

BOSS™

Copperad®

**BOSS COPPERAD
UNIT HEATERS**

Installation, Operation & Maintenance Manual



**OVER
100 YEARS
OF QUALITY**

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1.1 | GENERAL Description

BOSS Copperad Unit Heaters are hot water or steam fan heaters specifically designed for use in industrial and commercial environments. They are stand-alone heaters mounted at high level blowing a high velocity stream of air into the occupied space. They must be supplied with a flow of low pressure hot water or steam which transfers heat to the air blowing across the heat exchanger and adds heat to the space.

The units consist of a painted steel casing with a set of louvres for directing the outlet airstream. A finned tube (coil) heat exchanger is fitted within the casing and an axial fan is fitted behind the coil. The fan is directly coupled to a single phase EC (brushless DC) motor which blows air across

the heat exchanger and out through the bank of louvres.

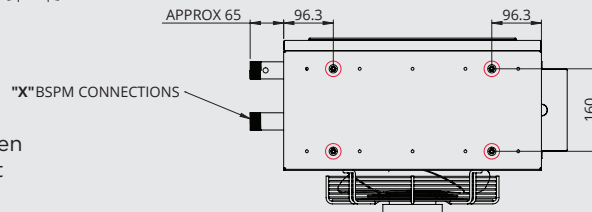
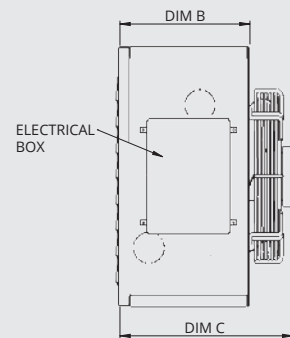
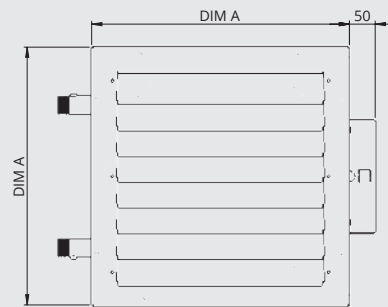
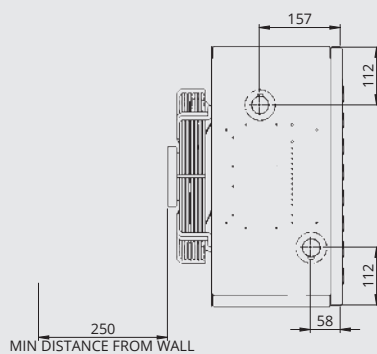
BOSS Copperad Unit Heaters units are available in a range of sizes.

Technical Data

Unit size	UH5	UH6	UH7	UH8
Weight (kg)	30	45	55	70
Int. vol. 2 row (l)	0.9	1.5	2.7	3.7
Int. vol. 3 row (l)	1.2	2.0	3.5	4.9
Int. vol. 4 row (l)	1.5	2.5	4.3	6.0
Power (V/Ph/Hz)	230/1/50	230/1/50	230/1/50	230/1/50
Fan type	Axial	Axial	Axial	Axial
Motor type	EC	EC	EC	EC
Connection size/type	1" BSP male taper	1" BSP male taper	1/4" BSP male taper	1/4" BSP male taper

Dimensions (mm)

Model	DIM A	DIM B	DIM C	X BSPM
UH5	500	252	335	1"
UH6	600	262	360	1"
UH7	700	262	360	1/4"
UH8	800	290	395	1/4"



LH coil connections when looking from the front

1.2 GENERAL

Receipt and Preparation

The units are shipped in sturdy, labelled cardboard boxes that clearly show their contents.

On receipt check that all details are correct to your order; any damages must be reported to the carrier and BSS immediately.

It is recommended that the packaging is kept in place and the units stored in a secure and dry area until the installation takes place.

2.1 MOUNTING

Mounting general

Recommended minimum and maximum mounting heights are given in the table below and vary with the unit size and speed selected. Higher fan speeds suit higher mounting locations but do generate additional noise so the unit speed should always be matched as closely as possible to the appropriate mounting height.

In the table below the figures for throw apply to the zone of effectiveness of horizontally mounted units and the coverage applies to vertically mounted units. The heights shown are for guidance only and acceptable operation would still be expected at close to these values.

