Unit 307: Central heating systems

Identify types and layout features of heating systems (part 2)

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Objectives

By the end of the session, learners will be able to:

- identify types and layout features of heating systems, including:
  - pumped heating gravity hot water
  - fully pumped, 2 x two-port valves (S plan)
  - fully pumped, 3 x two-port valves (S plan+)
  - fully pumped, three-port valve (mid-position/diverting) (Y/W plans)

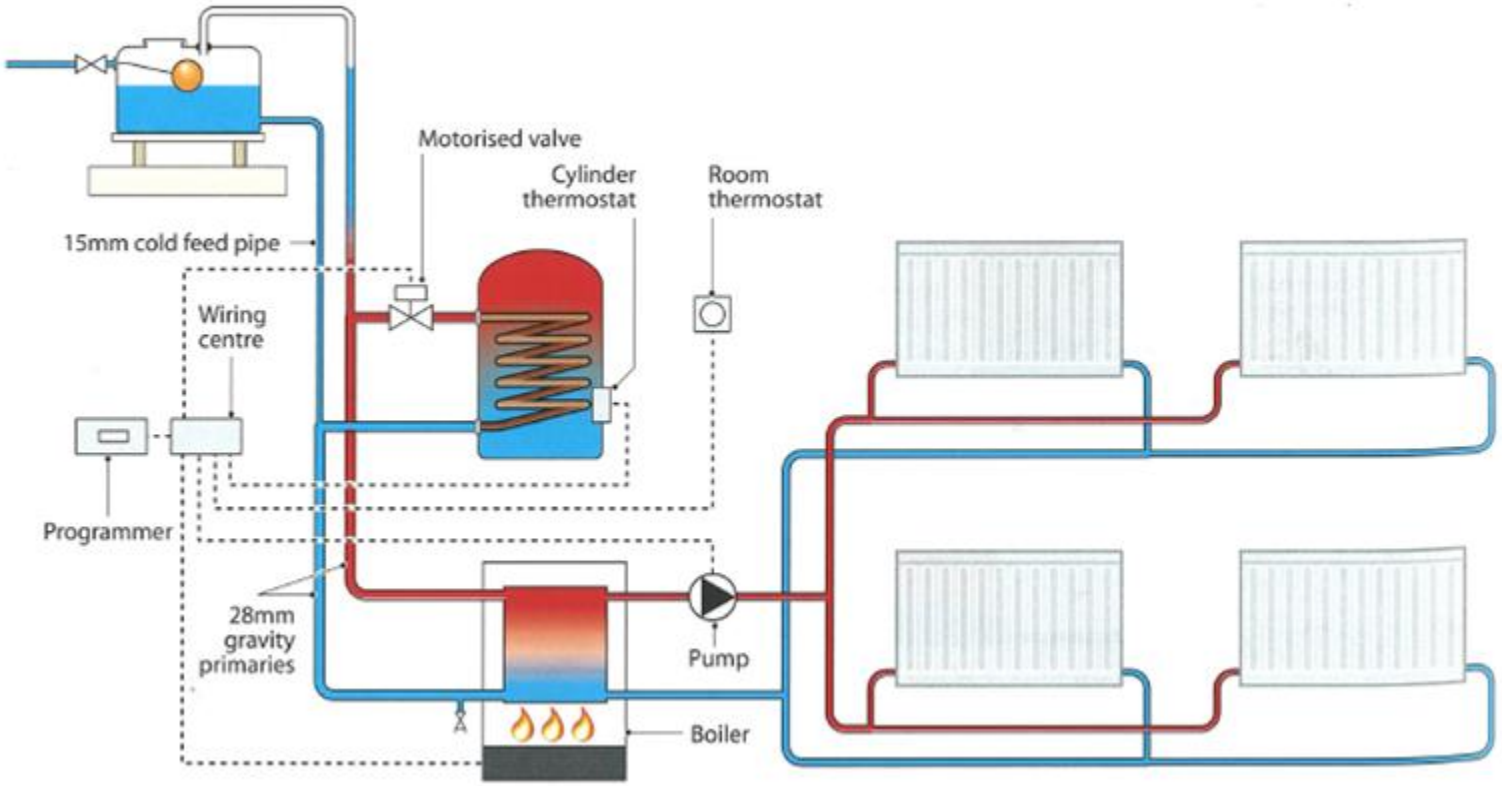
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C plan two-pipe semi-gravity

- An updated version of a two-pipe semi-gravity system that includes a cylinder thermostat and zone control on the hot water.
- The C plan+ includes a room thermostat, TRVs and zone control on the heating, as well as controls on the hot water.
- The C plan+ is the minimum acceptable compliant system with building regulations part L1B and the Domestic Heating Compliance Guide, which states that the system has to incorporate a thermomechanical thermostat. However, the current compliance guide indicates that best practice would be to update the system to a 'fully pumped system'.

