

Thank you for purchasing a BN Thermic product. Manufactured to a high standard, this product will, if used according to these instructions and properly maintained, give you years of trouble free performance.



REGISTER: PLEASE REGISTER THIS PRODUCT ONLINE TO ACTIVATE YOUR GUARANTEE AT
www.bnthermic.co.uk



IMPORTANT: PLEASE READ THESE INSTRUCTIONS, NOTE THE SAFE OPERATIONAL REQUIREMENTS, WARNINGS, AND CAUTIONS. USE THIS PRODUCT CORRECTLY, AND WITH CARE FOR THE PURPOSE FOR WHICH IT IS INTENDED. FAILURE TO DO SO MAY CAUSE DAMAGE AND/OR PERSONAL INJURY AND WILL INVALIDATE THE WARRANTY.

1. SAFETY INSTRUCTIONS

1.1 ELECTRICAL SAFETY

WARNING! It is the responsibility of the owner and the operator to read, understand and comply with the following:-

An electrician experienced and qualified in wiring appliances to 3 Phase power supplies MUST be used to connect this control box.

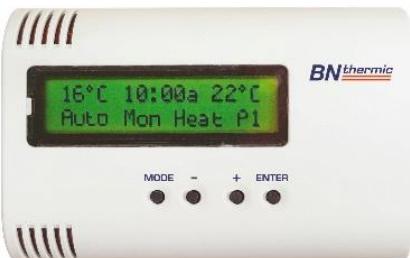
You must check all electrical products, before use, to ensure that they are safe. You must inspect power cables, plugs, sockets and any other connectors for wear or damage. You must ensure that the risk of electric shock is minimised by the installation of appropriate safety devices. A Residual Current Circuit Breaker (RCCB) should be incorporated in the main distribution board.

You must also read and understand the following instructions concerning electrical safety.

- The Health & Safety at Work Act 1974 makes owners of electrical appliances responsible for the safe condition of those appliances and the safety of the appliance operators. If in any doubt about electrical safety, contact a qualified electrician.
- Installation should always be carried out by a qualified electrician in accordance with current electrical regulation.
- Ensure that the cables are always protected against short circuit and overload.
- Regularly inspect the power supply cables for wear or damage and check all connections to ensure that none are loose.
- Important: Ensure that the voltage marked on the appliance matches the power supply to be used.
- DO NOT use worn or damaged cables or connectors. Immediately have any faulty item repaired or replaced by a qualified electrician.
- The unit should be protected by a suitably rated isolator and MCB's.
- This control box is only suitable for indoor use.

1.2 GENERAL SAFETY INSTRUCTIONS

- ✓ Remove all packaging and store it away from children.
- ✓ Familiarise yourself with the applications and limitations of the controller.
- X DO NOT use in areas where hazardous gasses or dusts may be present.
- X DO NOT disassemble the control box for any reason. It must be checked by qualified personnel only.
- X DO NOT use this control box to perform a task for which it has not been designed.



Control Switch- PC-C1
 (1 required per system)



Remote Sensor – CXS
 (Optional extra)



2. INTRODUCTION & SPECIFICATION

Each PC3-A control box provides output control for up to 12 x ESP2-18 and/or ESP2-12 and/or ESP2-09 radiant cassette heaters or up to 36 x RP3-03 or RP3-06 panel heaters from a single point. This approach allows the heating of the building to be adjusted by means of a simple wall-mounted controller, enhancing comfort and improving economy. It incorporates "soft start" which reduces shock loads on the power supply. Each control box can operate up to the maximum stated heaters above but by using additional PC3-A control boxes, linked together, the number of heaters controlled from a single point is almost endless. All control connections are made by Cat5 cable for super-quick and error-free installation. Frost thermostats can easily be added to make this controller fully compatible with your exact requirements. Each system requires one controller, stock code: - PC-C1.

Applications

Typical applications for ESP2 heaters include Community halls, Showrooms, Sports halls, Food halls and Squash courts.

Typical applications for RP3 heaters include Offices, Showrooms, Trade counters, Care homes and Meeting rooms.

Model No	PC3-A
Input Supply	380-415V 50Hz AC 3 Phase + Neutral
Maximum Power (using 12 x ESP2-18 or 36 x RP3-06 Heaters)	@400V 21.6kW 94A (7.2kW 32A per Phase) @415V 23.5kW 98A (7.84kW 32.7A per Phase)
Dimensions (W x H x D)	310 x 350 x 80mm
Max Mains Terminal Capacity	6.0mm ²
Max Heater Terminal Capacity	4.0mm ²
Fuse (each heater or bank of heaters)	10A
Weight	3.9kg
Case Knockouts	1 x 32mm, 4 x 25mm, 24 x 20mm
Optional Frost Thermostat Code	FST-RS (Can be set between -12°C and +26°C) or RST3-IN (Can be set as low as 5°C)
Cat5 Cables	Available from BN Thermic, stock codes:- 5M – DX05, 10M – DX10 and 20M – DX20