Mounting Height and Coverage

Unit size	UH5			UH6			UH7			UH8		
Speed	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Min. height (m)	2.0	2.5	2.5	2.5	2.5	3.0	2.5	3.0	3.0	2.5	3.0	3.5
Max. height (m)	3.0	3.5	3.5	3.5	4.5	4.5	3.5	5.0	5.5	4.0	5.0	6.0
Throw (m)	7	9	13	10	13	19	13	16	25	15	18	27
Coverage (mxm)	6	7	12	9	12	18	11	13	23	12	15	25

Throw refers to the distance from a horizontal unit to a point at which the heater will effectively condition the space. Coverage refers to the distance in both directions from a vertical unit at which the unit effectively conditions the space. These are typical values only for guidance and will be enhanced by internal air movement.

As unit heaters generate a flow of warm air, the outlet air is more buoyant than that of the surroundings and excessive leaving air temperatures can give rise to high temperature stratification within the space being heated. Ideal leaving air temperatures for unit heaters are in the range 30 to 45°C. The leaving air temperature (LAT) can be calculated from the output (kW), the airflow (m³/s) and the entering air temperature (EAT):

$$\text{LAT}(\text{°C}) = \text{EAT}(\text{°C}) + [\text{output}(\text{kW}) / \text{airflow}(\text{m}^3/\text{s}) / 1.2]$$

The approximate noise levels for the unit heaters at their various speeds are shown in the table below. Unit heaters are intended to generate high velocity air flows and intended for installation in industrial environments so will always generate significant noise. The figures shown are representative sound pressure levels that would be expected at a distance of 3m from the outlet of the unit in the free field. Actual sound pressure levels will depend on the reverberant nature of the installation.

Generated Noise Levels

Unit size	UH5			UH6			UH7			UH8		
Speed	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
dBA	41	47	57	41	50	60	43	52	62	48	54	66

Table 3. Sound pressure levels

2.2 | MOUNTING OF HORIZONTAL UNITS

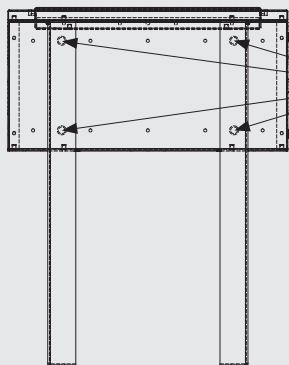
Horizontal units blow a horizontal flow of air, typically from the side of the space into the building. They are equipped with an array of adjustable outlet louvres to angle the airstream downwards. The louvres are fully adjustable but recommended angles for the direction of the airstream are 30 to 45° from the perpendicular. If horizontal units are being mounted on both sides of the building then they are best fitted in a staggered pattern.

Units are supplied, as standard, with captive threaded inserts on the top, bottom and sides of the unit casing. These inserts are intended for the fixing of

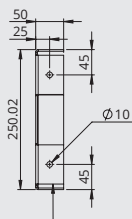
mounting brackets or channel struts. The unit heaters can be supplied with cantilever wall brackets as an optional extra. Bolts are supplied to secure the unit heater to the top of the cantilever bracket and the holes in the brackets are positioned to allow a suitable clearance between the wall and the back of the fan. Fixings between the brackets and the wall are not supplied and these are within the scope of the installer who must ensure that suitable anchors are fitted to the wall. Figure 2 below shows details of the angle bracket fixing method.

Wall angle bracket fixing

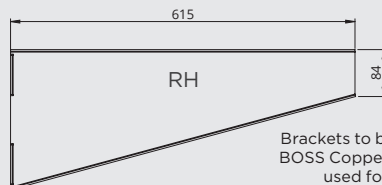
Suggested Horizontal Airflow Mounting - Angle Bracket



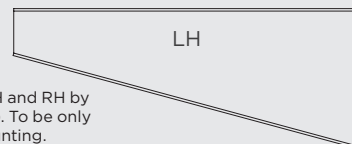
Angled bracket to be fixed by M8 bolts and washers. Ensure unit is fixed on all 4 hexserts



Fix to wall on this side. Ensure appropriate fixing used for the desired mounting wall



Brackets to be supplied LH and RH by BOSS Copperad (optional). To be only used for bottom mounting.



If horizontal unit heaters are not fixed using the angle bracket option then the captive inserts in the top and bottom of the casing can be used for fixing channel

struts which can become a part of a custom hanging arrangement (channel struts not supplied). The diagram below gives details.