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C plan two-pipe semi-gravity (continued)



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C plan two-pipe semi-gravity (continued)

Advantages:

- All heat emitters reach the same temperature
- Two-pipe system is quicker to heat up
- Compliant with building regulations L1B
- Full control on heating and hot water

Disadvantages:

- Not fully pumped
- Boilers fitted to this system tend to be lower efficiency

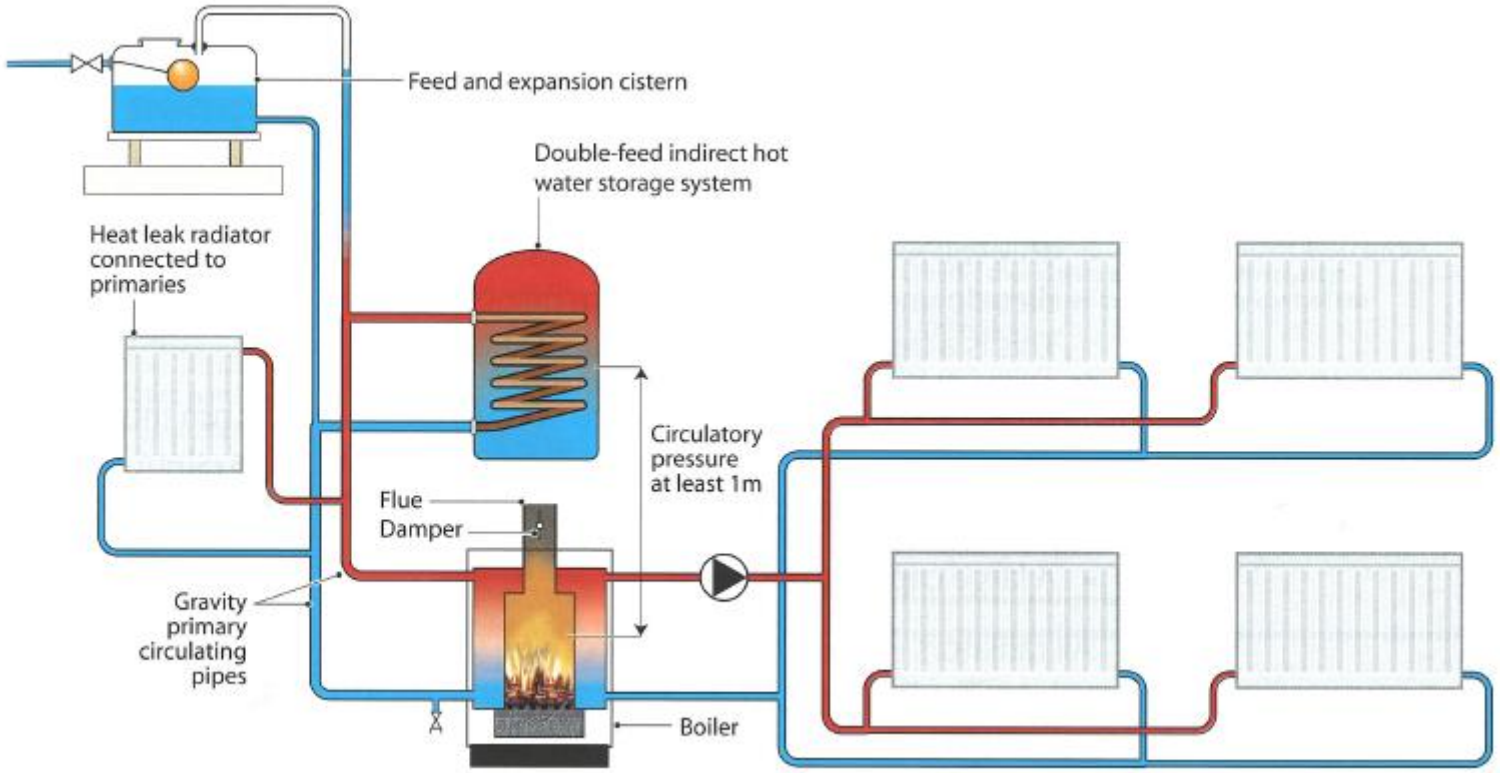
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Two-pipe semi-gravity with heat sink

