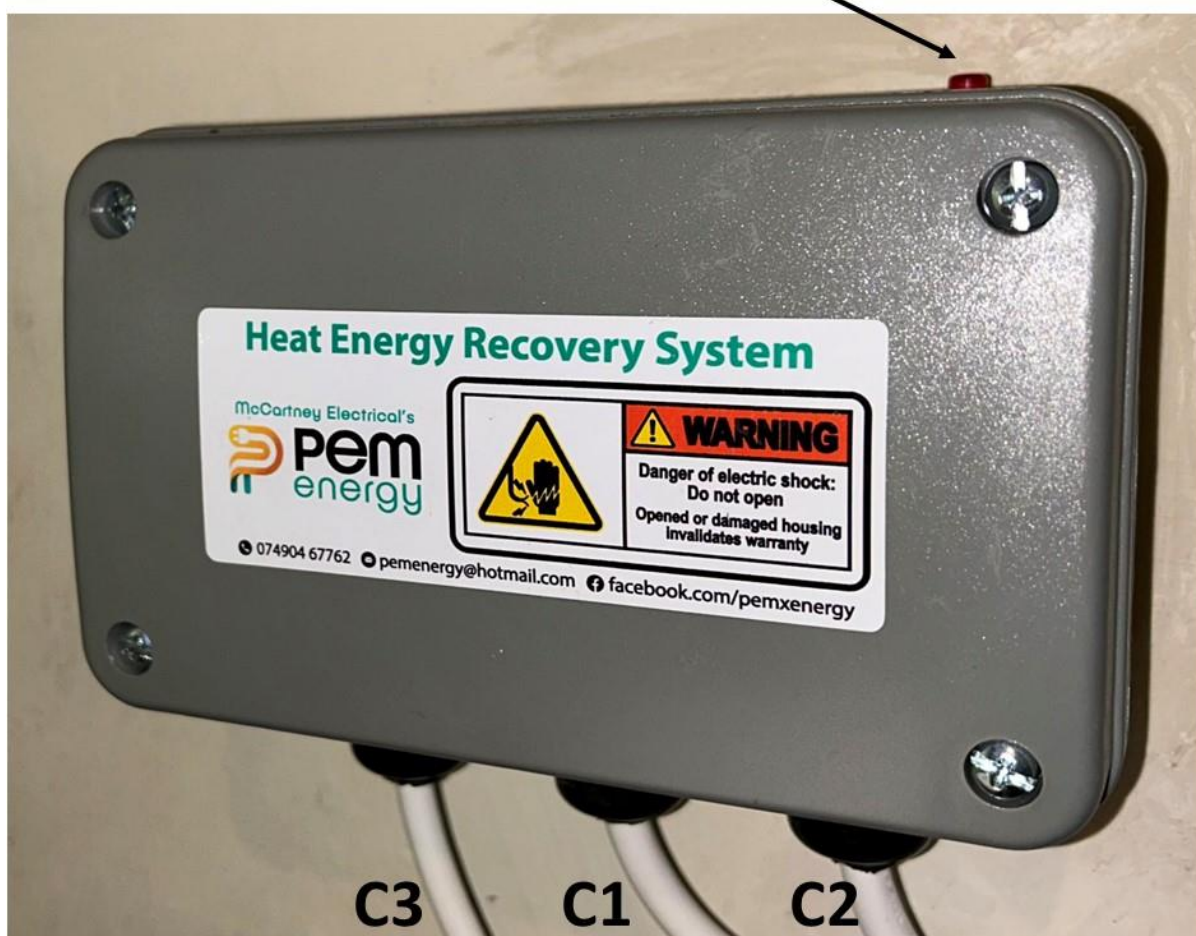


PeM Heat Energy Recovery System

(for oil fired central heating systems)

Installation Guide with S-Plan Heating systems (2 zones or more)

The PeM Heat Recovery Unit Burner “live” indicator



The efficiency of a Central Heating System is determined by the system's ability, holistically, to dissipate Generated Heat Energy, by the intended means.

Further, oil fired central heating system use a boiler that, usually, weighs more than 18 stone (>114 kg). This metallic hulk acts like a large "storage heater" but where much of the 'stored' heat can never be used by the consumer.

The **PeM Energy Heat Recovery System** has two specific functions:

- 1) Stored heat, not normally consumable by the user, in the boiler's metallic hulk is continually transferred to heat the system's radiators.
- 2) Proportionate to fuel consumption, the radiators' ability to dissipate Heat Energy is increased.
- 3) When the programmer/timeclock goes to 'OFF', the system's radiators continue to be heated by cooling the boiler's metallic hulk.

