

**QUICK INSTALLATION
MANUAL
NRG LEX V2.2**

nrGLEX_{v2}

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.

The correct tools and equipment must be used when working on the NRG Lex.

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 v2.2 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 power supply for the NRG Lex could lead to an imbalance in the RCD, potentially causing it to trip.

Features:

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

Zone Control: Four zones with individual fused 1A connections. The zone blocks have terminals for clocks, programmers, thermostats, motorized zone valves and/or zone pumps.

DHW Priority: Zone A can be designated as a DHW priority zone with a switch. This will prevent the heating zones from calling when the DHW is being heated.

Boiler Power Supplies: Two fused 3A 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.

Boiler Relay Test Switch: Manual switch for the boiler relay for testing during commissioning.

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.

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.

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 and auxiliary provisions 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: The 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 v2.2

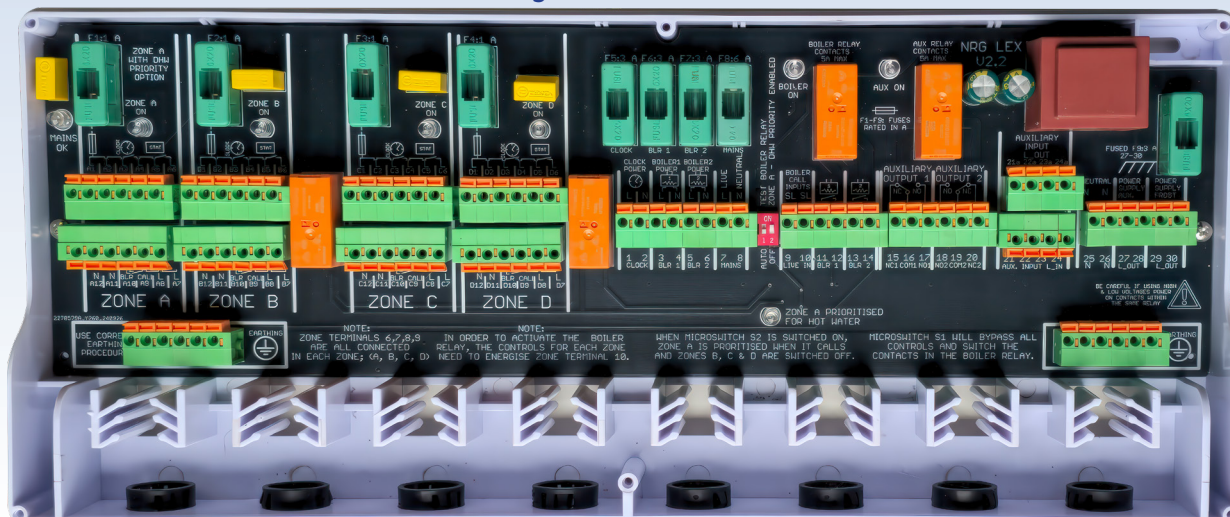


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POWER SUPPLY RATING	230 V~, 15 mA, 50 HZ / 60 HZ, 1 PHASE
POWER SWITCHING CAPACITY - (COMBINED LOAD)	MUST NOT EXCEED 5 A FOR ALL LOADS
BOIL RELAY RATING	DOUBLE POLE NORMALLY OPEN -DPNO 5 A
BOILERS - BOILER VOLT FREE CONTROL SWITCHES	2
BOILER SUPPLY	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 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
MOUNTABLE	DIN RAIL OR SCREWS