3. INSTALLATION

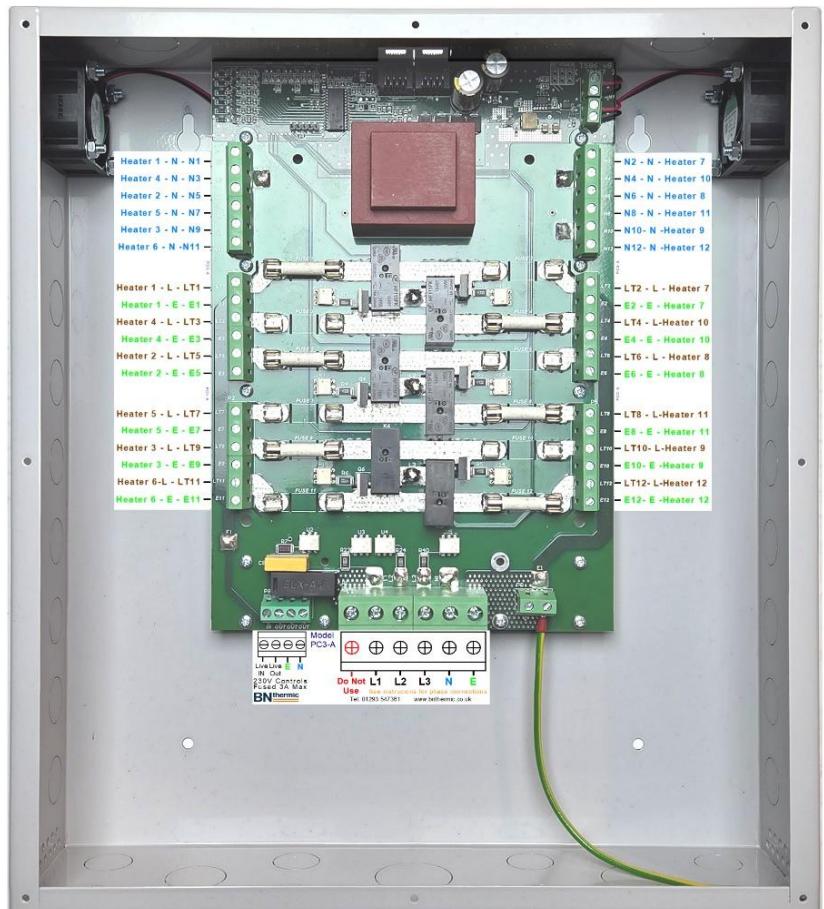
Mechanical Fixing

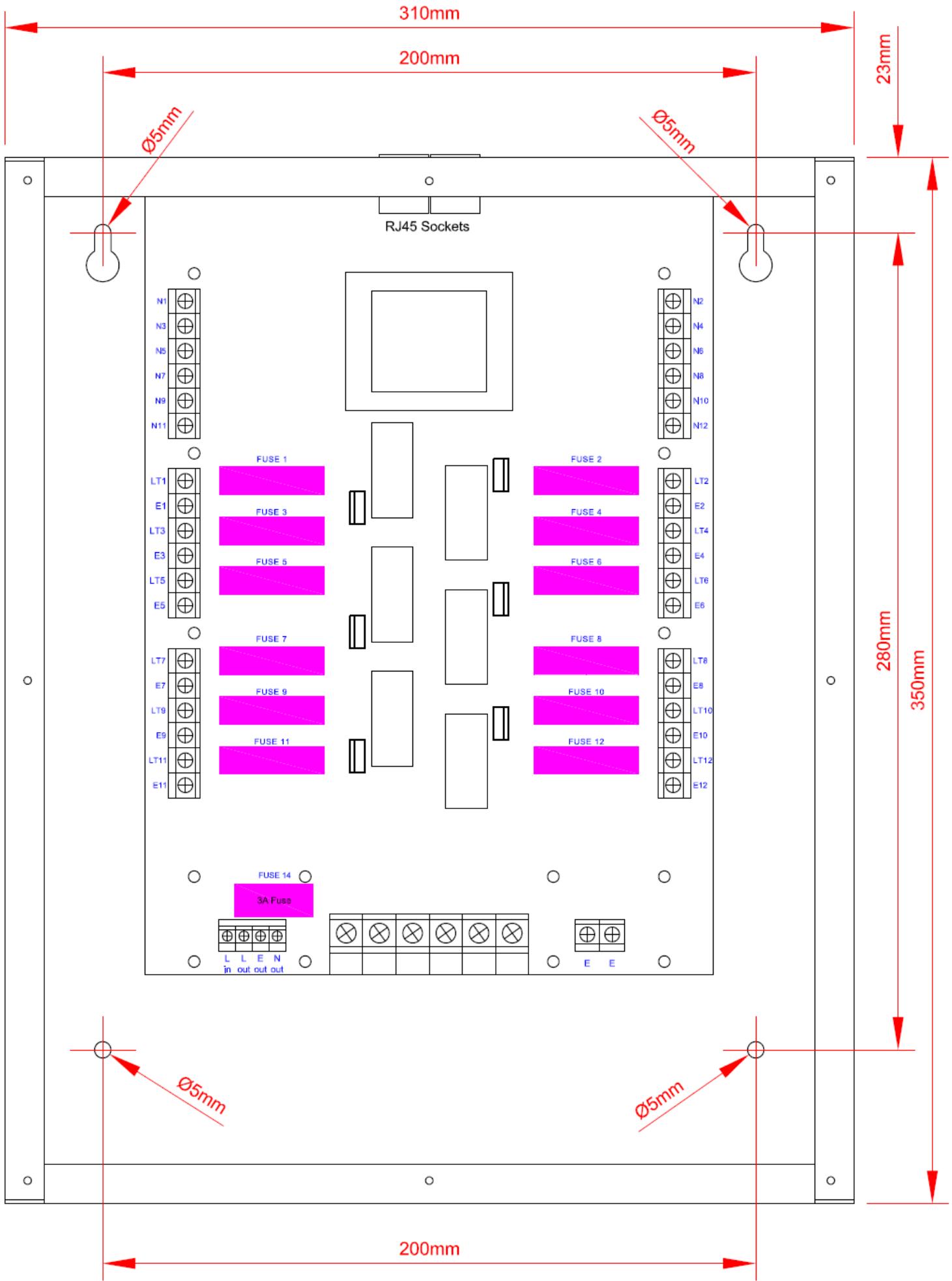
Please note the following when positioning your control box.

- To allow a good airflow a gap of 25mm MUST be left between the left or right side and any object e.g. a wall or other electrical enclosure.
- If mounting two or more control boxes side by side leave a minimum air gap of 50mm between them

Do NOT use power tools to undo or do up electrical terminal screws or the front cover screws.

- Remove the front cover, taking care to disconnect the earth wire connected to the inside.
- Carefully remove any knockouts where you require holes. Knockouts are either 20mm, 25mm or 32mm dia.
- Mount the control box using the 4 holes shown, away from any direct source of heat but ideally in the centre of the group of heaters being controlled by this box. By mounting in the centre, you can keep installation costs down by reducing the cable length required to each heater.
- Once all the heaters are connected to the box, replace the front cover making sure the earth cable is first attached.
- Secure the cover using all 8 screws.





4. ELECTRICAL CONNECTIONS – ESP2 RADIANT CASSETTE HEATERS

See Section 5 for wiring instructions for RP3 radiant ceiling panel heaters.

ISOLATE MAINS SUPPLY BEFORE COMMENCING ANY INSTALLATION WORK.

Please make sure you have read the safety instructions and that you are a suitably qualified electrician familiar with 3 phase wiring before continuing.

Drawings opposite show the connection of each heater to the PC3-A control box and the mains cable connection.

ESP2-09 , 12 or 18 heater wiring only (See page 6 for RP3 wiring)

This Control box must **NOT** be used for ESP2-36 and or ESP2-30 and or ESP2-24 heaters. (Use a PC4-A or PC5-A control box).

Each heater should be wired using a minimum of 1mm² 3 core cable as per **“Section 4”** and wired 230V single phase using the heater instruction leaflet (Instruction leaflets are supplied with each individual heater). If you require very long lengths of cable between heater and control box, check cable size using voltage loss calculations.

Connect Heater 1 terminal L – LT1, N – N1 and E – E1

Connect Heater 2 terminal L – LT5, N – N5 and E – E5

Connect Heater 3 terminal L – LT9, N – N9 and E – E9

Connect Heater 4 terminal L – LT3, N – N3 and E – E3

Connect Heater 5 terminal L – LT7, N – N7 and E – E7

Connect Heater 6 terminal L – LT11, N – N11 and E – E11

Connect Heater 7 terminal L – LT2, N – N2 and E – E2

Connect Heater 8 terminal L – LT6, N – N6 and E – E6

Connect Heater 9 terminal L – LT10, N – N10 and E – E10

Connect Heater 10 terminal L – LT4, N – N4 and E – E4

Connect Heater 11 terminal L – LT8, N – N8 and E – E8

Connect Heater 12 terminal L – LT12, N – N12 and E – E12

If you use fewer than 12 heaters connect in order 1,2,3 etc

Mains Cable Wiring

As you can mix the model of heaters up to a maximum of 12 total load on the power in mains cable will vary and needs to be worked out. Below is information to help you.