Generally, (per month, year, etc.) the running time of the burner and its components are significantly reduced, reducing maintenance cycles.

Expensive "Energy Efficient" offer no advantage with a PeM Energy Heat Recovery System installed.

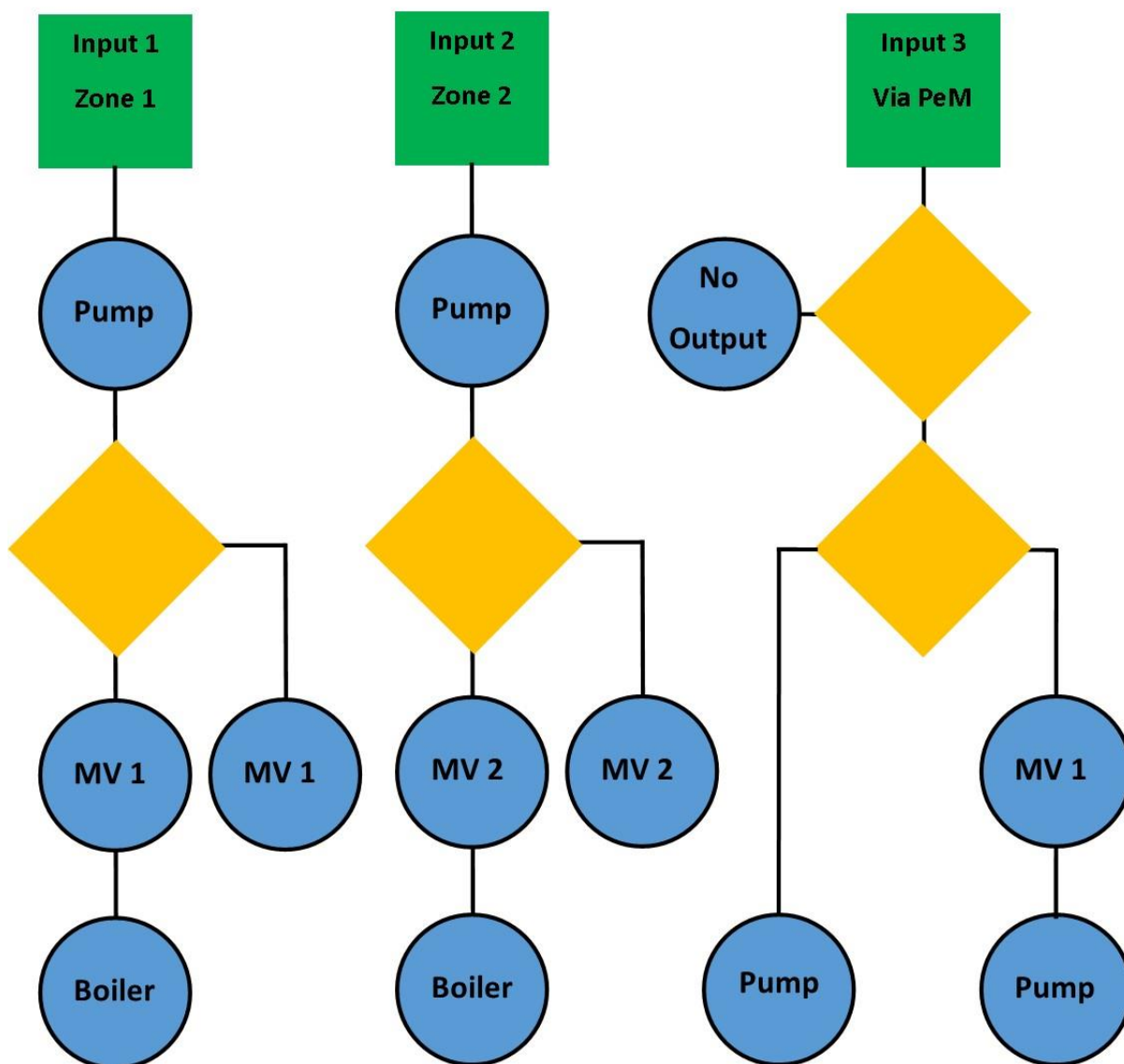
PeM's binary functions in a 2-Zone S-Plan Heating system

(relative to three 'LIVE' inputs)