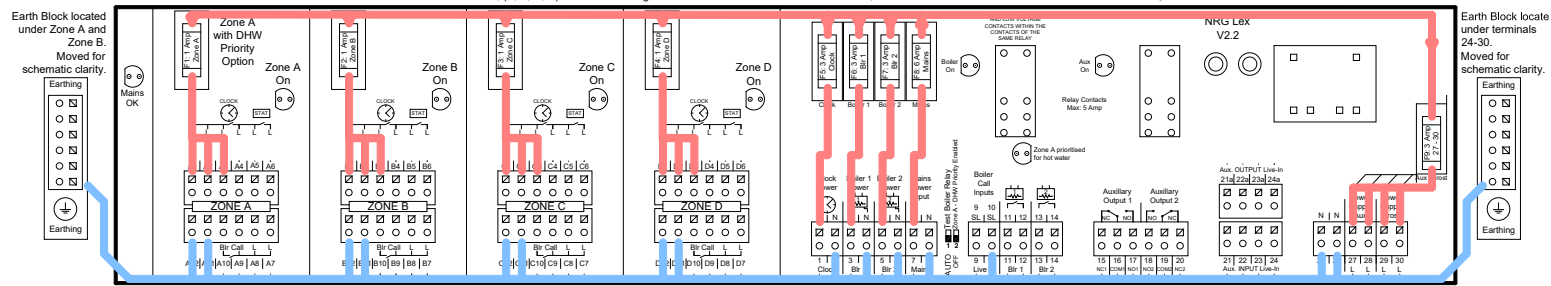


Figure 2: NRG Lex v2.2 Simplified layout for schematics with the internal tracks highlighted.

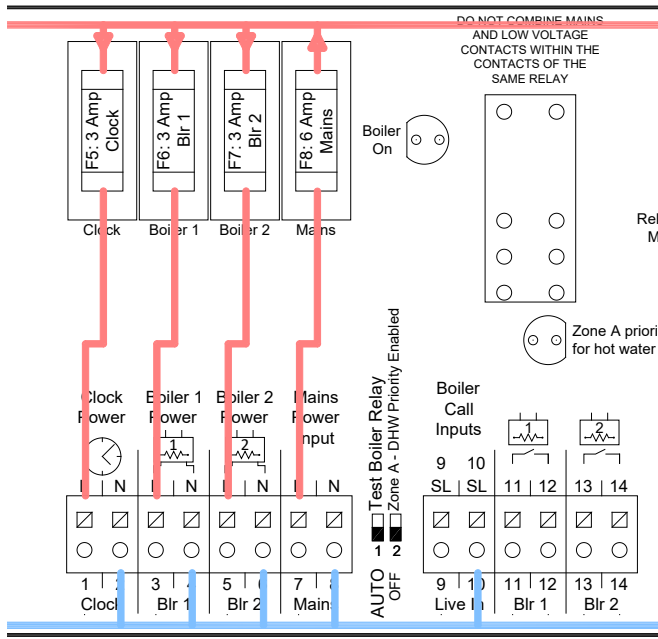


Figure 3: Power, boiler and frost blocks

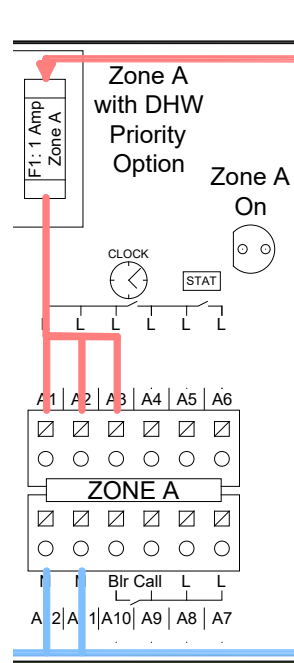


Figure 4: Zone Block B.

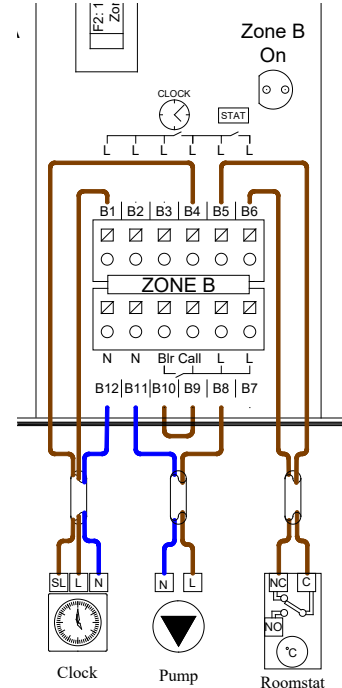


Figure 5: Zone Block B with a pump, clock and roomstat.

