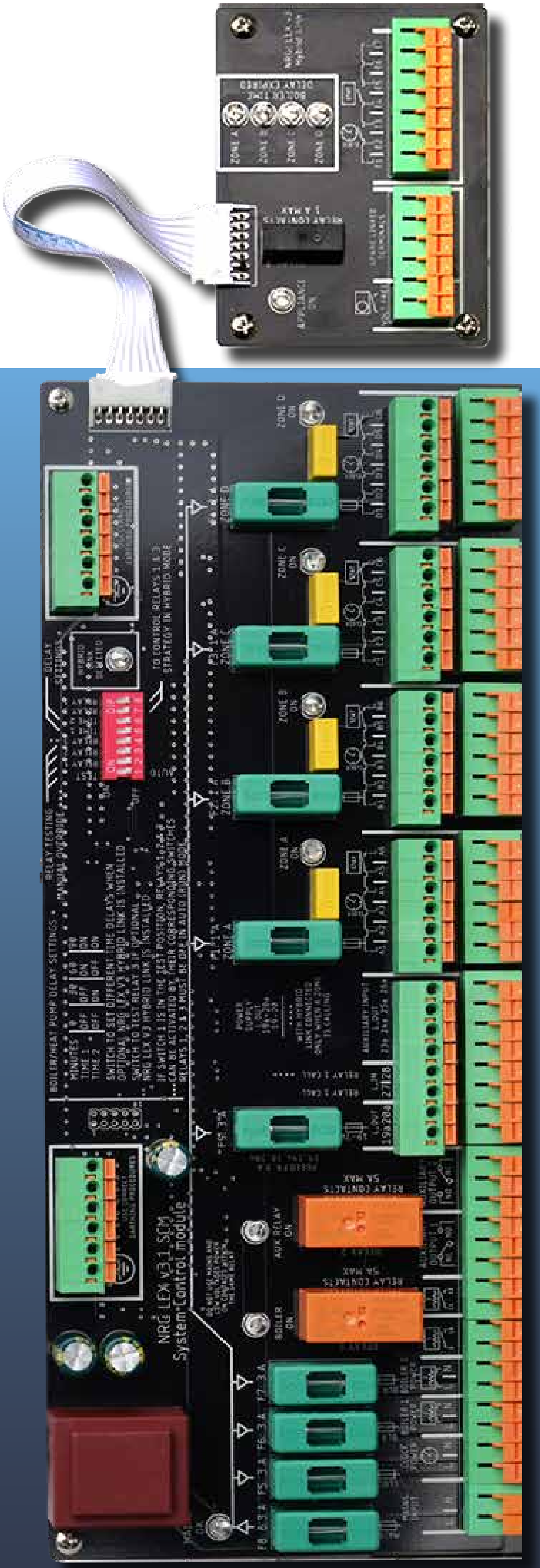


# INSTALLATION & SYSTEMS DESIGN MANUAL

nrgLEX V3.1

## Warnings and safety precautions

Before installing, read all instructions, including this manual and any related manuals or supplements.

Failure to comply could result in severe personal injury, death or substantial property damage.

A competent person must fit this product in accordance with the guidance, standards, and regulations applicable to the country or state where the product is installed.

Failure to comply with the relevant guidance, standards, and regulations could lead to injury, death, or prosecution and result in substantial property damage.

Use the correct tools and equipment for the job.

Be aware of your surroundings and take precautions to avoid hazards.

If you are unsure how to install this product safely, consult a qualified professional.

Once installed, test the product to ensure that it is working safely.

By following these instructions, you can help to ensure the safety of yourself and others during and after the installation process.

## Connections to the Power Supply

The connection method to the mains electricity supply MUST facilitate complete electrical isolation of the entire installation.

The power supply must be 230 V~, 50/60 Hz, Single Phase. Attaching the NRG Lex board to multiple phases will cause irreparable damage.

To ensure a single phase, we recommend introducing power only at the Main's input terminals (7, 8) and that all other power inputs must derive from suitable outputs on the board.

A double pole switch fused to carry the entire heating system's power load with at least 3 mm (1/8") contact separation in both poles should be used to serve only the NRG Lex panel.

The connection point to the mains should be readily accessible and, if possible, adjacent to the NRG Lex unit.

Always isolate the AC mains supply before installing or working on any components that require 230 V~, 50 Hz supply.

Only use 0.5 mm2 to 1.5 mm2 cables when connecting to the NRG Lex v3 SCM.

Wiring external to the NRG Lex printed circuit board MUST follow current statutory wiring regulations and any applicable local regulations.

Devices attached to NRG Lex MUST be earthed correctly in accordance with the manufacturer's specifications.

**Note**:

The zone LED indicator might have a dim light when the zone is not calling due to induction, but it will glow brightly when the zone is calling.

## Use of RCDs

An RCD, short for residual current device, is a critical safety device engineered to safeguard against potentially lethal electric shocks caused by contact with live electrical components, such as exposed wires. It also contributes to reducing the risk of electrical fires. Unlike regular fuses and circuit breakers, RCDs offer unique personal protection.

It is essential to ensure that the electrical installation employs the correct size and type of safety device (RCD) when using inverter-driven heat pumps. Pay attention to the specific requirements for the RCD's sensitivity to guarantee the safety and proper functioning of the electrical setup.

Additionally, it is crucial to power the NRG Lex directly through the same supply that passes through the same RCD. Using an independent parallel power supply for the NRG Lex could lead to an imbalance in the RCD, potentially causing it to trip.

# Table of Contents

**Features:**

Fused Power Supply: The fused power supply protects the system components from damage.

Zone Control: Four zones with individual fused connections. The zone blocks have terminals for clocks, programmers, thermostats, motorized zone valves, or zone pumps.

Boiler Power Supplies: Two fused power supplies specifically to protect boilers and provide a reliable power supply for the heating equipment.

Boiler Control Circuits: Two boiler control circuits usable for switch-live or voltage-free controls, providing flexibility when connecting the unit to various boiler switching types.

LED Indications: LED indicators that show the status of zones, boiler calls, and auxiliary operations make monitoring the system's operation easy.

Auxiliary Provision: Auxiliary relay provision with four isolated inputs and two sets of isolated relay contacts (C, NO, NC) for more complex control scenarios and integration with other systems.

Hybrid System Support: An optional Hybrid Control Module (HCM) can connect directly to the NRG Lex v3, allowing the NRG Lex v3 to control a priority heat source with a secondary backup, creating a hybrid system: typically a primary heat pump and a secondary boiler.

Relay Operation Testing: Onboard facility to test relay operations for maintenance and troubleshooting.

Frost Input: An optional frost input can trigger a boiler call when frost protection is required, ensuring the heating system responds appropriately to temperature changes.

Easy Connections: "Push-Open" connections suitable for 0.5 to 1.5 mm2 cable sizes used to simplify the installation process.

Scalability: Scalability allows multiple NRG Lex units to interconnect within a single heating system.

**Benefits:**

Zoned Heating Control: Efficient control of different zones, ensuring each area receives the desired heating level without wasting energy.

Energy Efficiency: The optional hybrid control module support and heat pump prioritisation contribute to increased energy efficiency and lower utility bills.

Customisable Control: Inputs, outputs, and testing facilities provide customisation options for complex heating control scenarios.

Easy Installation: The "Push-Open" connections and clear LED indicators make installation and setup easier for installers.

Flexibility: Can adapt to various heating system setups with different boiler firing control options and zone configurations.

Reliability: Fused power supplies, auxiliary provisions, and relay testing features ensure the heating system's reliable and stable operation.

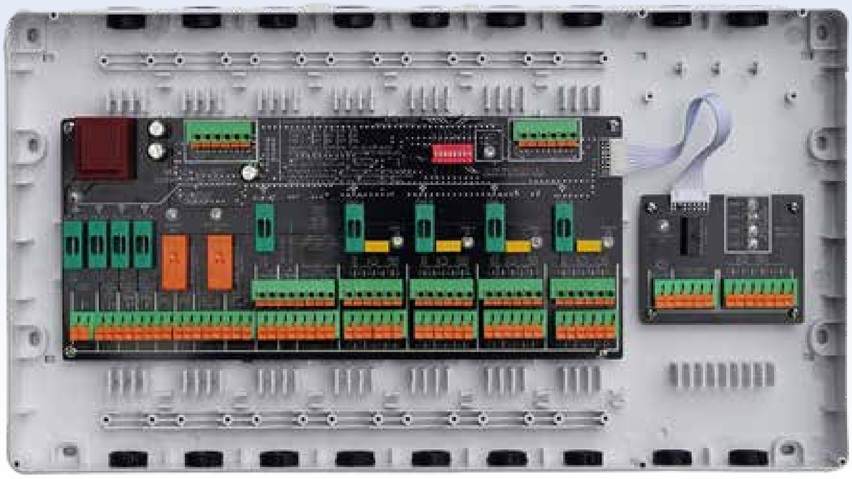
Scalability: Scalability feature enables the expansion of the heating system while maintaining centralised control, which is particularly beneficial for larger installations.

Advanced Control: The ability to manage pumps, valves, and other auxiliary components enhances the overall control and performance of the heating system.

Maintenance and Troubleshooting: Relay testing capabilities and LED indicators help identify issues quickly and simplify maintenance tasks.

Enhanced Safety: Fused power supplies and isolated inputs/outputs contribute to system safety by preventing potential electrical issues.

*Figure 1: NRG Lex 3*



| | |
|---|---|
| POWER SUPPLY RATING | 230 V~, 15 mA, 50 HZ / 60 HZ, 1 PHASE |
| POWER SWITCHING CAPACITY - (COMBINED LOAD) | MUST NOT EXCEED 5 A FOR ALL LOADS |
| MAIN RELAY RATING | DOUBLE POLE NORMALLY OPEN -DPNO 5 A |
| BOILERS - BOILER VOLT FREE CONTROL SWITCHES | 2 |
| BOILER SUPPLY | 2 |
| CLOCK SUPPLY | 1 |
| BOILER FROST PROTECTION | 1 |
| AUXILIARY INPUTS | 4 |
| AUXILIARY OUTPUTS | 2 SETS OF DOUBLE POLE CHANGEOVER 5 A |
| OPERATING TEMPERATURES | 0 - 50°C |
| ENCLOSURE RATING | IP20 |
| MAIN FUSE | 6.3 A, 230 V ~ T ANTI-SURGE |
| BOILER/CLOCK FUSING | 3.0 A, 230 V ~ T ANTI-SURGE |
| ZONE FUSES | 4 x 1.0 A, 230 V ~ T ANTI-SURGE |
| ZONE CALL INDICATORS | 4 |
| MAINS SUPPLY INDICATORS | 1 |
| BOILER CALL INDICATORS | 1 |
| AUXILIARY CALL INDICATORS | 1 |
| TRANSIENT SUPPRESSION (VDR X 2) | YES |
| TERMINALS | 0.5 $MM^2$ TO 1.5 $MM^2$ |
| PCB DIMENSIONS | 128 X 298 X 30 MM |
| ENCLOSRUE DIMENSIONS | 257 X 450 X 90 MM |
| MOUNTABLE | DIN RAIL OR SCREWS |
| PCB WEIGHT | 410 G |
| WEIGHT WITH ENCOSURE | 1770 G |

## Introduction

The NRG Lex v3 System Control Module (SCM) from NRG Awareness is a reliable operating system for your heating system. The design layout makes installing and following the system operation easy, making it safer and easier to perform routine maintenance and fault-finding.

This manual is a practical guide for safely and correctly installing the NRG Lex v3 SCM and associated time/temperature controls and connection methods to various third-party heat sources.

The NRG Lex v3 SCM meets the performance requirements of most domestic and light commercial heating systems, offering precise control of your design strategy for years of trouble-free operation.

This manual explains how to:

- **Understand the NRG Lex v3 SCM**
- **Install the NRG Lex v3 SCM,**
- **Wire the NRG Lex v3 SCM to configure up to four zoned control circuits and two heating appliances connected in parallel.**
- **Install and connect the optional Hybrid Control Module (HCM) to control a primary heat source, for example, a heat pump, with an interlinked second controllable boiler, such as an oil, gas, or biomass appliance.**

## Basic System Control Module Layout

The NRG Lex V3 is divided logically into six different areas with various purposes:

- **Power supplies,**
- **Boiler switch controls,**
- **Auxiliary controls for supplementary functions,**
- **Zone time & temperature connections for pumps or motorised valves,**
- **Earth blocks**
- **Microswitches for relay testing and hybrid system setup.**

## Hybrid Control Module

An optional Hybrid Control Module (HCM) that fits neatly in the same enclosure can be connected to the NRG Lex v3 to control a secondary boiler with primary boiler (heat pump). There are two versions of the HCM, one for the NRG Lex 3 and one for the NRG Lex 3.1.

**Note**: When the hybrid board is attached to the main board, its relay 3 becomes the primary heat call control for the NRG Lex v3 module.

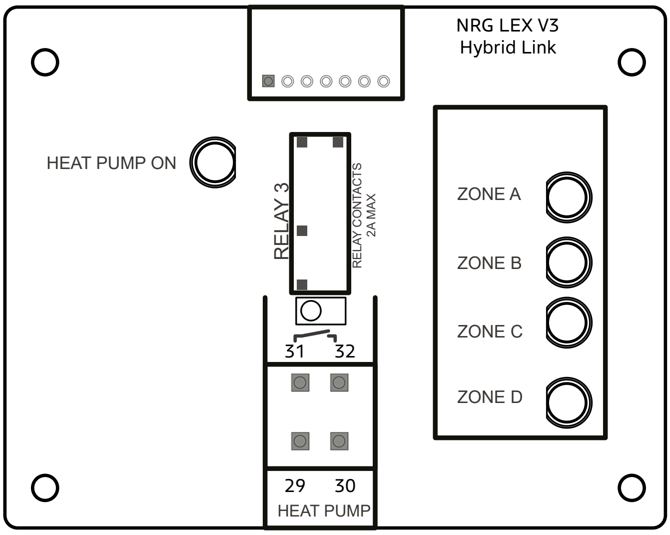



*Figure 2: Hybrid Control Module for Lex 3*

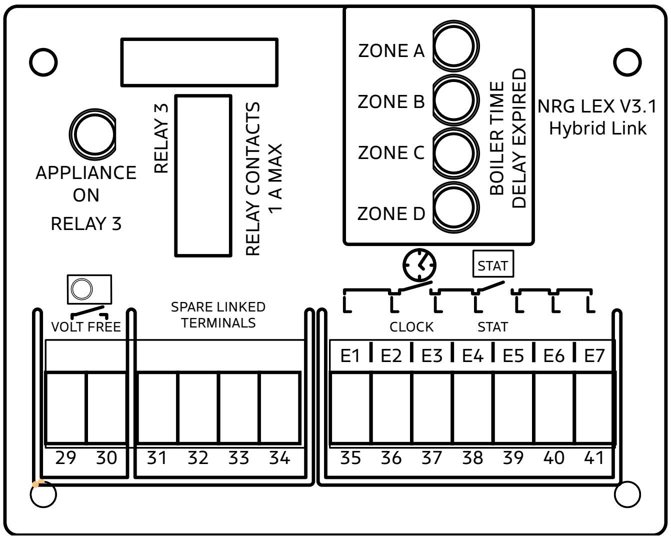



*Figure 3: Hybrid Control Module for Lex 3.1*

## NRG Lex v3.1 Layout - Layout

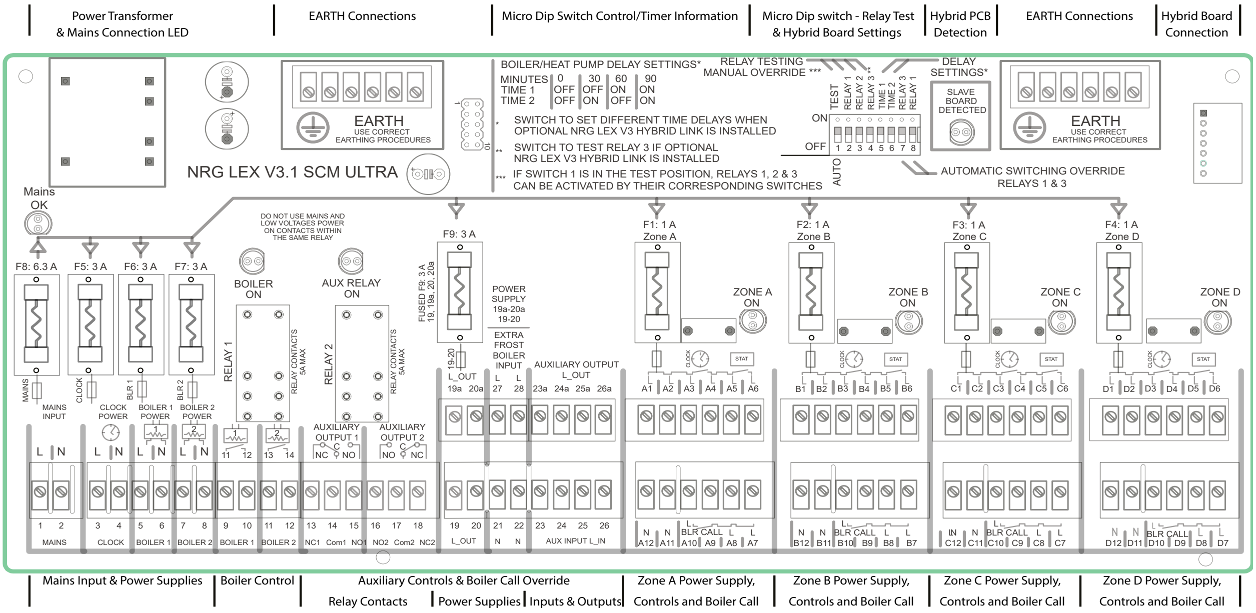



*Figure 4: NRG Lex v3 Layout*

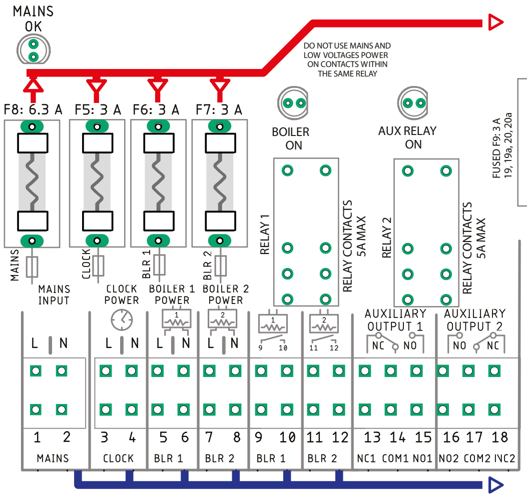



*Figure 5: Power, boiler and auxiliary blocks*

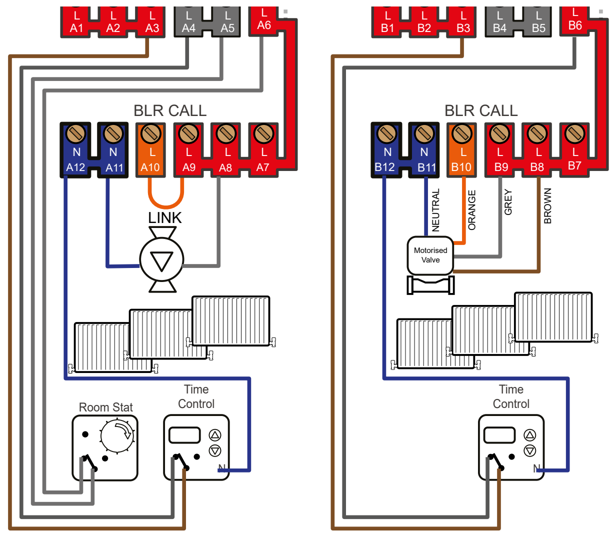



*Figure 6: Zone wiring with circulator or motorised valve*

## 1. Power Supply

When a power supply connects to 1 Live (L) and 2 Neutral (N), onboard tracks conduct the power to the other Live and Neutral terminals. The 'Mains OK' LED will illuminate when the power supply is on. The main 6.3A fuse (F8) supplies all the other Live terminals through the other fuses (F1, F2, F3, F4, F5, F6, F7 and F9). Each neutral terminal directly connects with the others.

Terminals 3-8 provide power to central time/temperature controllers and permanent power supplies to boilers or other system appliances, each with independent fuses with a maximum fuse rating of 3A.

## 2. Zone Controls

Zone control blocks A, B, C and D are identical, each with 12 terminals. Terminals 1-3 are permanent live outputs supplied through the zones' 1A fuse. Terminals 4 and 5 are connected, and terminals 6, 7, 8 and 9 are connected. Terminal 10 is the boiler call; a live signal into this terminal will switch the boiler relay and light the zone call LED.