Inter-input functions not shown

PeM Energy Heat Recovery System

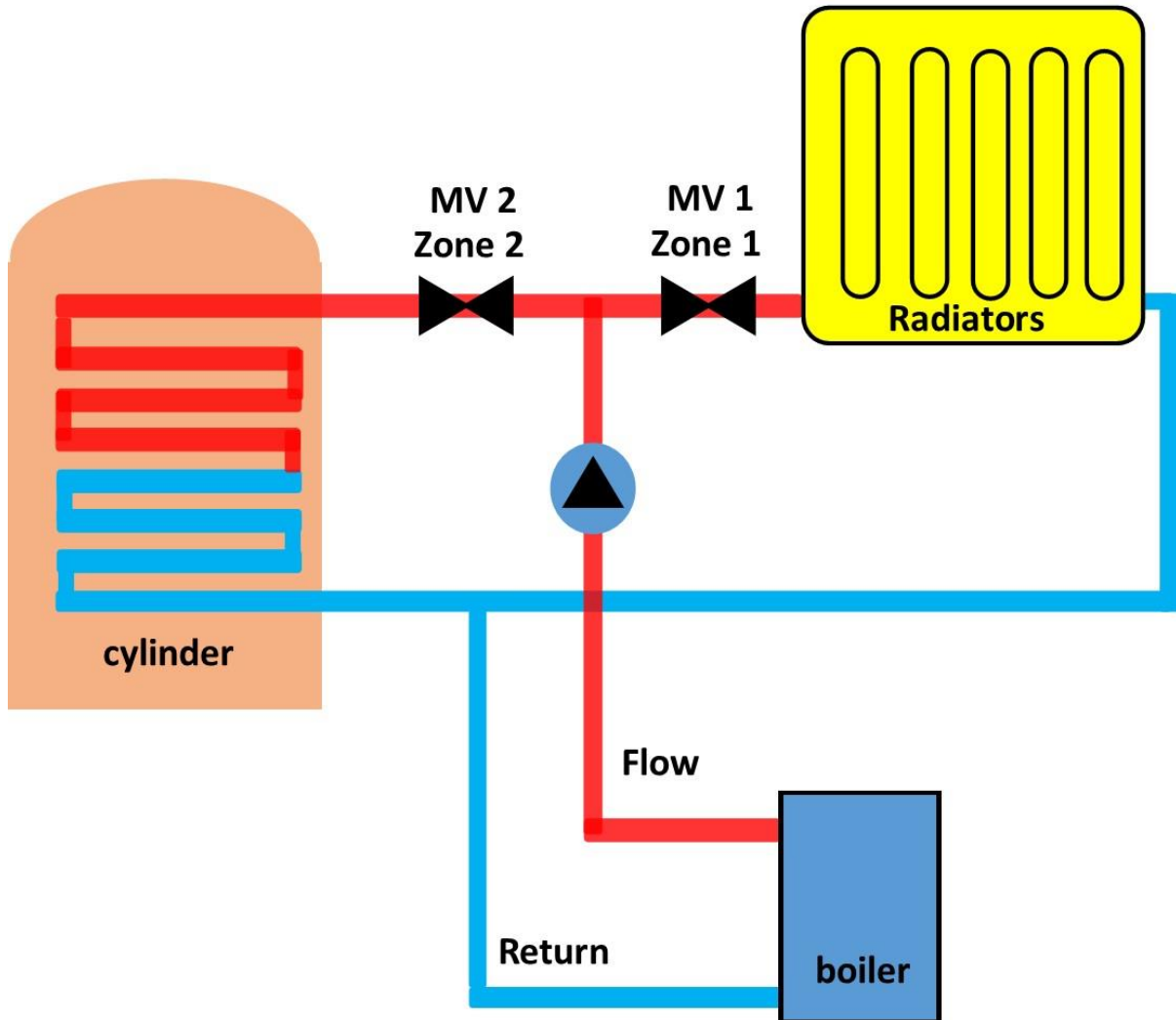
Functions



Abbreviations/terminologies used in this document:

- Boiler = Boiler and combined burner/stats arrangement.
- MV = two port, 4 wire & earth Motorised Valve (L, N, E, and aux switch's aux 1 & aux 2).
- Z = Zone (radiators zone/s or hot water zone).
- Z1 always refers to the zone that operates the radiators in the (normally downstairs) living area.
- Zone 1 (as defined above) must always function as the “Control & Purge Zone”.
- P/C Stat = Purge & Control Stat is a pipe stat that operates the circulating pump and MV1 when the programmer is ‘OFF’ (all zones).
- CH-JB = S Plan CH systems have a junction box (CH-JB) where all components of the system are individually wired back to and terminated.
- C1 = C1 is first of two five core flexible cables leaving the PeM Unit.
- C2 = C2 is second of two five core flexible cables leaving the PeM Unit.
- C3 = C3 is a four-core flexible cable going from the PeM Unit to the P/C Stat.

