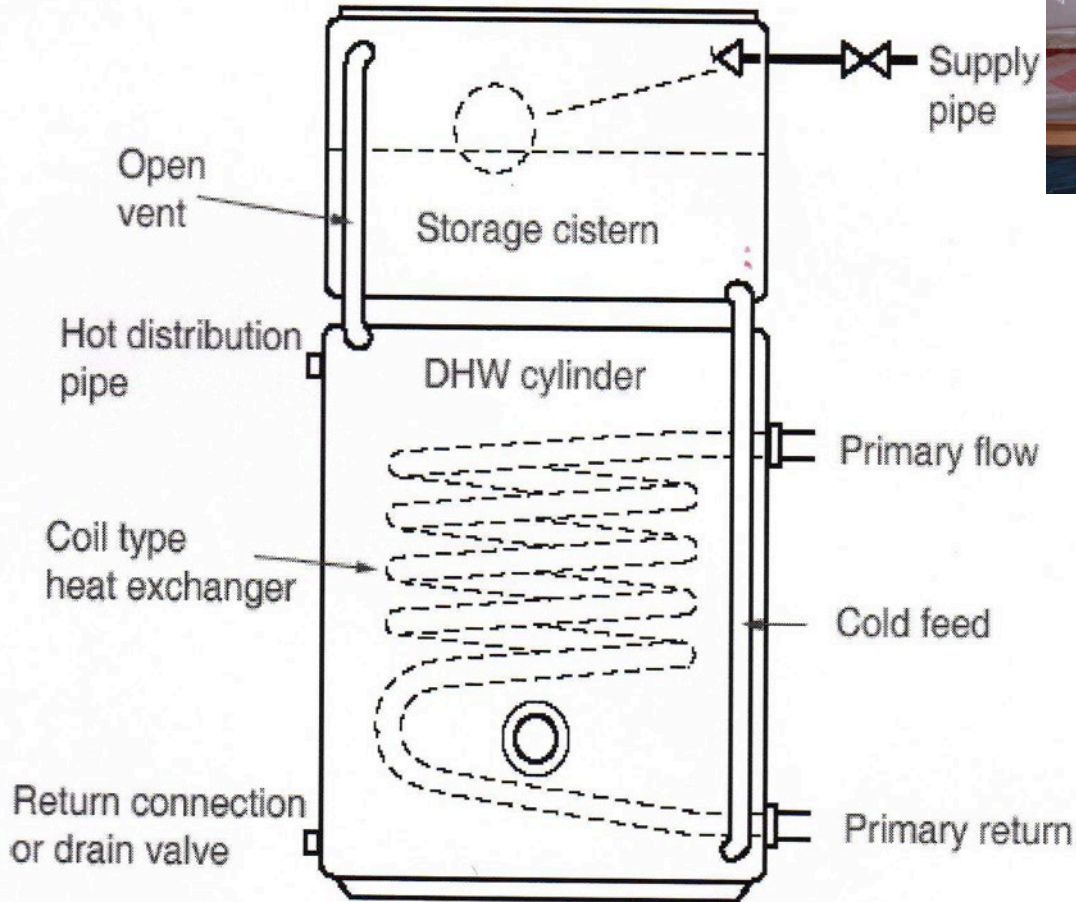
Types of systems

Open vented combination units

These are pre-plumbed units in which the cylinder and cold water storage cistern are joined together. With these units it is only necessary to run the mains feed and join the distribution pipe. They are sometimes found in flats.

These have a disadvantage because of the lack of head pressure given, but they are easy and quick to install.





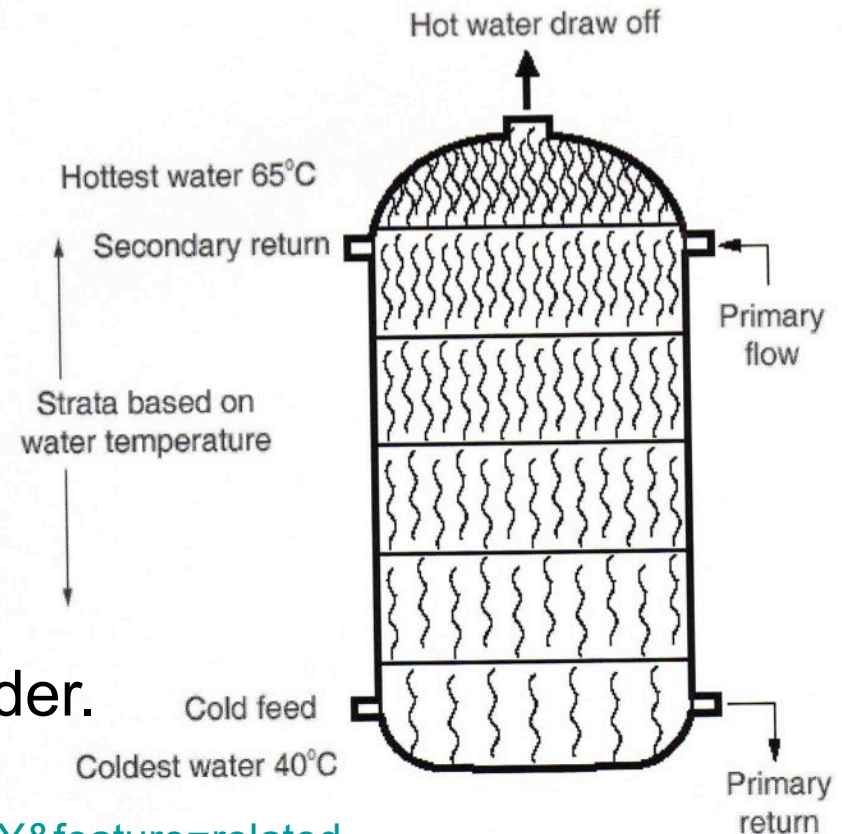


Types of systems

In all hot water cylinders, when they are up to temperature there is a temperature difference between the top (hot) and bottom (cooler) on the cylinder: temperature stratification.

