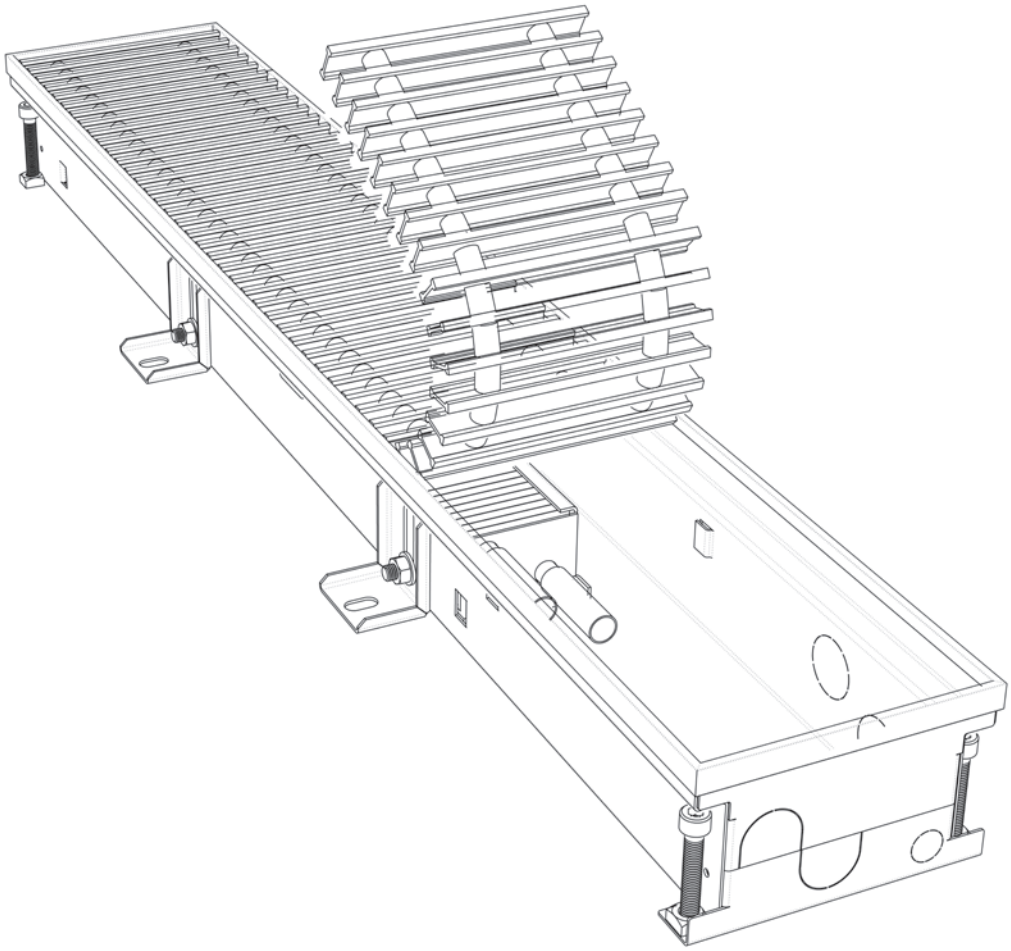


Metropolitan Natural Trench Heaters

Installation, Operation & Maintenance Manual

IOM 76 Issue 7

SPC

Contents

1. General

1.1 Description

This manual covers the SPC natural range of LPHW trench warm air heaters. The heaters are available in various combinations of length, width and height and a wide range of heat outputs. The units consist of the trench itself c/w LPHW heat exchanger plus loose roll-up grille and grille trim. Other accessories may be supplied depending on the details of the particular order.

The heaters are intended for use in internal environments and must not be used outdoors or where they are subjected to excessive moisture. They must be installed by experienced heating contractors and, where appropriate, 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	Natural convection trench
Heating element	LPHW copper tube, aluminium fin
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, 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. The fixing feet require 20mm on either side and it is suggested that this is also provided at both ends. If pipework is to be run alongside the trench then it is recommended that at least 50mm clearance is provided, and ideally 100mm.