1. Power Supply

When a power supply connects to 7 Live (L) and 8 Neutral (N), onboard tracks conduct the power to the other Live and Neutral terminals. The 'Mains OK' LED on the left side of the board will illuminate when the power supply is on. The main 6A fuse (F8) supplies all the other Live terminals through the other fuses (F1, F2, F3, F4, F5, F6 and F7). Each neutral terminal directly connects with the others.

Terminals 1-6 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 internally on the board, and so are terminals 6, 7, 8 and 9. A live into terminals 6, 7, 8 or 9 will light the zone call LED. Terminal 10 is the boiler call; a live signal

into this terminal will switch the boiler relay.

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.

2.1. Clocks and thermostats

In Figure 6 above a clock is powered from 1 with its neutral from terminal 12 and its Switch-Live (SL) back to terminal 4. Terminal 4 is internally linked to 5 which supplies a room thermostat with a SL back to terminal 6. Terminal 6 is internally linked to terminals 7, 8 & 9. Terminal 8 supplies a pump with its neutral from terminal 11 and there is a link from terminal 9 to 10 to close the boiler relay.

2.2. Programmable Thermostats

As programmable thermostats incorporate time & temperature features, they would connect from a zone live (1, 2 or 3) and switch directly to terminal 6, bypassing terminals 4 and 5.

2.3. Multi-Channel Programmers

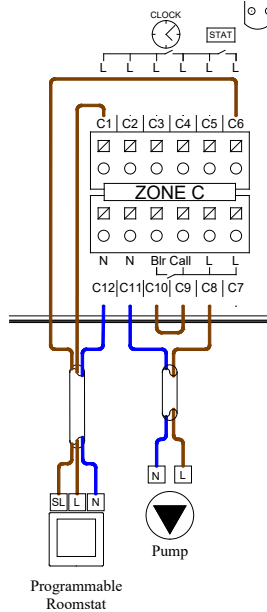


Figure 6: Zone Block C wired with a programmable thermostat and circulation pump

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 1, fused at 3A, and neutral from the adjacent terminal 2. 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.

2.4. Zone Circulator Control

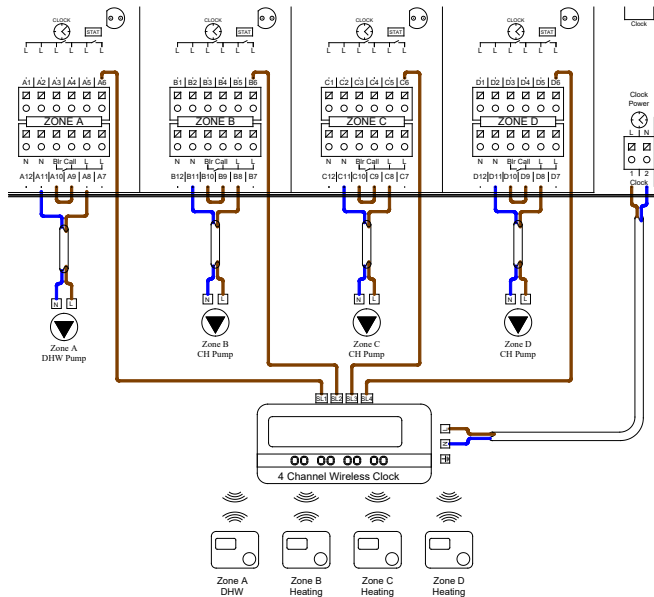


Figure 7: 4 zones wired with a multi-channel programmer and wireless thermostats

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.

See Figures 6, 7 & 8 for examples of zone circulator wiring.

2.5. DHW Recirculation Pump

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.

2.6. 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 terminals 7, 8 or 9 and its neutral from 11 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.