The printed NRG Lex symbols provide a diagrammatic path, showing the general zone-control strategy that takes power from terminals 1, 2 or 3, with neutral terminals 11 and 12 to the respective zones. The terminals usually supply live power to a zone's time & temperature controls or a programmable thermostat.

For example, a clock powered from 1, 2, or 3 with its SL back to 4 linked to 5. Terminal 5 supplies an ambient or a Domestic Hot Water (DHW) thermostat, switching back to 6, which is preconnected to terminals 7, 8 & 9 that are used to power a pump or a motorised valve, again using neutral terminals 11 and 12.

Note: For the Lex 3.0 the numbering of terminals 7-12 are read from 7 to 12 left to right. This was changed for the NRG Lex 3.1 to read from right to left to make the control logic easier to follow. The position of the terminals stay the same so terminals 7 & 8 are the neutrals on the Lex 3.0.

## 2.1 Fault Finding

The NRG Lex LEDs will identify when the controls call for a zone to heat. This indication can also determine if a zone time or temperature control is faulty by switching each of the two and observing the effect on the LED.

The LEDs are particularly useful with motorised valved-based installations, especially when the valve incorporates an LED. The illuminated valve LED will identify that the time and temperature controls are working, and the NRG Lex Zone LED will help determine that the valve's integral microswitch has closed to call for heat.

## 2.2. Multi-Channel Programmers

When it is preferable to use a multi-channel programmer for time control of many zones, take power from the central time control supply live at terminal 3, fused at 3A, and neutral from the adjacent terminal 4. The switch lives from a multi-channel programmer, which can then bypass the zone power supply and go directly to terminal 4. If the programmer has time and temperature control, common with wireless thermostat systems, the switch-live can go directly to terminal 6.

## 2.3. Programmable Thermostats

As programmable thermostats incorporate time & temperature features, they would connect from a zone

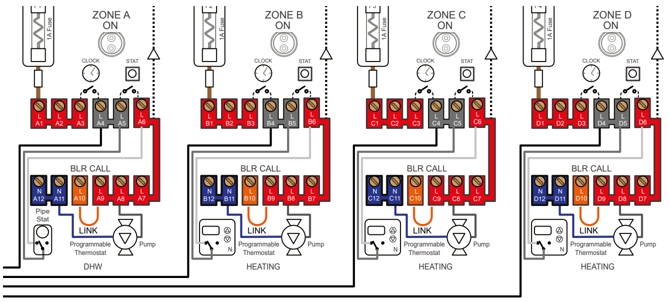



*Figure 7: Zones wired with a multi-channel programmer*

live (1, 2 or 3) and switch directly to terminal 6, bypassing terminals 4 and 5.

## 2.4. Zone Circulator Control

When circulators control the heating of a zoned circuit, they connect in series with the zones' time and temperature controls. The circulator's live power connects to one of the zone's terminals 7,8, or 9, and the neutral to terminals 11 or 12. The pump's earth connects to one of the earth blocks.

As pumps do not have auxiliary switching to call a boiler when operating a zone, a switch live link must be supplied to terminal 10 to activate the boiler relay when a zone is calling, typically by linking terminals 9 and 10.

**Note:** For example, terminals 1-6 may be used for time and/or temperature control for a domestic hot water recirculation pump. The pump can be supplied from terminals 7, 8 or 9 as with normal zone pumps, but omitting the link to terminal 10 will prevent the boiler relay from switching. This method will keep the DHW recirculation zone independent from the boiler controls.

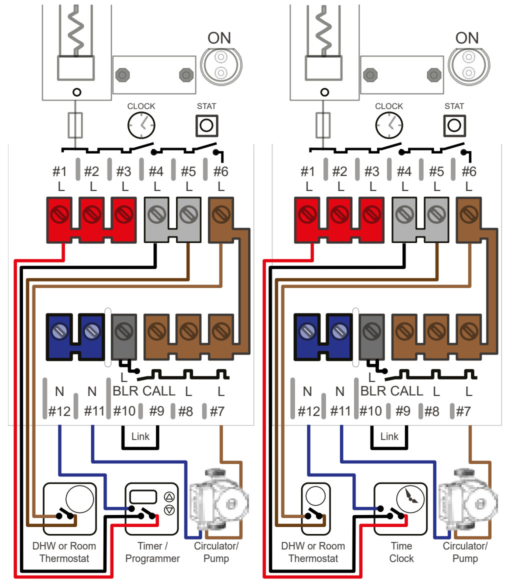



*Figure 8: Zones with circulation pumps*

## 2.5. 2-Port Motorised Valves

If any of the four zones is to control a 2-port motorised valve, then the power to the valve would connect to the respective switch live terminals (7, 8, 9) and its neutral from11 or 12. The valve's auxiliary microswitch would take its power (grey) from the fused input, 1, 2 or 3, or Terminals 7, 8 or 9, and the switch live (orange) would connect to terminal 10. That connection method will safely interlock the boiler with the zone call, preventing the boiler from firing unless the control valve has opened.

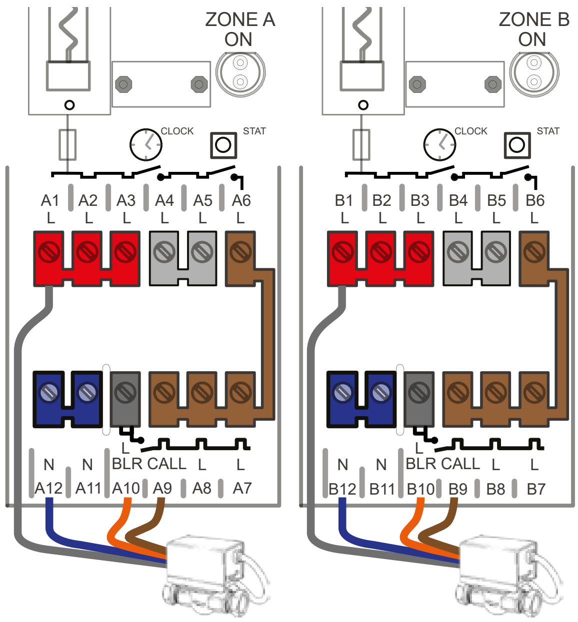



*Figure 9: Wiring of motorised valves with NRG Lex v3*

## 2.6. 3-Port Motorised Valve

The key elements to correct 3-port motorised valve control are typically as follows:

1, Heating Off, DHW Off, - Grey Wire Live

2, Heating Off, DHW On, - No Wires Live

3, Heating On, DHW Off, - Grey and white Live

4, Heating On, DHW On, - White Wire Live

Two NRG Lex zones are required to operate a mid-position 3-port motorised valve where port AB is the valve entry or common port. Valve port B remains open (typically to the hot water zone) when the valve is not activated, and port A supplies the heating zone when there is a heating call.

The first (DHW) zone time control and thermostat have two crucial valve operation functions. In this example, the DHW normally closed or clock 'off' connection supplies power to the grey wire in the valve at terminal A7.

### DHW Call (Grey Wire Energised)

The 3-port valve will remain open to DHW unless the motor is powered. The wires are already in place; therefore, when the DHW time control and the DHW stat call, the power is directed to terminal 10 for the boiler to heat the water.

### Heating Call (Grey & White Wire Energised)

The heating zone call requires this power at the grey wire to open the valve to the heating position (Port A) and to call the boiler when the zone calls. The power on the grey from the DHW 'Off' position allows the valve to open to heating port A. The heating controls energise the white wire, which goes through the microswitch within the valve and out through the orange wire into terminal 10 on the heating zone to fire the boiler.

### Heating & DHW Call (White Wire Only Energised)

The grey wire is de-energised when the DHW controls are calling. Internal switches and other components ensure the motor holds at this mid-point, and the white wire now has live power to pass through a microswitch within the valve and into terminal 10 to call the boiler to heat the zones.

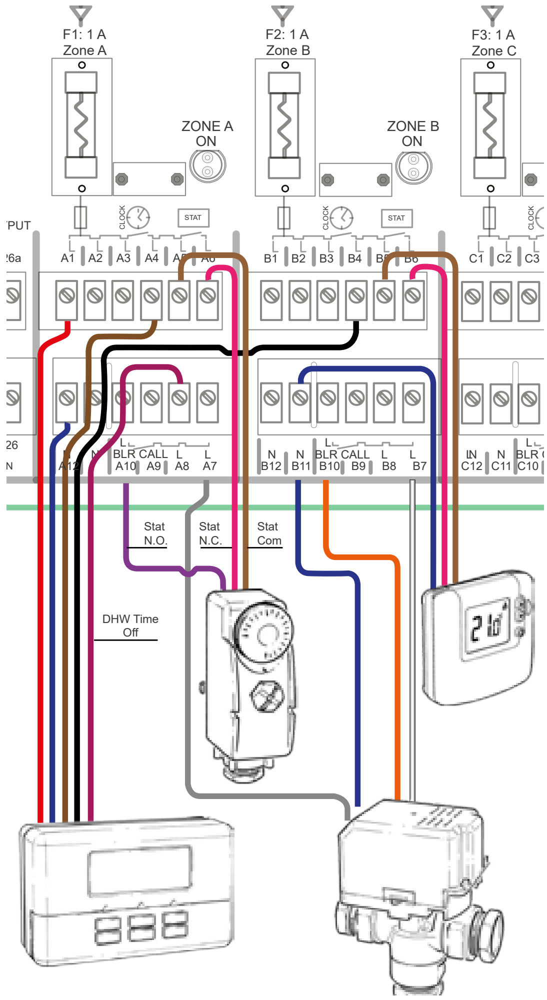



*Figure 10: Wiring of a 3-port valve using 2 zones*

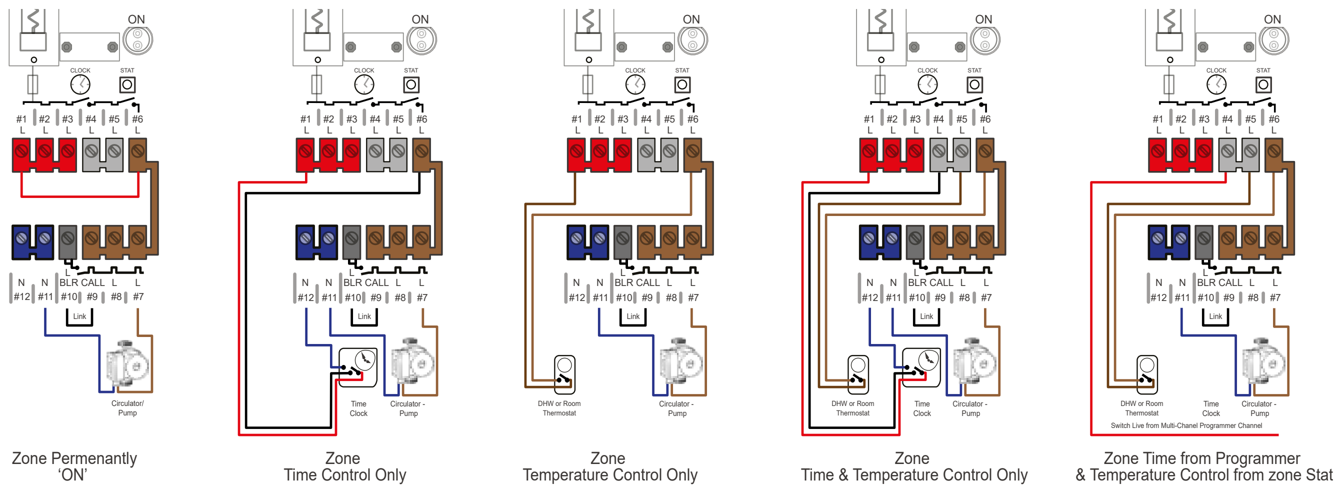



*Figure 11: Examples of zone wiring*

## 3. Boiler Call Control

Unless the optional Hybrid Control Module (HCM) is connected, the double pole Boiler Control - Relay 1 is the primary boiler call relay when power connects at any zone's terminal 10. Relay 1 can call a single or two heat sources using one of the two sets of volt-free contacts, 9 & 10 or 11 & 12.

Any switch-live input into a zone's terminal 10 will switch the boiler relay, generally by having a link between zone terminals 9 and 10.

If terminal 10 on any zone is powered to energise the boiler control relay, it will remain isolated from all other zone calls.

However, if the HCM board connects to the main board, the LED will illuminate, and the HCM Relay 3 will become the primary boiler call and close contact when any zone terminal 10 is energised. Boiler Control – Relay 1 will now be the secondary boiler call and operate depending on the settings of the microswitches explained later. This feature is convenient for systems with two types of heat sources that don't always have to fire simultaneously, such as hybrid systems with heat pumps and boilers.

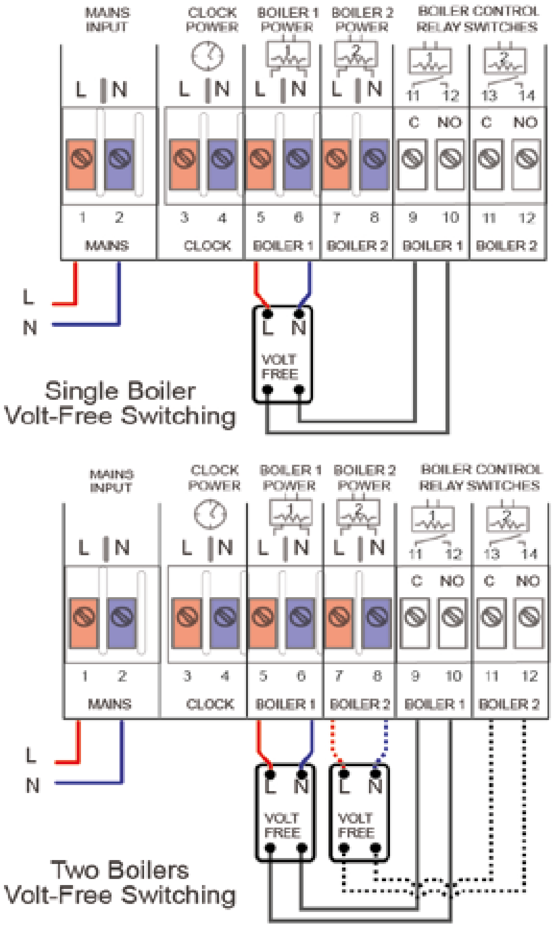



*Figure 12: Wiring examples of Volt-Free boilers*

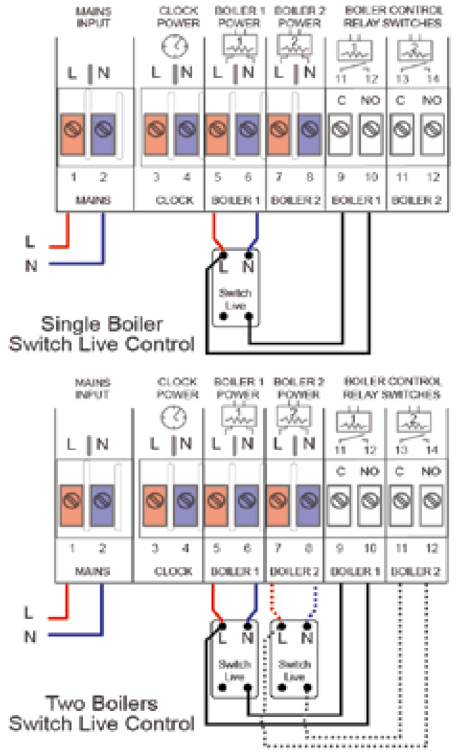



*Figure 13: Wring examples of Switch-Live boilers*

## 4. Boiler Call Override & Frost Input

Terminals 27 and 28 are independent inputs that, when energised, will close the Boiler Control Relay 1 contacts, 9 - 10 and 11 - 12. They have many uses, including frost protection or overriding the zone-dependent boiler call.

The power for the frost protection thermostat, or any other ancillary function, is typically taken from Fuse 9 (3A) terminals 19, 19a, 20, or 20a.

## 5. Interconnecting Multiple NRG Lex Units

Numerous NRG Lex SCMs can interlink in series by taking a switch live through the boiler relay of one NRG Lex and supplying it to the frost input terminal on the next NRG Lex. The last NRG Lex in the chain will have the system boiler(s) connected to its boiler relay.

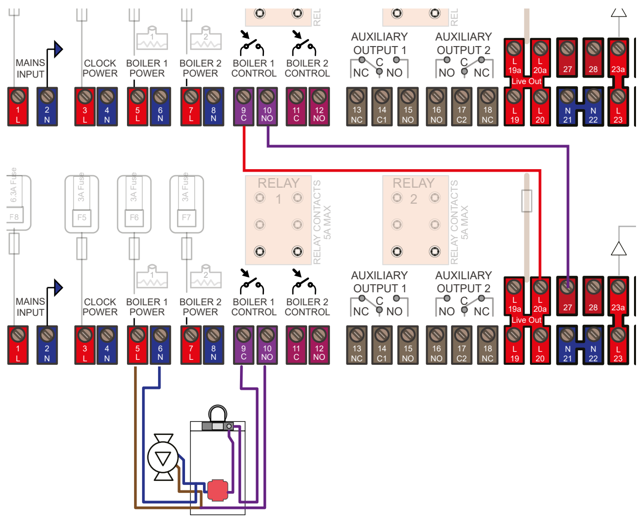


*Figure 14: Two NRG Lex v3 boards interlinked*

## 6. Auxiliary Control Relay

The auxiliary controls give the NRG Lex V3 great flexibility to accommodate various auxiliary system options. For example, to isolate the power to zones that are not required when Priority DHW is needed.

The Auxiliary output is a double pole changeover unit with two switches, each having a common (C), normally closed (NC) and normally open (NO) terminal. The common and normally closed terminals are usually connected. When energised, the auxiliary relay switches contacts, breaking the connections between the common and normally closed terminals and making the connections between the common and normally open terminals.

Live power for auxiliary functions, fused at 3A, is available at terminals 19, 19a, 20, and 20a, with Neutrals provided at terminals 21 & 22.

The 4 auxiliary input terminals (23, 24, 25 & 26) are isolated from each other. Any one input terminal will operate the auxiliary relay (relay 2) when it receives a 230V supply, without back feeding to any of the other inputs.

Terminals 23a, 24a, 25a and 26a connect in series to the corresponding numbers, i.e., 23 - 23a. They provide optional additional functionality by making the switch-live to switch the relay available for other functions. For example, to operate a biomass stove pump with the same switch live used to switch over the auxiliary relay and break an oil boiler call circuit.

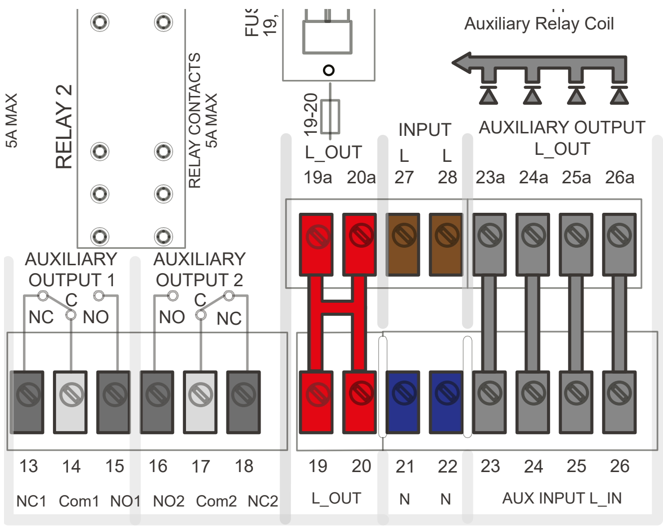



*Figure 15: Auxiliary control terminals*

## 7. Relay Test Facility

The NRG Lex v3 has eight microswitches, four of which (microswitches 1 to 4) are used to test the relays during installation and commissioning. The remaining four microswitches are related to the Hybrid Control Module (HCM) and are explained in detail in section 9.3.