- Used with solid fuels, which are not as controllable as gas or oil boilers.
- If gravity circulation stops due to the flow and return being the same temperature, the boiler will still produce heat.
- This heat can be dissipated through the heat sink without the boiler overheating.
- The heat sink used is generally a radiator with two lock shield valves.
- The boiler heat on a solid fuel boiler is often controlled by a simple air damper, rather than an electrical control.

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Two-pipe semi-gravity with heat sink (continued)



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Two-pipe semi-gravity with heat sink (continued)

Advantages:

- Compliant with building regulations (Part L)

Disadvantages:

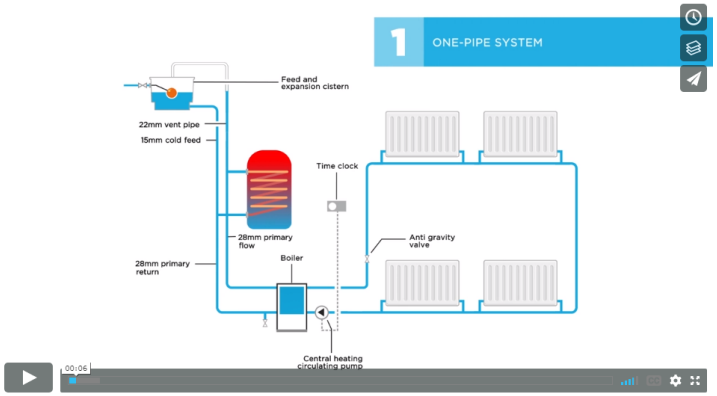
- Restricted heat control
- Only used on open vented systems
- Overheating possible
- Can be expensive
- Reduced efficiency

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Pumped central heating

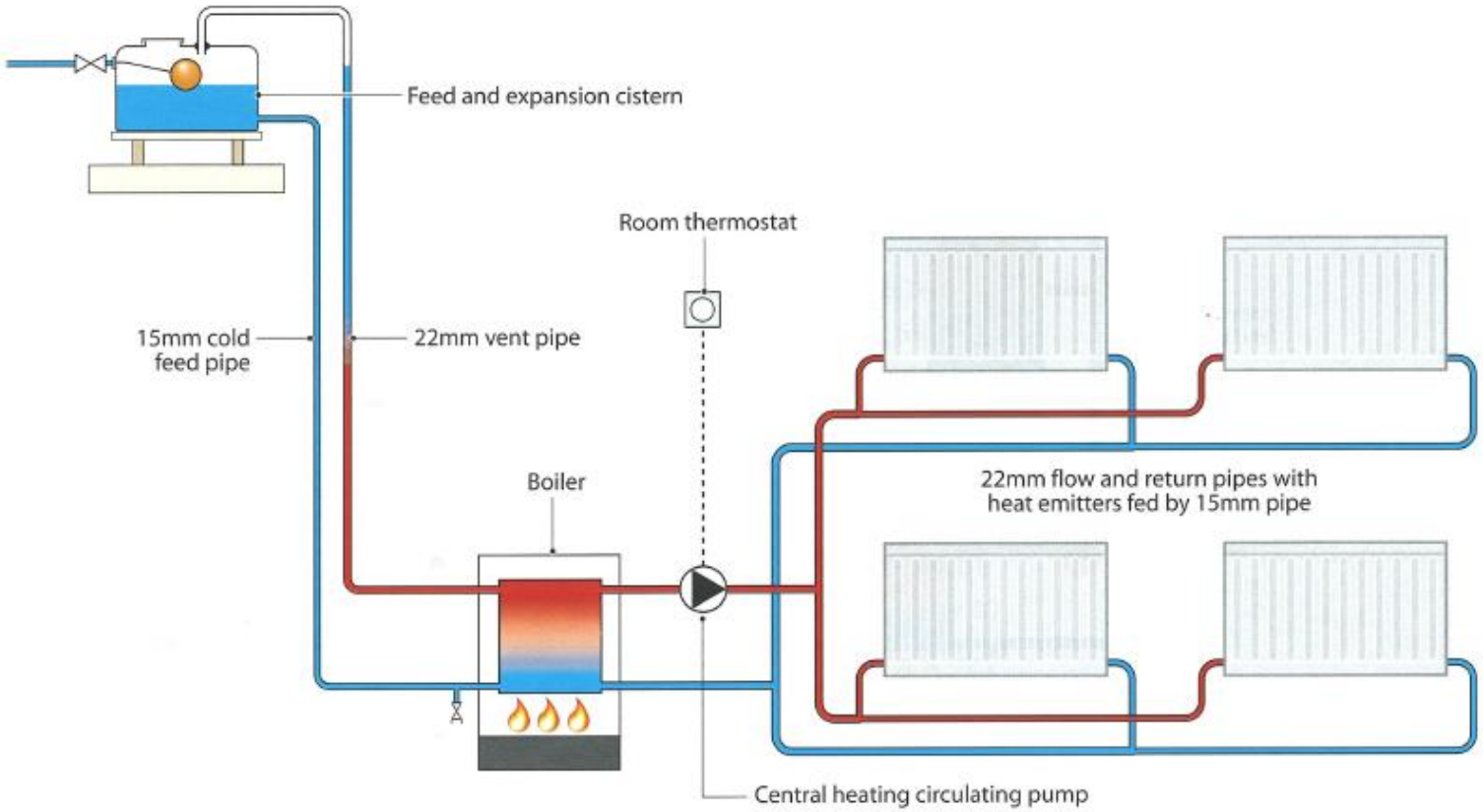
- These are older-type systems that do not have any provision for hot water but serve some heat emitters around the property.
- The cold feed and vent pipe can be taken from the boiler (four tapping boiler) or from the pipework.
- It is generally a two-pipe system with a circulator to assist the heat-up time.
- The controls consist of a timer, boiler thermostat and possibly a room thermostat, heating all rooms to a controlled, comfortable temperature.