Total maximum load of 12 x 1.8Kw ESP2-18 Heaters is 21.6KW = 7.2kW per phase or 32A per phase.

If you are only using 6 x 1.8Kw ESP2-18 Heaters total load is 10.8kW = 3.6kW per phase or 16A per phase.

When working out the loading heaters MUST be wired as above and in correct order (1, 2, 3 etc.).

Heaters 1, 4, 7 & 10 are connected to phase 1.

Heaters 2, 5, 8 & 11 are connected to phase 2.

Heaters 3, 6, 9 & 12 are connected to phase 3.

A) Using one or the first control box

Ensure you are using a suitable mains cable for the total load required.

Connect Phase 1 – L1.

Connect Phase 2 – L2.

Connect Phase 3 – L3.

Connect Neutral – N.

Connect Earth – E.

B) Using multi control boxes

Please follow the instructions for wiring multi control boxes on Page 8.

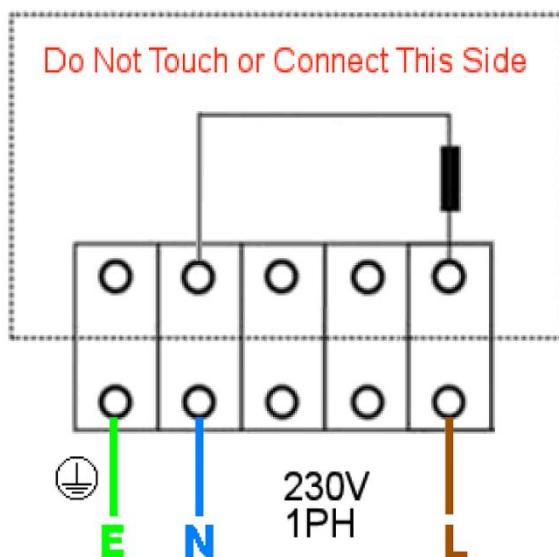
Failure to follow the instructions for multi control boxes will mean your system could be badly balanced across all 3 phases.

Network Cables

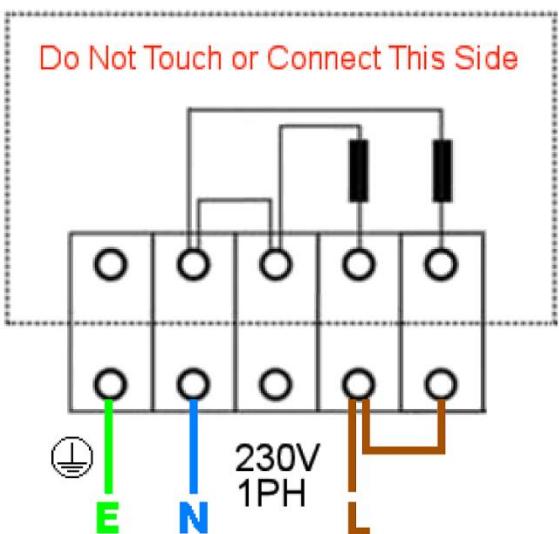
Network sockets on the control boxes are bi-directional. This means that either may be used for in or out. One socket has a plug already in place. This is solely to be used to stop objects falling into the socket if not being used. Remove if you require to use the socket. See section 7 to 10 for more information.

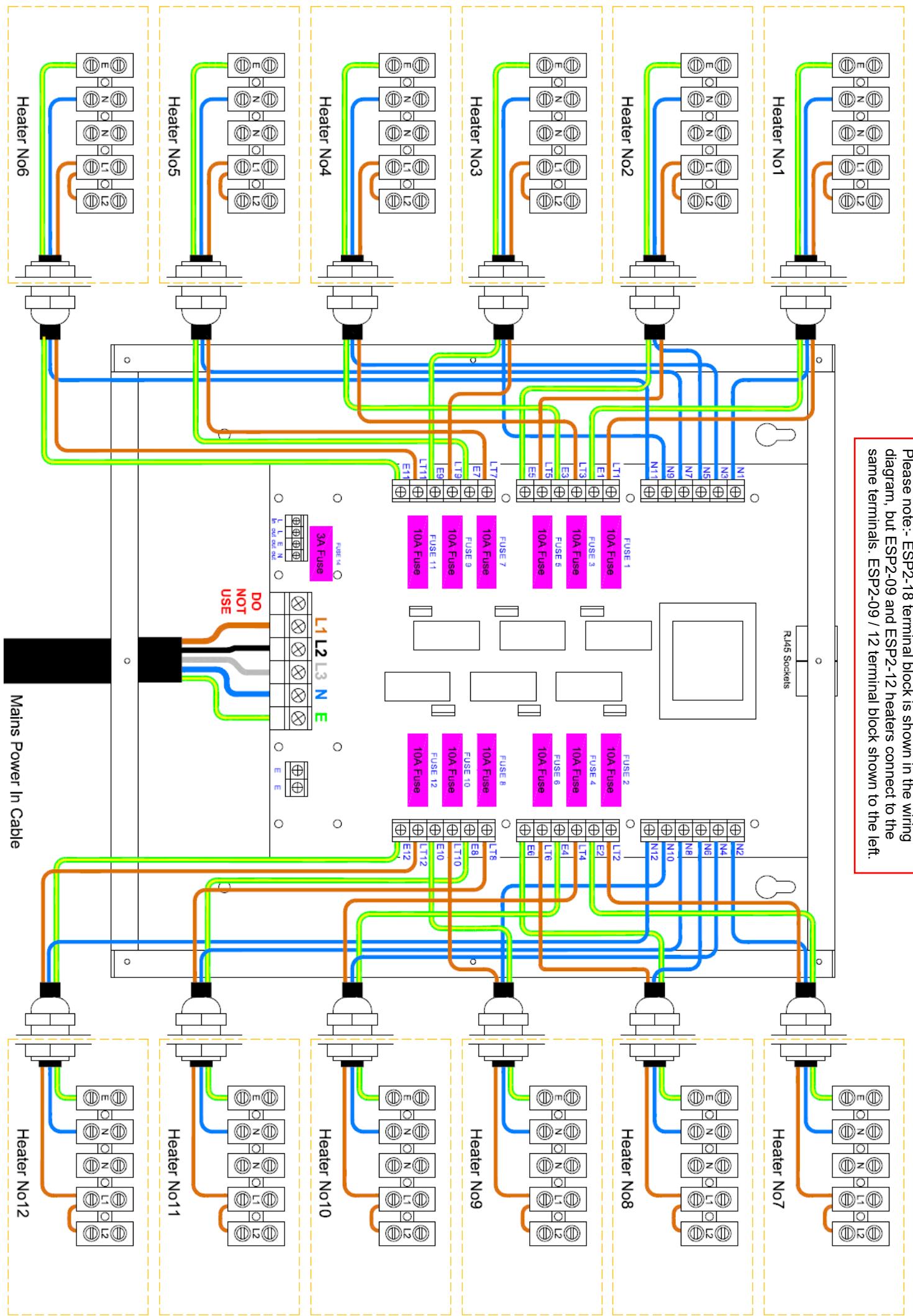
PLEASE CHECK ALL CONNECTIONS BEFORE TURNING ON AS INCORRECT WIRING IS NOT COVERED BY THE GUARANTEE

ESP2-09 &12 Heater Terminal Connection



ESP2-18 Heater Terminal Connection





Please note:- ESP2-18 terminal block is shown in the wiring diagram, but ESP2-09 and ESP2-12 heaters connect to the same terminals. ESP2-09 / 12 terminal block shown to the left.