S-Plan Heating System 2 Zones or more



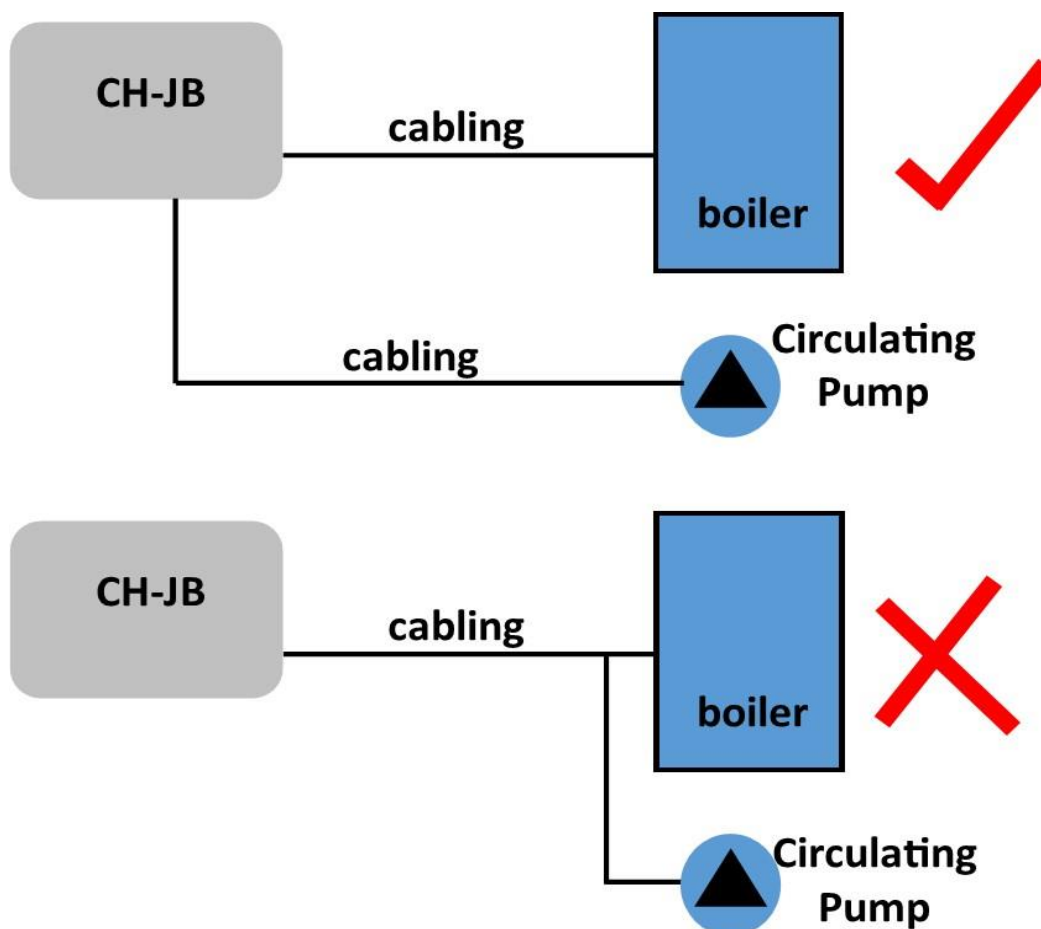
Pre-Installation Check

Wiring from the boiler, circulating pump and MV1 must return to the CH-JB individually.

In some installations the pump will be loop fed from the boiler.

Where the pump is loop fed from the boiler (or some variation of this), an alteration is required. There are two obvious possibilities:

- 1) New cabling is installed from the CH-JB to the pump, or
- 2) Often it is more practical to relocate the circulating pump in the close vicinity of the CH-JB, and connect the pump to the CH-JB from there.



Pre-Installation Alterations to the Existing CH-JB

At the installation's CH-JB:

- 1) The installation's 3-amp switch-fuse spur must be open (turned OFF). The installation's CH-JB should be checked for live inputs (from other sources). When deemed safe:
- 2) Identify auxiliary wires (normally grey & orange) from MV Zone 1: Disconnect these and make it safe. These are no longer required.
- 3) Identify the phase (live) to the pump: Disconnect from current terminal and replace in an empty terminal.
- 4) Identify the phase (live) to the boiler/burner: Disconnect from current terminal and replace in an empty terminal.
- 5) Identify the phase (normally brown) to the MV1: Disconnect from current terminal and replace in an empty terminal.