Go back to SmartScreen to check out the **Pumped central heating** video e-learning.



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Pumped central heating



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Fully pumped systems

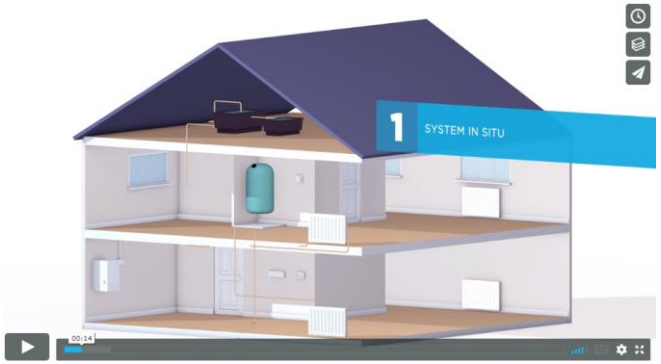
- These are modern systems that use a pump to circulate the heated water around the hot water and heating circuits.
- Controlled by installing a cylinder thermostat, room thermostat and programmer, along with either two-zone valves or a three-port mid-position valve.
- These systems offer better control, design and boiler type. The boiler position no longer needs to be lower than the cylinder.
- Heat-up times are much quicker and therefore make the system more economical on fuel and operating costs.
- Boilers can be fuelled from natural gas, LPG or oil.

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Fully pumped mid-position valve – Y plan system