5. ELECTRICAL CONNECTIONS – RP3-03 & RP3-06 RADIANT CEILING PANEL HEATERS

See Section 4 for wiring instructions for ESP2 radiant cassette heaters.

ISOLATE MAINS SUPPLY BEFORE COMMENCING ANY INSTALLATION WORK.

Please make sure you have read the safety instructions and that you are a suitably qualified electrician familiar with 3 phase wiring before continuing. Drawings opposite show the connection of each heater or heater bank to the PC3-A control box and the mains cable connection.

RP3-03 and / or RP3-06 ceiling panel heater wiring only (See page 4 for ESP2 wiring)

Each ceiling heater can be wired singularly and / or in a bank of two (see Bank Type A) and / or in a bank of three (see Bank Type B). They must **not** be wired in banks of 4 or more. You can connect a maximum of 36 ceiling panel heaters per control box, but you can add additionally control boxes giving an almost endless number of heaters controlled by one device. Each ceiling panel heater or bank should be wired back to the control box using a minimum of 1mm² 3 core cable. If you require very long lengths of cable between heater and control box, check cable size using voltage loss calculations.

Balancing the System

To keep the loading on each phase balanced as close as possible we recommend you only bring back 3, 6, 9, or 12 cables to the control box where possible. Wire them as heater bank / heater 1,2,3 etc.

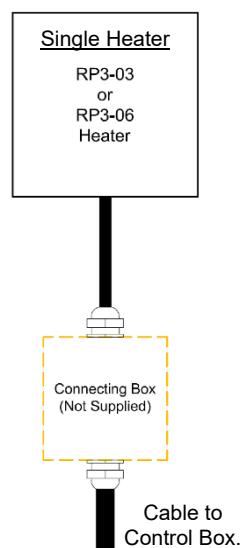
Also, when using heater banks with 3 heaters wire these to the lower numbers then add any 2 bank heaters and finally 1 heater.

e.g., if you were wiring 16 heaters you could use any one of the following combinations.

A) 4 x 3 heater banks (type B) wired to 1, 2, 3 & 4, then 2 x 2 heater banks (type A) wired to 5 and 6. This gives you 6 connections.

B) 7 x 2 heater banks (type A) wired to 1, 2, 3, 4, 5, 6 & 7, then 2 x single heaters wired to 8 and 9. This gives you 9 connections.

C) 5 x 2 heater banks (type A) wired to 1, 2, 3, 4, & 5, then 7 x single heaters wired to 6, 7, 8, 9, 10, 11 and 12. This gives you 12 connections.



Connect Heater Bank 1 or Heater 1 terminal L – LT1, N – N1 and E – E1
 Connect Heater Bank 2 or Heater 2 terminal L – LT5, N – N5 and E – E5
 Connect Heater Bank 3 or Heater 3 terminal L – LT9, N – N9 and E – E9
 Connect Heater Bank 4 or Heater 4 terminal L – LT3, N – N3 and E – E3
 Connect Heater Bank 5 or Heater 5 terminal L – LT7, N – N7 and E – E7
 Connect Heater Bank 6 or Heater 6 terminal L – LT11, N – N11 and E – E11
 Connect Heater Bank 7 or Heater 7 terminal L – LT2, N – N2 and E – E2
 Connect Heater Bank 8 or Heater 8 terminal L – LT6, N – N6 and E – E6
 Connect Heater Bank 9 or Heater 9 terminal L – LT10, N – N10 and E – E10
 Connect Heater Bank 10 or Heater 10 terminal L – LT4, N – N4 and E – E4
 Connect Heater Bank 11 or Heater 11 terminal L – LT8, N – N8 and E – E8
 Connect Heater Bank 12 or Heater 12 terminal L – LT12, N – N12 and E – E12

If you use fewer than 12 Heater Banks or 12 heaters connect in order 1,2,3 etc

Mains Cable Wiring

To work out mains cable loading add together all wattages of heaters on each phase.

Heaters or heater bank 1, 4, 7 & 10 are connected to phase 1

Heaters or heater bank 2, 5, 8 & 11 are connected to phase 2.

Heaters or heater bank 3, 6, 9 & 12 are connected to phase 3.

Take the highest Wattage / phase and then divide by 230 (volts per phase) to give you the amp loading. e.g., in the above example of 16 heaters if all were RP3-03 (300W Heaters) loading on highest wattage phase would be 1800W. $1800/230 = 8A$ per phase or total load 24A.

A) Using one or the first control box

Ensure you are using a suitable mains cable for the total load required.

Connect Phase 1 – L1 Connect Phase 2 – L2 Connect Phase 3 – L3

Connect Neutral – N Connect Earth – E

B) Using multi control boxes

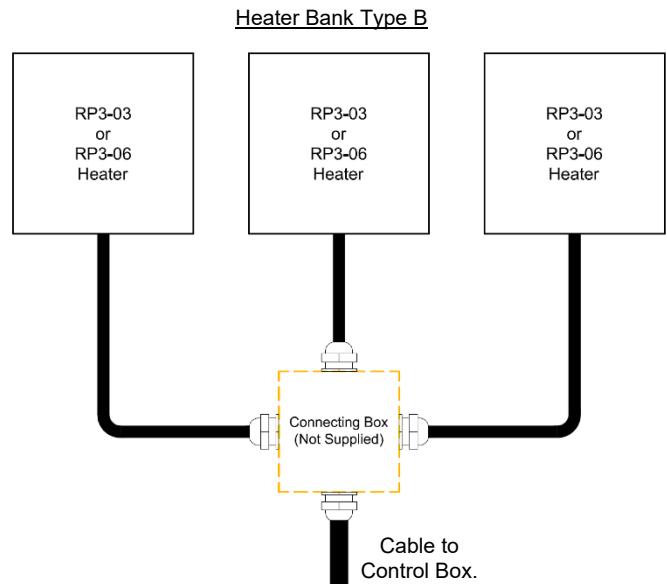
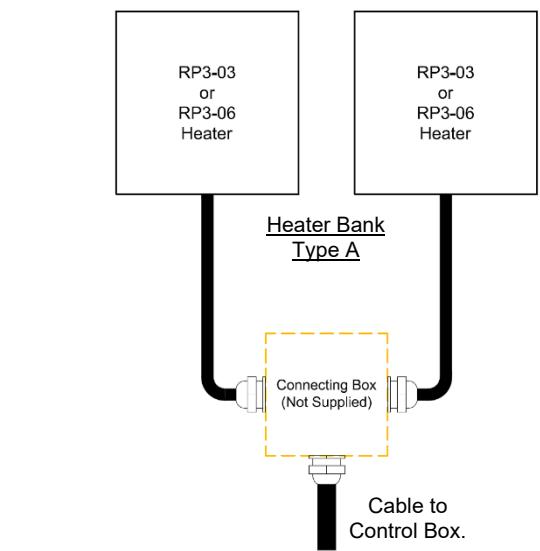
Please follow the instructions for wiring multi control boxes on Page 8.