Horizontal unit channel strut fitting

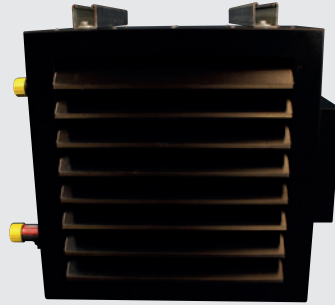
Suggested Horizontal Airflow Mounting - Channel Strut Mounting

Isometric view

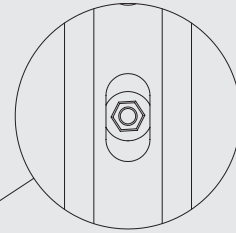


Top mounting shown. The same can be done to the bottom panel for bottom mounting

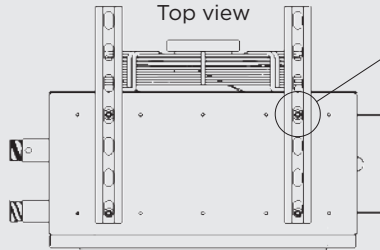
Front view



Use M8 bolts and washers to fix Unistrut to the hexserts. Please ensure the unit is fixed by all 4 hexsert



Top view



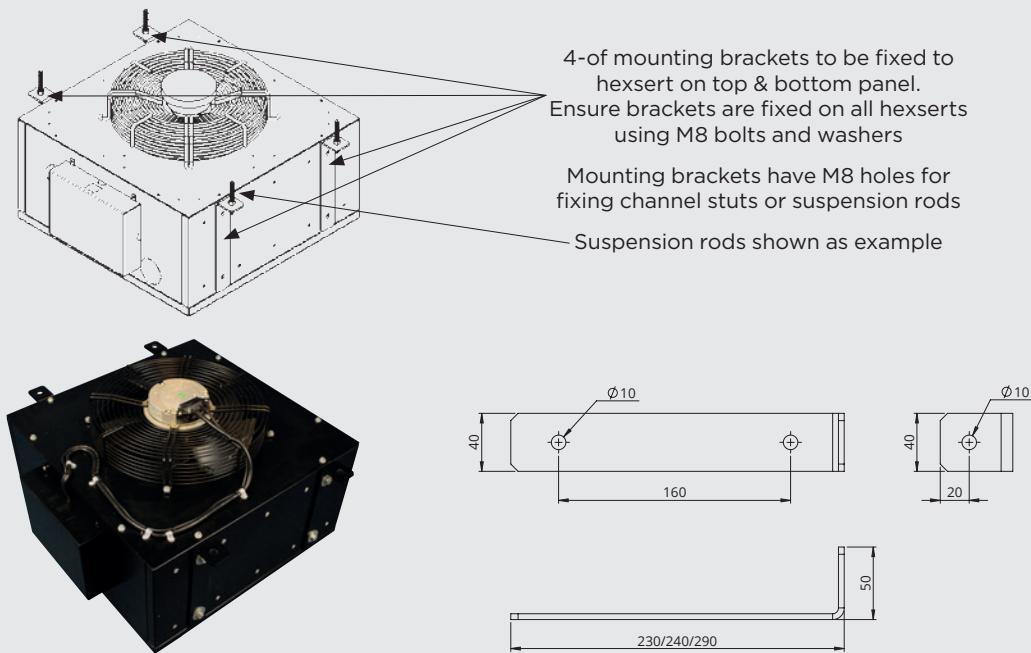
2.3 | MOUNTING OF VERTICAL UNITS

Vertical units are fitted with the fan at the top and the louvre array at the bottom of the unit so as to blow the flow of air vertically downwards. They are intended to be suspended from threaded bar and can be supplied with optional fixing brackets to facilitate this. This set of 4-off brackets screw into the captive inserts in the sides of the casing and provide a plain hole for the rod to be fixed to. The diagram below highlights the use of the vertical mounting brackets.

If custom mounting of the vertical units is used then the captive inserts in the casing can be used to affix channel struts, angle iron etc.

Vertical unit bracket and rod mounting'

Suggested Vertical Airflow Mounting - Mounting Bracket



Note. Medium temperature hot water and steam units are only suitable for horizontal mounting and must not be mounted as though they were vertical units. This will lead to damage to the fan motor and invalidate the warranty.

Suggested Vertical Airflow Mounting - Mounting Bracket



2.4 | MOUNTING - PIPING

The flow and return pipes penetrate the side of the unit casing. The sketch below shows the correct arrangement for inlet and outlet pipes, these must be respected or the design performance will not be achieved for water units and damage will occur in steam units, invalidating the warranty.

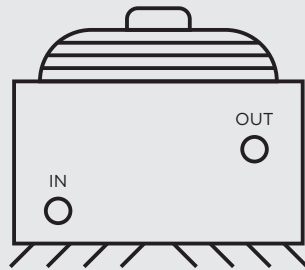
Connections are steel with a BSP male taper thread to the dimensions shown earlier in this document. In order to ensure that coils cannot be damaged by twisting during installation it is vital that grips are used to hold the steel connection stubs while tightening adjoining fittings. Incorrect practice will

damage the coil tubes and invalidate the warranty.