- **MS1 is used to enable testing mode. When MS1 is in the "On" position MS2, MS3 and MS4 can be used to switch the relays.**
- **MS2 switches Relay 1, the boiler relay.**
- **MS3 switches Relay 2, the auxiliary relay.**
- **MS4 switches Relay 3, located on the HCM.**
- **When the testing is complete, MS1 must return to "Off" for the NRG Lex operations to operate in automatic mode.**

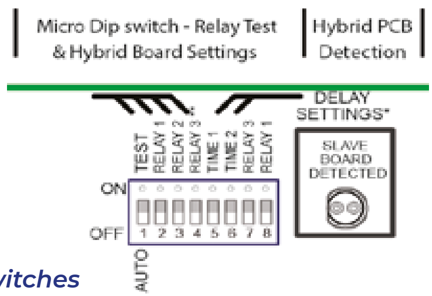



*Figure 16: Microswitches*

## 8. Relay Board Addon

The NRG Lex Relay Board has two electrical double pole double throw (DPDT) relays, R1 & R2. There are two switches per relay, each of which has three contacts. The terminals are labelled "C" (Common), "NO" (Normally Open) and "NC" (Normally Closed). When the relay is de-energised, the C is in contact with NC. When the relay coil energises, the contacts swtiches, and C connects to the NO terminal instead of the NC terminal.

A 230VAC power supply connects to the mains input "Power In" terminals. The Relay Board provides three live outputs: 2 x 230VAC and one 12VDC output. The DC output can, for example, power a DHW cylinder anode.

A live input is needed on L1 (Relay 1) or L2 (Relay 2) to switch the relays. The two microswitches on board allow either L1 or L2 to switch their respective relays or to change contacts on both relays together, allowing one input to switch both relays simultaneously.

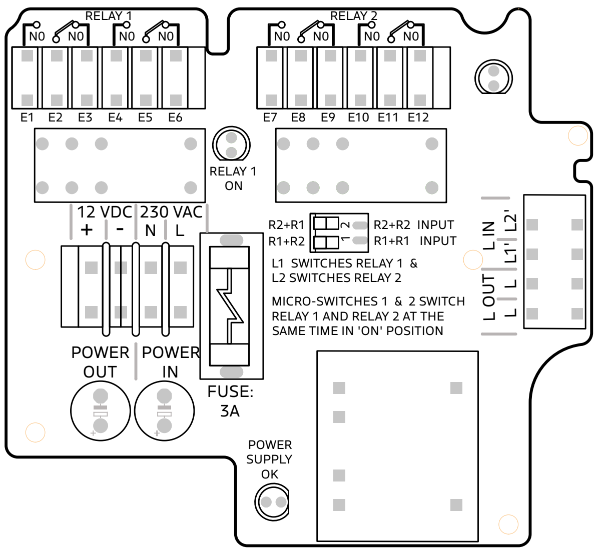



*Figure 17: NRG Relay addon.*

## 9. Hybrid Heat Pump Systems

Heat pump systems can integrate a secondary high-temperature heat source, such as an oil, gas, or biomass boiler, to optimise their Coefficient of Performance (COP) or achieve a higher output during challenging conditions. However, ensuring proper coordination and control between the heat pump and the secondary heat source is crucial to achieving optimal performance and energy savings.

The secondary heat source comes into play when the primary heat pump's efficiency drops or cannot meet the system's heat load due to a significant decrease in outdoor temperature. In extremely low outdoor temperatures, the primary heat pump may require assistance to provide sufficient heat. The secondary heat source can seamlessly take over at such times to ensure faster and more efficient heating.

Under milder weather conditions, the primary heat pump will generally exhibit a higher COP than the secondary heat source. However, as outdoor temperatures decrease, the COP of the heat pump will also decrease accordingly. Eventually, operating the secondary heat source may become more cost-effective than operating the heat pump.

### 9.1. Example Hybrid System Design Strategies

There are three commonly accepted design approaches for hybrid heat pump systems:

**1.** Employing system controls to activate the secondary heat source when any zone remains unsatisfied for longer than a predetermined duration. When a zone has been calling for a long time it indicates that the heat pump cannot meet the demand and needs assistance.

**2.** Include a buffer tank strategy, where the heat pump maintains the temperature in a buffer tank. Whenever a zone calls for heat, it draws heat from this buffer. If the buffer temperature falls below a specified setpoint, indicating that the heat pump struggles to keep up with the heating load, the secondary heat source takes over the system heating as the heat pump works to reheat the buffer to the desired temperature.

**3.** Use an outdoor thermostat to trigger a switch to the secondary heat source when the outdoor temperature drops below a predefined setpoint. This switch typically occurs when the operating cost of the secondary heat source is more economical than that of the heat pump due to a decrease in COP.

### 9.2 Hybrid Control Module (HCM)

The NRG Lex v3 SCM controls four zones and two boilers. However, adding the optional Hybrid Control Module (HCM) can enhance its func tionality, tailored explicitly for hybrid system operation. When the HCM is connected, the 'Hybrid Link Detected' LED will light up.

With the HCM in place, the NRG Lex board reconfigures its processor to accommodate the additional HCM Relay 3, which becomes the primary relay for any zone calls. Boiler Relay 1 becomes the secondary relay and takes control of the secondary high-temperature heat source.

Following design strategy 1, if a zone's heating demand extends beyond the preset time delay, Boiler Relay 1 switches on. The microswitches determine the time delay and whether the heat pump should deactivate when the boiler relay is active or stay on together with the boiler.

The HCM features LEDs that indicate its status. The 'Appliance ON' LED indicates if its relay is activated, while the four Zone LEDs (A, B, C, or D) signal if any of the corresponding four zones on the NRG Lex v3 have exceeded their designated time limits, indicating that the system is in hybrid mode.

There are two versions of the HCM, one for the NRG Lex 3 and one for the NRG Lex 3.1. The relay and control strategy are identical for both versions, but the 3.1 version offers additional onboard terminals and an additional zone (E). There are no live outputs on this board, but the unit can be helpful for optional purposes, such as wiring the time and temperature control for a domestic hot water recirculation pump.

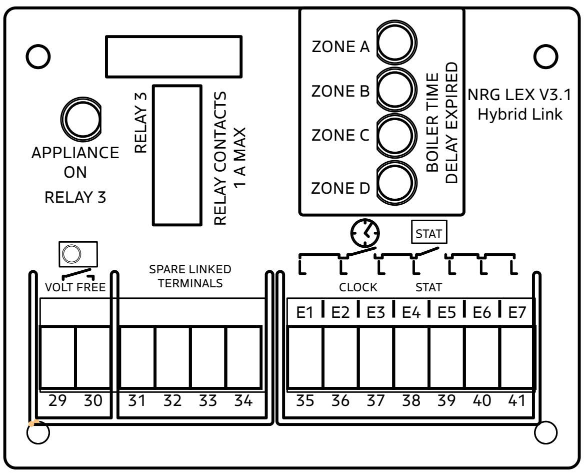



*Figure 18: Hybrid Control Module*

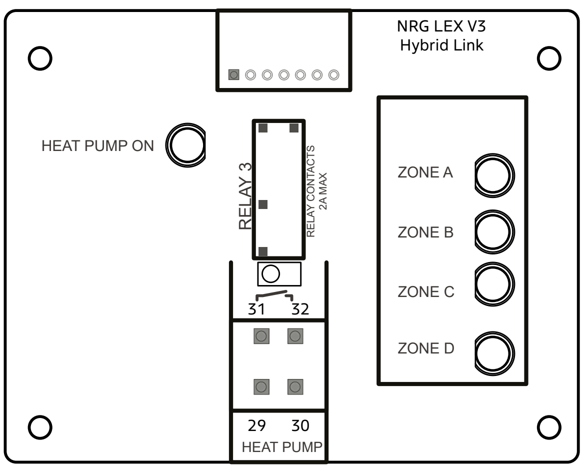



*Figure 19: NRG Lex Hybrid Control Module v3 - HCM V3*

## 9.3 Hybrid System setup with Microswitches

Microswitches 5 to 8 are crucial in configuring the system when the HCM is connected:

Miroswitch 5 and miroswitch 6 set the time delay before the secondary boiler relay switches:

- **Setting both MS5 and MS6 in the 'off' position cancels the time delay, and boiler relay 1 remains inactive.**
- **If MS5 is 'off' and MS6 is 'on,' the delay is 30 minutes.**
- **When MS5 is 'on' and MS6 is 'off,' the delay is 60 minutes.**
- **If both MS5 and MS6 are 'on,' the delay is 90 minutes.**

Microswitch 7 determines whether the primary heat source should continue running when the boiler relay is activated:

- **If MS7 is 'off,' the primary heat source turns off when the secondary heat source starts.**
- **When MS7 is 'on,' the primary heat source remains operational when the secondary heat source is active.**

Microswitch 8 controls the duration for which the boiler relay should remain active before turning off:

- **If MS8 is in the 'off' position, the boiler relay stays on for the same time delay set by MS5 and MS6 before reverting to HCM relay 3 only.**
- **If MS8 is 'on,' the boiler relay continues to operate until the zones are satisfied.**

## 9.4 Boiler Call Override & Frost Input with HCM

When the HCM connects to the NRG Lex 3, the function of terminals 27 and 28 change, such as the ability to switch to a higher-temperature heat source during colder weather or when there is a demand for high-temperature Domestic Hot Water (DHW).

NRG Lex v3

In NRG Lex v3, terminals 27 and 28 serve the same function and only function when there is a zone call and the time delay settings are off (MS5 & MS6 off).

When these settings are applied, and there is a live signal at terminals 27 or 28, Relay 1 (boiler) will activate, and Relay 3 will either deactivate or remain active, depending on the configuration of MS7.

With the time delay set to 30, 60 or 90 minutes, or no zones are calling, terminals 27 and 28 have no function.

NRG Lex v3.1

With the NRG Lex V3.1, terminals 27 and 28 have slightly different functions.

Terminal 27 will always bring on Boiler Relay 1, regardless of the time delay or zone calls.

If there is a zone call when terminal 27 is energised, HCM Relay 3 will turn off or stay on depending on the setting of MS7.

Terminal 28 will only bring on Boiler Relay 1 when there is a zone call, regardless of the time delay. Again, HCM Relay 3 will turn off or stay on depending on the setting of MS7.

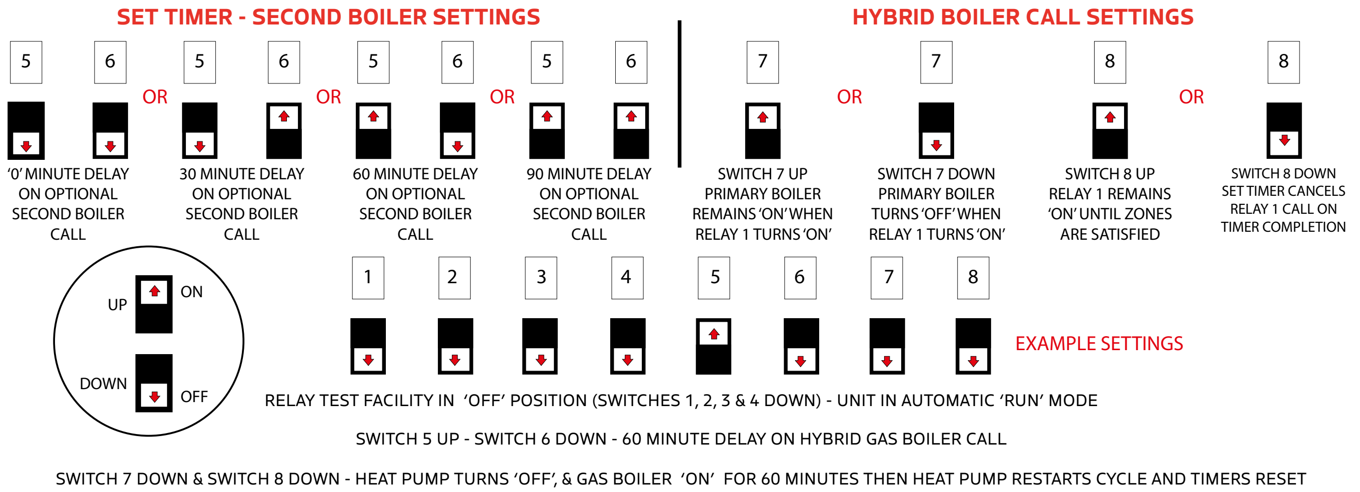



*Figure 20: Setting of the microswitches*

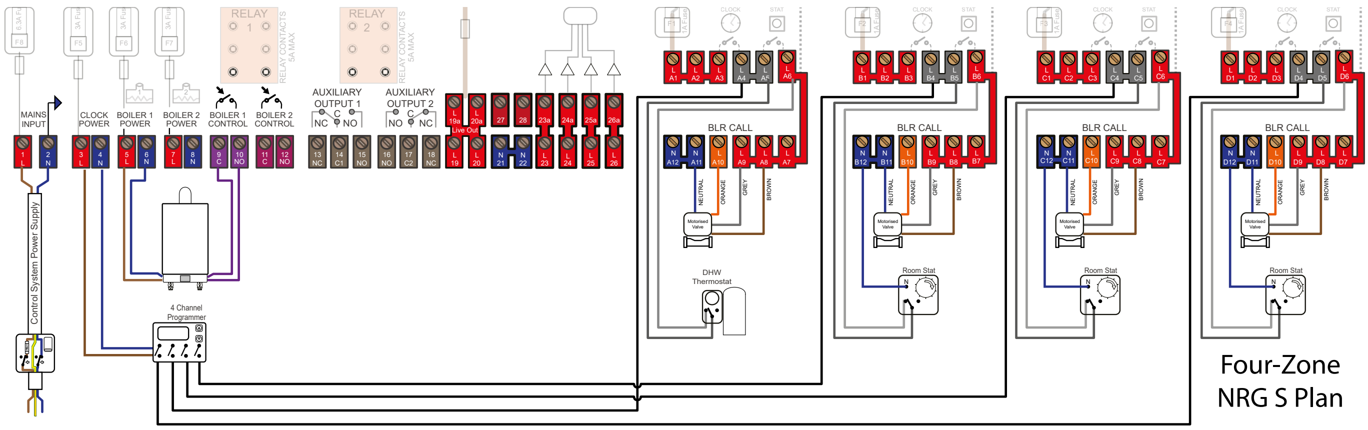
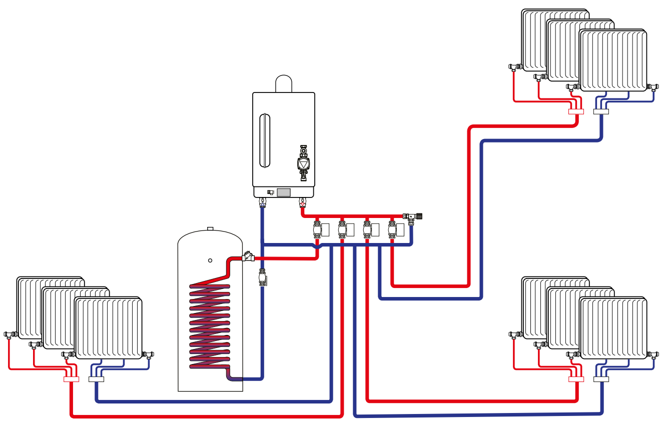



*Figure 21: NRG S-Plan Wiring*

An NRG Lex can accommodate up to 4 motorised valve-controlled zones in an S-plan configuration. Power is supplied from terminals 3 (L – 3A) and 4 (N) in systems that use a multi-channel programmer. Each switch-live wire connects to its respective zone's terminal 4, bypassing the zone's fuse. Thermostats are connected across terminals 5 and 6 to activate the valve's motor at terminal 8 and its volt-free auxiliary micro-switch at terminal 9.

When a valve opens, it conducts power to terminal 10 through the Orange wire to activate the boiler. A valve's LED can detect the failure of any zone valve by confirming that the valve has power but has not opened, while the NRG Lex zone LED indicates when the valve has opened.



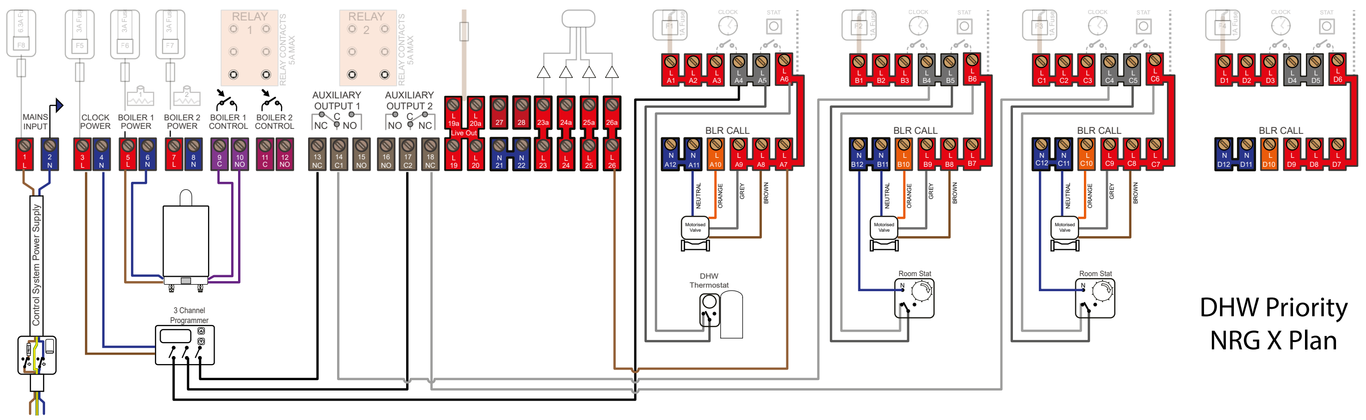
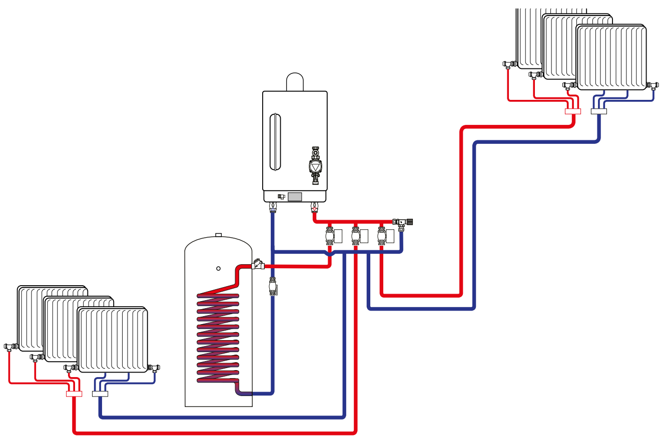



*Figure 22: NRG X-Plan - Priority Hot Water*

The NRG X Plan is similar to the S-Plan but features a priority for domestic hot water (DHW). The multi-channel programmer draws power from terminals 3 (L – 3A) and 4 (N); each switch-live wire connects to its respective zone's terminal 4, bypassing the zone fuse. The multi-channel programmer's switch-live to heating zones B and C pass through the noramlly closed (NC) contacts of the auxiliary relay.

When there is a call for DHW, terminal A7 supplies a switch-live into terminal 26, switching the auxiliary relay. The NC contacts open, de-energising the heating zones. This configuration allows the prioritised domestic hot water zone to operate independently, ensuring rapid hot water heating.



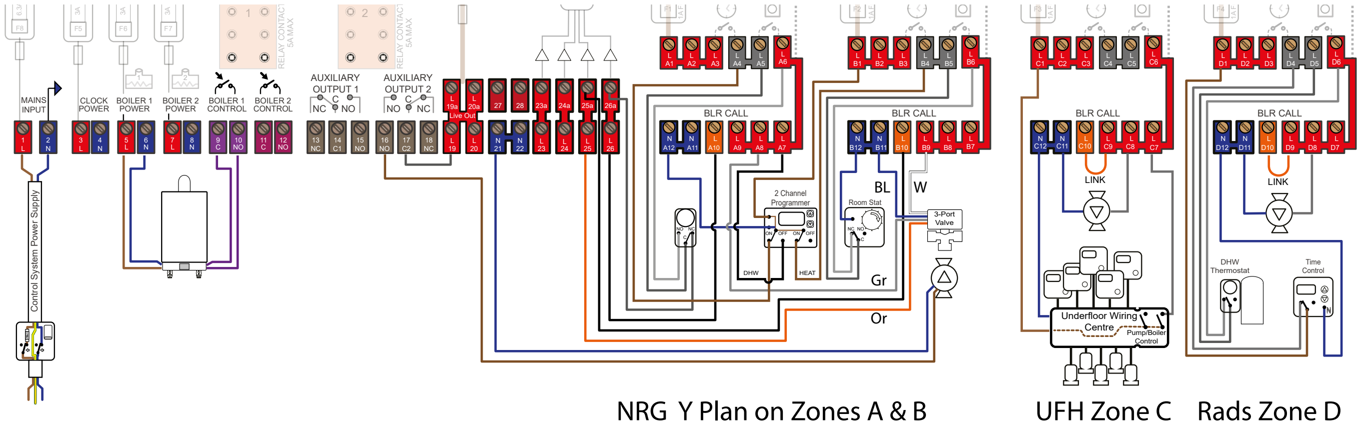
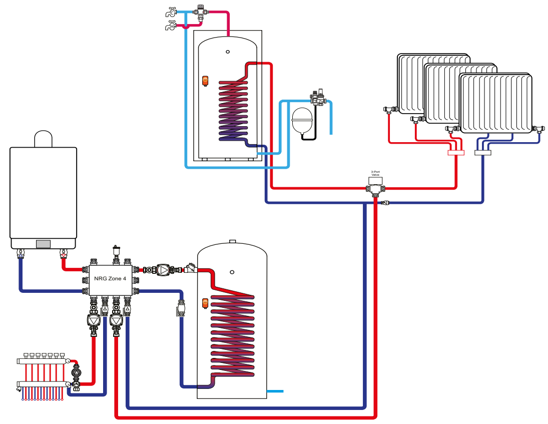



*Figure 23: Combined NRG Y Plan and two pump-controlled zones (C & D) in an S Plan configuration.*

The NRG Lex v3 can seamlessly integrate a combination of control methods, such as the NRG Y Plan, alongside two pump-controlled zones (C & D). When used with an NRG Zone manifold, this versatile system allows diverse control strategies to coexist.