Failure to follow the instructions for multi control boxes will mean your system could be badly balanced across all 3 phases.

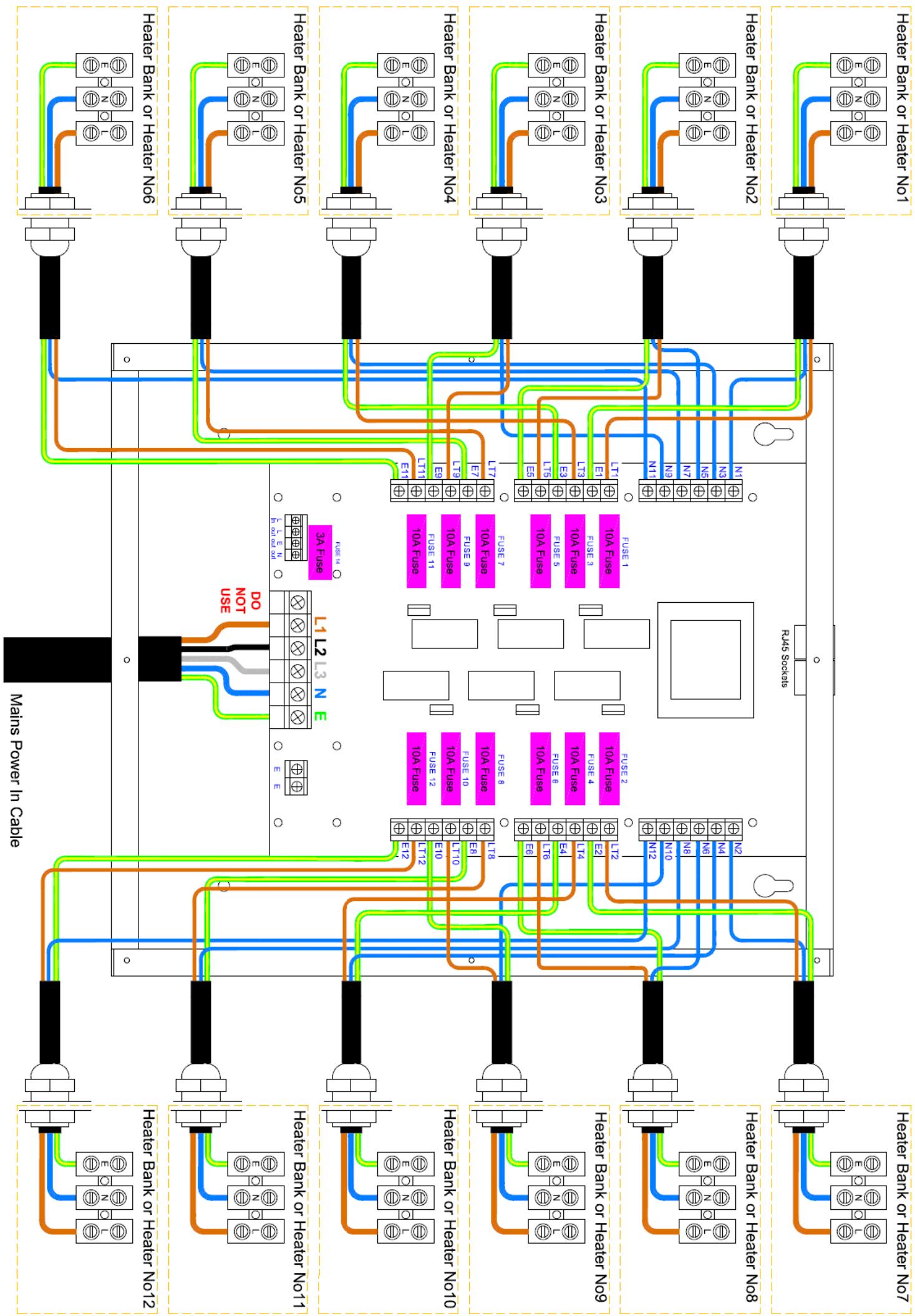
Network Cables

Network sockets on the control boxes are bi-directional. This means that either may be used for in or out. One socket has a plug already in place.

This is solely to be used to stop objects falling into the socket if not being used. Remove if you require to use the socket. See section 7 to 10 for more information.