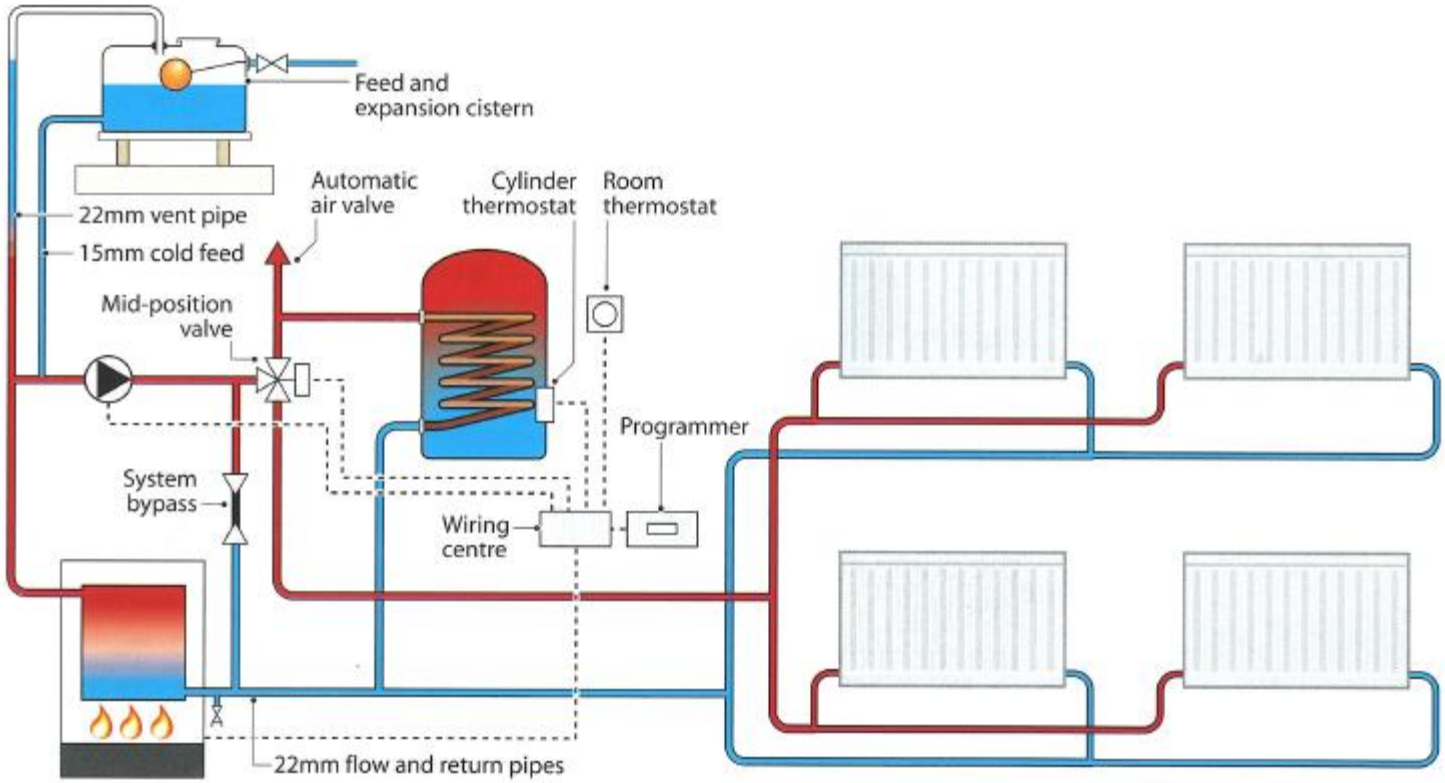
- The three-port mid-position valve controls the flow of water to the hot water cylinder and heating circuit.
- The valve reacts to the room thermostat and cylinder thermostat.
- The system has an automatic bypass valve, which connects the flow and return pipe.
- The bypass opens if the system pressure increases when circuits close down due to them reaching temperature. This allows water to flow through the boiler – stopping **lock out** – and it also prolongs the circulator life.

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Fully pumped three-port valve
video e-learning.



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Fully pumped mid-position valve – Y plan system



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Types of system



The Y plan system incorporates a three-port mid-position (zone) valve.

This valve controls the flow of water to **both** the heating and hot water circuits. It reacts to both the cylinder and room thermostat.

There is also a system incorporating a three-port valve which looks similar to the mid-position valve: it's a diverter valve which is based on the hot ***water priority system (the W plan system).

W plan
It provides **either hot water or heating**, but **never both simultaneously**.

****the same hot water priority principle applies to the combination boilers***.

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Fully pumped, two-port valves – S plan system