There is a baffle installed in some cylinders, which prevents incoming cold water mixing with the hot water. The temperature difference can be up to 10°C.

The cylinder stat is placed one-third of the way up the cylinder.



Online resource:

<http://www.youtube.com/watch?v=SV2vdGPLRiY&feature=related>

Types of systems

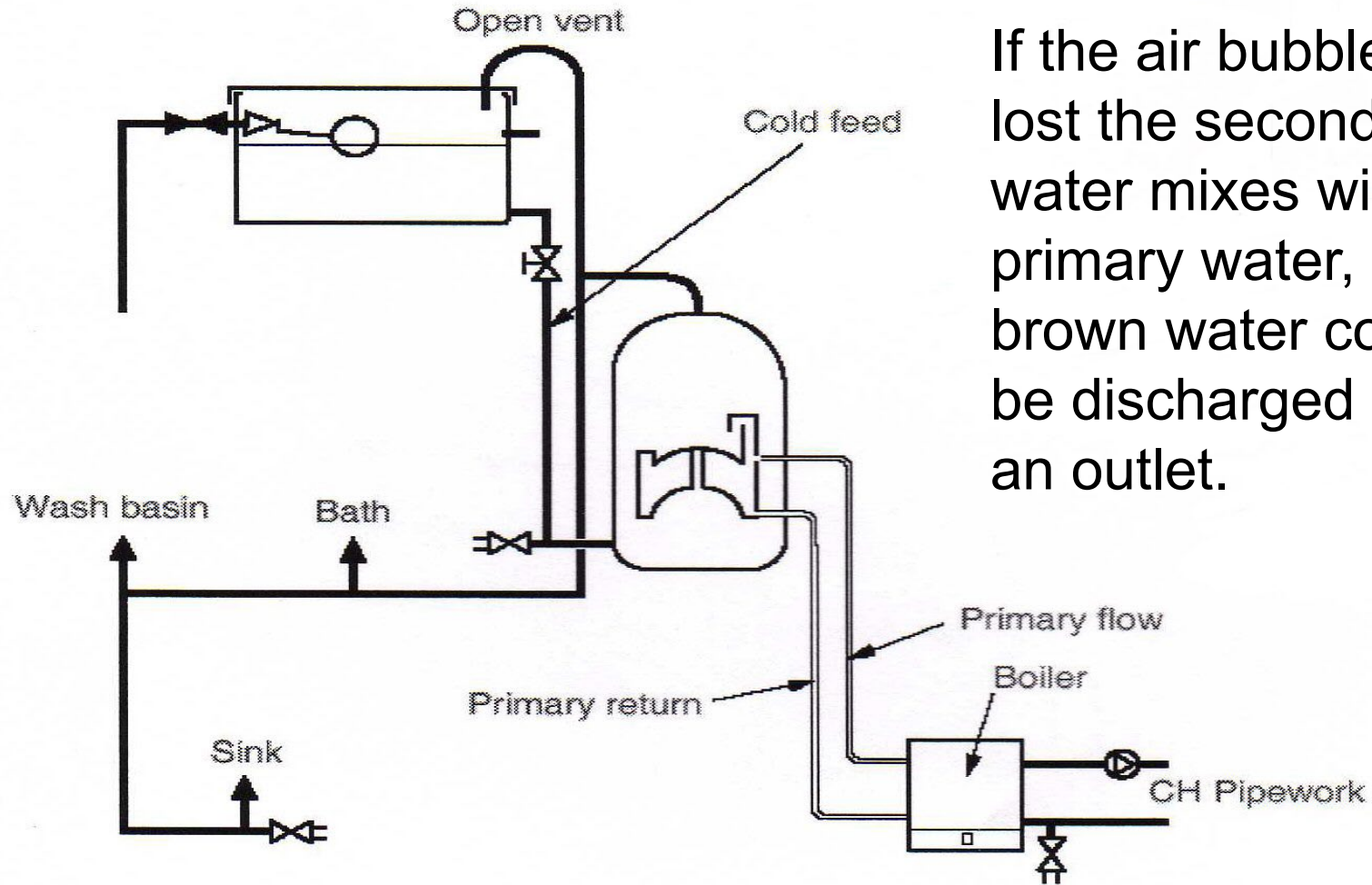
There is an old system called a **single feed** system.

This system only has one CWSC in the loft area and fills both the primary and secondary waters through the same pipe. (The system does not require a feed and expansion cistern.)

It uses a primatic cylinder. In this cylinder the heat exchanger uses an air lock to separate the primary water from the secondary waters.