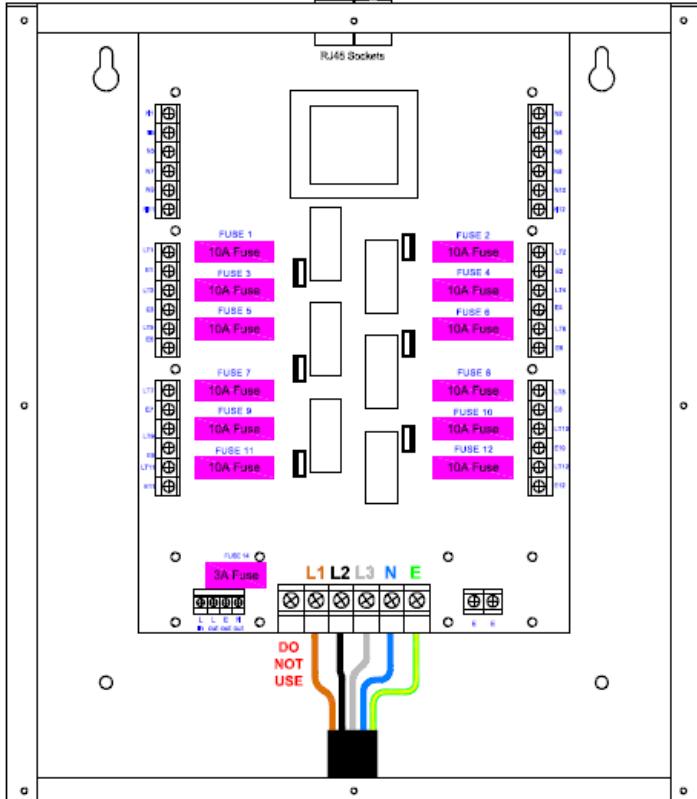


PLEASE CHECK ALL CONNECTIONS BEFORE TURNING ON AS INCORRECT WIRING IS NOT COVERED BY THE GUARANTEE

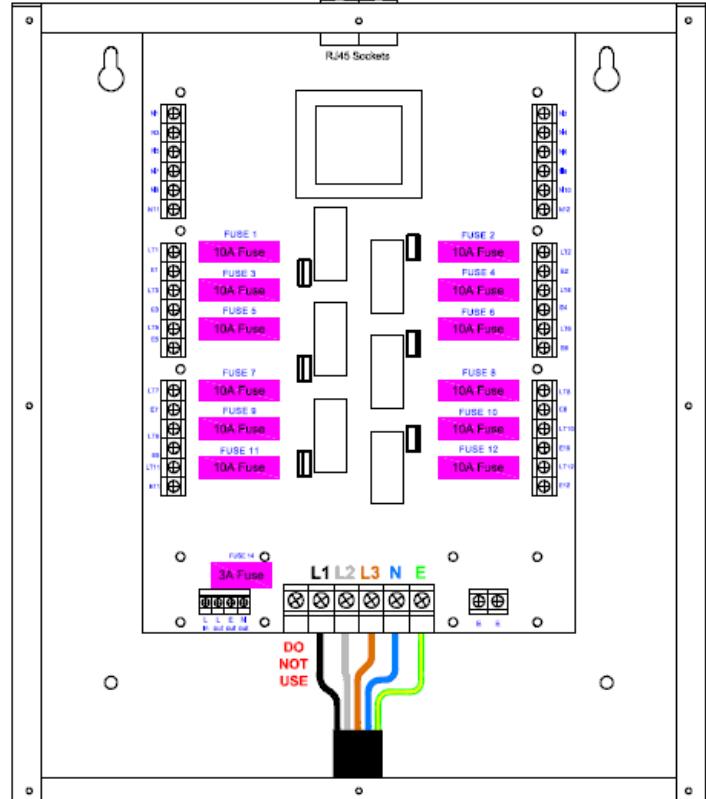


6. USING MULTI CONTROL BOXES

If you are using more than one control box, please follow the wiring diagram below to help keep a balanced load on all phases.



Mains Power In Cable
Control Box 1, 4, 7, 10



Mains Power In Cable
Control Box 2, 5, 8, 11

Mains Power Connections

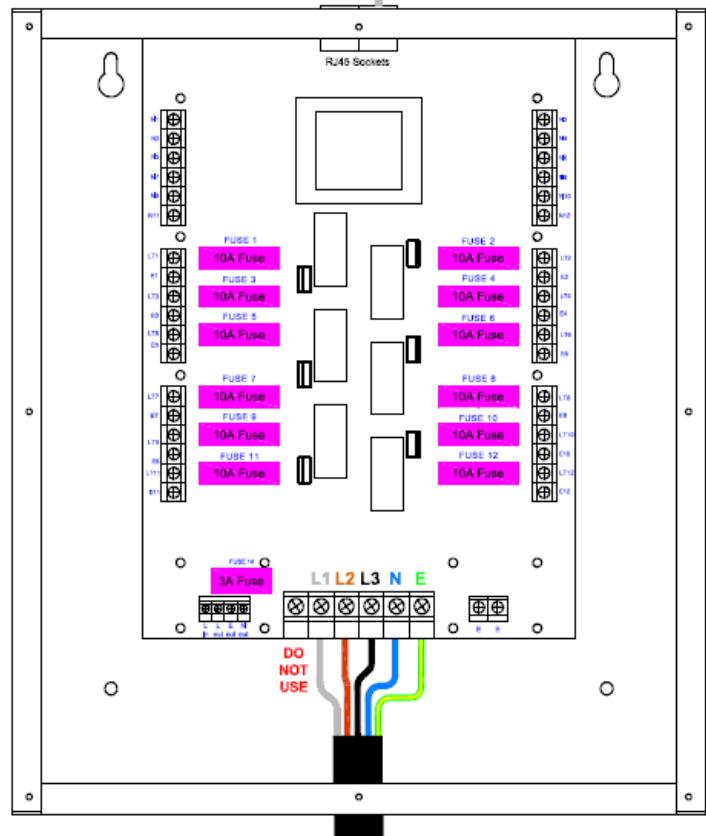
	Terminal L1	Terminal L2	Terminal L3
1st Control Box	Phase 1	Phase 2	Phase 3
2nd Control Box	Phase 2	Phase 3	Phase 1
3rd Control Box	Phase 3	Phase 1	Phase 2
4th Control Box	Phase 1	Phase 2	Phase 3
5th Control Box	Phase 2	Phase 3	Phase 1
6th Control Box	Phase 3	Phase 1	Phase 2
7th Control Box	Phase 1	Phase 2	Phase 3
8th Control Box	Phase 2	Phase 3	Phase 1
9th Control Box	Phase 3	Phase 1	Phase 2
10th Control Box	Phase 1	Phase 2	Phase 3
11th Control Box	Phase 2	Phase 3	Phase 1
12th Control Box	Phase 3	Phase 1	Phase 2

For each box also connect the following:-

Blue Wire (Neutral) to the N Terminal

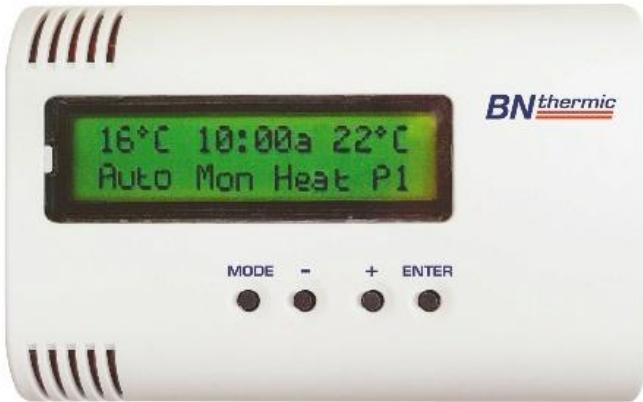
Earth Wire (Yellow / Green) to the E Terminal