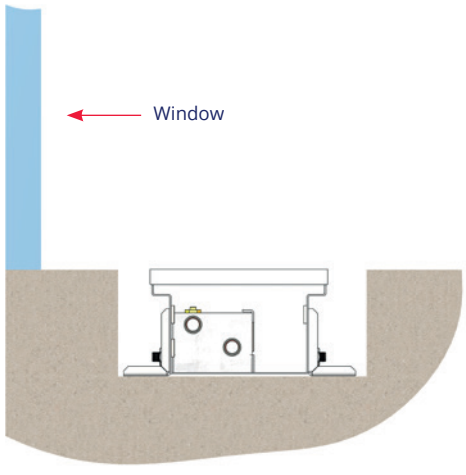


Figure 1

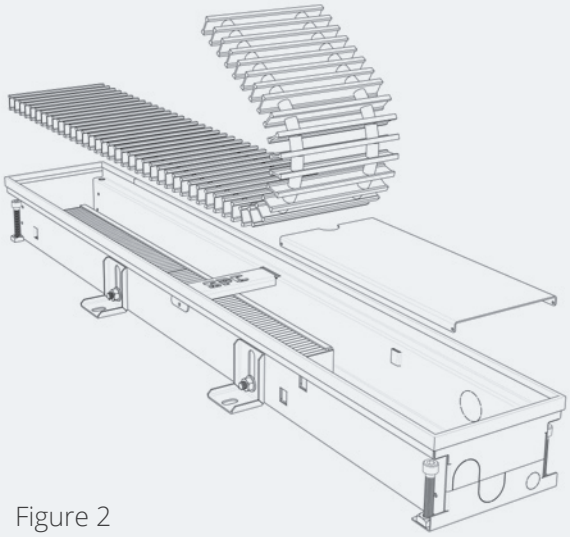
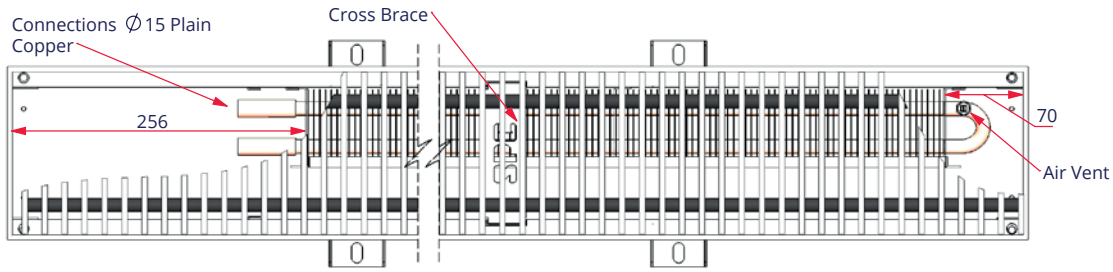