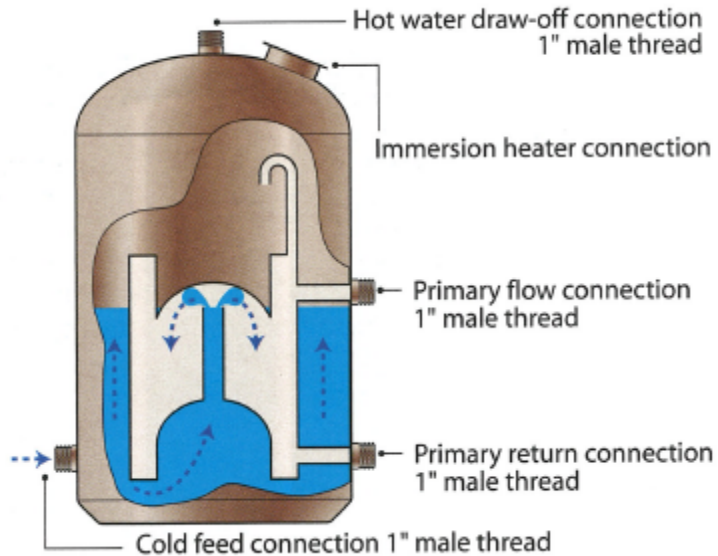
In effect it is an indirect system.

Types of systems

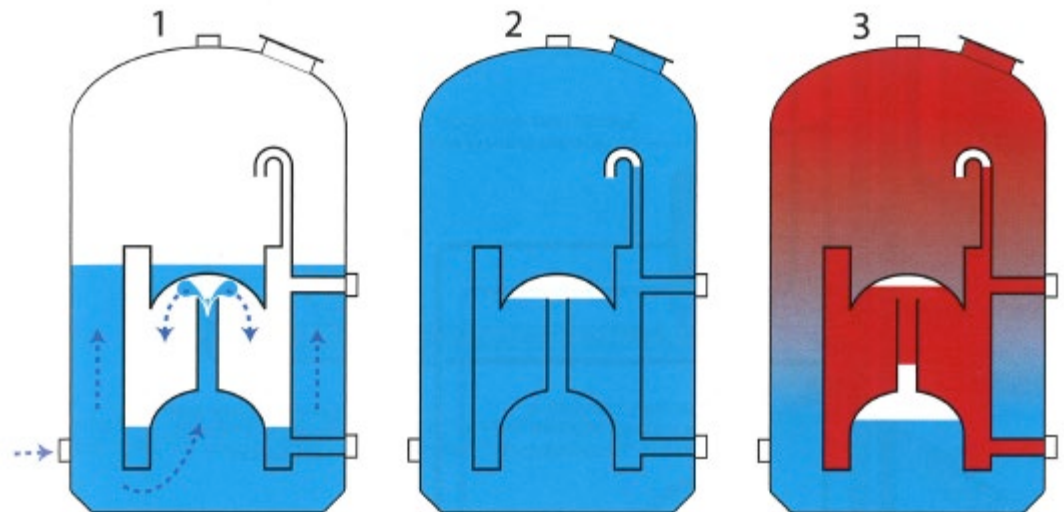


If the air bubble is lost the secondary water mixes with the primary water, so brown water could be discharged from an outlet.

Types of systems



1. Cold water enters cylinder and heat exchanger.
2. Air lock is formed, cylinder and primaries are full.
3. Water is heated and pushes air bubble into lower dome.



Types of systems

Advantages and disadvantages

System	-ve	+ve
Direct cylinder	Risk of rusty water Risk of scale build up Lack of temperature control	Quick heat-up time Cheap to install
Indirect cylinder	Expensive to install Two cisterns in loft area	Can be fully pumped Various size cylinders available Compliant with part L Inhibitor can be used
Combination unit	Lack of pressure Lack of CW storage Pumped showers cannot be fitted	Cheap to install Suited for flats/chalets Easy to install Compliant with part L

Types of systems

Advantages and disadvantages of stored water:

- With any cylinder the customer has a secondary heat source
- There is always a back-up supply of water if the mains is cut off
- Suitable for areas with low water pressure
- These systems with a cylinder and cisterns do take up more space than a combination boiler
- They are more expensive to install with fewer design options
- With a combination boiler there is instant hot water; a stored hot water system has a longer heat-up time

Types of systems

Not only can you heat domestic hot water by the use of a boiler and immersion, but water can be heated via:

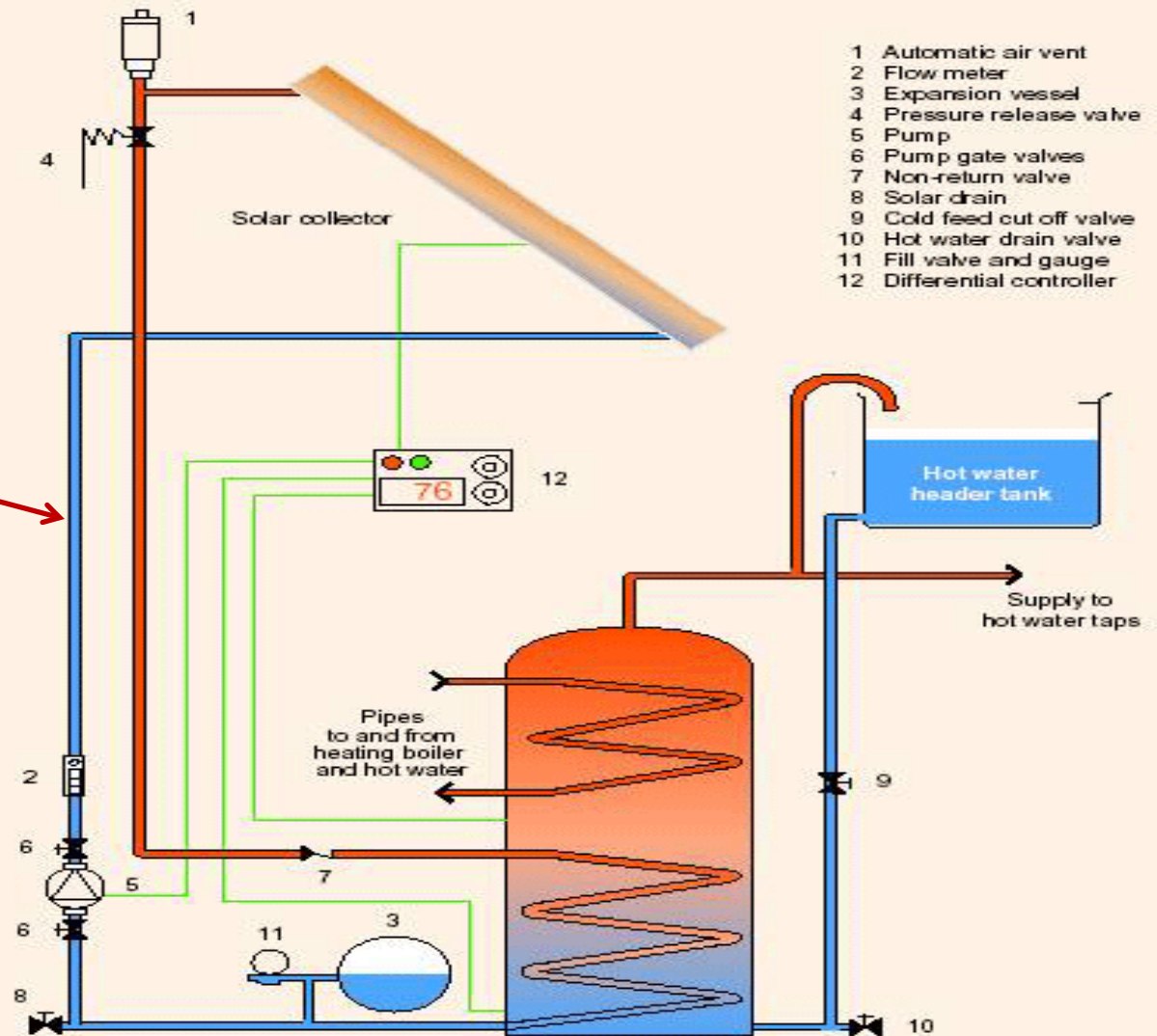
- Solar panels on the roof
- Solid fuel units

These can be incorporated into a domestic hot water system by introducing a second or third coil in the hot water cylinder. This will allow the hot water to be heated by various means:

- Renewable energy

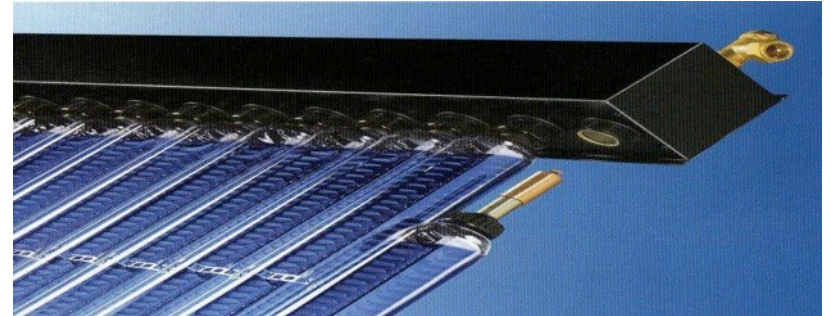
This system must have anti-freeze in this circuit

It is the lower coil that is connected to the solar circuit



Types of systems

Solar thermal is a growing business in the UK. The most popular form is solar water heating via panels installed on a south facing roof.



The fluid circulates down to the cylinder, heating the water. In the UK, solar water heating can provide over 50 per cent of a household's demand.

A common method of solar thermal is the use of evacuated tubes. These capture the heat from the sun's rays; this in turn heats water, which circulates down to the cylinder, heating the DHW.