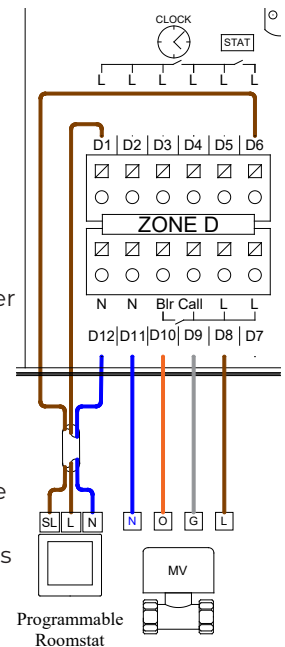


Figure 8: Zone Block D with a motorised valve

2.7. 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 Boiler Call LED will help determine that the valve's integral microswitch has closed to call for heat.

2.8. 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 C7.

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 C10 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 D10 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.

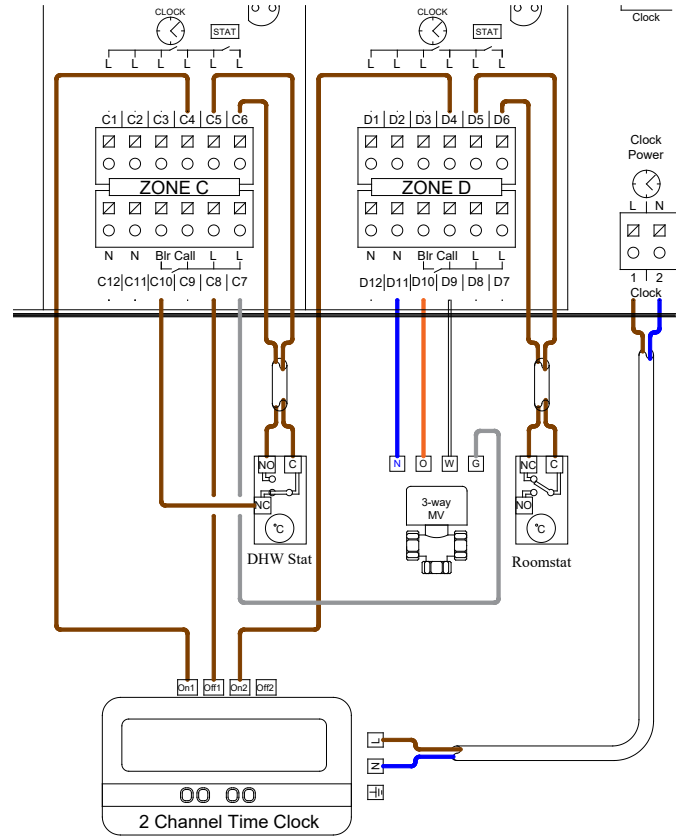


Figure 9: Wiring of a 3-port valve using 2 zones

2.9. DHW Priority

Microswitch 2 can be used to make Zone A a DHW priority mode. When microswitch 2 is ON, zones B, C and D will turn off whenever Zone A is on.

When Zone A is in DHW priority mode and calling, the "Zone A prioritised for hot water" LED will light to show that this zone is being prioritised. When this LED is lit, no other zone can call.

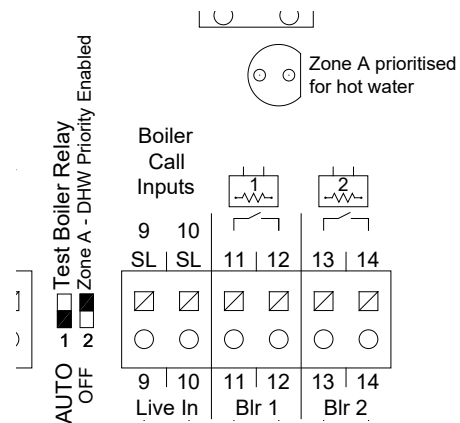


Figure 10: DHW Priority switch in ON position with the priority LED on in the upper right corner.

3. Boiler & Heat Pump Call Control

The double pole Boiler Control - Relay 1 is the heating appliance call relay. The relay can call one or two heat sources using one of the two sets of volt-free contacts, 11 & 12 or 13 & 14.

Any switch-live input into a zone's terminal 10 (A10, B10, C10 and D10) 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.