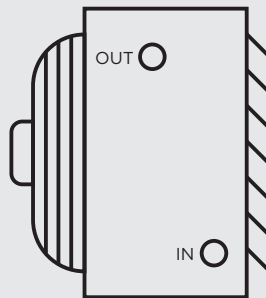
Low temperature hot water units will have vents and drains in the connection stubs. If the coil is not at the top or bottom of the pipework system then the installer will need to fit vents and drains in the pipework at the high and low points.

***Note.** For medium temperature hot water and steam units vents and drains are not fitted and automatic air vents must not be used. Any steam piping must be made in line with normal practice for steam piping to ensure that condensate cannot be held up inside the coil.

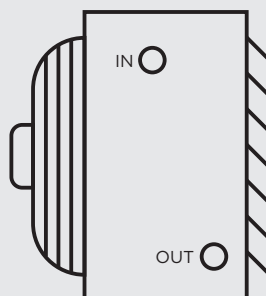
Low Temperature Hot Water - Vertical



Low/Medium Temperature Hot Water - Horizontal



Steam (Horizontal Only)



2.5 | WIRING

All units incorporate high efficiency EC motors directly coupled to the fan. Power to the units should be from a standard 230V/1Ph/50Hz supply and transformation and rectification is provided at the motor itself. The table below gives power draw data for the units at various speeds.

Electrical power draw

Unit size	UH5			UH6			UH7			UH8		
Speed	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Power draw (W)	70	110	200	90	150	300	100	180	380	230	420	700

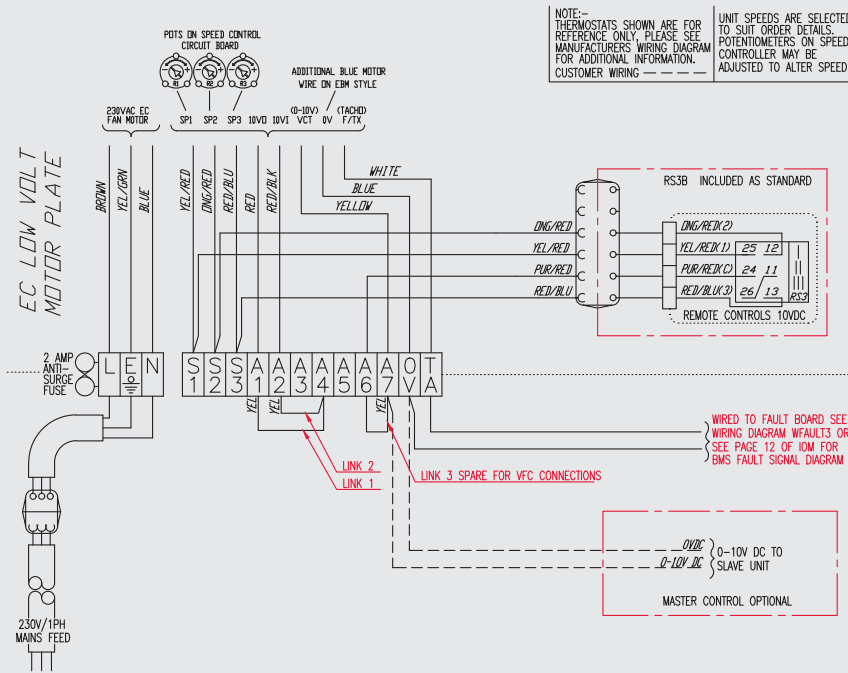
All wiring should be undertaken by a certified electrician in line with the latest version of the wiring regulations and the unit should be isolated prior to working on it or opening the terminal box. It is recommended that each unit be powered via a dedicated fused/switched spur. An earth connection must be provided as part of the power supply. The casing/electrical box can have holes cut in the sides

to facilitate cable entry but suitable glands and grommets should be used.

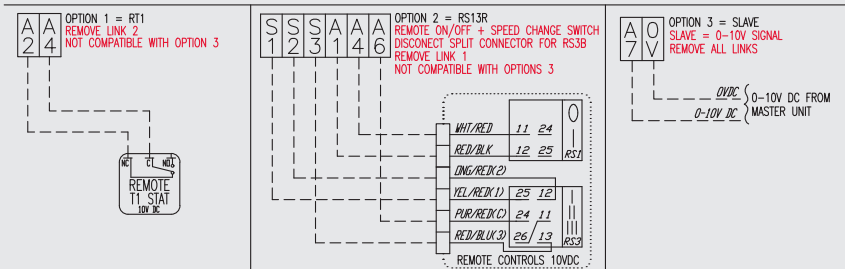
A wiring diagram specific to the controls ordered with each unit is provided and all customer wiring should be made in line with this. Please contact BOSS Copperad if the wiring diagram cannot be found; do not attempt to wire to the units without this diagram.