Types of systems

Unvented hot water cylinders

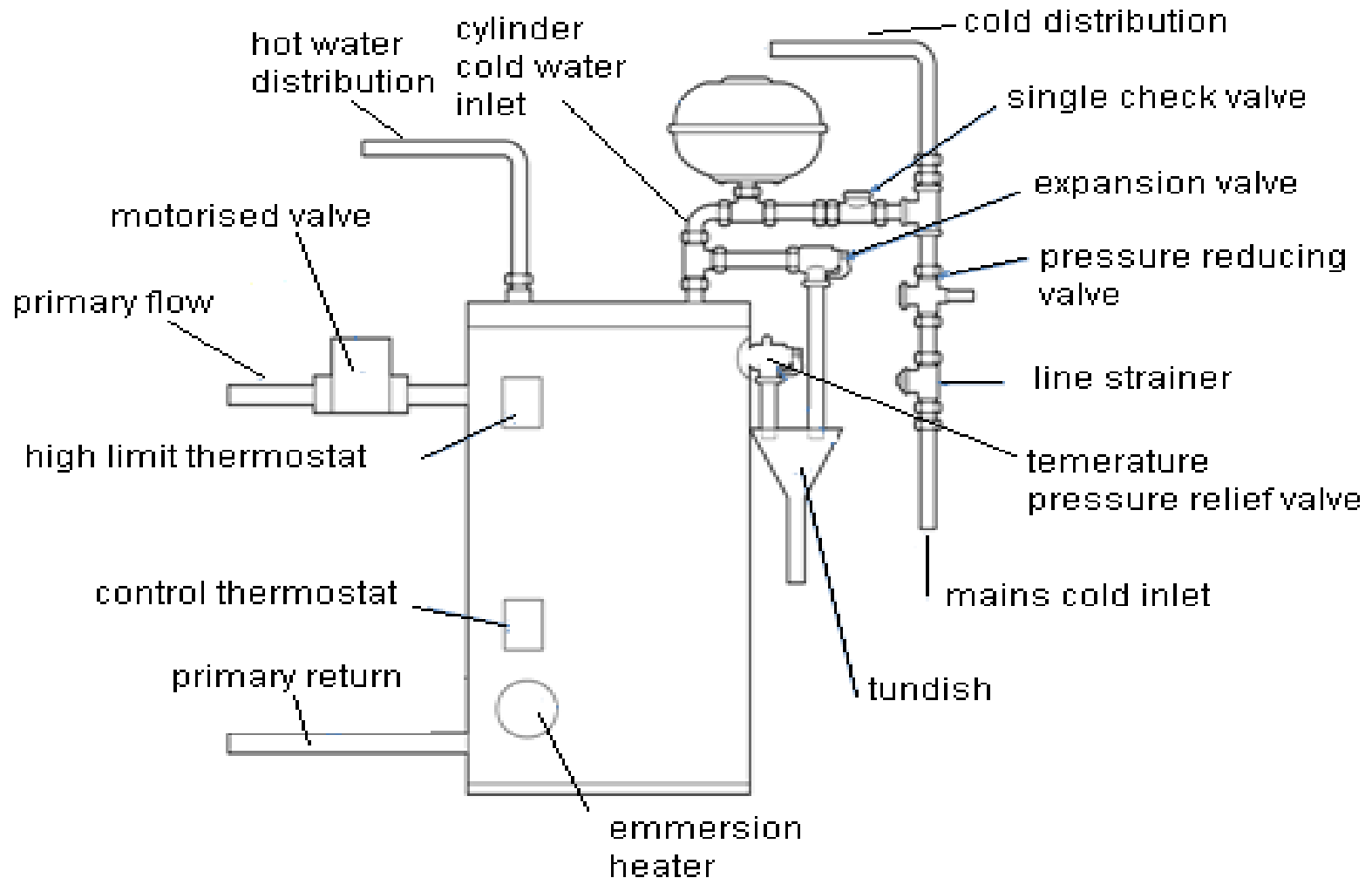
These cylinders and systems do not have an open vent. This means the safety relief must be incorporated elsewhere in the system.

They operate under mains pressure, so are known as high pressure systems. This also means they do not require a CWSC in the loft.



Types of systems

Unvented hot water system



Types of systems

Unvented hot water system

- The cylinder must be fitted with a range of safety (temperature) controls so the hot water never reaches 100°C
- The discharge pipes are located in a safe place
- The system must be maintained by a competent person
- Installations must be notified to the local authority or self-certified (Competent Persons Scheme)

Types of systems

Instantaneous hot water systems

These systems can be centralised or localised using single or multi-point heaters.

They work on the principle of heating the domestic hot water only when it is needed. So each device needs to transfer heat to the cold water very quickly as it passes through the heat exchanger.

