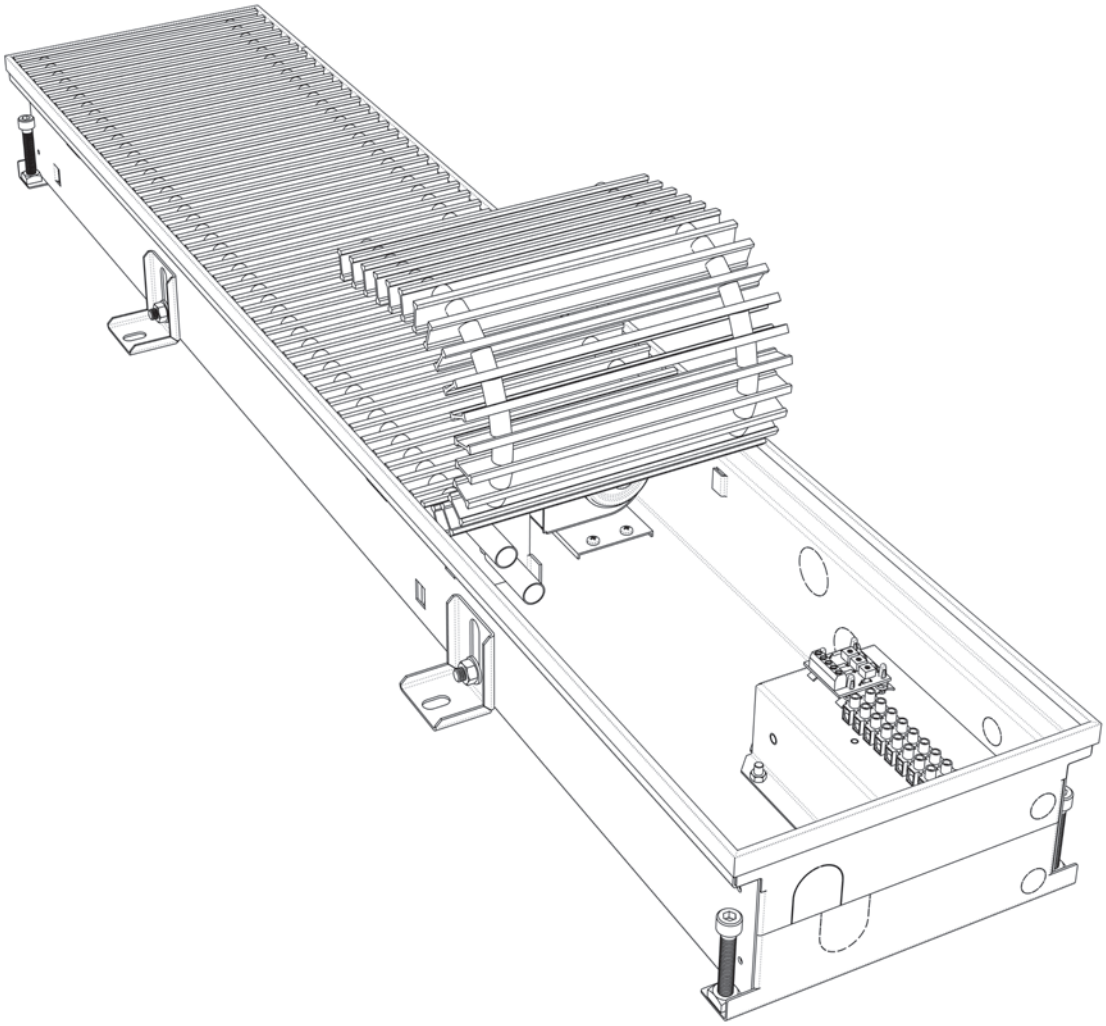

Metropolitan Powered Trench Heaters

Installation, Operation & Maintenance Manual

IOM 78 Issue 7

SPC

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1. General

1.1 Description

This manual covers the SPC powered range of LPHW trench warm air heaters. The heaters are available in various combinations of length and width and a wide range of heat outputs. The units consist of the trench itself c/w LPHW heat exchanger, fan(s), electrical connections plus loose roll-up grille and grille trim. Other accessories may be supplied depending on the details of the particular order. Power supply to the units is 230V, single phase, 50Hz which is converted to a 24V dc signal by the integral power supply to match the requirement of the EC fan(s).

The heaters are intended for use in internal environments and must not be used outdoors or where they are subjected to moisture. They must be installed by experienced heating contractors and electricians in compliance with all statutory regulations. Table 1 gives general details for the standard range of units, figure 2 on page 4 gives an overview of the pertinent components.