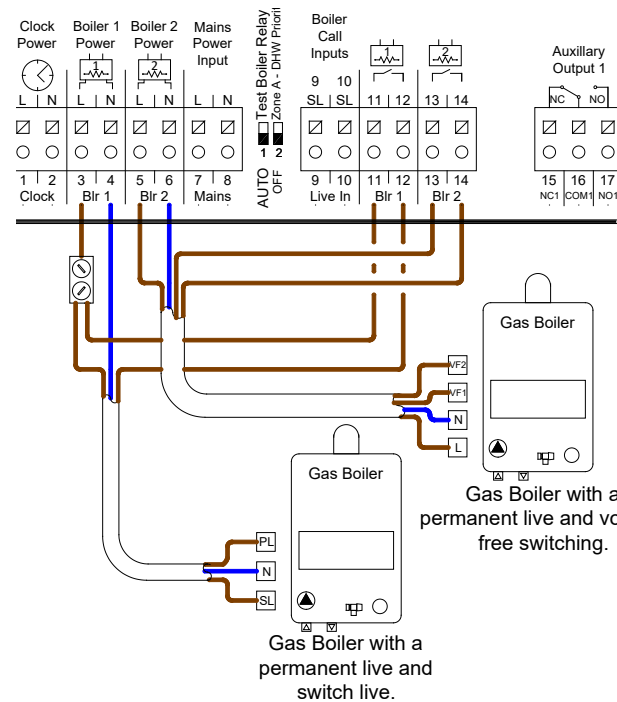


Figure 11: Wiring examples of a permanent live and switch live gas boiler (Boiler 1) and volt-free gas boiler (boiler 2).

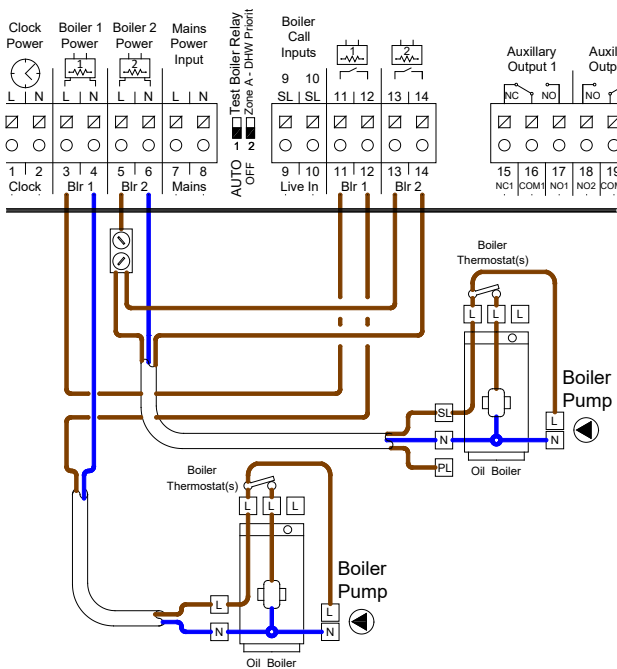


Figure 12: Wiring example of switch live oil boiler (Boiler 1) and permanent live and switch live oil boiler (Boiler 2).