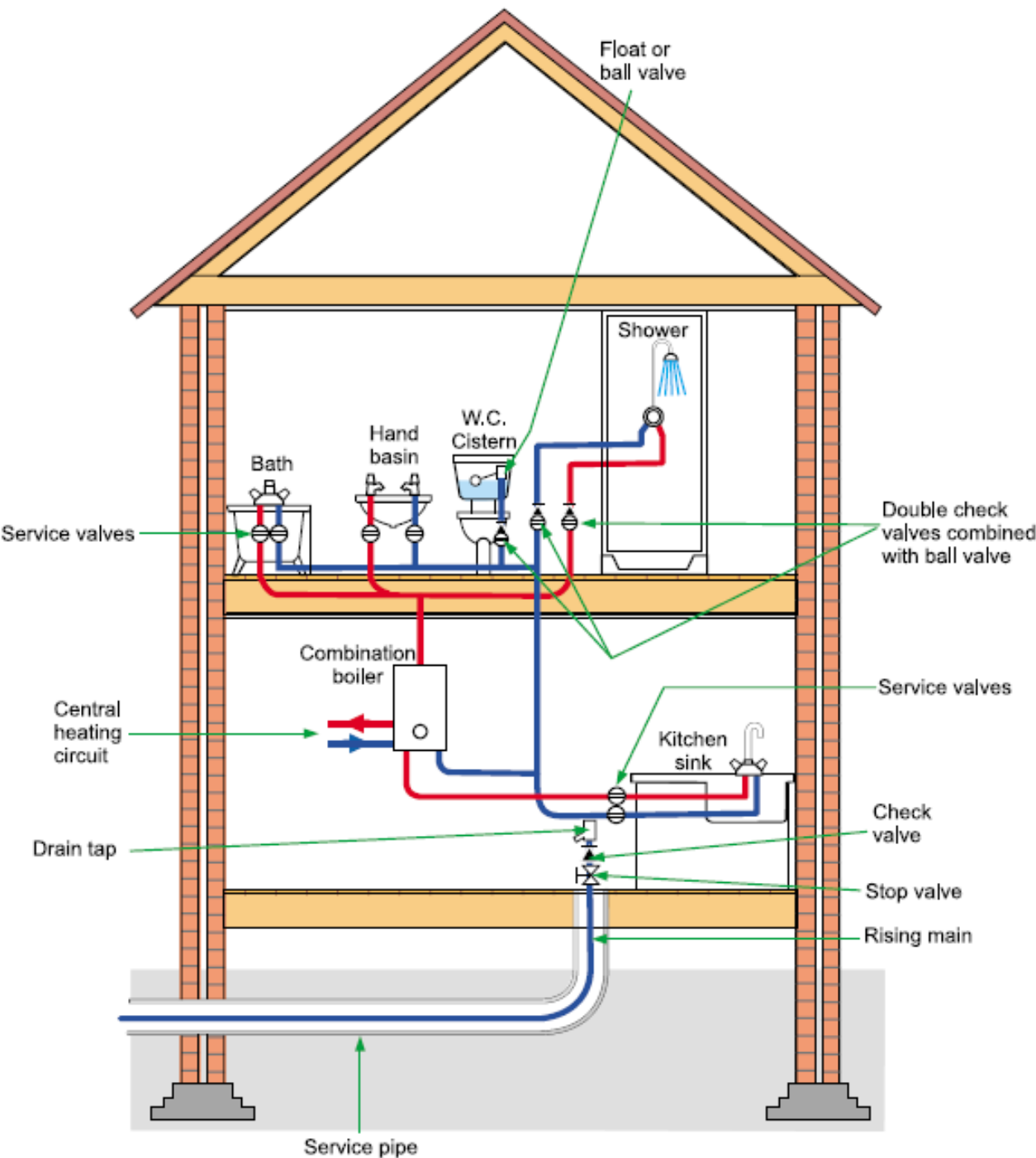
Types of systems

Combination boiler

This type of boiler is designed to heat up cold mains water instantaneously to supply a property with hot water. This is done by using a plate heat exchanger with a large surface area.

This is a high pressure system.





Types of systems

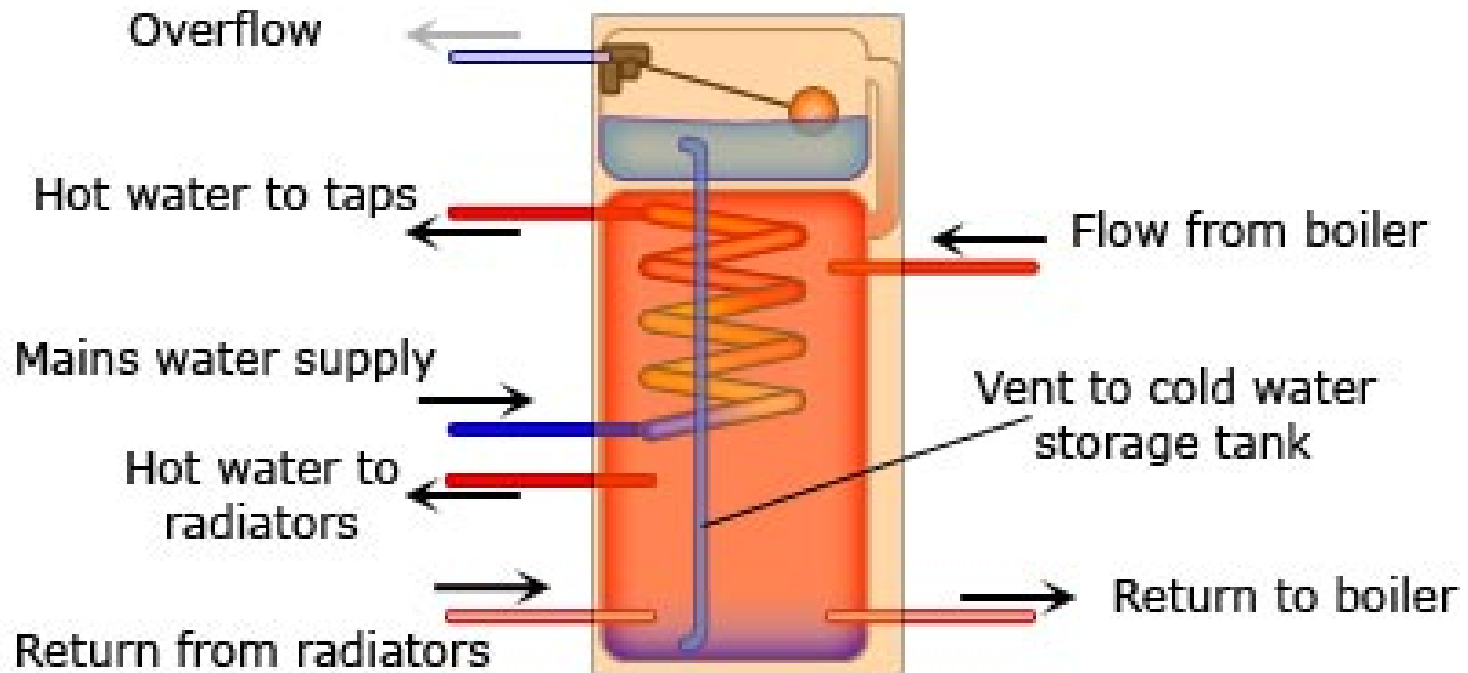
Water jacket heater or thermal store unit

This system is a form of instantaneous hot water under mains pressure.