If the system you are working on has three (or more) zones, the above still equally applies.

Apart from that listed above no other modification of the existing wiring is required at the CH-JB (regardless of how many zones the system has).

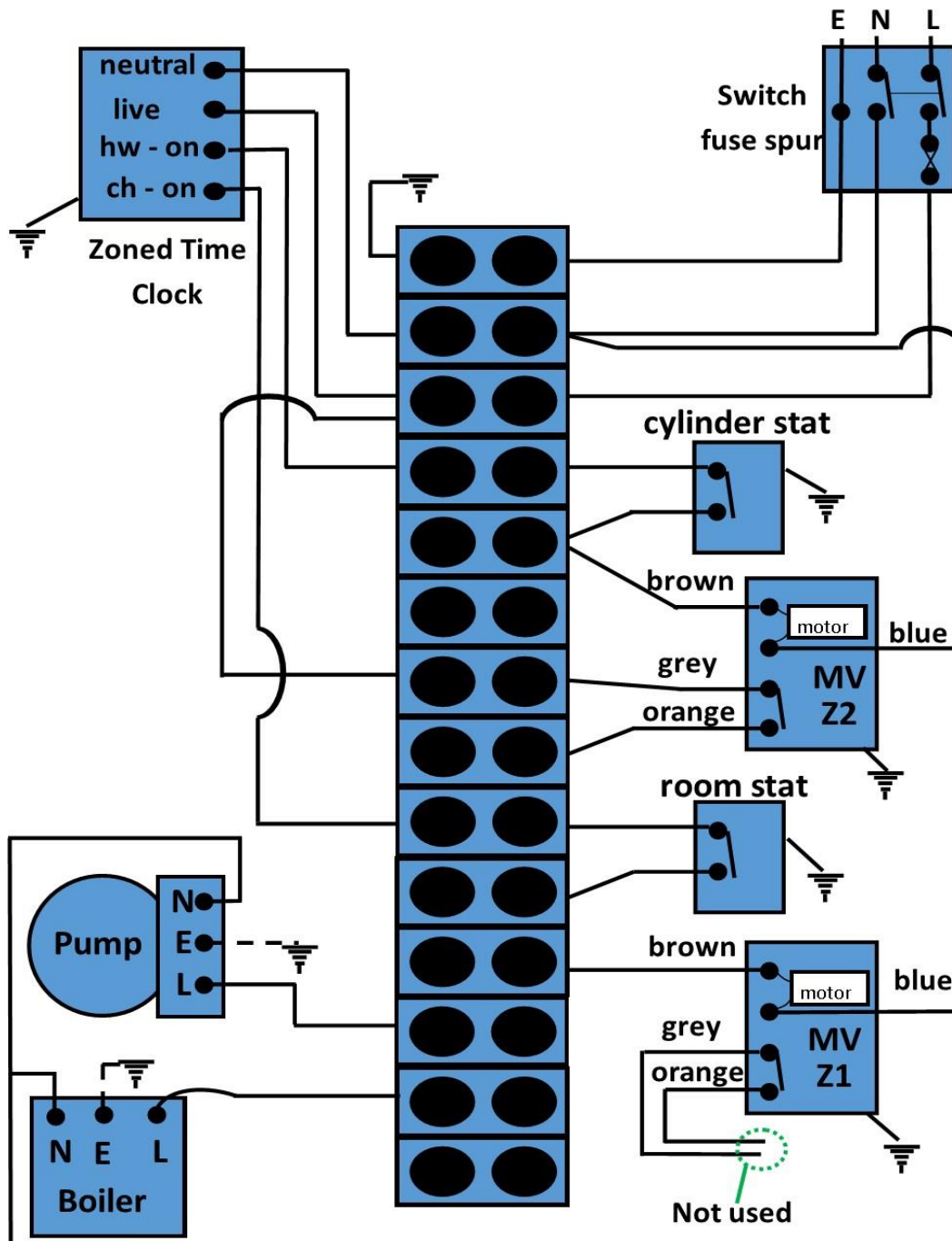
The wiring diagram below shows these alterations.

The layout of the wiring depicted will likely differ from that of your system, however functionally they must be the same.