Heater type	Powered trench
Heating element	LPHW copper tube, aluminium fin
Fan type	Tangential
Motor type	ECDC
Power supply	230V/1Ph/50Hz
Casing	Powder coated steel
Roll-up grille	Anodised aluminium bar, plastic spacer, steel spring
Grille trim	Anodised aluminium
Hot water connections	15mm copper
Maximum room temperature	50°C non-condensing
Maximum LPHW temperature	90°C
Maximum working pressure	10 bar

Table 1. General specification

1.2 Receipt and Preparation

The units are wrapped and display the serial number, model reference and site reference where appropriate. Installation, operation and maintenance instructions and wiring diagrams, together with any special instructions are all supplied with the unit.

On receipt check that all details are correct to the customer schedule prior to opening packaging. Damage should be reported to SPC immediately. It is recommended that packaging is kept in place and the units stored in a safe area until the necessary services are completed in order to avoid the possibility of site damage.

All units are guaranteed for 12 months from date of delivery.

2. Installation

2.1 Mounting general

The trench heaters are packed fully assembled, apart from the grille and grille trim which should be fitted after the units are fully installed. Grilles and trim are packaged separately along with any other order specific accessories.

Trench heaters are suitable for installation in either concrete or suspended/hollow flooring. If the units are to be mounted in a concrete screeded floor then the trench into which they are fitted must be at least wide enough to allow placement of the fixing feet which extend beyond the outer dimensions of the trench unit.

Trench heaters can be installed as individual elements or can form part of longer continuous runs. If part of a continuous run it is important that the complete run is laid out in the trench or suspended floor to ensure correct fitment prior to screwing down. It is important for continuous runs that the level of the top of each individual section is constant to allow the continuous grille to lay flat when fitted.

Continuous runs may include angle, corner pieces or 'dummy' sections. These should be assembled as part of the complete run and fixed in position along with the active lengths of trench heater.

Trench heaters should be installed close to the window or wall that they are intended to protect, typically 50 to 500mm away (refer to figure 1). They should be installed with the heat exchanger on the window side, with the flow and return pipework on the left hand side (when looking inside to outside), see figures 1 and 2.

The grilles supplied for fitting to the top of the trench heaters are suitable for occasional foot traffic. Units must not be fitted where the grilles are likely to be exposed to point loads from chair legs etc., neither should they be fitted directly in front of doorways where they are subjected to excessive footfall. Not only is there a risk of damage or injury but there will be excessive build-up of debris from footwear.

Figure 3 shows the various cross-sectional dimensions of the standard trench units. When installing in a concrete floor the minimum clearances should be observed; 20mm on either side and at both ends is recommended but this will need to be increased if pipework and/or electrical conduit is to be run alongside the trench. Note that the width at the feet not the unit width needs to be considered when sizing the trench.

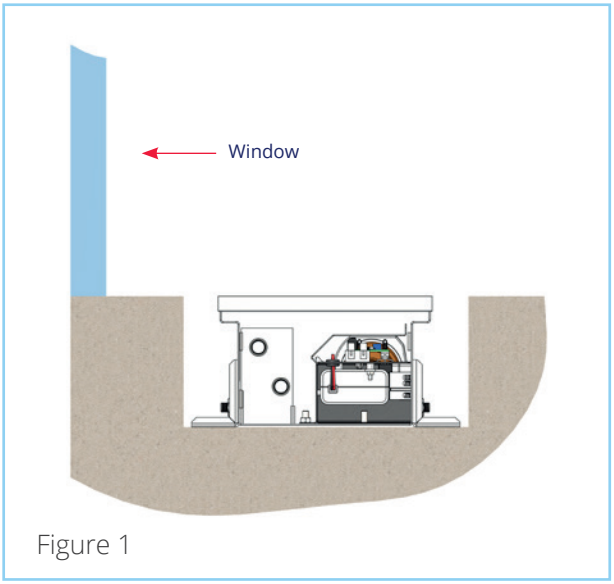


Figure 1

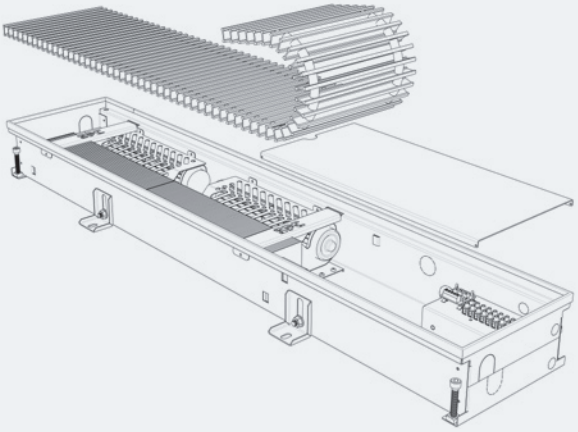
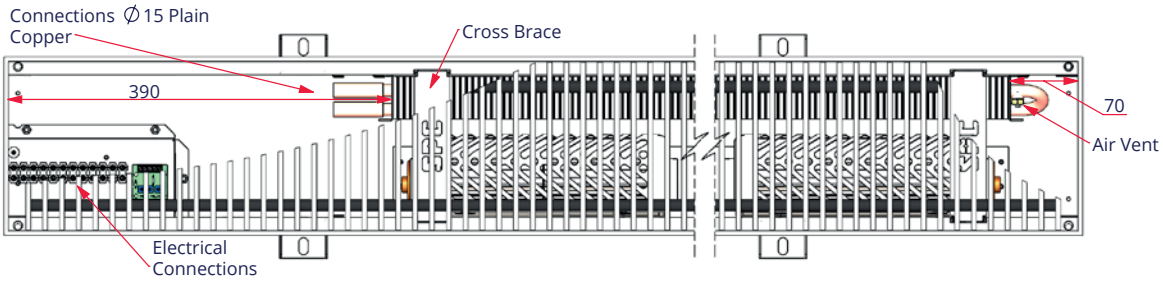