It works in a similar way to an indirect cylinder, except in reverse. The cylinder is filled with primary water and the coil is filled with the water that needs heating. When a hot draw off point is opened, water flows through the coil and is heated. It then passes through a blending valve, which regulates the temperature to the property.

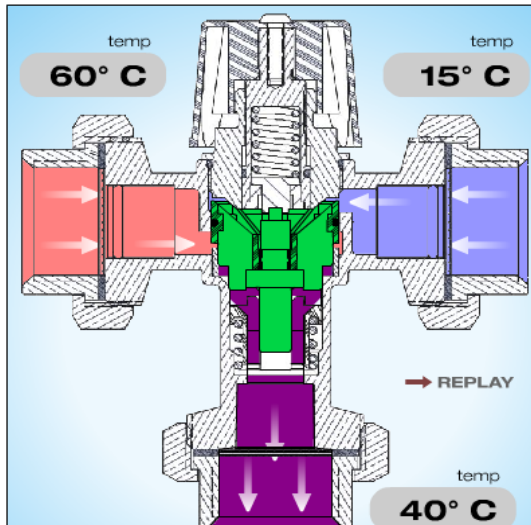
Types of systems

Water jacket heater or thermal store unit



Types of systems

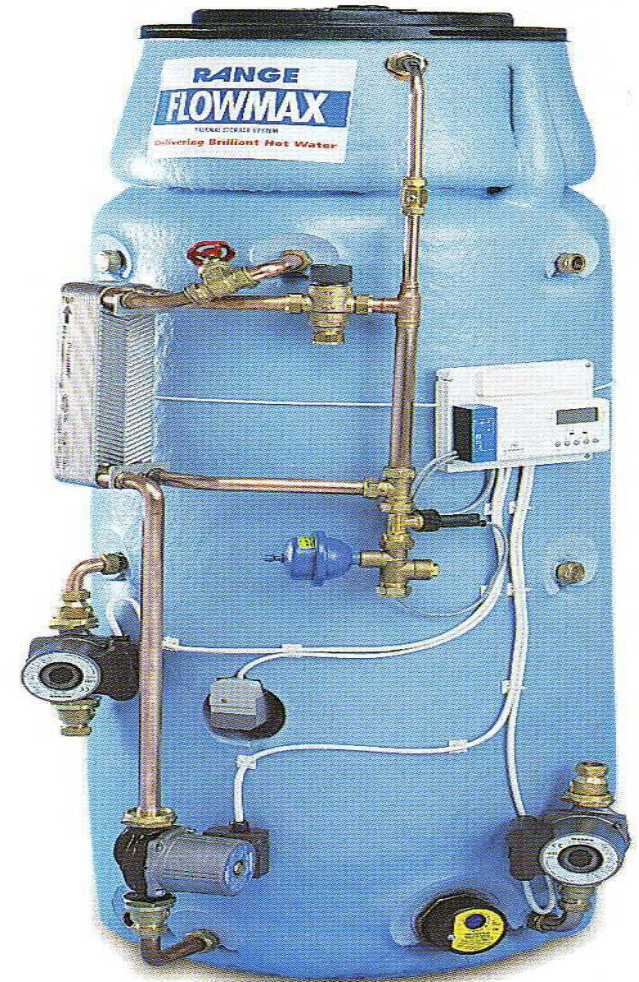
Water jacket heater or thermal store unit



Normal Operation
Thermostat automatically positions seat assembly to continually maintain the preset outlet temperature within the tolerances of the valve.

Click to watch:

- Normal Operation
- Temperature Spike
- Cold Water Loss



Types of systems



Types of systems

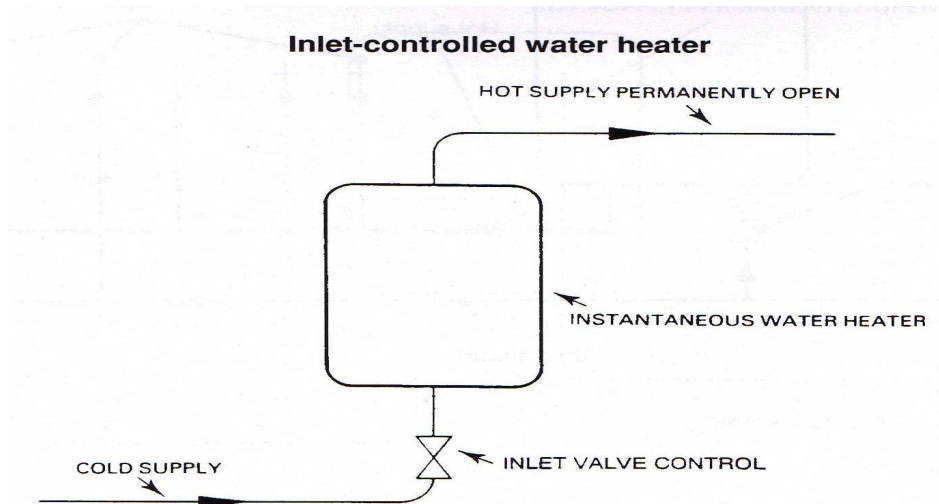
Single point water heater

- Commonly used where an isolated basin/sink is too far away from a DHW storage vessel (dead leg), or where there is no other form of DHW in a building
- Rely on an open spout, always open to atmosphere
- This type of unit generally needs to be mains fed but some units can be fitted to a cistern
- Always check the manufacturer's instructions
- These units have a small capacity of stored hot water – 5 litres or so – some require a flow restrictor to be fitted so flow is maintained at 7 litres per minute. (If capacity is over 15 litres they come under an unvented appliance)
- Can be fitted above a sink or below a sink
- Can be fitted in loft conversions or extensions

Types of systems

Single point water heater

These units are also known as **inlet controlled**, as the tap allows mains water to enter the unit, which then allows water to pass down the open spout (open vent).