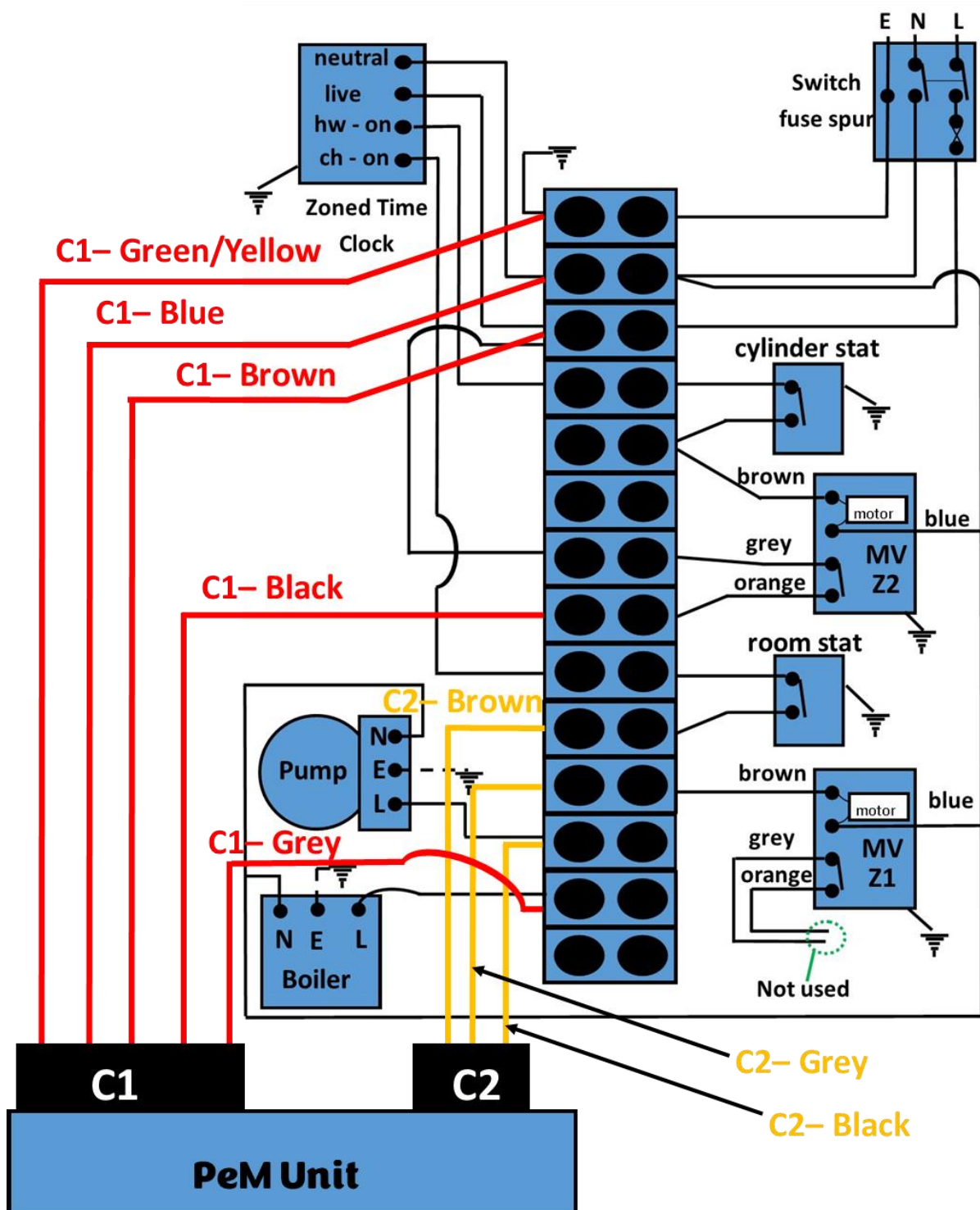
(Neutrals are not drawn at cylinder stat and room stat.)

(Note: for simplicity this diagram does not layout the Earth circuitry. This circuitry is required nonetheless).

Pre-Installation Alterations to the Existing CH-JB Wiring diagram



Connecting the PeM Unit to the system's CH-JB Wiring diagram



C1 (cable 1 from PeM Unit) connections:

- C1 (cable 1): Green/yellow is connected to CH-JB's Earth terminal.
- C1 (cable 1): Blue is connected to CH-JB'S neutral terminal.
- C1 (cable 1): Brown is connected to CH-JB'S permanent live terminal.
- C1 (cable 1): Black is connected via CH-JB to MV2's aux switch wire (usually orange).
- C1 (cable 1): Grey is connected via CH-JB to Boiler's live.