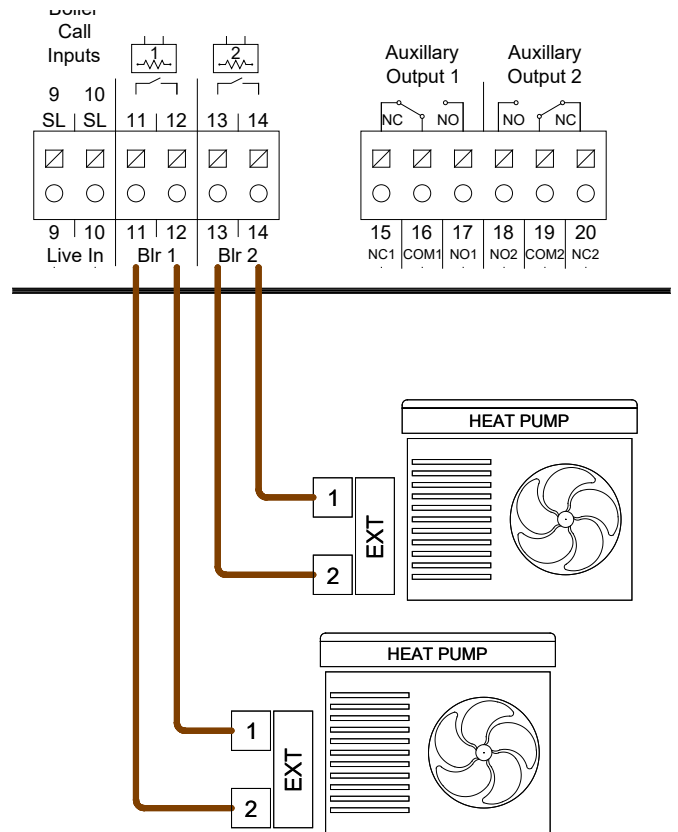


Figure 13: Wiring examples two heat pumps wired to the NRG Lex. The volt-free circuit from the heat pumps are wired through the boiler call switches on the NRG Lex. When the boiler call switches close, the circuit is made, and the heat pump sees that there is a call for heat and they start running.

4. Boiler Call Override

Terminals 9 and 10 are independent inputs that, when energised, will close the Boiler Control Relay 1 contacts, 11 - 12 and 13 - 14. 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 27, 28, 29, or 30.

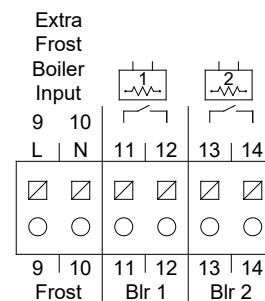


Figure 14: Frost input and boiler call switches

5. Boiler Relay Testing

Microswitch 1 can be used to test the boiler relay. This is particularly useful when commissioning the system to make sure that the boiler or heat pump is working correctly.

When the switch is in the up position, the boiler relay will close. When the switch is in the down (AUTO) position the NRG Lex

will work as normally and the boiler relay will close when a zone is calling or there is an input into the boiler call inputs.

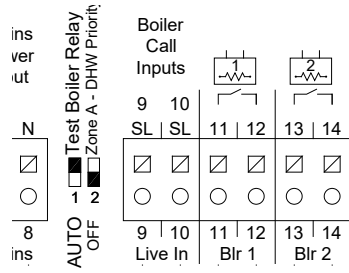


Figure 15: Boiler Relay test switch in the on position, meaning the boiler relay is engaged.

6. 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.

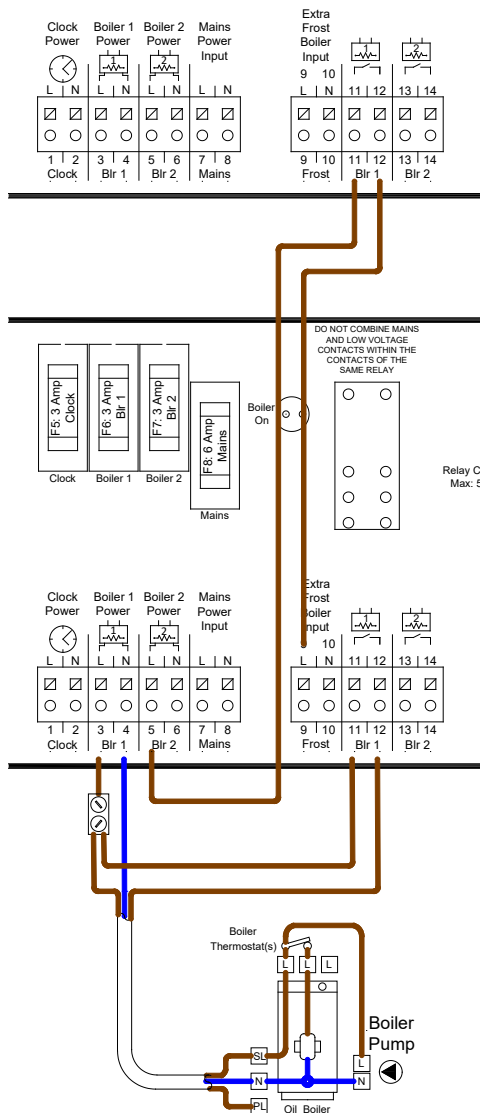


Figure 16: Two NRG Lex v2.2 boards interlinked. Here the boiler on the lower NRG Lex will fire when the boiler relay on the upper NRG Lex closes. The live signal travels from terminal 5 on the lower NRG Lex, through boiler switches 11-12 on the upper board and then into the frost input terminal 9 on the lower board to fire the boiler.