In this example, zones C & D use zone pumps, while zones A & B utilise a 3-port valve with one pump supplying the valve zones. This flexible arrangement is well-suited for various projects, such as commercial properties with underfloor heating zones and dedicated domestic hot water (DHW) provision, alongside separate Y plan accommodations. Similarly, this method is applicable in residential settings where a part of the house has been converted into self-contained accommodations, each with its independent heating and DHW zones.



The three schematics above show how to wire and plumb a NRG S-Plan, NRG X-Plan and NRG Y-Plan with the NRG Lex and the NRG Zone. The following pages show a variety of schematics to cover a wide range of systems.

For more system examples see [www.nrgawareness.com/schematics](www.nrgawareness.com/schematics) or scan the QR code below.

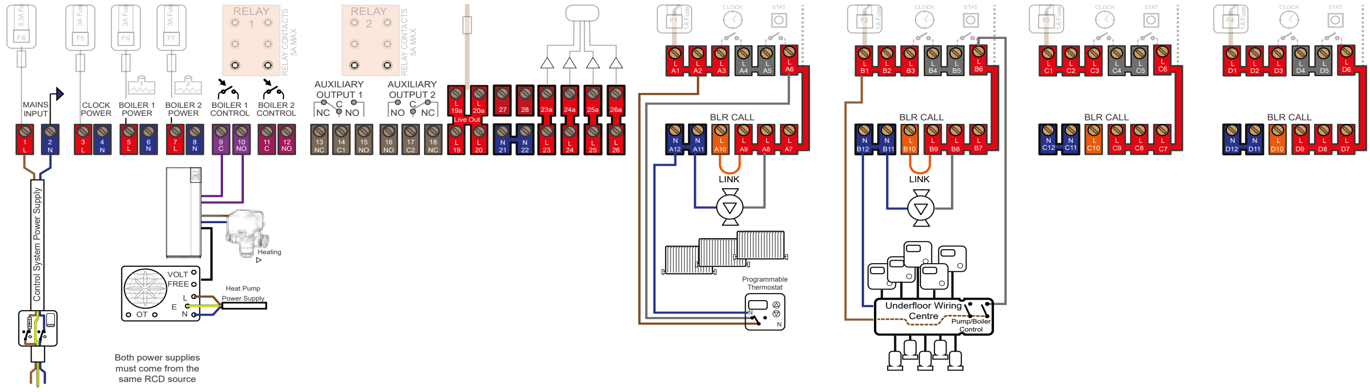
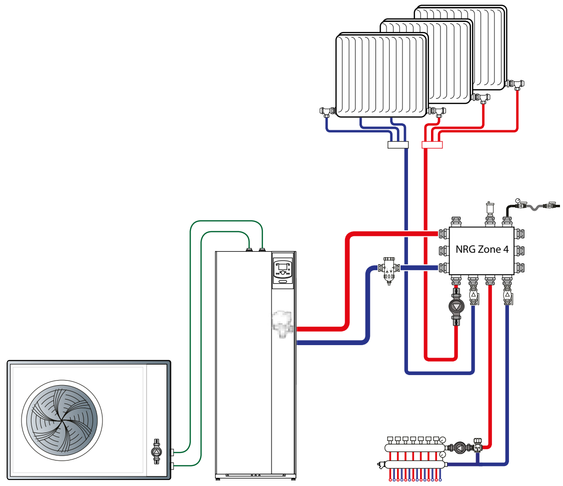


*Figure 24: Integrated DHW cylinder, a radiator zone and an underfloor heating zone*

This system comprises a heat pump with an integrated Domestic Hot Water (DHW) cylinder, a radiator zone, and an underfloor heating (UFH) zone. The heat pump's heat demand is regulated by the 'Boiler 1 Control' using the boiler relay, while DHW control is managed internally by the heat pump.

Zone A operates with a programmable thermostat. The UFH wiring centre controls Zone B and provides a switch-live signal to the NRG Lex for the boiler call and to run the UFH pump. Both zones have a link from zone terminals 9 to 10, which closes the boiler relay and activates the heat pump when the zones require heating.



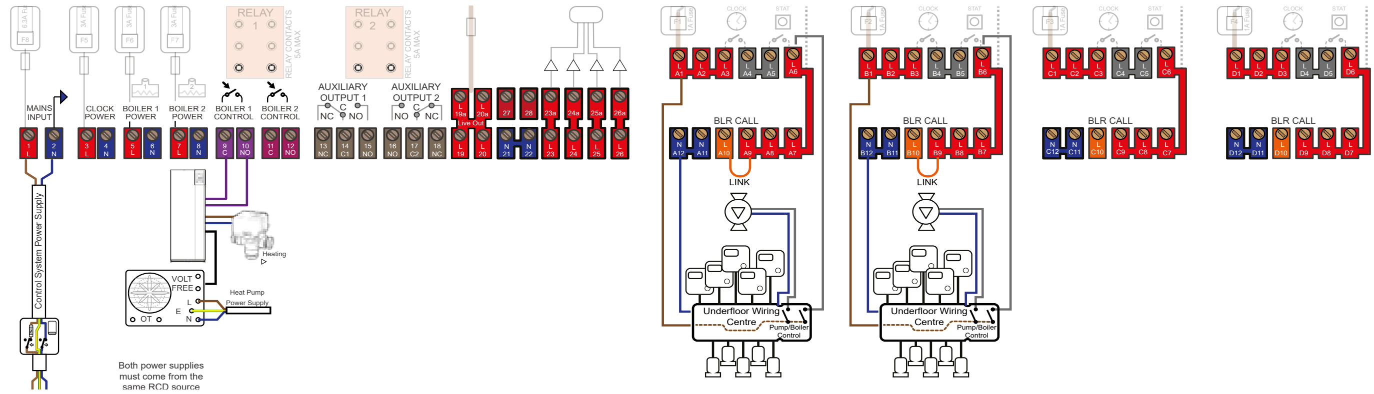
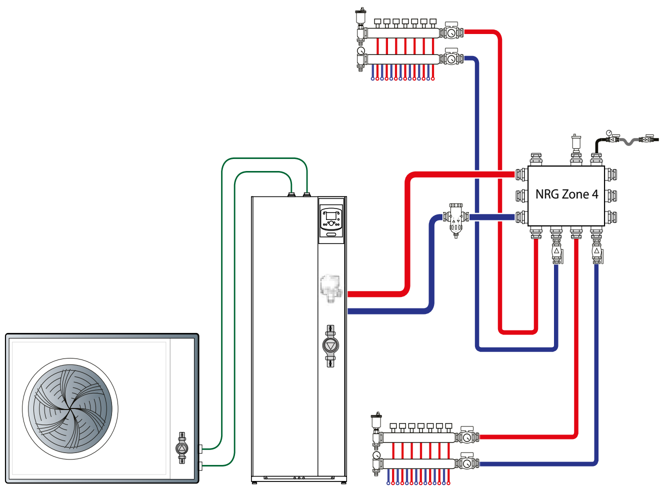



*Figure 25: Heat pump with and integrated DHW cylinder and two underfloor heating zones*

This system's heat pump call is controlled by "Boiler 1 Control" using the boiler relay.

DHW control is handled internally by the heat pump. UFH wiring centres control both zones, running the UFH pump directly and giving switch-live back to the NRG Lex.

The zones have a link from zone terminals 9 to 10 to close the NRG Lex boiler relay and run the heat pump when the zones call for heat.



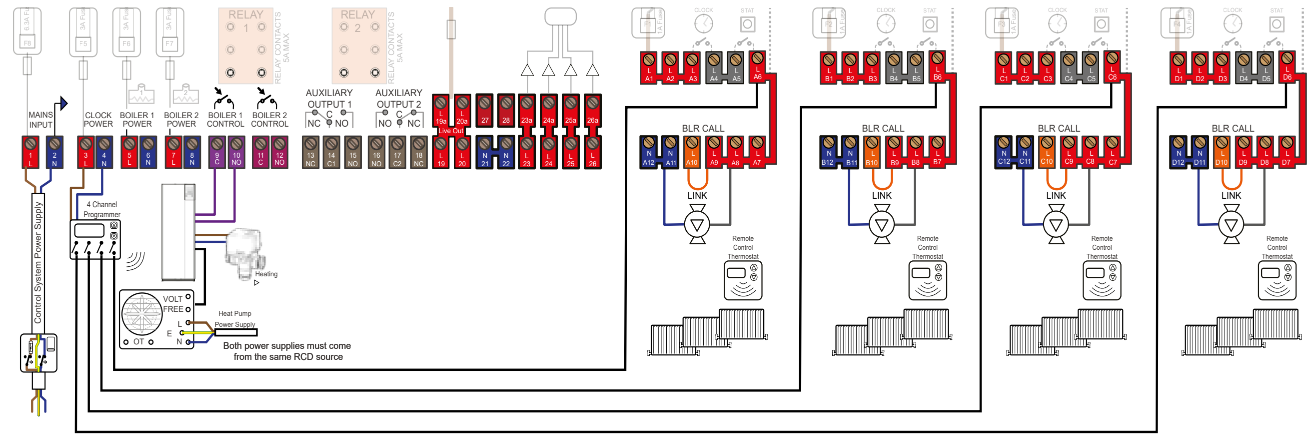
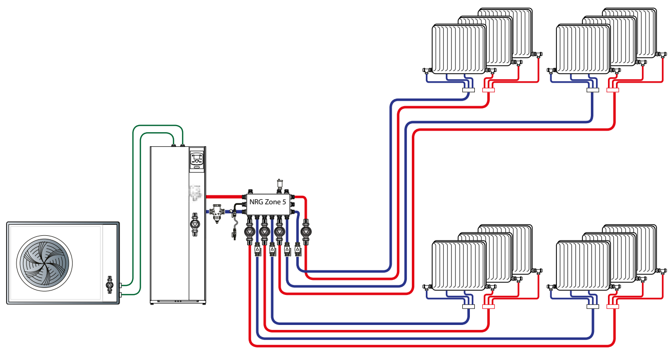



*Figure 26: Heat pump with an integrated DHW cylinder and four radiator zones*

In this setup, the heat pump's heat demand is regulated by 'Boiler 1 Control' via the boiler relay, while Domestic Hot Water (DHW) control is managed internally by the heat pump. A 4-channel programmer with wireless thermostats controls the heating zones.

All zones are configured with a link from zone terminals 9 to 10. This link closes the boiler relay and activates the heat pump whenever any zone requires heat.



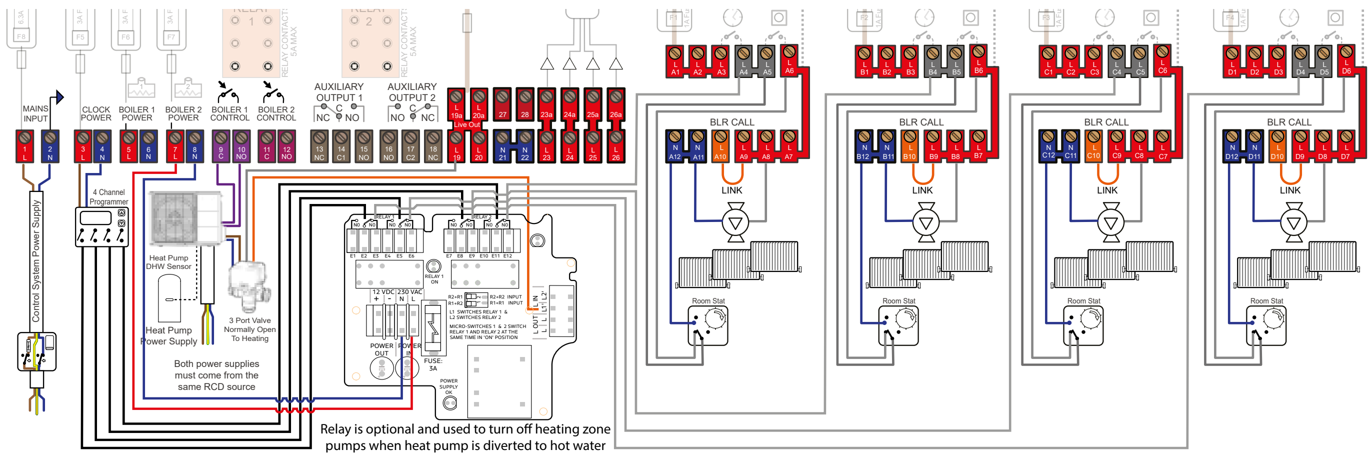
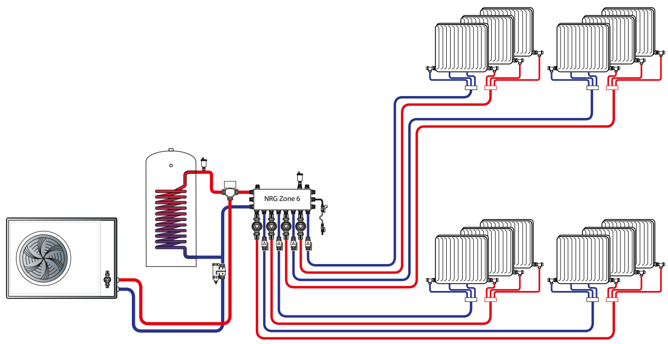




*Figure 27: Heat pump with an external DHW cylinder, a 3-way valve and four radiator zones*

In this system, the heat pump's heat demand is controlled by 'Boiler 1 Control' through the NRG Lex boiler relay. For Domestic Hot Water (DHW) heating, the heat pump uses a DHW sensor. When there is a DHW call, a 3-port valve switches, and the heat pump disregards the heat call from the NRG Lex.

A 4-channel programmer with wireless thermostats for the zones manages the overall system. All zones are configured with a link from zone terminals 9 to 10, which closes the boiler relay and activates the heat pump when any zones require heat.

Additionally, the system includes an optional NRG Relay that cuts off power to the zones when the heat pump is in DHW mode. This action prevents the zone pumps from running to save energy.



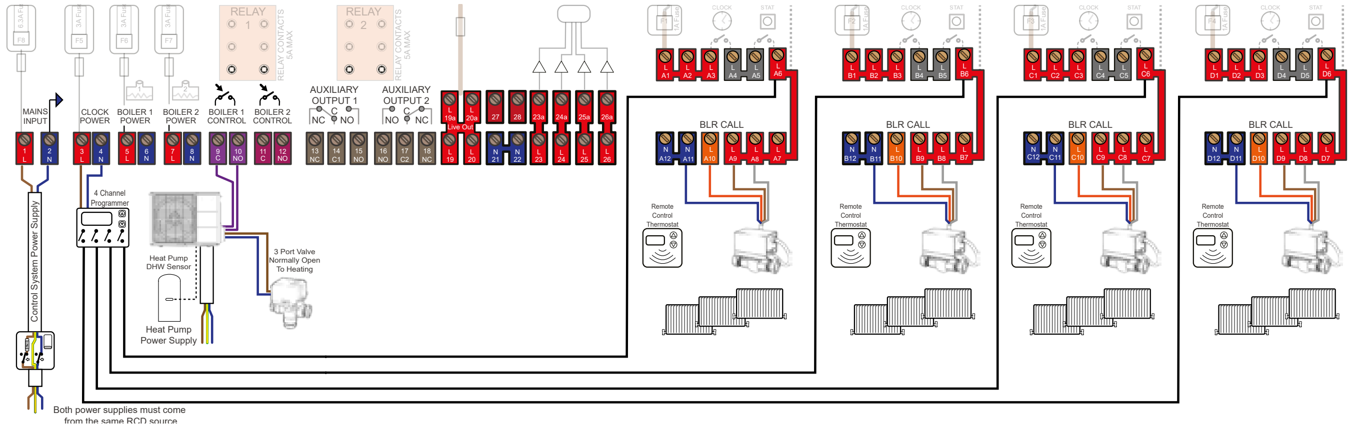
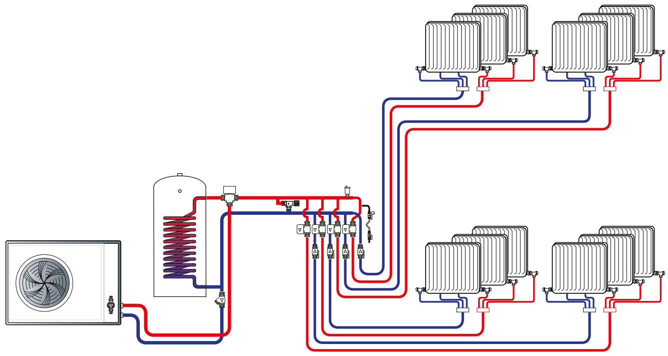


*Figure 28: Heat pump with an external DHW cylinder, a 3-way valve and four radiator zones*

In this system, the heat pump's heat demand is regulated by 'Boiler 1 Control' using the boiler relay. For Domestic Hot Water (DHW) temperature control, the heat pump uses a DHW sensor.

When there is a DHW call, a 3-port valve switches, and the heat pump disregards the heat call from the NRG Lex. A 4-channel programmer with wireless thermostats for the zones controls the entire system.

When a zone calls for heat, its motorised valve opens, and the orange wire from the valve carries live power to the zone's terminal 10. This power signal closes the boiler relay and activates the heat pump, ensuring that the heat pump runs when the zones require heat and the valve is open.



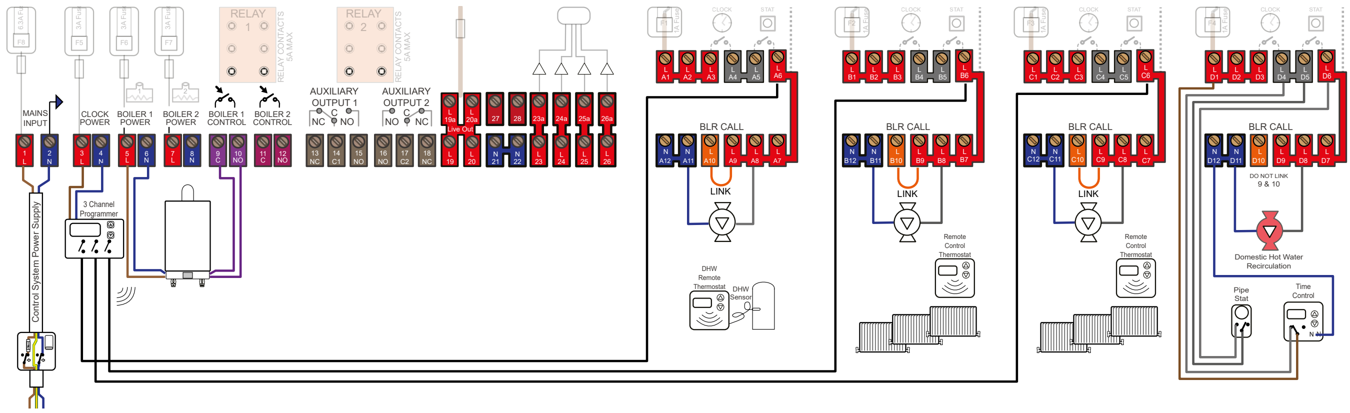
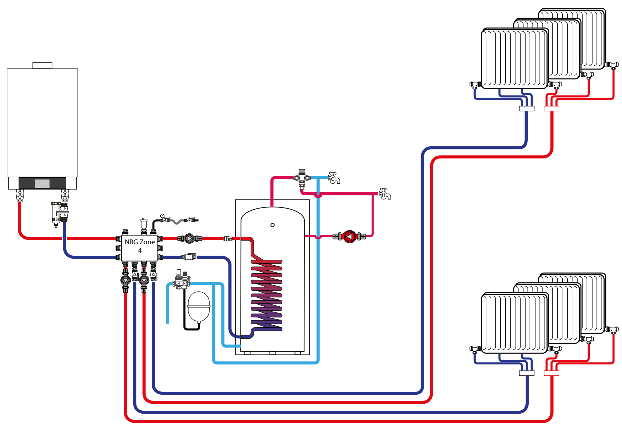


*Figure 29: Gas boiler, a DHW cylinder and two Radiator zones*

In this system, the boiler is controlled by 'Boiler 1 Control' via the boiler relay. A 3-channel programmer with wireless thermostats manages the time and temperature settings for the zones.