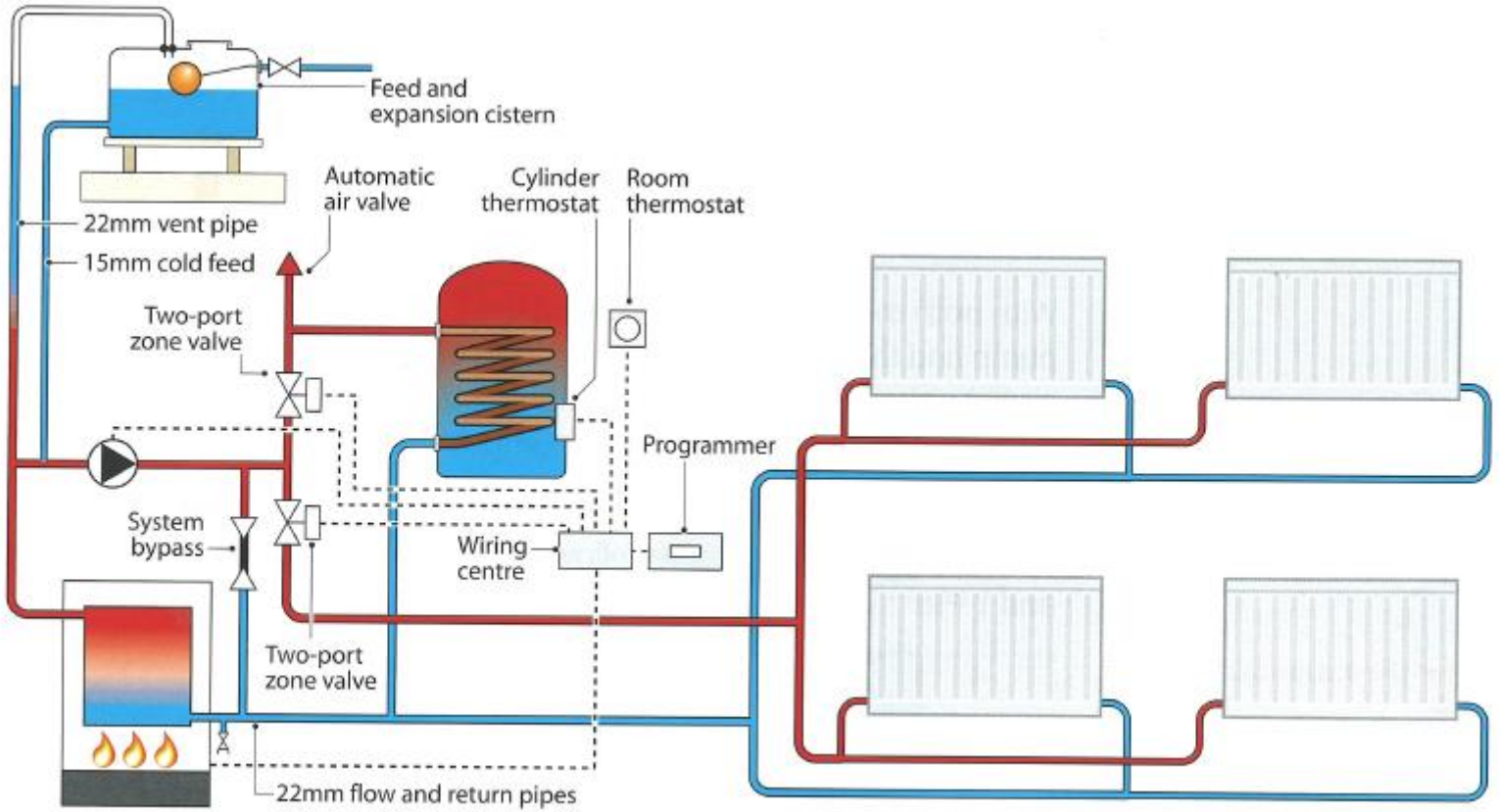
- This system uses one zone valve to control the hot water, which is activated by the cylinder thermostat, and a second zone valve, which is activated by the room thermostat. The zone valve acts as an isolator, closing the flow of water off.
- If a property is over 150m^2, an additional heating zone valve should be fitted, allowing independent control of two zones – usually upstairs and downstairs.
- As with the Y plan, an automatic bypass is fitted to the system if required by the boiler manufacturer.

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Fully pumped two-port valve
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Fully pumped, two-port valves – S plan system



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Types of system

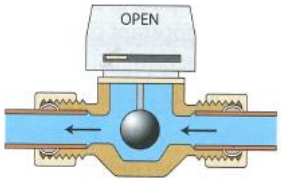
The S plan system incorporates two-port motorised valves.

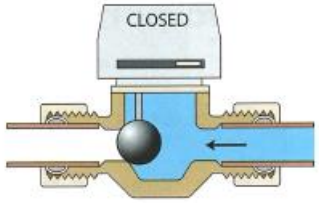
Commonly known as a zone valve, this can be activated by a room or cylinder thermostat.