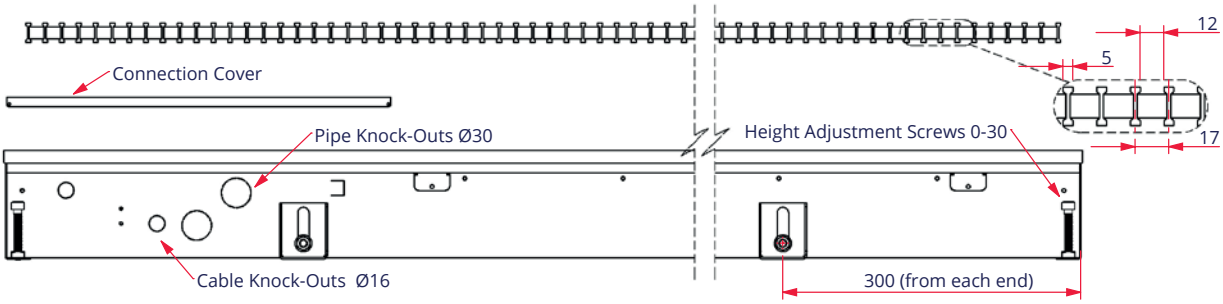
Figure 2

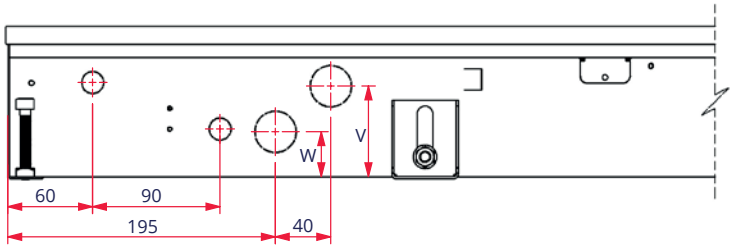
2.2 Installation process

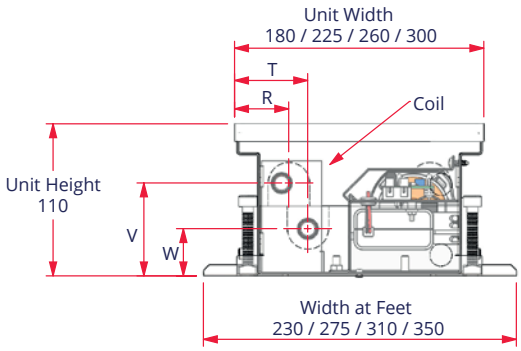
1. Unwrap the trench heater and place it on the floor. **DO NOT REMOVE THE WOOD PIECE.**
2. Adjust the height using the screws at each end to level out the trench heater.
3. Secure the trench heater using the support feet.
4. Remove the wood piece and connect the coil using flexible hoses and/or wire the electrical components. Once complete, place the wood piece back on the trench heater.
5. Fill in the gap around the side of the trench heater and complete the flooring.
6. Remove the wood piece and fit the grille and/or trim.