Slave units can be wired up to 30m in distance from the master unit. There is no limit to the number of slave units wired back to the master unit. The only limit on the number of units is how practical it is to wire back to the master unit through daisy-chaining or star wiring.

Options for Standard Units (Wiring Diagram)



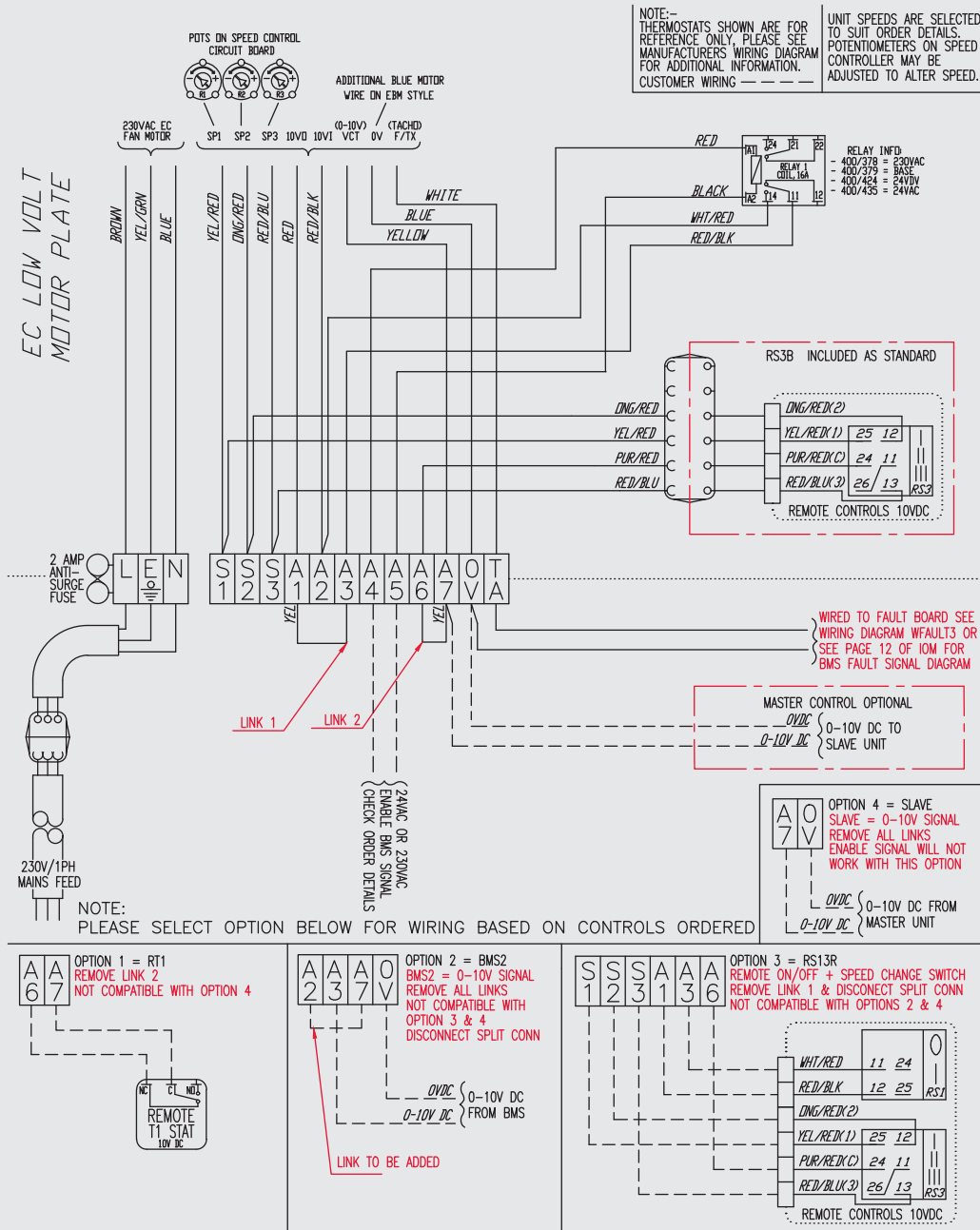
NOTE: PLEASE SELECT OPTION BELOW FOR WIRING BASED ON CONTROLS ORDERED



IMPORTANT: ALL INSTALLATION WIRING TO COMPLY WITH CURRENT EDITION OF IEE REGULATIONS. CONNECT MAINS FEED TO UNIT VIA FUSED SPUR BOX OR SIMILAR (3A RATED). OTHER CONNECTION WIRING TO UNIT MUST BE VIA SUPPLIED CUSTOMER CONNECTION BOX (WHERE SHOWN). NON COMPLIANCE WITH ABOVE MAY RESULT IN VOIDING OF WARRANTY.