For all three zones, a link connects zone terminals 9 to 10. This link ensures the boiler relay closes and activates the boiler whenever any zone calls for heat.

However, it's important to note that the DHW recirculation pump has its independent time and temperature control on zone D. In this case, Zone D terminals 9 and 10 should not be linked, as the boiler should not fire when there is a call to run the DHW recirculation pump.



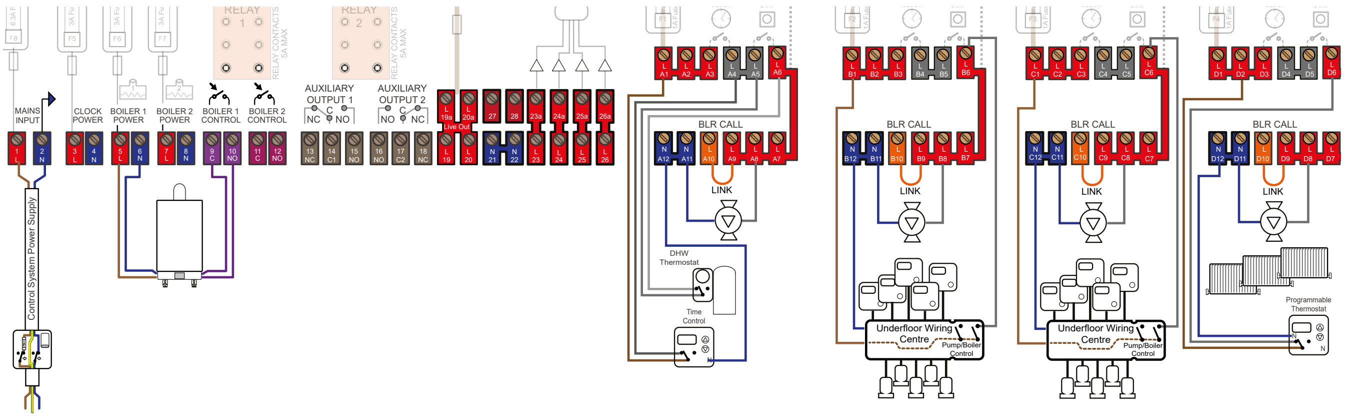
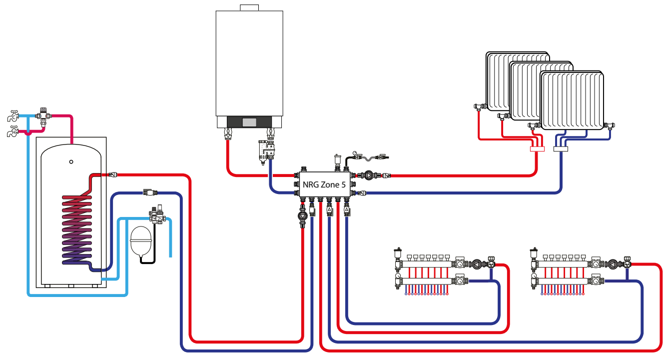


*Figure 30: Gas boiler, a DHW cylinder, a radiator zone and two UFH zones*

A programmer with a DHW Thermostat handles the time and temperature calls of the hot water cylinder; the radiator zone has a programmable thermostat, taking power from the respective Zone terminals 1, through the zone's thermostat at 4 & 5 connected to Terminal 6. The UFH zones have their own UFH wiring centres, each with multiple programmable thermostats.

All four zones are configured with a link from zone terminals 9 to 10, ensuring that the boiler relay closes and activates the boiler whenever any zone calls for heat. In this example, the UFH pumps are wired from the NRG Lex and supplied by the switch live from the UFH wiring centres.



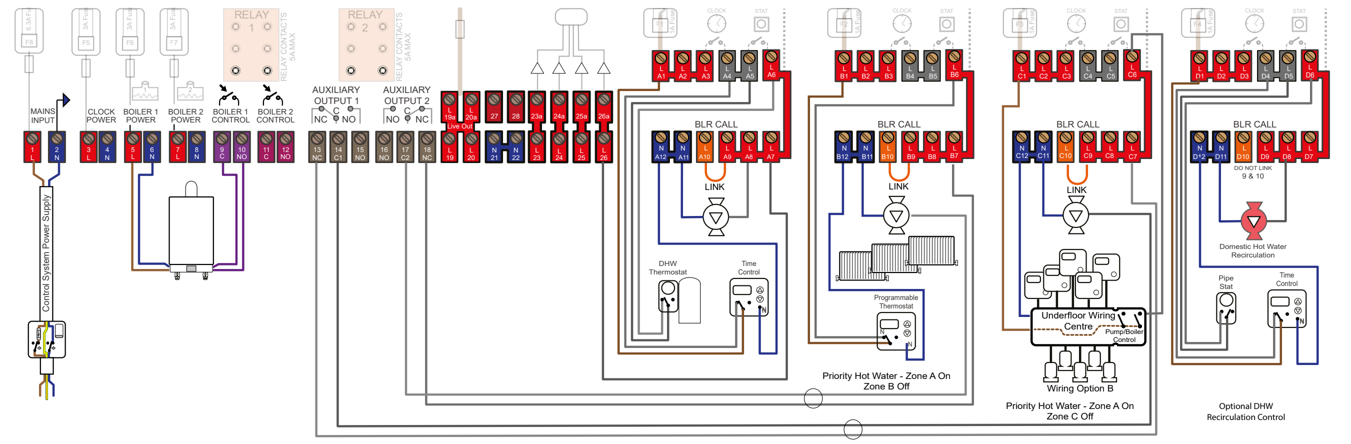
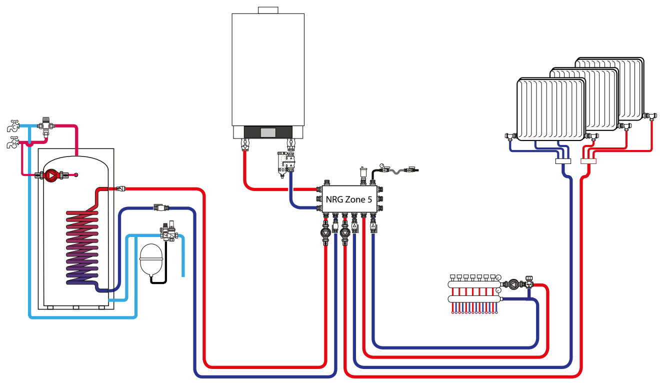


*Figure 31: Gas boiler, a DHW cylinder, a radiator zone, a UFH zone and a DHW recirculation Pump*

The boiler is controlled by "Boiler 1 Control" using the boiler relay. A programmer and a thermostat control the DHW zone. The radiator zone has a programmable thermostat, and the UFH zone has a UFH wiring centre with multiple programmable thermostats. All three zones have a link from zone terminals 9 to 10, ensuring that the boiler relay closes and activates the boiler whenever any zone calls for heat. Zones B and C are connected through the Normally Closed (NC) connections on the auxiliary outputs to provide priority DHW. When the DHW zone is active, a signal from terminal A7 goes to 26, triggering the auxiliary relay. This action breaks the circuits for the heating pumps, preventing the zones from heating while the DHW calls for heat.

It is important to note that the DHW recirculation pump has its own time and temperature control, but zone terminals 9 and 10 are not linked, as the boiler should not fire when there is a call to run the DHW recirculation pump alone.



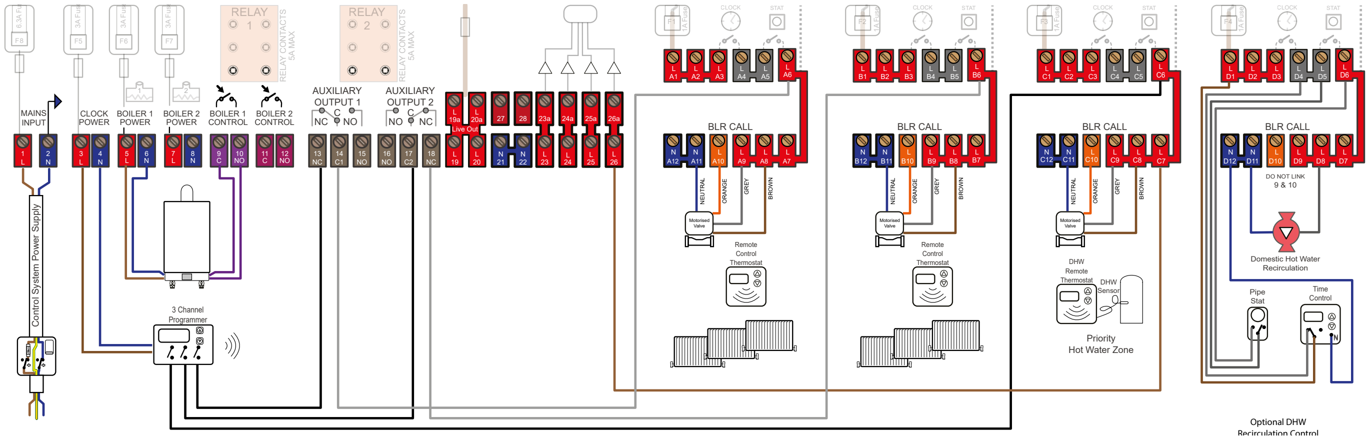
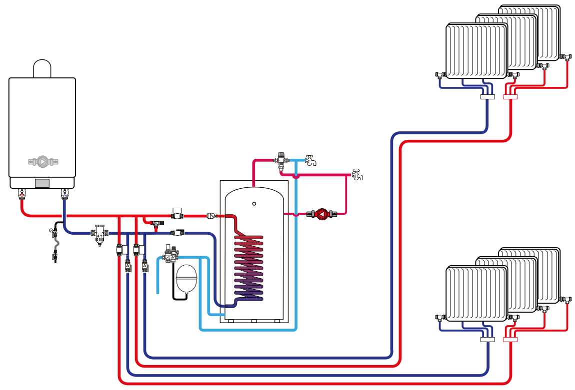



*Figure 32: Gas boiler, a DHW cylinder, two radiator zones and a DHW recirculation pump*

In this system, the boiler is controlled by ‘Boiler 1 Control’ using the boiler relay. A 3-channel programmer and wireless thermostats control the zones. When the motorised valves open, the orange wires energise zone terminal 10, closing the boiler relay and running the boiler.

The motorised valves for zones A and B are wired through the normally closed connections on the auxiliary outputs to provide Domestic Hot Water (DHW) priority. When the DHW zone is active, a signal from terminal C7 goes to 26, activating the auxiliary relay. This action breaks the circuits for the heating zone valves, ensuring that the zones do not heat while the DHW calls for heat. The DHW recirculation pump has its own time and temperature control. In this case, there is no link between terminals 9 & 10, as the boiler should not fire when the recirculation pump alone is running.



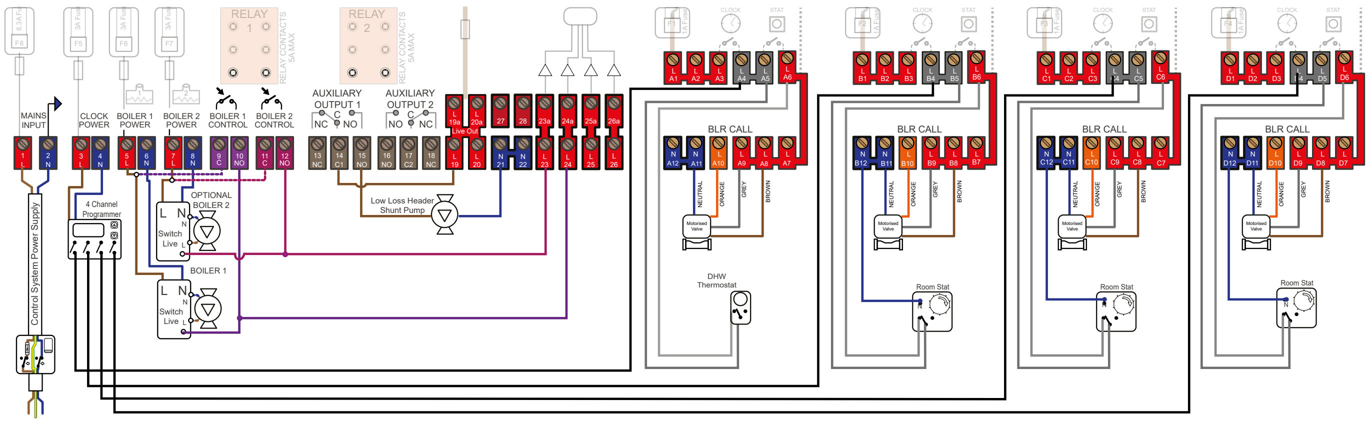
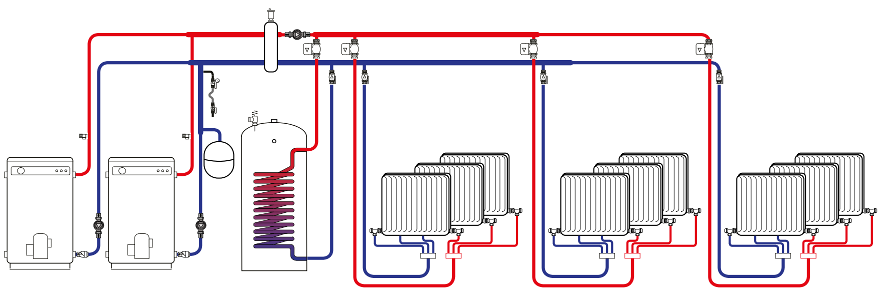



*Figure 33: Two oil boilers, a DHW cylinder and three radiator zones with a Low-Loss Header*

A 4-channel programmer with individual thermostats controls the zones.

When a zone calls, its motorised valve opens, energising its zone terminal 10 with the valve’s orange wire, which closes both sets of contacts in Boiler Relay 1. Terminal 10 is the switch live for Boiler 1 and terminal 12 for Boiler 2.

Switch lives from terminals 10 and 12 also connect to separate isolated inputs (23 and 24) on the Auxiliary Relay, causing it to close on boiler call. Power from terminal 19 is delivered through the Auxiliary contacts 14 (C) and 15 (NO), providing a switch to the low-loss header shunt pump on the secondary side whenever one or both boilers call. In other words, the two boilers work together to heat the zones in the system. When any zone calls for heat, both boilers fire and the low-loss header shunt pump circulates heated water to the zones.



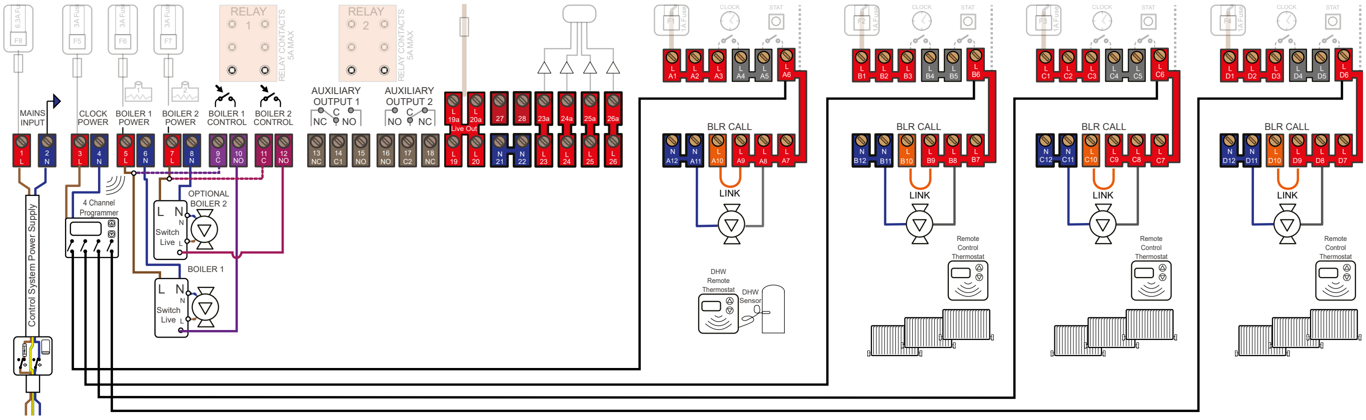
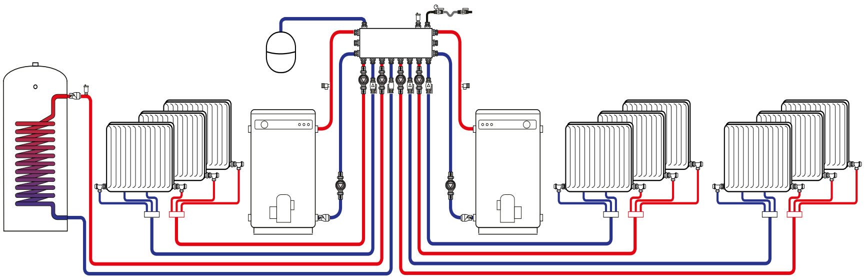



*Figure 34: Two oil boilers, a DHW cylinder and three radiator zones with NRG Zone 6*

In this setup, the two boiler output contacts in Boiler Relay 1 control the heat calls for the two boilers. A 4-channel programmer and wireless thermostats control the zones. Each zone has a link from zone terminals 9 to 10, ensuring that the boiler relay closes and activates the boilers whenever any zone calls for heat.



While the boilers can have a simple control method by periodically adjusting one boiler thermostat higher than the other to make it fire longer at a slightly higher temperature, adding a boiler sequencer to this type of system will improve fuel economy and reduce boiler wear & tear. The sequencer ensures that each boiler does an equal amount of work, and some models can even incorporate weather compensation for greater system efficiency.

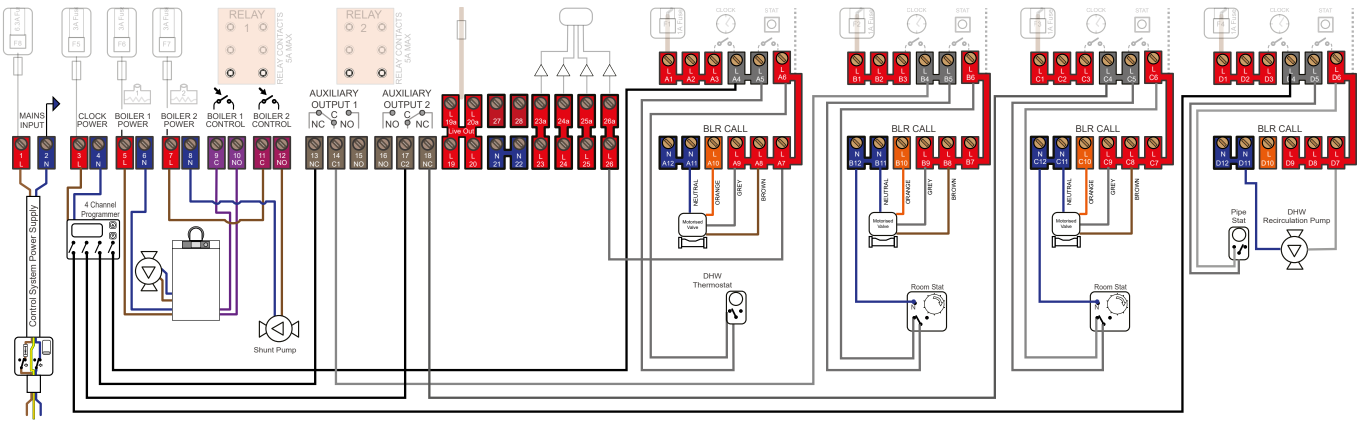
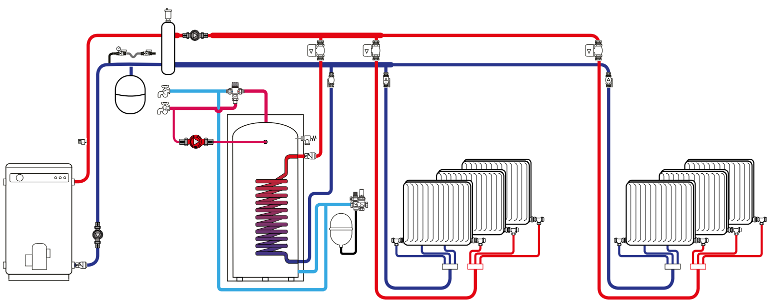



*Figure 35: Priority DHW with an Oil boiler and a Low-Loss Header, Two Radiator Zones and DHW Recirculation*

When zones A, B or C call, their motorised valves will open, and the respective valve's orange wire carries live power from the grey live to the zone's terminal 10 to call Boiler Relay 1 and activate the boiler. However, Zone A has an additional wire connecting from terminal A7 to Auxiliary input 26 to operate the Auxiliary relay when the DHW calls. When there is no call for DHW, the programmer's switch lives to zone pumps B & C pass through the two normally closed contacts of the auxiliary relay to feed the zone stats.