3. General arrangement and dimensions







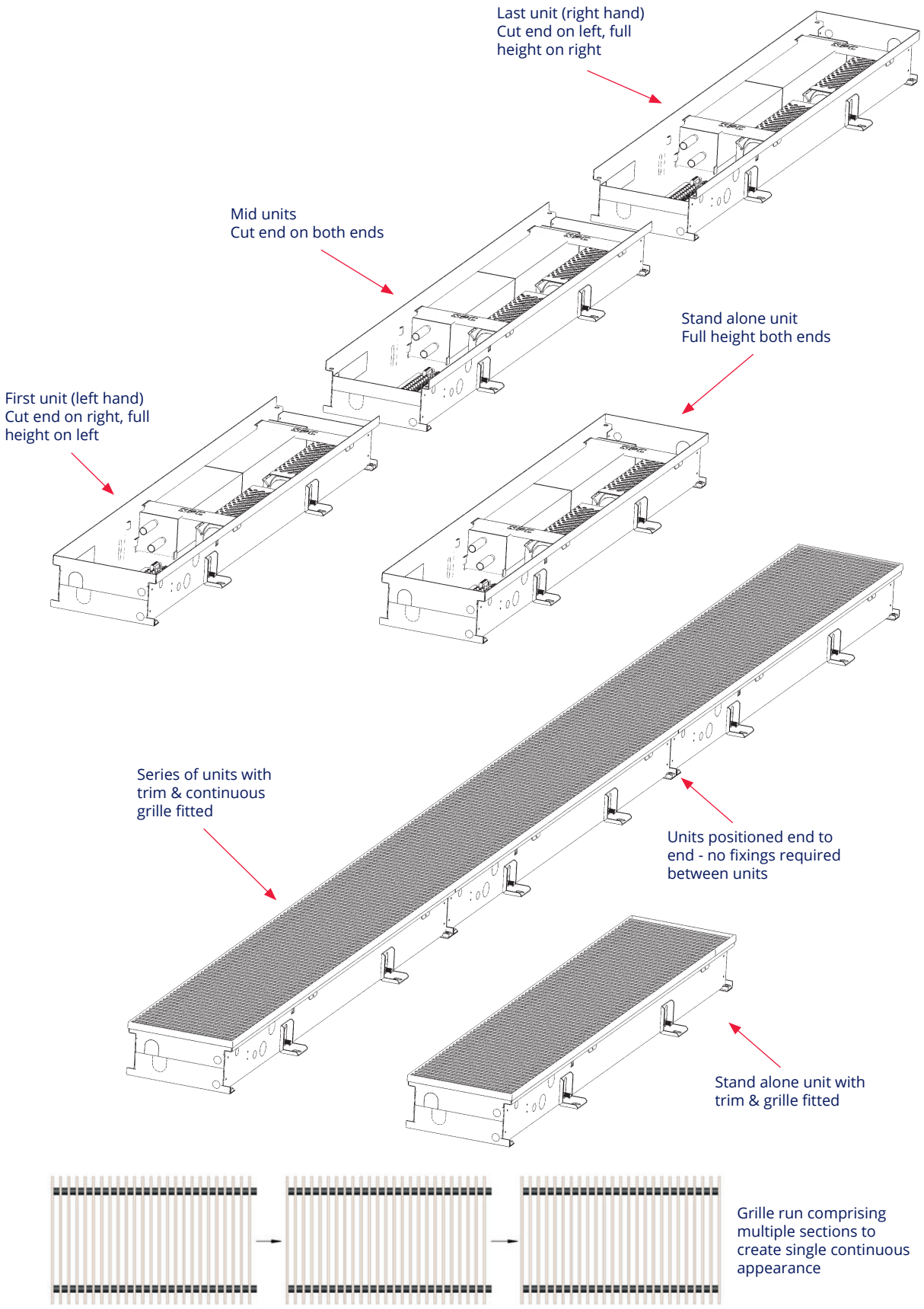


Width (mm)	Height (mm)	Vertical distance between water flow knock-out & bottom (mm)	Vertical distance between water return knock-out & bottom (mm)	Horizontal distance between water flow knock-out & side (mm)	Horizontal distance between water return knock-out & side (mm)	Internal volume (litres)	Trench weight (kg)	Grille weight (kg)
		V	W	R	T			
180	110	67	34	39	53	0.2	7.8	1.6
225	110	67	34	53	71	0.4	8.9	2.0
260	110	67	34	53	110	0.6	9.8	2.3
300	110	67	34	53	148	0.7	11.2	2.7

Note. Volumes and weights are given per metre length of trench. Grille is standard aluminium version.

Figure 3

3.1 Types of Trench Unit for continuous grille & stand alone



(All types of unit have independent water connection on the left hand end)

Figure 4

3.2 Suspended/hollow floor

The finished height of the trench heater, including grille and trim, should be level with the finished floor surface +/-1mm. It is possible to adjust the finished height of the trench unit using the fixing feet which are height adjustable along with the height adjustment screws fitted in each corner.

The trench heater should be anchored to the floor using suitable screws and anchors through the slots in the fixing feet and any further fine adjustments made to bring the finished level in line with the finished floor. It is recommended that rubber or foam pads are fitted below the fixing feet.

3.3 Solid/concrete floors

The hole (trench) should be cut in the floor in line with the clearances given in section 2.1. If water pipes and/or electrical conduits are to be run alongside the trench heaters then the size of the trench must be increased to suit.

Prior to concreting in it is important that the bracing pieces are in place and that the decorative trim and grille are removed. All holes in the sides of the trench heater must be covered during concreting using suitable tapes. A cover must be placed over the top of the trench heater to ensure that no concrete mixture can be spilled inside.

The trench heater must be anchored to the floor via the fixing feet during concreting to ensure that there can be no movement. The correct 'knockouts' must be removed and water pipes brought into the trench heater casing prior to concreting, see next section for details of pipe fittings. There are also knockouts for cable glands and the required power and control cables must be brought inside the trench before concreting.