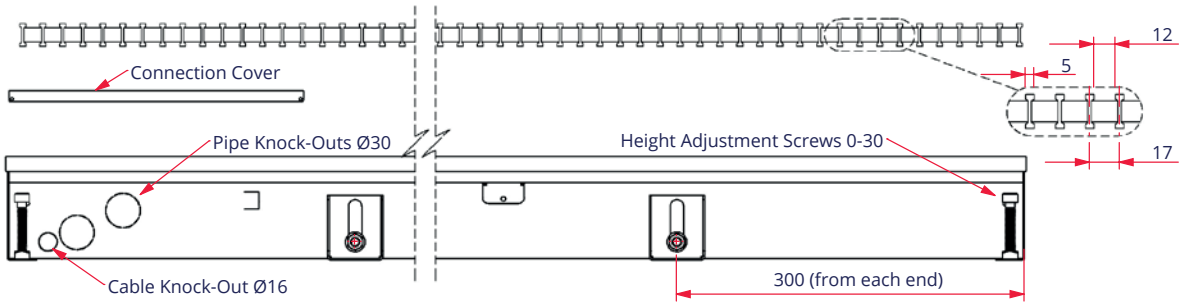
Figure 2

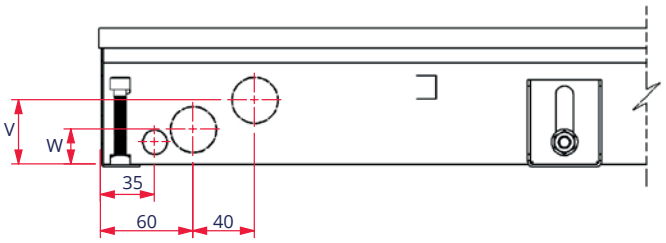
2.2 Installation process

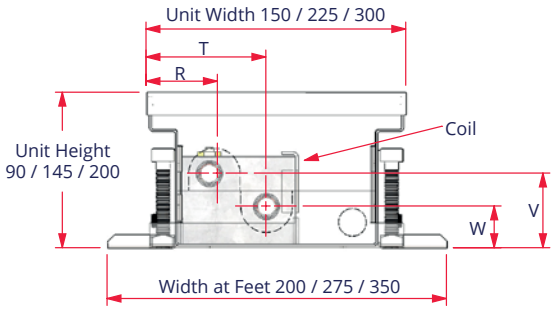
1. Unwrap the trench heater and place it on the floor. **DO NOT REMOVE THE WOOD PIECE.**
2. Adjust the height using the screws at each end to level out the trench heater.
3. Secure the trench heater using the support feet.
4. Remove the wood piece and connect the coil using flexible hoses and/or wire 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