7. Auxiliary Control Relay

The auxiliary controls give the NRG Lex v2.2 great flexibility to accommodate various auxiliary system options. For example, to isolate the power to zones that are not required when priority DHW is required.

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 27, 28, 29, and 30, with Neutrals provided at terminals 25 & 26.

The 4 auxiliary input terminals (21, 22, 23 & 24) 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 21a, 22a, 23a and 24a 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.

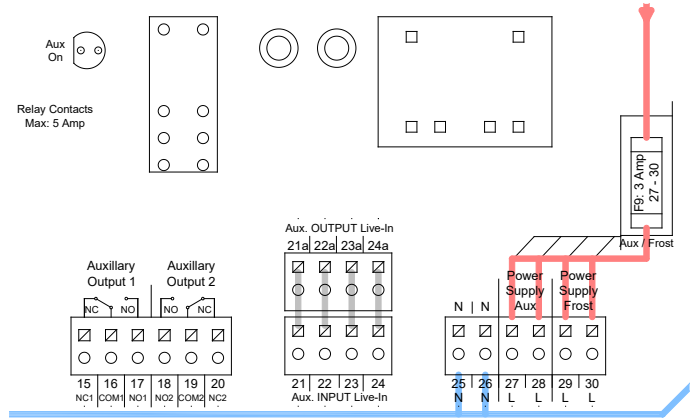
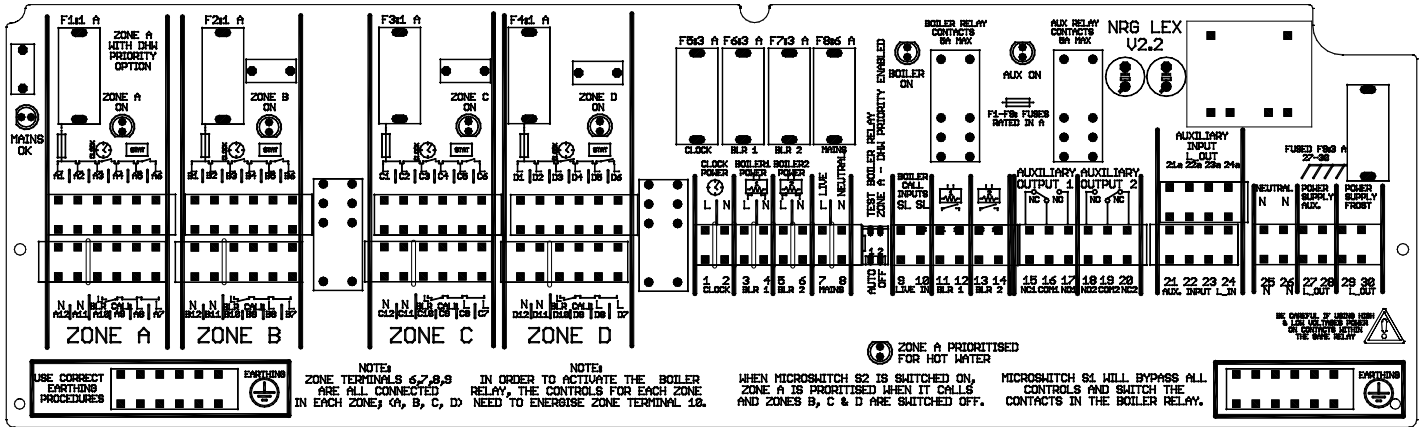


Figure 17: Auxiliary control terminals

8. System Sketchpad with NRG Lex v2.2



Draw your own system here



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