**PLEASE CHECK ALL CONNECTIONS BEFORE TURNING ON AS
INCORRECT WIRING IS NOT COVERED BY THE GUARANTEE**



Mains Power In Cable
Control Box 3, 6, 9, 12

7. ADDING THE PC-C1 CONTROLLER



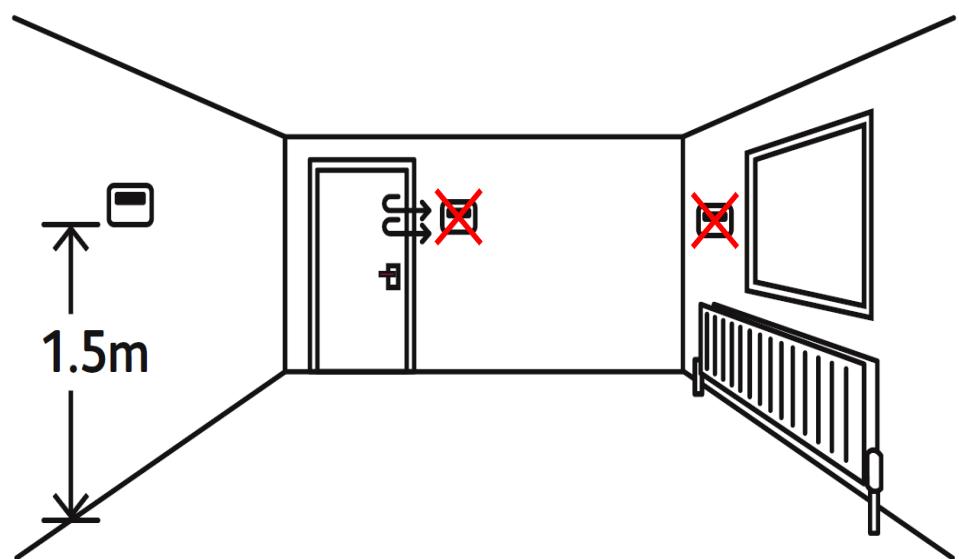
The PC-C1 Thermostat is an easy to install and use 7 Day, or 5/2 day programmable room thermostat which offers two, four or six time and temperature changes each day, with different programmes available for weekdays and for weekends. It is designed to provide automatic time and temperature control of multi heating control systems. All heaters follow suit. If you are using this wall controller with multi control boxes, you can turn the power off or isolate any control box and the remaining boxes will continue to operate without changing any of the control link cables. This is a design feature of the system.

8. LOCATION OF CONTROLLER

CHOOSING A LOCATION FOR YOUR PC-C1

The PC-C1 controller should be mounted on an internal wall approximately 1.5 meters from floor level and should be in a position away from draughts, direct heat and sunlight.

Ensure that there will be enough space on the left hand side of the controller to allow free air movement though the controller so it can detect the room temperature. If you wish to place the controller in a separate area such as an adjacent room or cupboard, a remote sensor will be required to detect the temperature. Remote sensor part number- CXS. Recommended maximum length of network cable between the controller and control box is 50 meters.

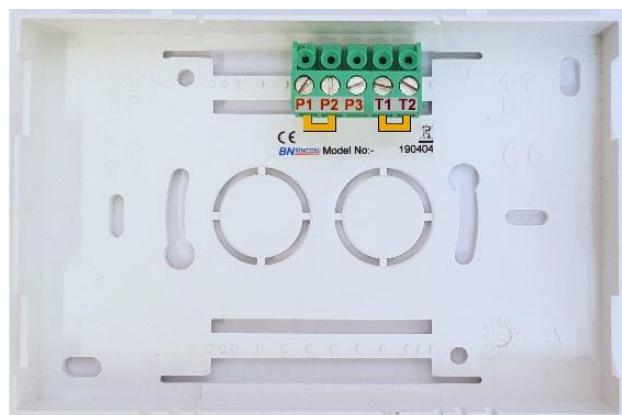


9. MOUNTING THE CONTROLLER.

To remove the back plate from the front of the controller gently push the bottom of the back plate whilst gently prising the front panel away. The bottom of the controller must be released from the back plate first before gently unclipping the top.

Screw to the wall ensuring the "UP arrows" are pointing the correct way and the green terminal block is at the top.

The PC-C1 can also be mounted on a single gang flush wiring box using the 2 x semi-circular slotted holes in the back. DO NOT overtighten the fixing screws as you will deform the box and the connection block in the back will not engage with the circuit board correctly.



10. ELECTRICAL CONNECTIONS.

A network cable is used to connect the controller to any of the PC control boxes (read notes below regarding cables).

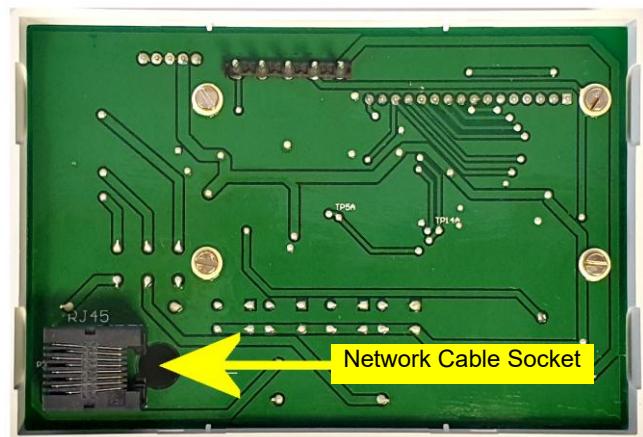
- We recommend you use our network cables as they have been thoroughly tested with all heaters and controllers and are 100% totally compatible.
- Problems arising from using non-standard or inferior network cables are not covered by the guarantee.
- Network cables with "wings" on the boot connections will not fit into the controller socket.

Bring sufficient length of network cable through one of the knockouts in the back plate to allow a lazy loop to be formed before plugging into the back of the circuit board. If you are not fitting additional sensors or linking the controller to a building management system (BMS) leave the links in the back plate in position.

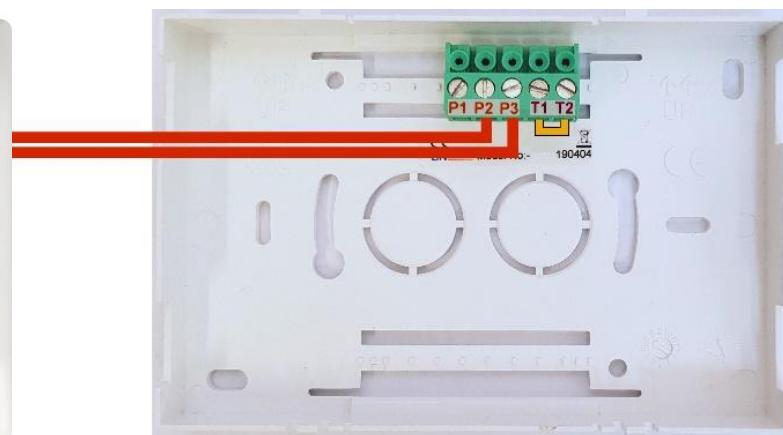
To refit the front panel to the back

Locate the 2 holes on the top of the front cover onto the two lugs on the top of the back box. Now gently click the bottom of the front cover onto the back box. No force should be applied if the front cover does not fit easily the network cable is possibly caught please check before trying again.

If you are not fitting an additional sensor or switches go to section 15.



11. USING A REMOTE SENSOR (CXS) WITH THE CONTROLLER.



- 1) Remove the existing link  between P1 and P2.
- 2) DO NOT remove the link  between T1 and T2.
- 3) Using any insulated copper wire connect the remote sensor to terminals P2 and P3.