When DHW calls, Zone A energises the Auxiliary Relay, and the motorised valves on zones B and C will close. They will only reopen once the DHW reaches its set temperature.

Zone D operates the DHW recirculation pump but does not have a link to its terminal 10 to fire the boiler.



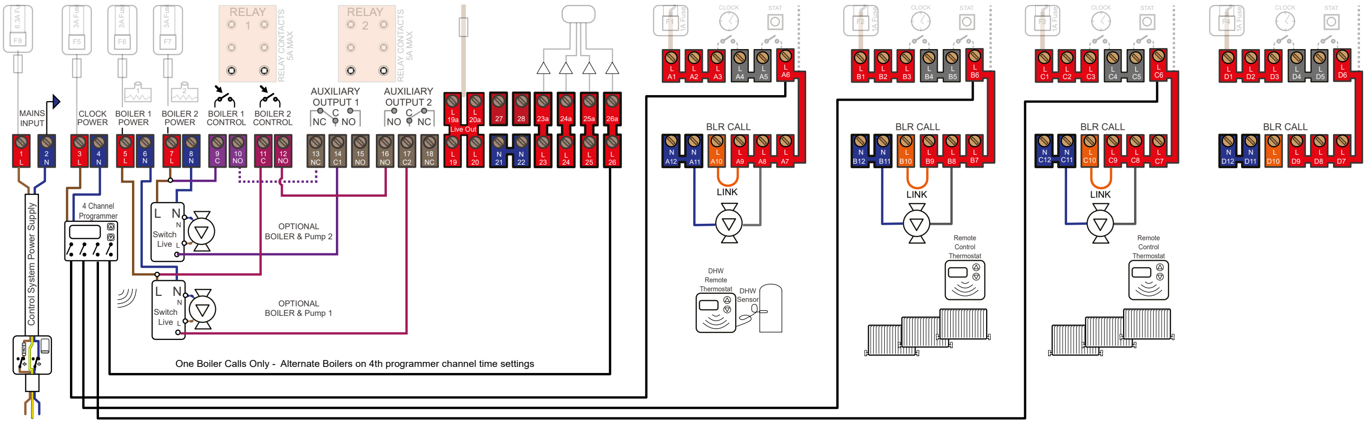
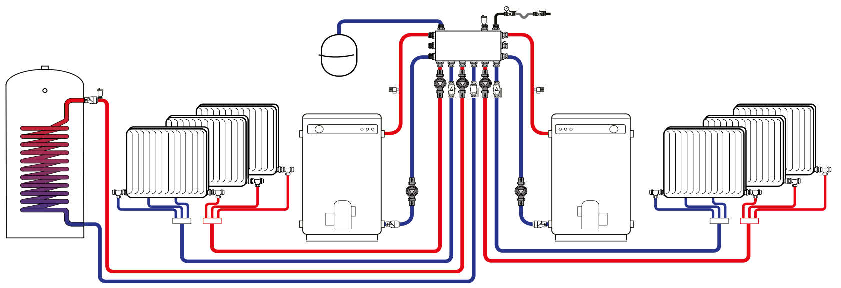



*Figure 36: Two oil boilers, a DHW cylinder and two radiator zones with NRG Zone 5*

In this configuration, a 4-channel programmer with wireless thermostats controls the zones. All zones have a link from zone terminals 9 to 10, ensuring that the boiler relay closes and runs the boiler whenever any of the zones call for heat. The boilers switch on through the two boiler outputs from the boiler relay and the auxiliary outputs. One boiler is wired through the normally closed contacts, while the other connects through the normally open contacts.



The 4th channel on the programmer sets the times that switch the auxiliary relay through terminal 26, allowing alternation on which boiler heats the system. This optional wiring method enables the designation of a schedule or alternate boiler usage to reduce wear and tear.

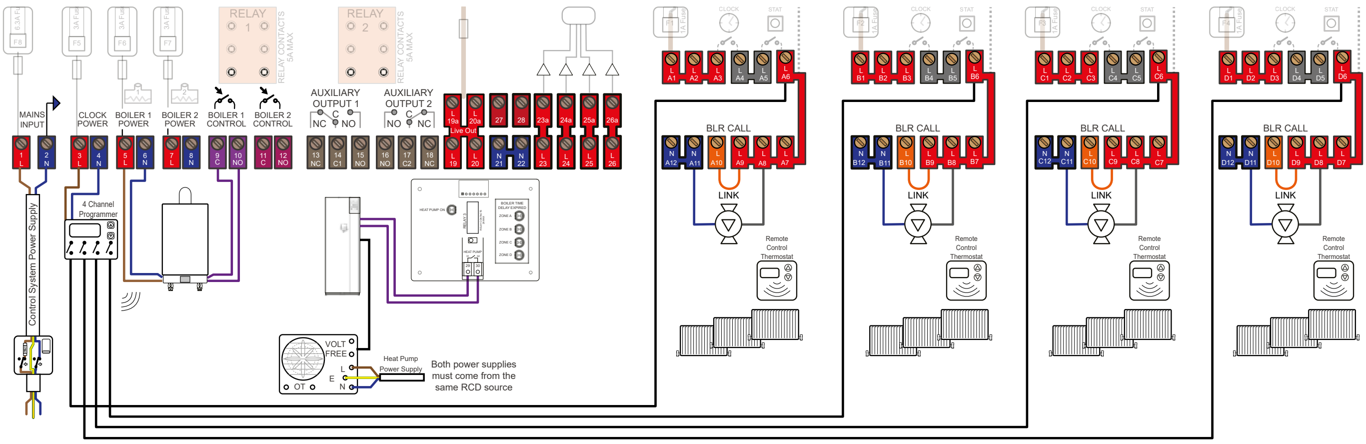
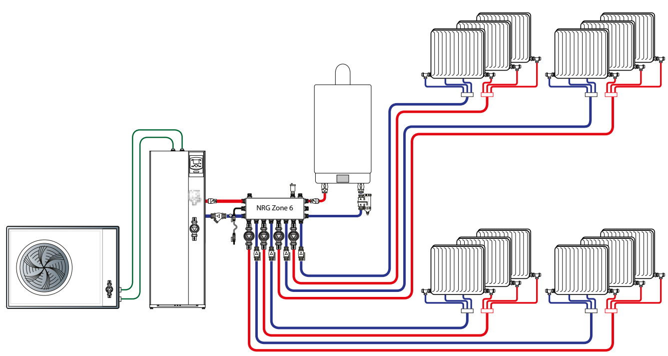



*Figure 37: Gas boiler, a Heat Pump-integrated DHW Cylinder & four Radiator Zones with NRG Zone 6*

This hybrid system combines a gas boiler and a heat pump with an integrated Domestic Hot Water (DHW) cylinder, serving four radiator zones. Relay 3 on the Hybrid Control Module (HCM) controls the heat pump's heat demand, while the boiler is regulated by Relay 1 on the NRG Lex.

A 4-channel programmer and wireless thermostats control the heating zones. All zones have a link from zone terminals 9 to 10. This link ensures the heat pump or boiler is available whenever any zone calls for heat.

The settings of the microswitches, as described above, determine when the heat pump or the secondary boiler is to operate, offering flexibility in system control and optimisation.



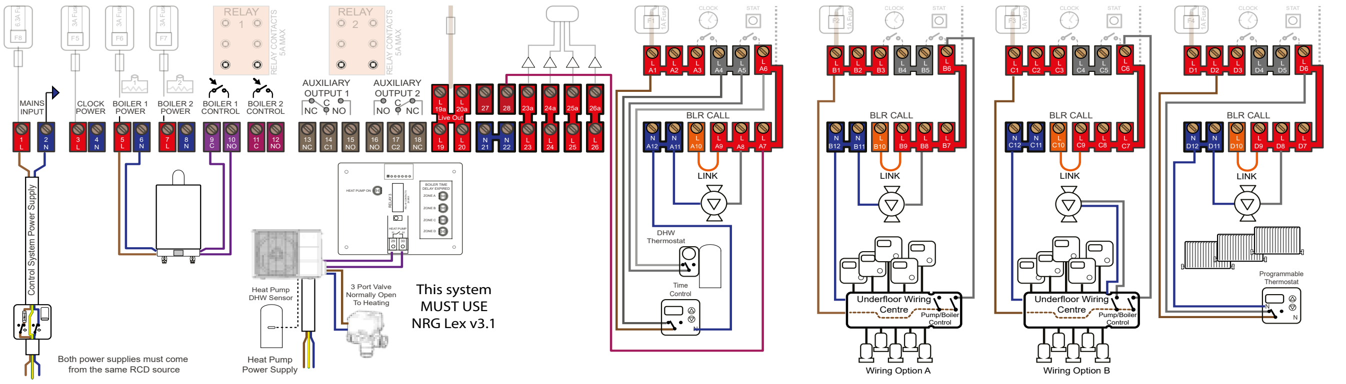
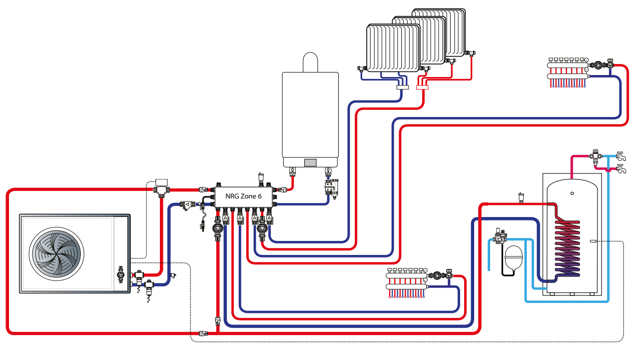



*Figure 38: Gas boiler, Monobloc Heat Pump, DHW Zone, Radiator Zone, and 2 UFH zones with NRG Zone 6*

This hybrid system controls the heat pump's heat call by Relay 3 on the HCM and the boiler by Relay 1 on the NRG Lex. A timer and a thermostat control the DHW zone, the UFH zones by UFH wiring centres and the radiator zone by a programmable thermostat.

All zones have a link from zone terminals 9 to 10 to close the boiler relay and run the heat pump or the second hybrid boiler when any zone calls for heat.

The heat pump has a DHW sensor and operates a 3-port valve for DHW control, but Zone A can override these controls to allow the boiler to heat the Domestic Hot Water. If Zone A runs, the link from A7 to 28 will bypass the time delay and light the boiler. The heat pump will then turn off or work with the boiler, depending on the setting of the microswitches.



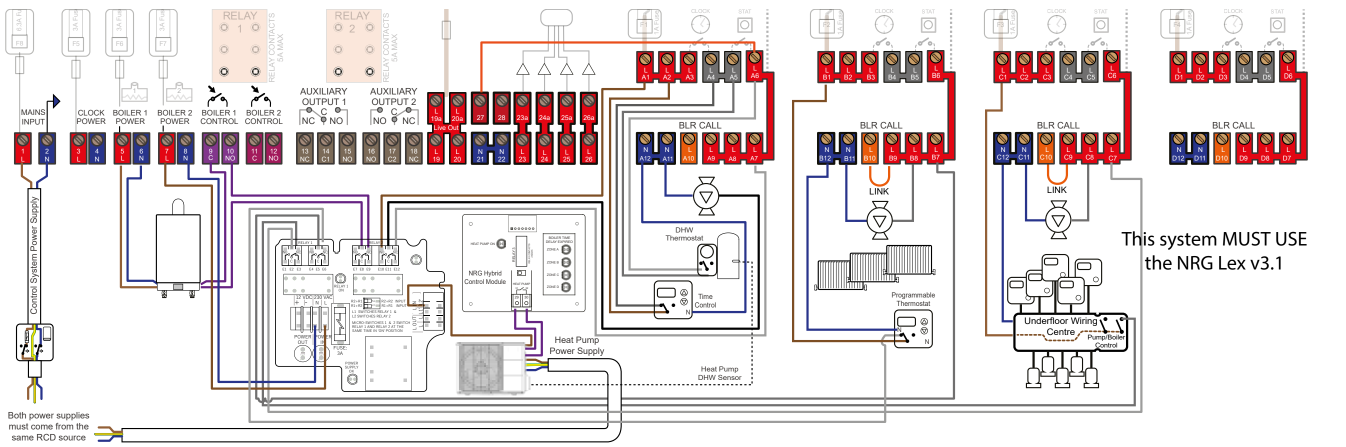
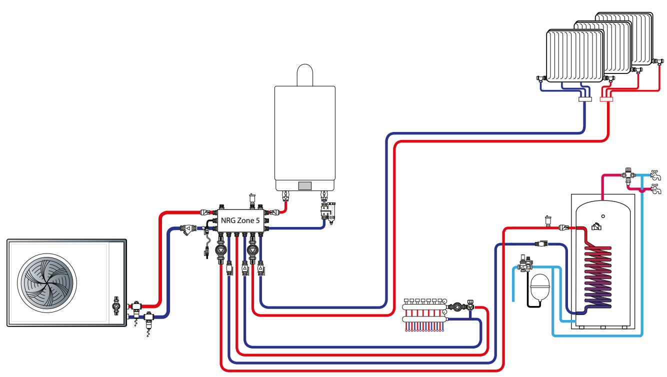




*Figure 39: Gas boiler, monobloc heat pump, DHW cylinder, Radiator and a UFH zone*

Relay 3 on the Hybrid Control Module (HCM) controls the heat pump's heat demand, while the boiler is regulated by Relay 1 on the NRG Lex. The heat pump's DHW sensor or the programmer and thermostat control the DHW demand. Programmable thermostats control the radiators and UFH zones through a wiring centre.

The heating zones have a link from zone terminals 9 to 10, ensuring that the boiler relay closes and runs either the heat pump or the secondary hybrid boiler whenever they call for heat.




The DHW sensor allows the heat pump to operate a 3-port valve for DHW control. However, Zone A can override these controls to enable the boiler to heat the Domestic Hot Water. If Zone A is active, the link from A7 to 27 bypasses the time delay and runs the boiler.

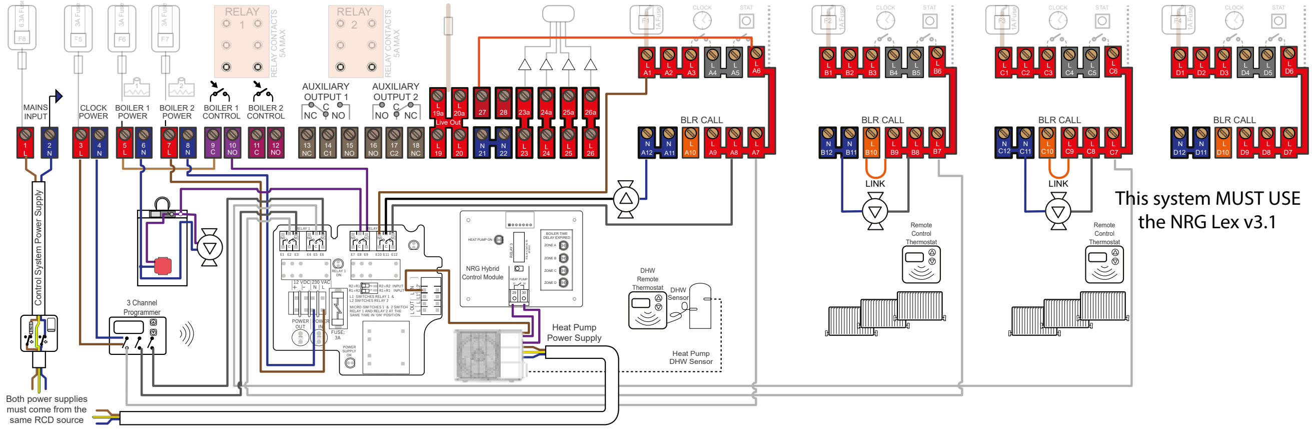
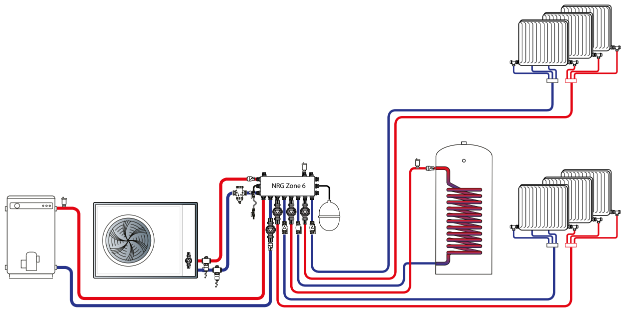



*Figure 40: Gas boiler, a Monobloc Heat Pump, a DHW cylinder and two Radiator Zones with an NRG Zone 6*



In this hybrid system, the heat pump's heat demand is controlled by Relay 3 on the Hybrid Control Module (HCM), while the boiler is regulated by Relay 1 on the NRG Lex. A 3-channel programmer and wireless thermostats control the zones. The heating zones have a link from zone terminals 9 to 10, ensuring that the boiler relay closes and runs either the heat pump or the secondary boiler whenever any zone calls for heat.

The heat pump incorporates a Domestic Hot Water (DHW) temperature sensor. Whenever the heat pump is in DHW mode, it supplies a live signal to the Live (L) in the Relay Board, triggering both relays. This action breaks the boiler and heating circuits and runs the DHW circulation pump. This design provides the heat pump with hot water priority. If the wireless cylinder thermostat calls for heat, the DHW circulation pump runs, and a signal from A6 to 27 turns on the secondary boiler.

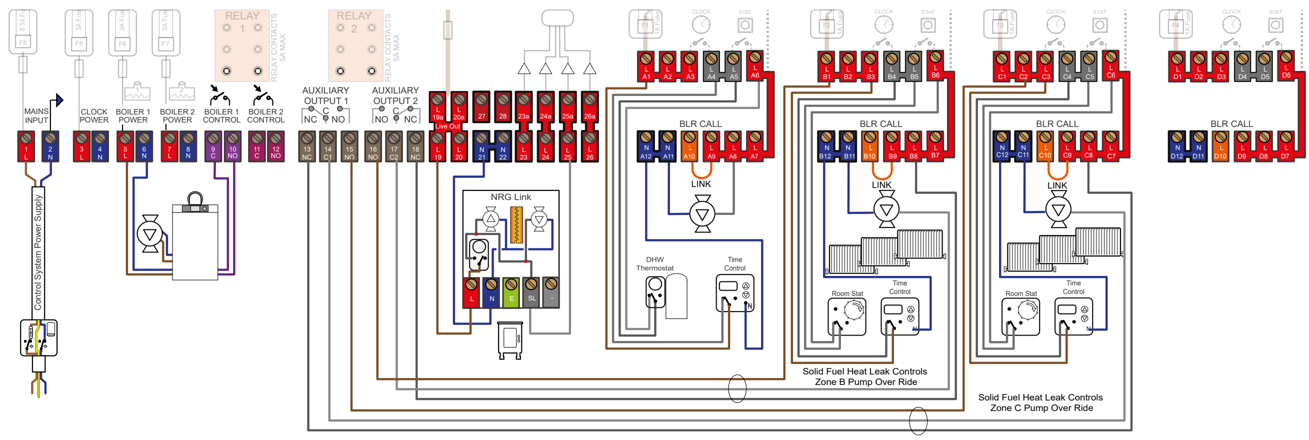
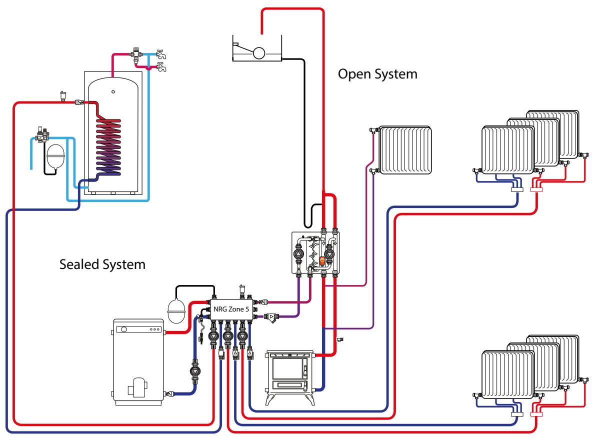



*Figure 41: Oil boiler, Biomass stove, DHW cylinder and two radiator zones with NRG Link & NRG Zone 5*




The biomass stove transfers heat with the sealed oil boiler heating system through an NRG Link heat transfer unit.