3.4 Fluid piping

The heating element consists of a finned tube matrix of copper tubes expanded into continuous aluminium fins.

The heating elements terminate in 15mm plain copper pipes; one for the flow connection and one for the return connection. These copper pipes are intended for the final connection of the heat exchanger from the flow and return system heating pipes. The majority of sized units will have one of the copper connections higher than the other and it is recommended, in order to optimise output, that the upper of the two connections is attached to the flow pipework and the lower to the return pipework.

The plain 15mm pipes are suitable for a number of different joining methods; the recommendation is to use compression fittings to connect to the main pipework either via hard piping or suitable flexible connectors. If the pipework should be brought in from the side of the trench heater via the knock-outs supplied and angled compression fittings are often useful, knock-outs are also available in the ends of the units. If entry via other than the knock-out points is required then holes can be cut in the trench to suit.

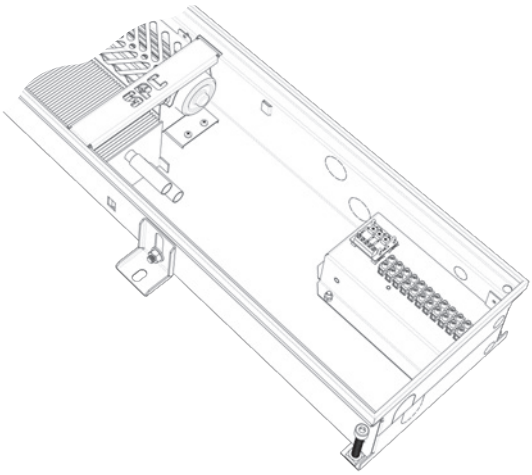
Alternative coupling methods include push-fit connectors and brazed/soldered joints. If using push fit it is important that the end of the pipes are deburred

and rounded to ensure a good seal. If plastic (PEX) pipework is used with push-fits then a special ferrule must be inserted into the plastic pipe to prevent distortion. If soldering/brazing then all surrounding surfaces must be protected from the heat.

A variety of fluid side fittings can be used in conjunction with trench heaters, these include: ¼ turn shut off valves, regulating valves and automatic control valves. It may be possible to incorporate these fittings in the case of the trench heater but in some instances this would not be appropriate. If a number of trench heaters are fitted in a single zone they would not normally be separately controlled and any automatic valves would be fitted in the common pipework system so as to simultaneously control the supply of hot water to all units within the single zone.

A selection of fittings are available from the supplier, alternatively these can be sourced independently.

The heat exchangers in the trench heaters all incorporate a manual air vent which should be used during commissioning to ensure that all air is bled from the heat exchanger.



3.5 Wiring

Powered trench units require a standard 230V/50Hz mains power supply, see table below for ratings. Power wiring is via 2 core and earth to the mains terminal block which is accessible after removing the cover of the electrical box. Note, units must be earthed.

Knock-outs are provided in the sides and ends of the casing to allow cables to be taken inside the trench case. Suitable glands should be used to ensure that the cables are secured and the trench sealed.

The EC/DC fan assemblies require a 24V dc supply for their operation; this is provided by an on-board power supply and customer power wiring is restricted to 230V ac. Note that if units are wired in a 'master/slave' arrangement such that the all respond to a single thermostat etc then each individual unit will still require its own supply of power.

Additional control wiring will need to be made. This will depend on the method of control chosen for the units; it is recommended that control wiring is made using wire with a cross sectional area of 1mm^2 or greater. The wiring diagram shown below in figure 5 is an example of the control possibilities but the diagram delivered with the actual unit must be used as the aforementioned is only for illustration. Figure 6 is an example of a unit wired for control via BMS.

Trench length (mm)	<1700	1700 to 2200	>2200
No. fan sets	1	2	3
Supply (V/Ph/Hz)	230/1/50	230/1/50	230/1/50
Max power draw (W)	10	20	30