This allows the hot water and the heating circuits to be controlled separately.

When there is a call for heat, the zone valve opens and allows water from the boiler to circulate around the pipework.

Likewise, when the thermostat is up to temperature, the zone valve is closed (isolates).

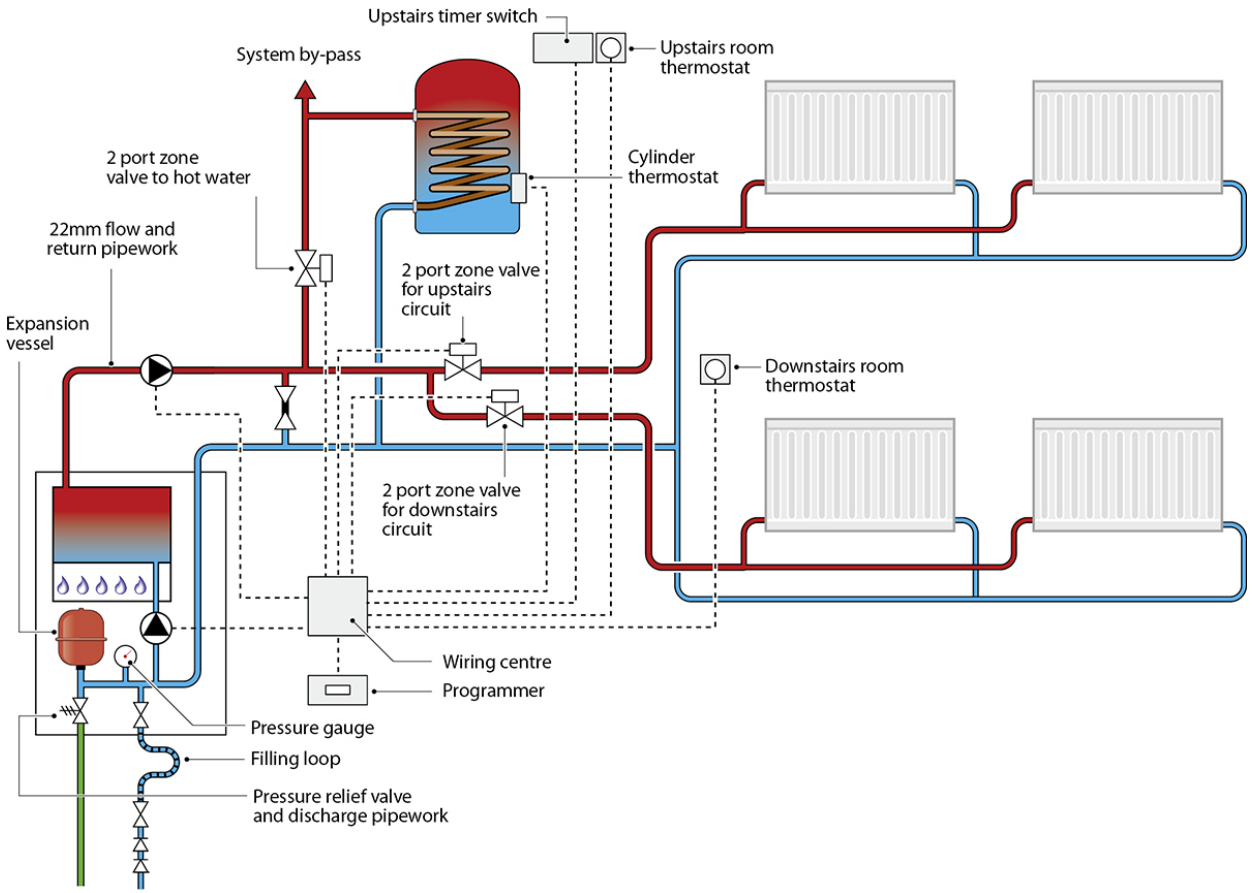






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Types of system (continued)



Multi-zoned system layout – S plan+

Sometimes an extra zone may be required to be added to an installation and this drawing shows three zone valves.

This system is called an **S plan+**.

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Types of systems (continued)

	Y plan	S plan
Full thermostatic control	✓	✓
Building regulations compliant	✓	✓
Recommended for larger properties		✓
Can be used with sealed systems	✓	✓
Can be used with system boilers	✓	✓
Can be zoned		✓
Boiler interlock	✓	✓

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Any questions?

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