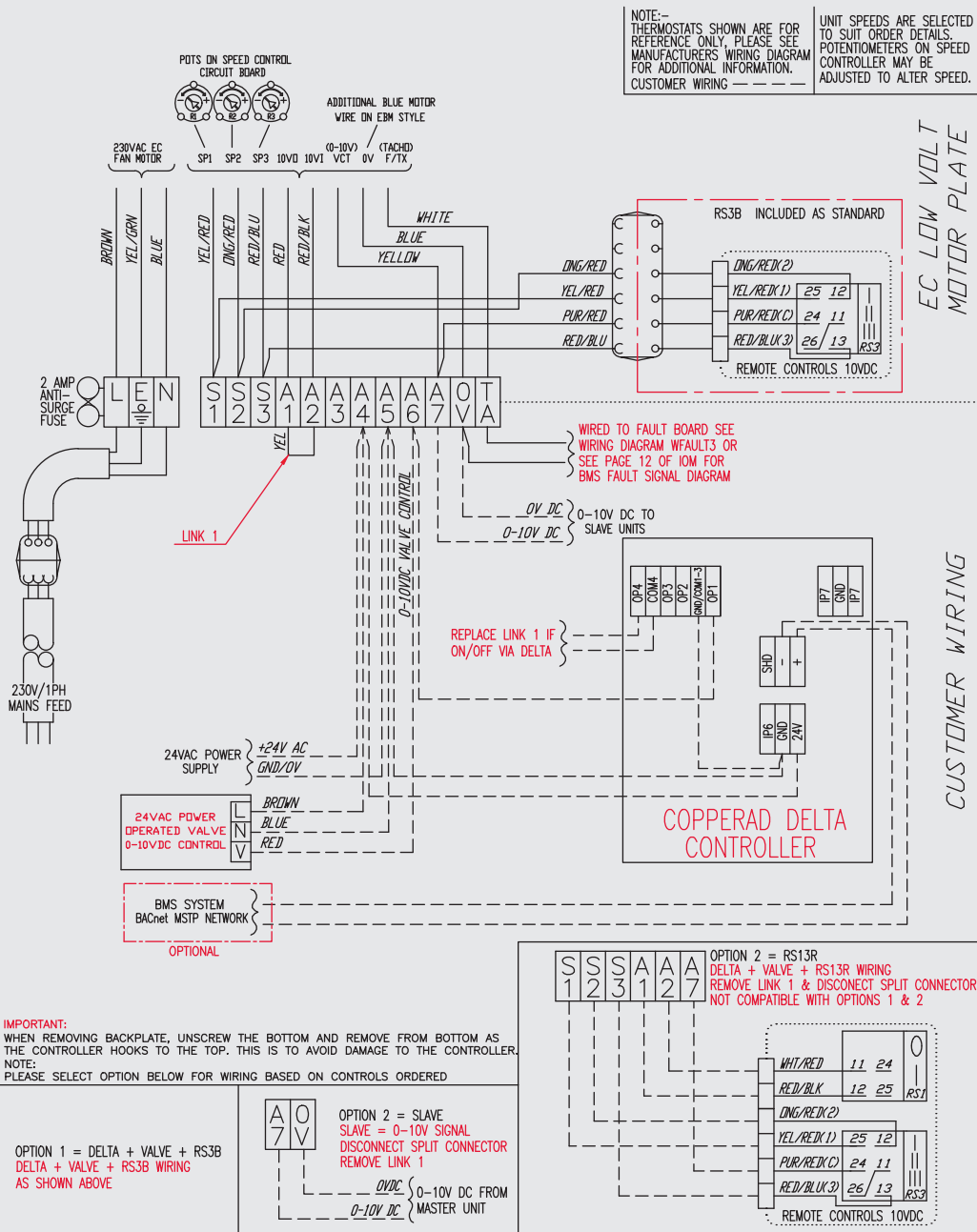
Options for BMS enabled units

BMS fault signal provided from the unit as standard'