Table 2. Electrical details

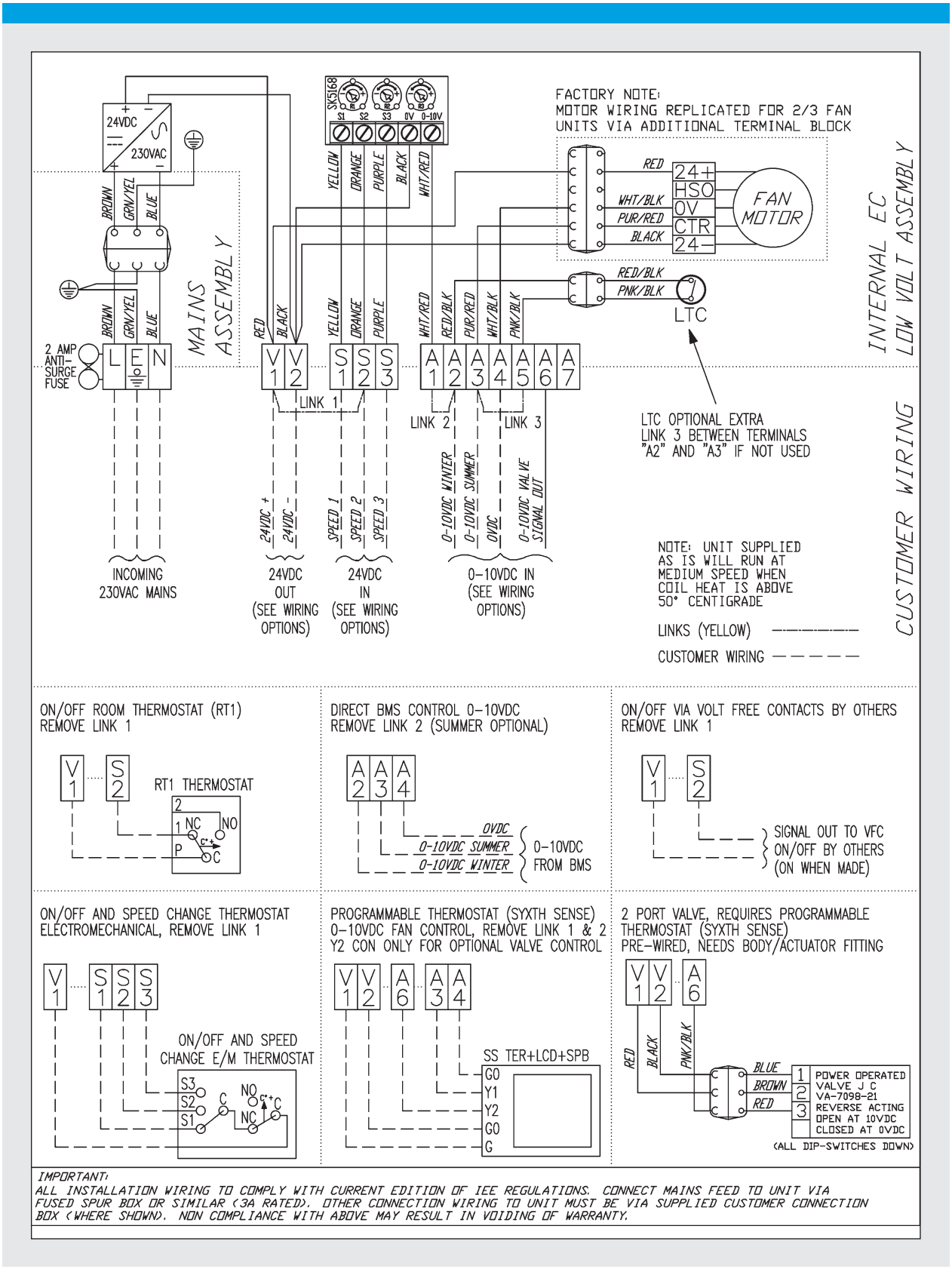


Figure 5. Sample wiring arrangement

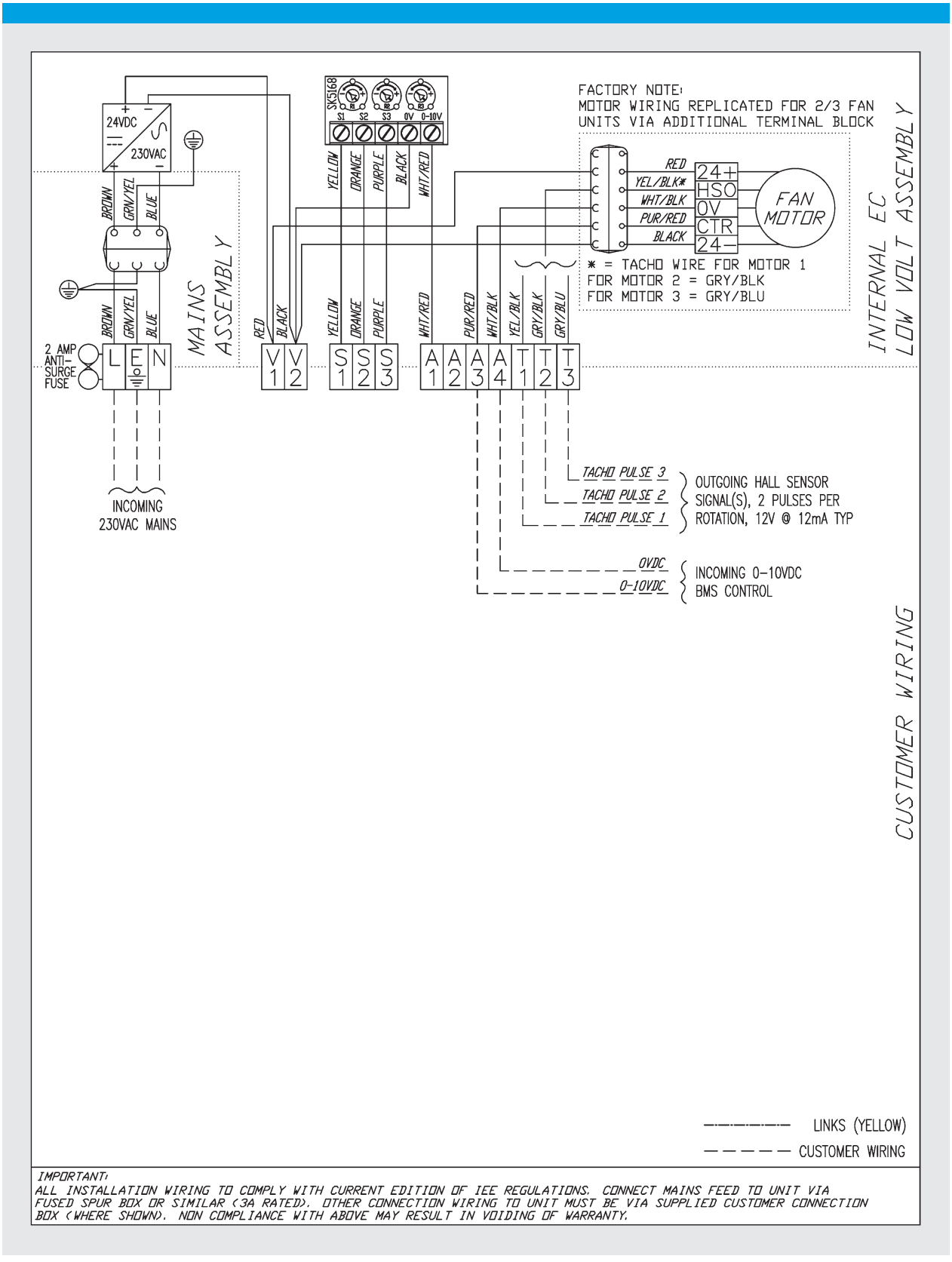


Figure 6. Sample wiring diagram

3.6 Control/operation

SPC natural trench heaters contain no fans and SPC powered units incorporate EC/DC fan assemblies which draw in room air and blow it across the heat exchanger prior to the warmed air being released into the space or up the side of the window.

Control of the unit's heat output is best achieved via control of the rotational speed of the fans. To