12. USING WITH A ZERO VOLT BMS SYSTEM

The control system can be used in conjunction with a Zero Volt or 230V building management system (BMS). Please read section 13 if your BMS system has 230v outputs.

Connecting to a zero volt system

Remove the link between T1 and T2 and connecting the two terminals to a zero volt output which is controlled by the BMS. The PC-C1 will be locked in the off mode with the BMS signal off.

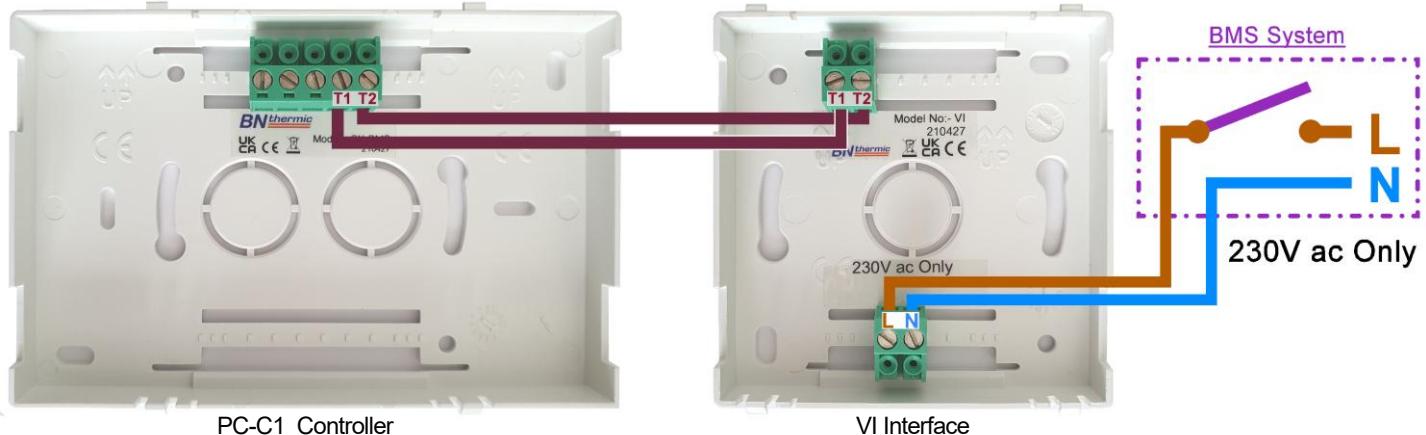
AT NO TIME MUST A VOLTAGE BE SENT DOWN THESE WIRES FROM THE BMS.



13. USING WITH A 230V OUTPUT BMS SYSTEM.

You MUST use a VI Interface (Product code – VI) if you require 230V connections.

Connecting to a 230V System



Remove the cover from the VI Interface and secure to a suitable surface.

Connect the PC-C1 Controller to the VI Interface. Connect terminal T1 to T1 and Terminal T2 to T2 as shown below.

Connect the L Terminal on the VI Interface to the switchable L terminal on your BMS. Connect the N terminal on the VI Interface to the Neutral connection on your BMS. The PC-C1 will be locked in the off mode with the BMS signal off.

PLEASE CHECK ALL CONNECTIONS BEFORE TURNING ON AS INCORRECT WIRING IS NOT COVERED BY THE GUARANTEE

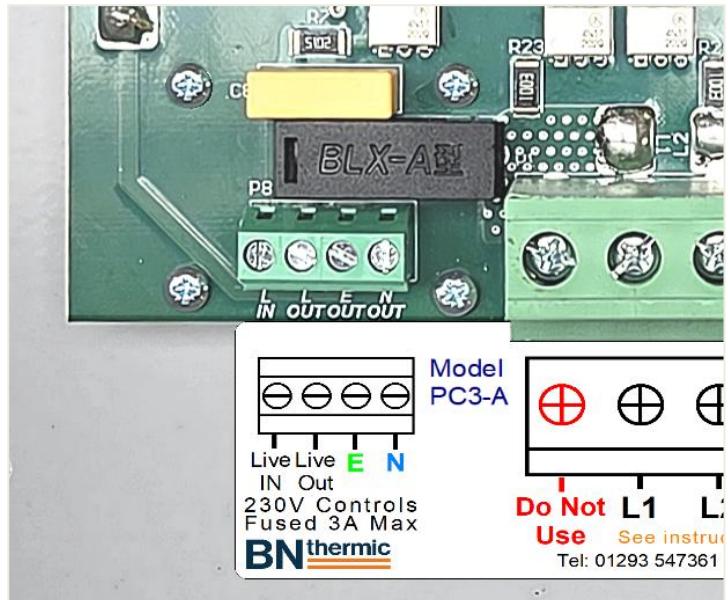
14. USING A FROST PROTECTION THERMOSTAT WITH THE CONTROLL BOX

You can add a frost thermostat to protect your building. This needs to be connected directly to a control box. With linked multi control box systems every control box can have its own frost thermostat connected to cover different areas of the building. Should any thermostat turn on, all control boxes will operate turning on all the heaters. Only when all frost thermostats turn off, will all the heaters turn off. Please note the frost thermostat will always override any other controller connected to the system.

Connecting a frost thermostat

Connect Live Out terminal on the circuit board to the common terminal on the frost thermostat (this is 230V and protected with a 3A fuse).

Connect the Live IN terminal on the circuit board to the terminal on the thermostat that becomes live when the temperature drops to the set point. If required, you can connect a neutral to the N terminal and earth to the E terminal on the circuit board.



15. TROUBLE SHOOTING AND SOLUTIONS

We recommend using a qualified electrician before attempting any fault finding – Please be aware that there is potentially 400V 3 phase supply inside the control box.

No heaters working but the power is turned on – First check the thermostat is asking for heat, secondly if it is a new installation check the network cable between the thermostat and the control box. 85% of faults are caused by faulty self-assembly of network cables. We always recommend you purchase our or factory made and tested network cables rather than making your own.

Single heater or heater bank not working - Check the corresponding fuse in the control box. If it has failed replace with another 10A fuse.

NOTE: It is our policy to continually improve products and as such we reserve the right to alter data, specifications and component parts without prior notice.



WEEE REGULATIONS:

This appliance bears the symbol of the crossed waste bin. This indicates that, at the end of its useful life, it must not be disposed of as domestic waste but must be taken to a collection centre for waste electrical and electronic equipment. It is the user's responsibility to dispose of this appliance through the appropriate channels. Failure to do so may incur penalties established by laws governing waste disposal.

IMPORTANT: No liability is accepted for incorrect use of this product.

WARRANTY: Your BN Thermic product is guaranteed for one year from date of purchase. We will repair or replace at our discretion any part found to be defective. We cannot assume any consequential liability. This guarantee in no way prejudices your rights under common law and is offered as an addition to consumer liability rights.

REGISTER: Activate your warranty by registering online at www.bnthermic.co.uk and retain this installation data for future reference.

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