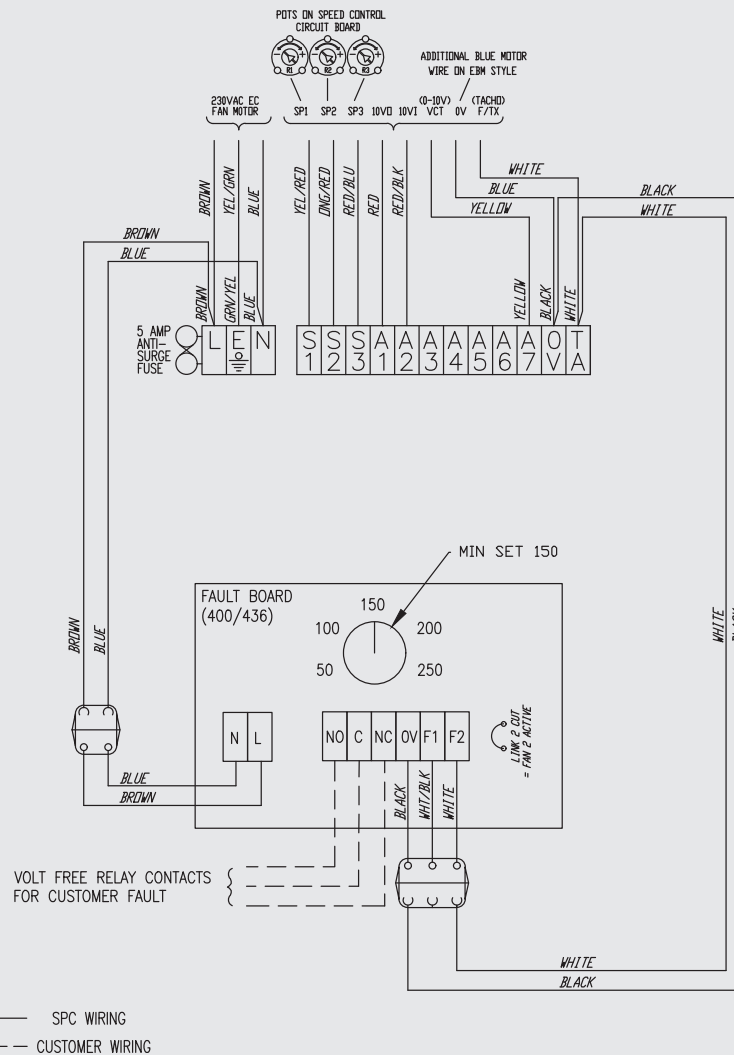
IMPORTANT: ALL INSTALLATION WIRING TO COMPLY WITH CURRENT EDITION OF IEE REGULATIONS. CONNECT MAINS FEED TO UNIT VIA FUSED SPUR BOX OR SIMILAR (3A RATED). OTHER CONNECTION WIRING TO UNIT MUST BE VIA SUPPLIED CUSTOMER CONNECTION BOX (WHERE SHOWN). NON COMPLIANCE WITH ABOVE MAY RESULT IN VOIDING OF WARRANTY.

Waterside Delta controller wiring diagram



BMS fault signal diagram

BMS fault signal provided from the unit as standard via volt free contacts



IMPORTANT:
 ALL INSTALLATION WIRING TO COMPLY WITH CURRENT EDITION OF IEE REGULATIONS. CONNECT MAINS FEED TO UNIT VIA FUSED SPUR BOX OR SIMILAR (5A RATED). OTHER CONNECTION WIRING TO UNIT MUST BE VIA SUPPLIED CUSTOMER CONNECTION BOX (WHERE SHOWN). NON COMPLIANCE WITH ABOVE MAY RESULT IN VOIDING OF WARRANTY.

2.6 CONTROL

A variety of control methods are available for unit heaters and these will have been discussed and arranged prior to the order being raised. A bespoke wiring diagram will have been supplied with the unit; this must be referred to while installing the unit(s) and will reference any remote components required.

Manual control via a remote on/off switch is the simplest form of control though automatic control via remote mounted thermostats is common. While fan speeds can be changed they are normally set on the basis of the mounting height of the units; in this case a change speed switch is mounted inside the unit but without straightforward access. If output modulation is required then this is best achieved on the waterside (this applies to low temperature hot water units only)

and packages may have been supplied incorporating valves, actuators and special 0 to 10V controllers.

Medium temperature hot water units would be controlled on/off on the airside and consideration should be given to preventing the flow of medium temperature hot water when the unit is not running (by others, beyond the scope of supply).