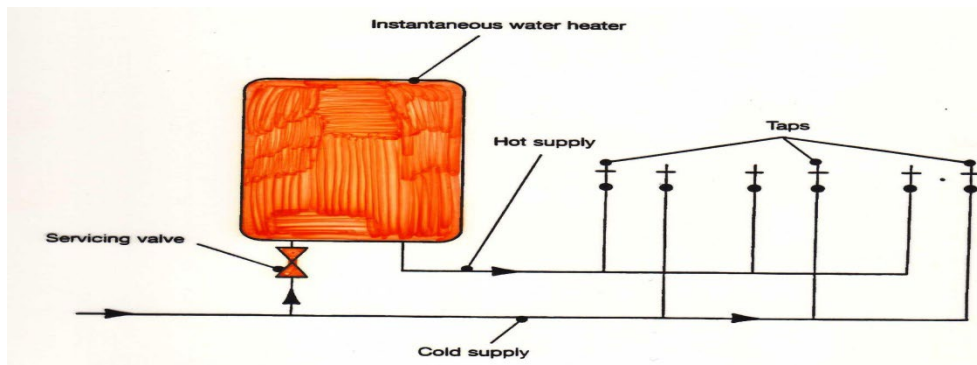


Types of systems

Multi-point water heater

These items store a small amount of water and, as their name suggests, supply water to a number of outlets on one location.

These are often kept at mains pressure and are outlet controlled, unlike single point heaters.

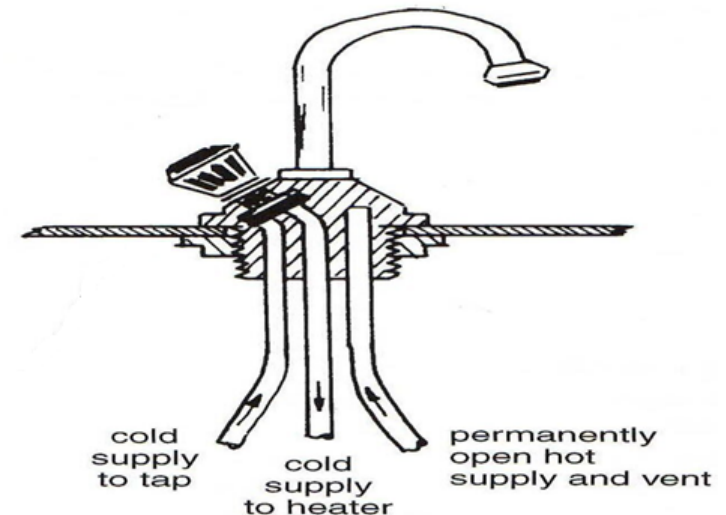
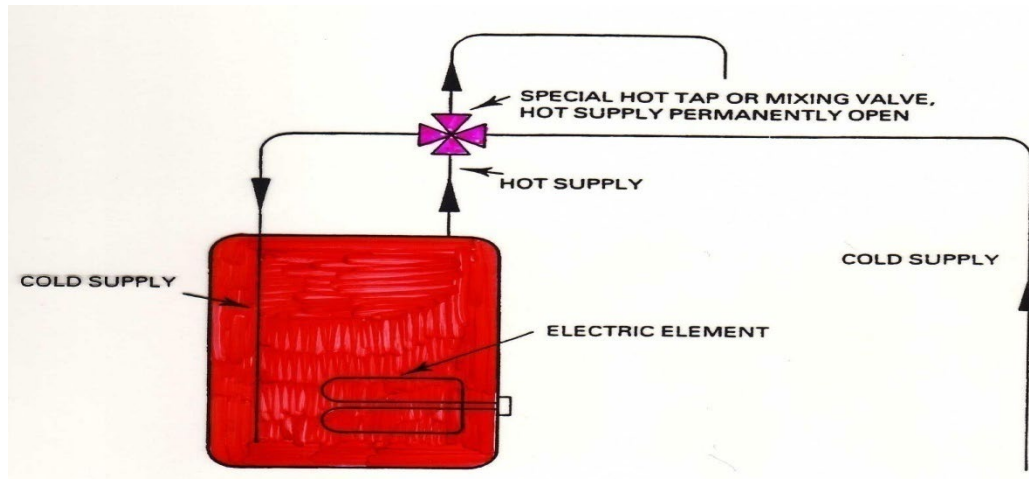


Types of systems

Under sink water heater

This appliance works on the same principle as the over-sink heater, but instead of the swivel spout it is piped into a special tap or mixer tap. The outlet is permanently open to atmosphere and the flow is controlled from the tap/mixer.

This appliance will store 10-15 litres of hot water.



Types of systems

Types of boilers

- Back boiler
- System boiler
- Independent boiler
- Combination boiler
- Floor standing
- Wall mounted



Types of systems

Fuel sources

- Natural gas
- LPG
- Solid fuel
- Bio fuels
- Oil
- Electric