this end the electronics built into the fan motor allow a 0-10V dc control signal to control the fan speed. At less than 1V the motors do not turn and between 1 and 10V they ramp up to their maximum speed.

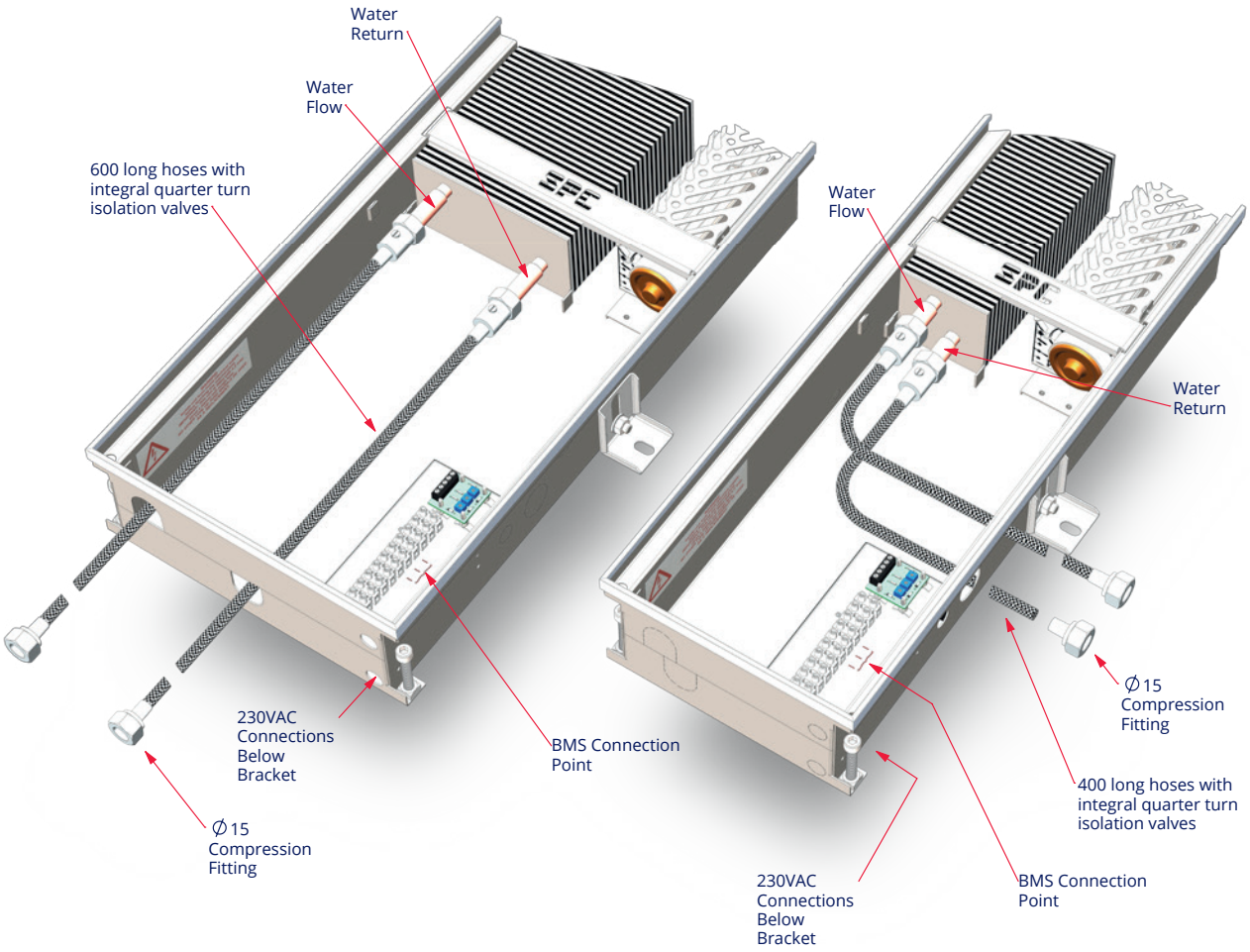
The 0-10V control signal can be supplied by the central control system of the building (BMS) or can be generated and set locally inside the trench unit via the in-built potentiometers. Figure 5 gives examples of control possibilities both direct from the BMS and locally using thermostats and switches.