Controls for steam units are not a part of the supply but they are best controlled on/off with the steam supply isolated when the units are not running. If pressure reducing valves are used to modulate output then they must be fitted alongside vacuum breakers to ensure that condensate is cleared as it is formed.

IP BOX Best Practices

The IP BOX offers a protection class of IP 66. Inside the box, two rocker switches are secured on a metal bracket that attaches to the box via screws. The connection terminal block will be positioned behind this bracket.

When drilling cable entry holes into the switch box, it's crucial to use cable glands with the same IP rating. These are not included and must be sourced by the customer.

Waterside Delta Controller

For the Delta Controller, thermostatic control uses a waterside valve and controller. The controller adjusts the opening of the valve to match the heat output to the heat demand in the environment near the door. Valves are all installed externally to the unit and can

be fitted to either the flow or return piping. Please consult the wiring diagram provided with the unit/below before attempting to connect the unit, remote controller, and valve actuator.

3 | COMMISSIONING

Commissioning of BOSS Copperad Unit Heaters involves the following:

- Check rotation of fan
- Check leaving air temperature
- Check operation of any controls
- Check no excessive and/or unexpected noise
- Check coil/pipework is properly vented on low pressure hot water systems

4 | MAINTENANCE

To ensure effective and safe operation of the unit heaters they should be subject to periodic inspection and cleaning. The outside of the case should be cleaned with a dry cloth; if liquids are used then they must not be allowed to contact the electrical box or the fan and motor. A vacuum or airline can be used to suck or blow any debris which is attached to the fins of the coil; the louvres should be fully opened in order to access the fin surfaces of the coil. The fan and basket guard can be cleaned in a similar manner with vacuum or compressed air. It is recommended that an inspection is made at least every 6 months though the rate at which cleaning is required will be largely determined by the nature of the environment. The fans and motors contain sealed for life bearings and no lubrication is required.

Internal surfaces of the coil heat exchangers are a combination of copper and steel so common water additives suitable for use with these material can be included. Coil heat exchangers are factory pressure tested to 22 bar air under water so have a safe working pressure of up to 15 bar on standard low pressure hot water systems. Maximum working pressure for steam units is 6 bar and maximum working temperature for medium temperature hot water units is 130°C. Low temperature hot water units are suitable for maximum water temperatures of 90°C.

5 | FAULT FINDING

Below is a list of common faults and the steps required to resolve them:

Fault	Cause	Remedy
Fan not running	No power	Check electricity supply
	Fuse blown circuit breaker tripped	Check/change
	Controls	Check controls are not preventing fan from running
	Damaged fan/motor	Replace
Low leaving air temperature	Controls	Check controls are not preventing valves from opening
	No/low water flow and/or temperature	Check for good flow of hot water to unit and that there is no excessive temperature drop on the water side. High temperature drops indicate low water flow. Check temperature of water to the unit

6 | WARRANTY

Duration: The warranty period shall extend for 12 months from the date of supply

Conditions of Warranty:

6.1 Maintenance:

The unit must have been maintained in accordance with the installation, operation, and maintenance guidelines provided by BOSS COPPERAD.

6.2 Coverage:

The warranty covers only the faulty part(s) of the unit, not the entire unit. For instance, if a motor malfunctions, only the motor is eligible for warranty claim.

6.3 Repair Procedure:

- If the entire unit is returned due to a faulty part, the defective component will be removed, tested, and repaired or replaced as necessary. The repaired or replacement part will be reinstalled into the original case.
- If the motor is damaged due to site work, the cost of the replacement coil will be communicated before a replacement motor is fitted, contingent upon receipt of an order from the customer.
- If the issue cannot be resolved on-site, the complete unit heater may be returned to BSS for examination. Faulty components will be repaired or replaced on the original case.

Note: The warranty does not cover damage resulting from improper installation, misuse, neglect, alteration, accident, or unauthorised repair.

For warranty claims and inquiries, please contact **BOSS Technical Team** on **0333 034 1920** or email **bosstechnicalteam@bssgroup.com**

This warranty statement is subject to change without prior notice.

7 | DISPOSAL

Units have a heat exchanger from copper tubes and aluminium fins. The units include fan assemblies from mixed materials and electrical components which should be disposed of separately in line with WEEE directives. It is not recommended that the units are disposed of with domestic waste but that the components are recycled as far as possible.



BOSS™

Copperad®

**For further technical support,
please contact the BOSS™ Technical Team
on 03330 341920 or email
bosstechnicalteam@bssgroup.com**



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Telephone: 0333 034 1920