Individual programmers and thermostats control the zones.

When the stove reaches its set temperature in its gravity heat leak circuit, the built-in NRG Link thermostat changes contacts and supplies a live signal to terminal 25, switching the auxiliary relay to run the two heating zone pumps as heat leak outlets for the stove.

This regulation-compliant method bypasses the controls and calls to operate the zones whenever the stove reaches operating temperature so that they can act as heat leaks for the uncontrollable biomass heat source.

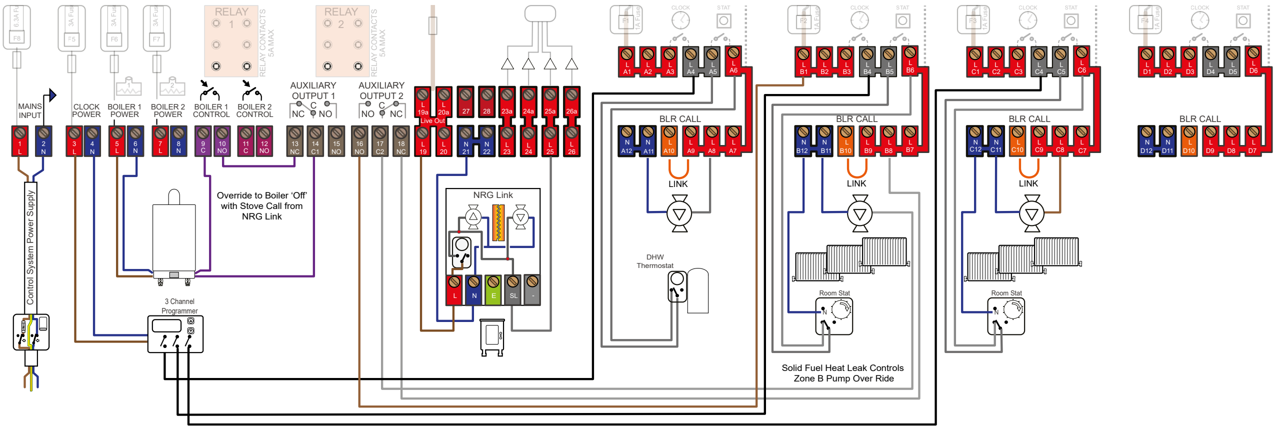
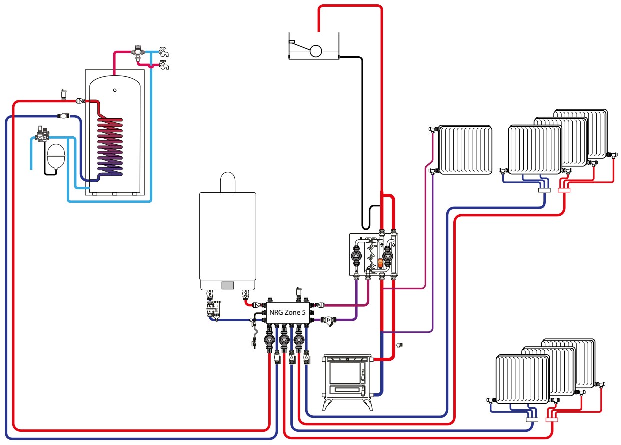


*Figure 42: Gas boiler, Biomass Stove, DHW cylinder, and Radiator Zones with NRG Link & NRGZone 5*

The biomass stove transfers heat with the sealed gas boiler heating system through an NRG Link heat transfer unit. A 3-channel program and wired thermostats control the zones.

When the biomass stove is hot and reaches a preset temperature, the NRG Link built-in thermostat supplies a live signal to terminal 25. This signal triggers the auxiliary relay, switching both auxiliary outputs. Auxiliary Output 1 breaks the gas boiler circuit. This action turns the boiler off, resulting in fuel savings. Auxiliary Relay Output 2 connects B1 to the Zone B pump, activating the zone as a heat leak, allowing it to absorb excess heat from the uncontrollable heat source.



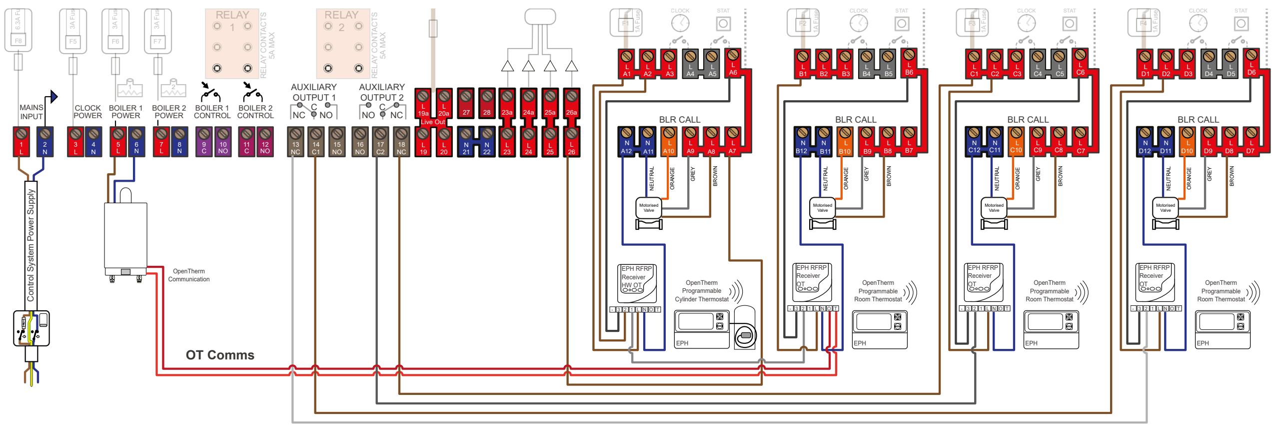
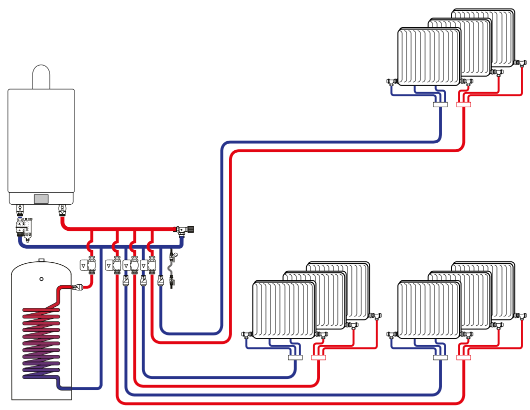


*Figure 43: Gas boiler, a DHW cylinder and three radiator zones*

In this hot water priority system, motorised valves with OpenTherm OpenTherm (OT) controls and wireless programmable thermostats operate the zones.

When the motorised valves open, the orange wires energise zone terminal 10, which lights up the zones' LEDs, indicating which zones are currently calling for heat. The (OT) controls call the boiler.

The hot water priority function takes a signal from the Domestic Hot Water (DHW) zone (A) to switch the auxiliary relay. This action breaks the power to the circuits for zones C and D as they pass through the normally closed connections on the relay. Additionally, zone (B) is de-energised because the live supply to the common (2) on the zone controller feeds from the normally closed (1) terminal on Zone A's controller. Therefore, when the Zone A controller switches, Zone B's switch control loses its power supply, allowing the DHW to have priority for Domestic Hot Water.



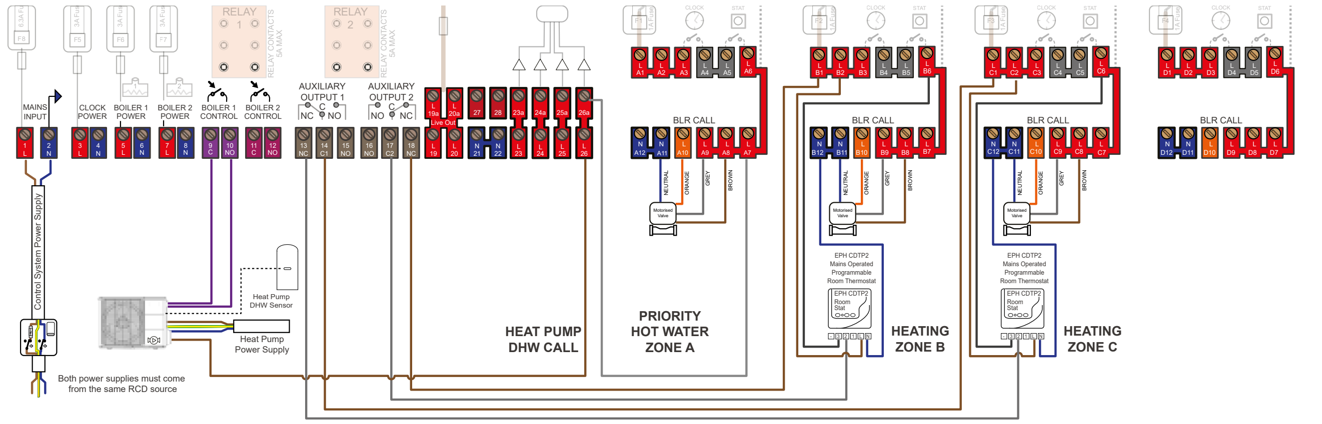
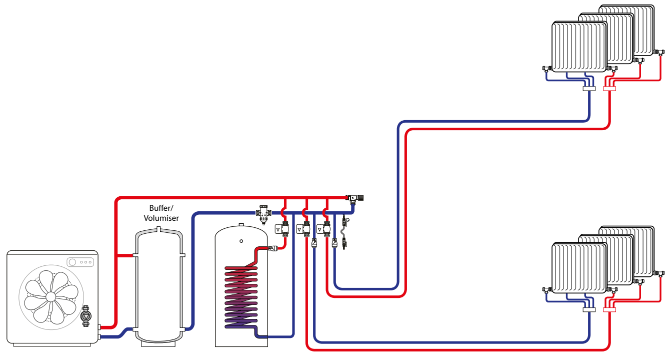



*Figure 44: Monobloc heat pump, DHW Priority and two radiator zones*

In this system, the zones operate using motorised valves with control provided by wired mains-operated programmable room thermostats.

The heat pump directly controls the motorised valve for the Domestic Hot Water (DHW) zone. The water temperature is detected using a remote sensor from the heat pump to the cylinder.




When the heat pump is in DHW mode, it sends a switch-live into auxiliary input terminal 26 – 26a. Terminal 26a feeds the Zone A DHW Motorised valve. This signal also activates the relay, which, in turn, breaks the circuits for radiator zones B and C. This action uses the auxiliary relay to prevent heat calls to the radiator heating in zones B and C and ensures priority hot water when the heat pump is in DHW mode.

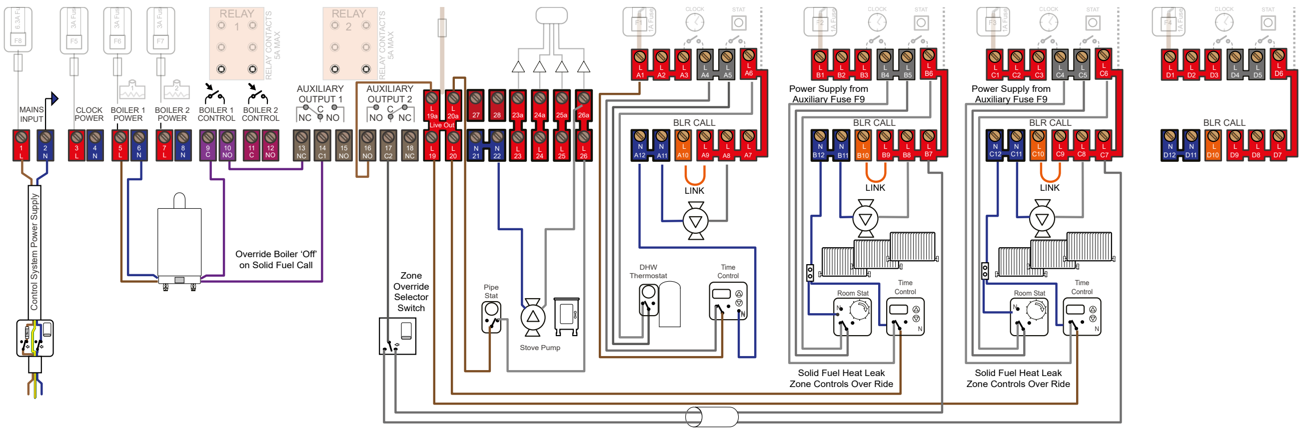
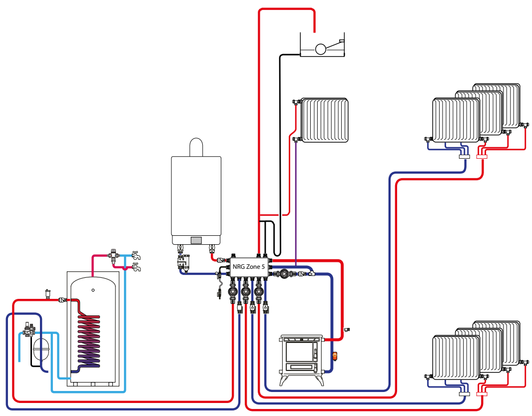



*Figure 45: Gas boiler, solid fuel stove, DHW cylinder and two radiator zones*

In this system, individual wired programmers and thermostats control the zones. The wired link between zone terminals 9 & 10 calls the boiler relay and runs the boiler whenever the zone's control calls for heat.

When the stove reaches the desired temperature, a pipe thermostat located on the stove's return pipe switches contacts. This action supplies a live signal to terminal 26, directly connected to terminal 26a. This signal operates the stove's pump and energises the auxiliary relay.



The auxiliary relay has multiple functions: the first output breaks the boiler's circuit, stopping the boiler. The second output feeds a manual switch, allowing the end-user to select either Zone B or Zone C as a heat leak zone while the stove is hot. If needed, the remaining zones can continue to operate as usual using their time and temperature controls, offering flexibility and control over the heating system.

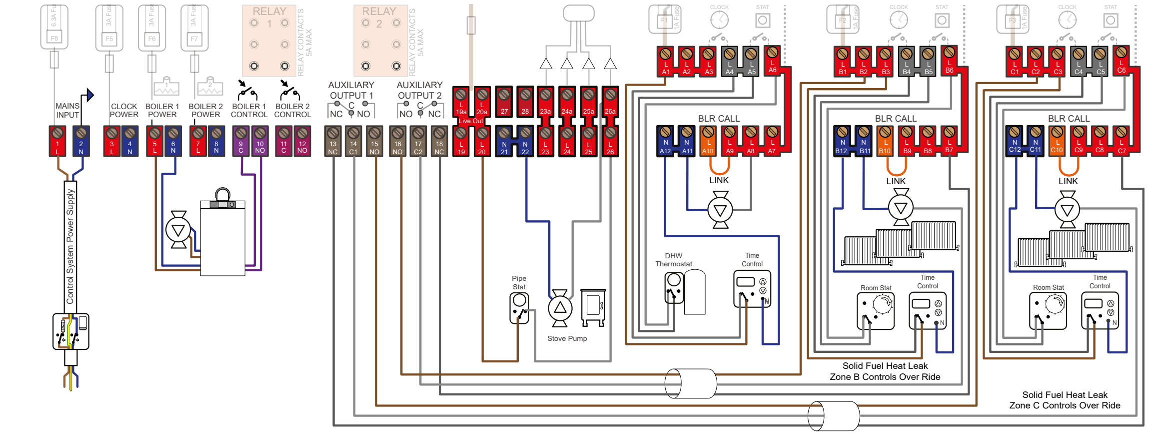
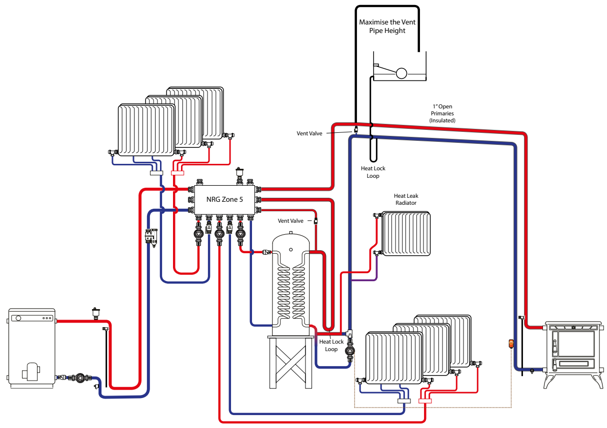



*Figure 46: Oil boiler, solid fuel stove, DHW cylinder and two radiator zones*

In this system, individual wired programmers and thermostats control the zones. The wired link between zone terminals 9 & 10 calls the boiler relay and runs the boiler whenever the zone's control calls for heat.

Under direct control from the programmer, the Domestic Hot Water (DHW) zone and oil boiler operate as usual, using the time and temperature controls.

When the stove reaches the desired temperature, a pipe thermostat located on the stove's return pipe switches contacts. This action supplies a live signal to terminal 26, directly connected to terminal 26a. This signal also operates the stove's pump and energises the auxiliary relay. The auxiliary relay then engages zones B and C to act as heat leaks when the stove is hot.



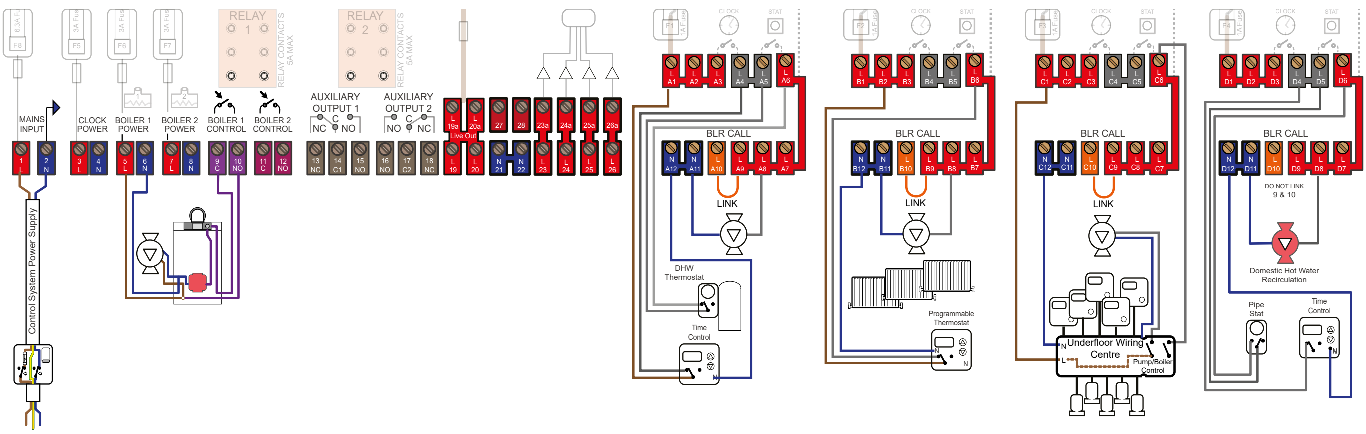
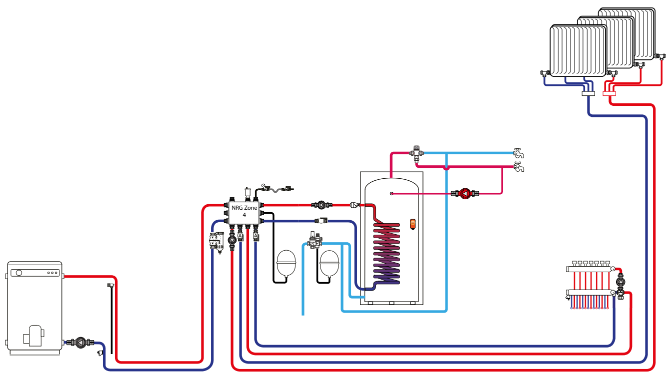




*Figure 47: Oil boiler, a DHW cylinder, an UFH zone, a radiator zone and a DHW recirculation pump*

In this system, a programmable thermostat operates the radiator zone, an UFH wiring centre controls the UFH zone, and the DHW zone has a programmer and a thermostat. The boiler relay controls the boiler's heat demand.