Programmable thermostats/controllers can also be used which incorporate a proportional band that automatically varies the fan speed with sensed temperature.

Waterside valves may be incorporated in the control strategy though airside control of the output is recommended.

4. Connections

Connections can be front or side entry



*Hose lengths are approximate.

Figure 7

5. Commissioning

Commissioning of powered trench heaters requires the following:

- Check boiler is providing a supply of hot water
- Check all water valves are open
- Ensure all air is vented out of the heat exchanger via vent plug provided
- Check pipe temperatures at the heat exchanger
- Check rotation of all fans
- Check operation of any controls

6. Maintenance

Cleaning – In order to maintain the trench heater at maximum efficiency it is recommended, especially when mounted in dusty areas, that the heat exchanger should be cleaned externally using a vacuum cleaner or by directing compressed air through it and that this should be done at least once every 3 months depending on the environment. The fan and its casing can be cleaned using air or a dry cloth but must not be cleaned using water or spray as the motor incorporates electronic components. The fan guard should be cleared of any obstructions. The trench casing can be cleaned with a dry or wet cloth using mild detergent; do not allow moisture to remain within the casing. Under no circumstances should moisture be allowed in contact with the electric section of the trench during the cleaning process. Any debris can be removed from the trench heater case using a vacuum cleaner. Access to the inside of the case is achieved by removal of the roll-up grille. The grille itself can be cleaned using a dry or damp cloth and mild detergent.

Water treatment – The hot water flowing through the heating system should be treated with suitable inhibitor to prevent the build-up of scale and the formation of air bubbles. Any treatment used must be compatible with copper piping.

Fan bearings – The tangential fan(s) incorporate sealed for life bearing and no lubrication is required.

7. Fault finding

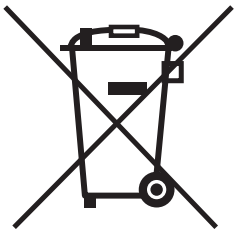
Below is a list of common faults and the steps required to resolve them.

Fault	Cause	Remedy
Flow and return pipes cold	Boiler not working	Check boiler controls and circuit
	Pump not working	Check electricity supply to pump
Fan(s) not running	No power	Check electricity supply to unit
	Fuse blown	Check unit fuse and any circuit breakers
	Controls	Check controls are not preventing fan(s) from operating
	Damaged fan/motor	Replace faulty fan assembly
Low room temperature	Low water temperatures	Check boiler/pipe temperatures
	Low water flowrate	Check pump and all valves in system (characterised by high flow and very low return water temperatures at heat exchanger)
	Air in system	Open manual air vents
	Controls	Check setpoint temperatures and operation of central control system to ensure fans are running at correct speed
	Fan(s) running slowly	Check controls as above and check for any obstructions to the fan movement or airflow. Check for excessive noise/vibration

Table 3. Fault finding

8. Disposal

The range of trench heaters are constructed from copper tube/aluminium fin heater exchangers and mild steel casings, grilles and grille trim are anodised aluminium with steel springs and plastic spacers. The heat exchanger, casing and grille assembly can all be disassembled and disposed of appropriately. The units include fan decks from mixed materials and printed circuit boards which should be disposed of separately and 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.



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