C2 (cable 2 from PeM Unit) connections:

- C2 (cable 2): Brown connected via CH-JB to the room stat's switch wire.
- C2 (cable 2): Grey connected via CH-JB to brown of MV1 (live to MV's motor).
- C2 (cable 2): Black connected via CH-JB to live going to circulating pump.
- C2 (cable 2): Blue not used and should be made safe.
- C2 (cable 2): Green/yellow connected to green/yellow of C1 inside the PeM Unit, providing a CPC (current protective conductor) for cable C2. It is not necessary to connect this to the CH-JB, but the cable end should be made safe.

Purge & Control Stat

The Purge & Control Stat (a pipe/cylinder stat) should **NOT be fitted to pipework until the PeM installation is completed and found to be operating/wired correctly.**

What does the Purge and Control Stat do?

Where the heating controls (programmer, room-stat or cylinder-stat) shut the heating system down, the Purge & Control Stat holds MV1 open and keeps the circulating pump running until the boiler cools.

Example 1:

The room-stat reaches temperature and calls to shut the burner down: MV1 will remain open, and the pump will continue to circulate until the room stat calls for the burner again or until the boiler cools.

Example 2:

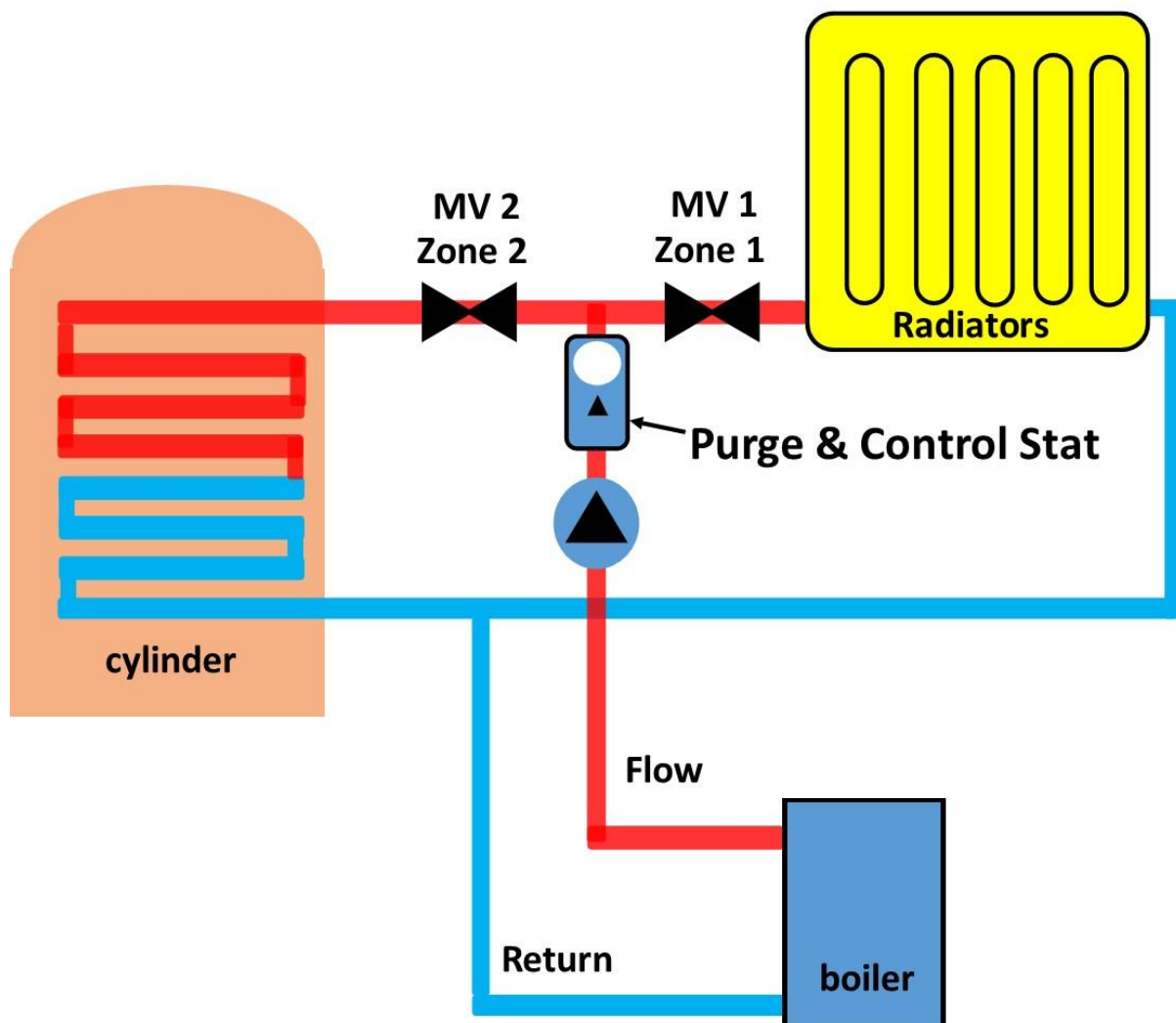
The Hot water zone goes OFF after, say, one hour: MV 1 will open, and the pump will continue to circulate until the boiler cools. (The radiators of Zone 1 will then be heated by the 'cooling' boiler.)