Each of the three zones has a link from zone terminals 9 to 10, used to close the boiler relay and run the boiler whenever the zones call for heat. In this example, the UFH wiring centre controls the UFH pump.

The DHW recirculation pump has its own time and temperature control. However, it's important to note that zone terminals 9 and 10 should not be linked with this zone because the boiler should not fire through a call to run the DHW recirculation pump. This wiring plan ensures that the boiler operates only when there is a heat demand in zones.



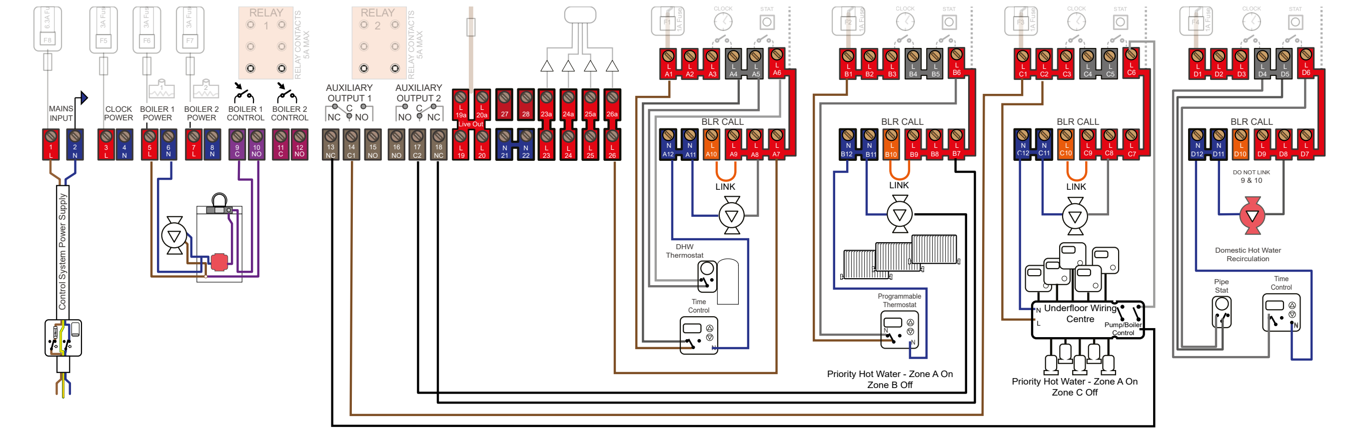
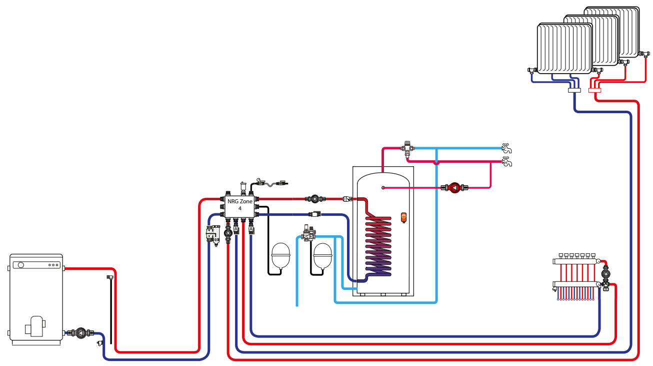



*Figure 48: Oil boiler, priority DHW, an UFH zone, a radiator zone and a DHW recirculation pump*

A programmer and thermostat control the DHW zone, and a programmable thermostat controls the Underfloor Heating zone using an UFH wiring centre with multiple programmable thermostats.

The boiler relay controls the boiler, and each of the three zones has an energised link from zone terminals 9 to 10 to close the boiler relay.

When there is a call for DHW, the link from A7 to 26 is energised, switching the auxiliary relay. This action breaks the circuit for the two heating pumps, prioritising DHW for the system. The DHW recirculation pump has its own time and temperature control. However, its zone terminals 9 and 10 should not be linked because the boiler should not fire through a call to run the DHW recirculation pump. This strategy ensures that the boiler only operates when there is a demand for heating in the zones, not for DHW circulation.



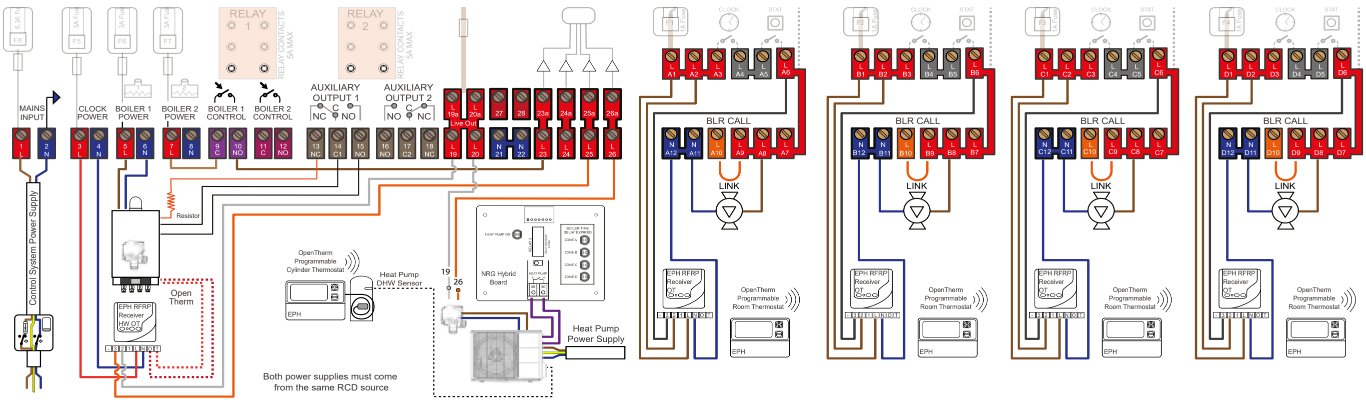
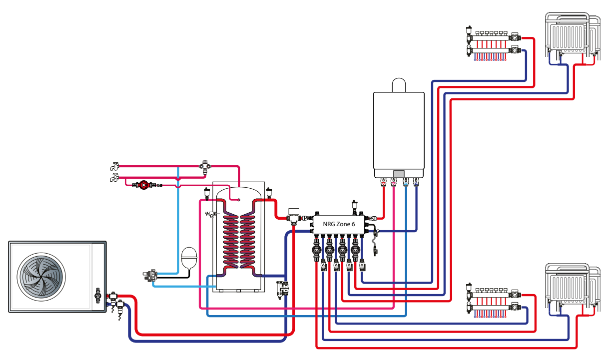



*Figure 49: 4-pipe gas boiler, heat pump, dual coil Cylinder, two UFH zone and two radiator zones*

OpenTherm (OT) controllers manage the zones and trigger the gas boiler when needed. The OT controllers also supply a switch-live to the zones to run the pumps and start the heat pump through zone 10 terminals. The NRG Lex prevents the boiler from heating with the heat pump, only letting the boiler activate if the heat pump doesn't hit target zone temps in the time set by the NRG Lex microswitches or during high-temp DHW zone calls.

When the boiler is not needed, the NRG Lex uses a resistor to replace the boiler's thermistor, creating a false reading to prevent the boiler from heating. If the demand exceeds the set time, the NRG Lex's boiler relay closes, reenabling the boiler's thermistor. At that point, the OpenTherm controls can directly control the gas boiler based on heat demand.

When the heat pump enters DHW mode, the Auxiliary relay switches to let the gas boiler handle the space heating. The gas boiler can also heat the DHW to a higher temperature in the second cylinder coil, and during that time, the heat pump remains available to supply the central heating.



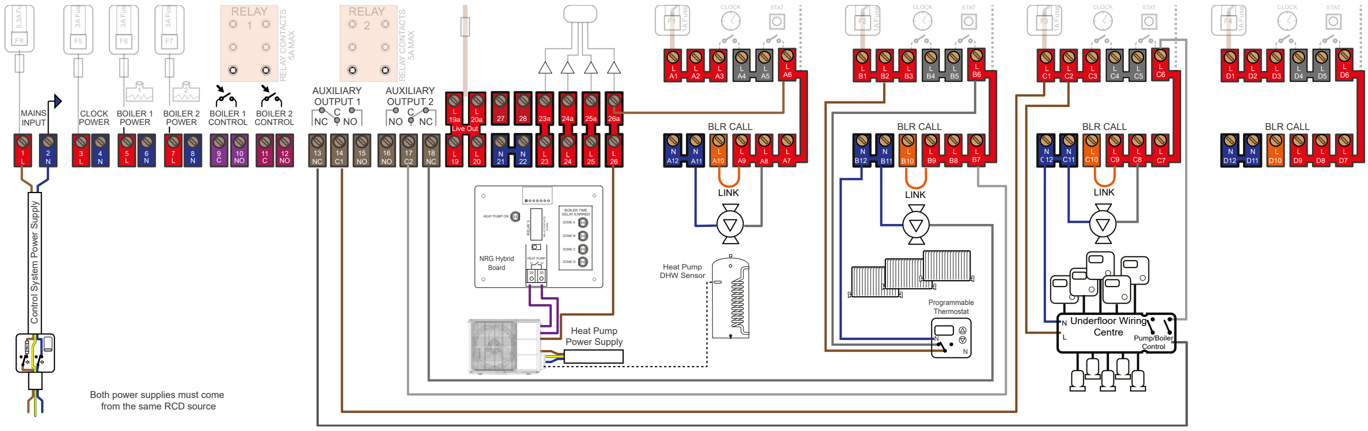
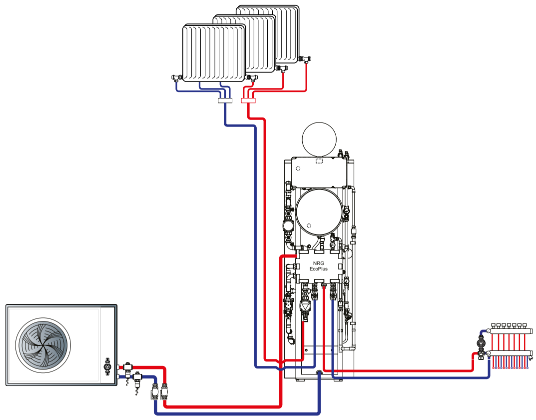



*Figure 50: NRG EcoPlus pre-plumbed heating system with a monobloc heat pump, radiator zone and a UFH zone*

This system shows the NRG EcoPlus pre-plumbed heating system with a monobloc heat pump, an UFH, and a radiator zone.



The heat pump is heating the DHW using its DHW sensor. When there is a DHW call, a switch live from the heat pump connects to terminal 26. This plan will switch the auxiliary relay and break the supply to the central heating pumps to provide DHW priority. The signal from the heat pump to terminal 26 also continues through 26a and to A6 to run the DHW pump.

The EcoPlus comes pre-assembled with all the major components needed for the heating and plumbing. It also includes a small 50L volumiser for the heat pump to improve its efficiency and reliability.

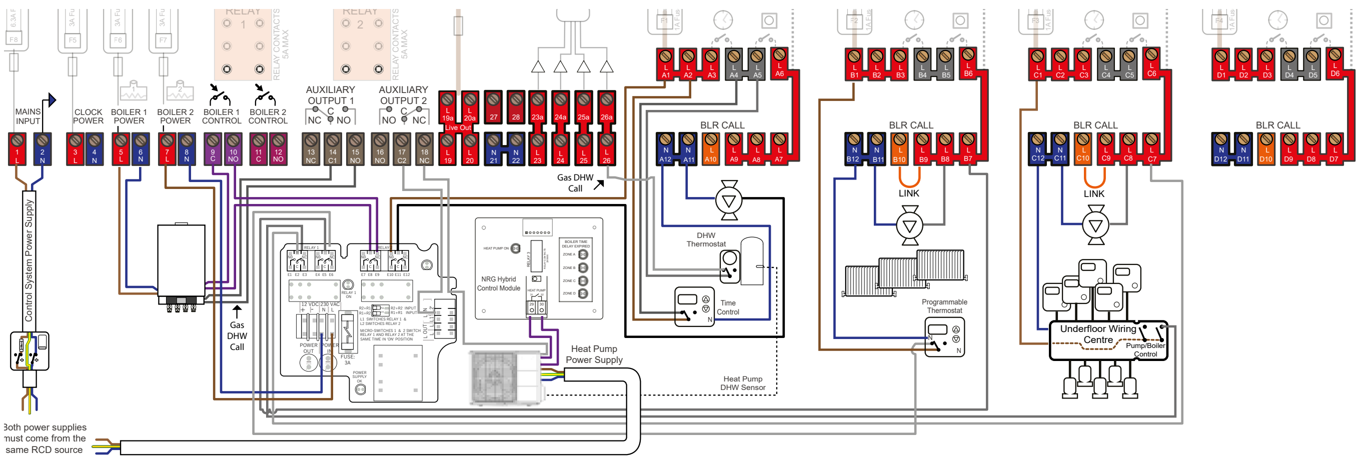
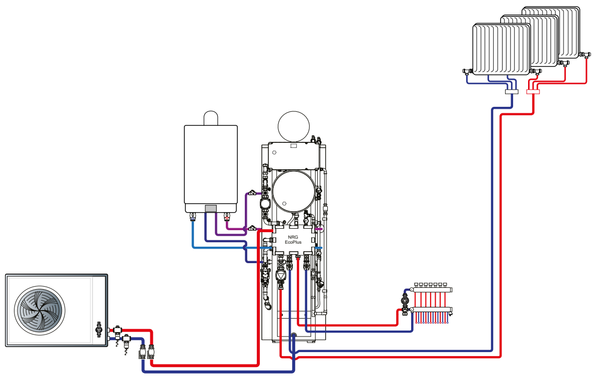



*Figure 51: NRG EcoPlus pre-plumbed heating system with a monobloc heat pump. 4-pipe gas boiler, radiator zone and a UFH zone*

This system has the NRG EcoPlus pre-plumbed cylinder in a setup with a monobloc heat pump, a 4-pipe boiler, an UFH zone, and a radiator zone.



This hybrid system allows the boiler to take over the space heating during extremely cold days. The DHW circuit from the boiler bypasses the NRG Zone 4 manifold using the two secondary hot water connections integrated into the EcoPlus. This design allows the heat pump to continue heating space while the boiler handles DHW heating. This arrangement ensures efficient operation and maximises space heating and DHW production utilisation.

The Relay Board breaks the heating zones and gas boiler heat call whenever the heat pump is in DHW heating mode to give it priority hot water and prevent its water from mixing with the higher-temperature boiler water.

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NRG LEX V3.1

## NRG Lex v3.1 Layout - Layout

| Power Transformer & Mains Connection LED | EARTH Connections | Micro Dip Switch Control/Timer Information | Micro Dip switch - Relay Test & Hybrid Board Settings | Hybrid PCB Detection | EARTH Connections | Hybrid Board Connection |
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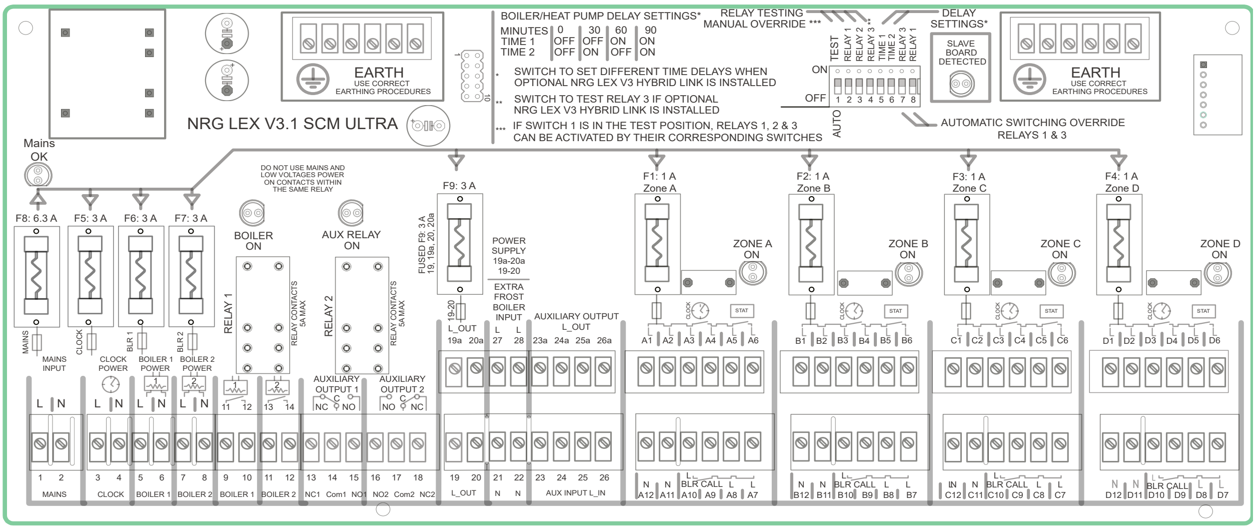


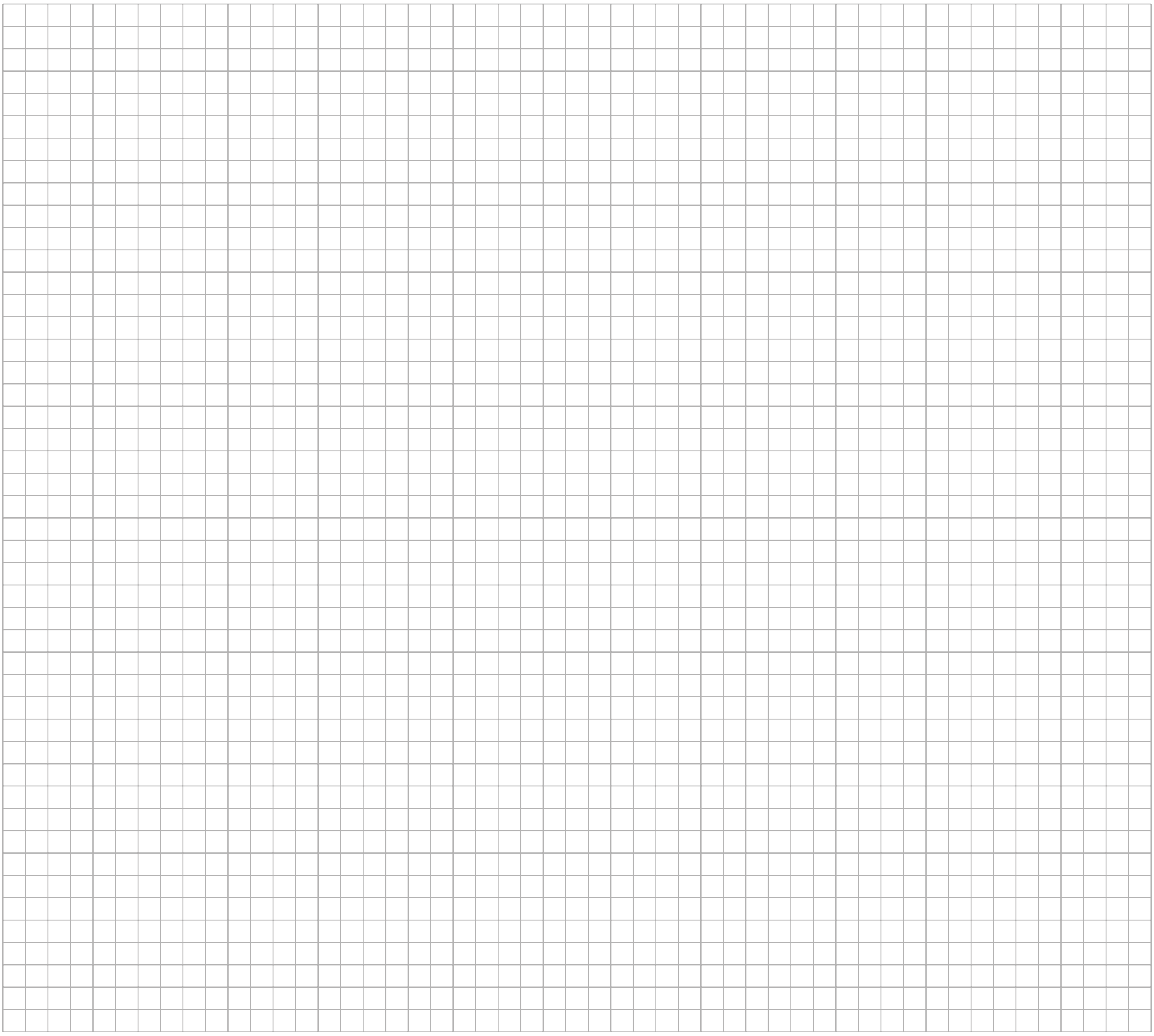

*Draw your own system here*

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