The consumer/user can disable this function by setting the Purge & Control Stat to its highest setting (90⁰ C). Disabling this function will reduce the efficiency that, otherwise, would be achieved with the **PeM Heat Recovery System.**

The Purge & Control Stat must be fitted to the boiler's "flow" pipe, ideally immediately before the pipework branches of to the motorised valves.

Note: The circulating pump is not always on the "flow" from the boiler: **Check first!**

S-Plan Heating System 2-Zone



Commissioning the PeM Installation

(Validating the new wiring is correct)

The PeM Heat Energy Recovery System has multiples of functions. These functions are pretested before the units are dispatched.

However, it will be necessary to ensure that the PeM Unit has been installed correctly.

Turn the installation's room stat and cylinder stat to their maximum setting.

Test 1:

- 1) Set the Purge & Control Stat to its highest setting (90⁰) and lay on a cool surface (floor or such).
- 2) Energise the heating system by turning 'ON' the system's main isolator (switch/fuse-spur).
- 3) Ensure all zones are 'OFF' at the programmer/timeclock.
- 4) Check, in particular, there is no power going to the circulating pump and MV1. Additionally, check the same is true for remaining motorised valves and the boiler/burner.

Where the above conditions are met continue to Test 2, otherwise check the wiring of the PeM installation.

Test 2:

Validate the Purge & Control functions, Switch from mode 1 to mode 2

- 5) Mode 1: Set the Purge & Control Stat to 30°C (ensure that this has not energised the pump).
- 6) With a soldering iron, heat the sensor surface on the rear of the stat until the stat reaches temperature: Stat enters Mode 2.
Check: This should energise **both** MV1 and the circulating pump but not any other component of the heating system.
- 7) Allow the Purge & Control Stat to cool, naturally. **Do not manually adjust the stat's setting.** [This process can be quickened by holding the stat's sensor face on a cold pipe or on the face of a hammer etc.] Stat returns to Mode 1: The pump and MV1 shut down.

Where the above conditions are met continue to Test 3, otherwise check the wiring of the PeM installation.

Test 3:

- 8) Turn Zone 1 'ON' at the programmer/timeclock.
- 9) Immediately, check the pump, MV1 and the burner are energised. The red LED on the PeM Unit should also be lit.

Where the pump, MV1 and the burner do not energise, turn Zone 1 'OFF' at the programmer/timeclock and after 60 seconds repeat steps 8) and 9) **once only**.

Where the above conditions are met continue to Test 4.

Where the pump, MV1 and the burner fail to energise through these two operations, check wiring of the PeM installation.

Test 4:

- 10) Ensure all Zones are 'OFF' at the programmer/timeclock.
- 11) Turn 'ON' Zone 2 (hot water) at the programmer/timeclock. Immediately check that the pump, MV2 and the boiler are energised. The red LED on the PeM Unit should also be lit.

Where the pump, MV2 and the boiler do not energise, turn Zone 2 'OFF' at the programmer/timeclock and after 60 seconds repeat steps 10) and 11) **once only**.

Where the pump, MV2 and the burner fail to energise through these two operations, check wiring of the PeM installation.

Where the above conditions are met, continue.

- a) With Zone 2 already 'ON' at the programmer/timeclock, leave this 'running' for at least another 20 minutes.
- b) With the zip ties provided, strap the Purge & Control Stat to the flow pipe from the boiler.

After the 20 minutes elapses:

Test 5:

- 12) Check the pump and MV2 are energised. The red LED on the PeM Unit may be lit but not necessarily so.

Return the installation's room stat and cylinder stat to their original setting.

Purge & Control Settings:

Summer Setting

30° C



Winter Setting

25° C