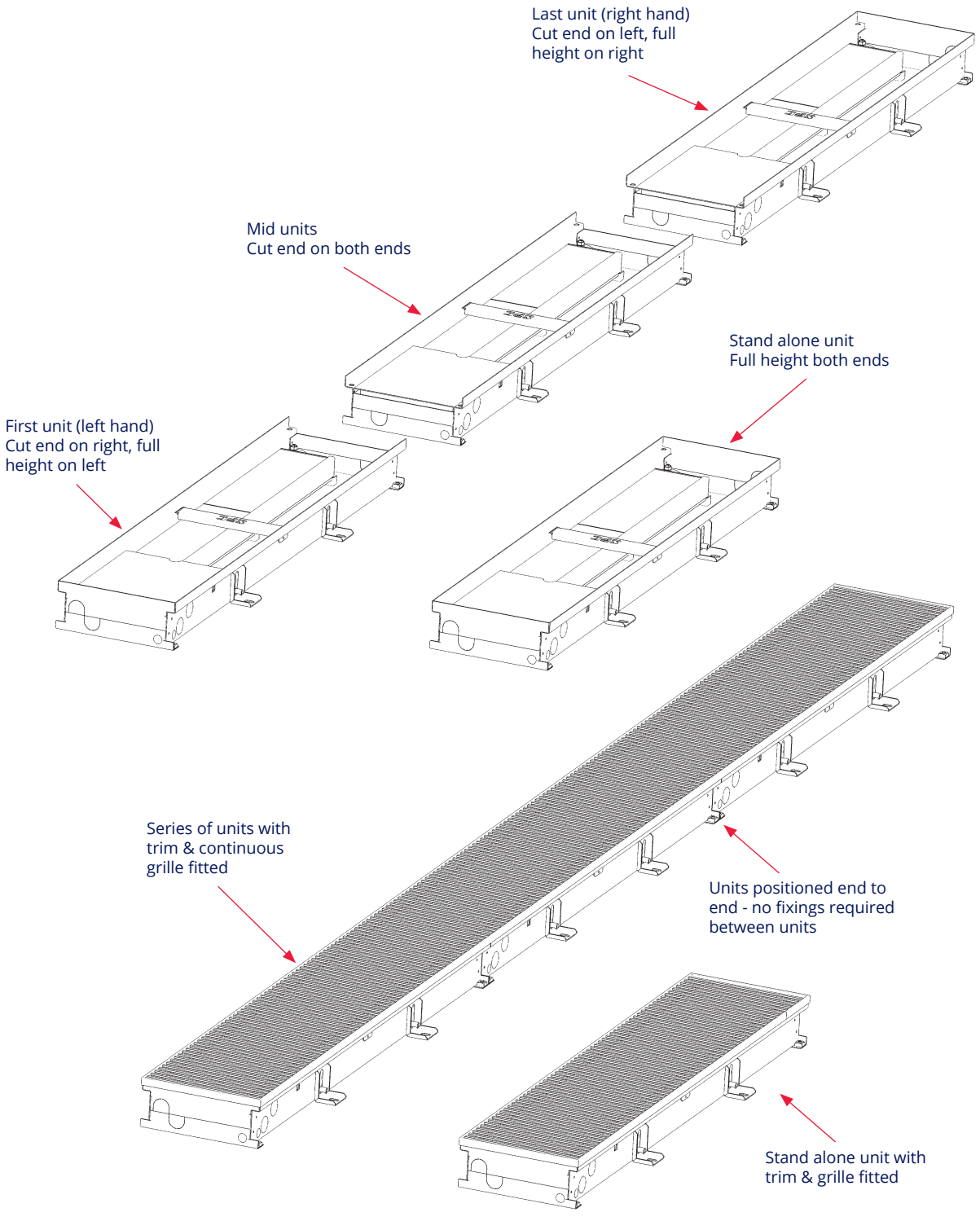


Width (mm)	Height (mm)	Vertical distance between water flow knock-out & bottom (mm)	Vertical distance between water return knock-out & bottom (mm)	Horizontal distance between water flow knock-out & side (mm)	Horizontal distance between water return knock-out & side (mm)	Internal volume (litres)	Trench weight (kg)	Grille weight (kg)
		V	W	R	T			
150	90	43	24	39	69	0.2	4.6	1.3
225	90	43	24	39	69	0.3	5.9	2.0
300	90	43	24	39	135	0.4	6.8	2.7
150	145	98	41	39	69	0.4	6.3	1.3
225	145	98	41	69	102	0.6	8.2	2.0
300	145	98	41	102	135	0.7	9.6	2.7
150	200	153	58	39	69	0.6	8.5	1.3
225	200	153	58	69	102	0.8	10.4	2.0
300	200	153	58	102	135	1.0	12.4	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.

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 are to be run alongside the trench heaters then the size of the trench must be increased to suit. Similarly, if any electrical connections are required to be made to valves fitted inside the trench units themselves then provision must be made for the incorporation of electrical conduit.

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.

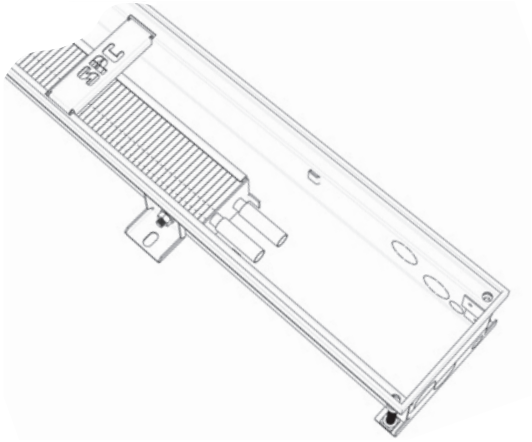
The trench heater must be anchored to the floor via the fixing feet during concreting to ensure that there can be no movement. The correct 'knockouts' must be removed and water pipes brought into the trench heater casing prior to concreting (see next section for details of pipe fittings). There are also knockouts for a cable gland should any wiring be required inside the trench heater casing.

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 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. In practice this means the water return connection is closest to the window.

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 is being brought in from the side of the trench heater then angle compression fittings are often useful. 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 natural trench heaters, these include: ¼ turn shut off valves, regulating valves and automatic control valves. Whilst it may be possible to incorporate these fittings in the case of the trench heater (refer to Figure 6) 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.

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 Control/operation

SPC natural trench heaters contain no fans and rely simply on the passage of hot water through the heat exchanger tubes for their operation. The increased surface temperatures of the heat exchanger draw cool room air through same and warm it before it convects upwards into the space. Accordingly, any control scheme will involve control of the temperature or flowrate of hot water through the heat exchanger. Modulating control of such heaters is not used as their output is not high and on/off control of the flow of water in response to a fall/rise in the room temperature is the recommended method of control.

The simplest means of control integrates the trench heaters with the boiler which supplies the hot water. When the boiler/pump is operating then the trench heater sees a supply of hot water and will heat the space; if either or both are not operating then there will be no addition of heat. Though simple this scheme does not allow individual zone control or response to room temperature.

If control of the heaters is to be made in response to changes in the room temperature then the heaters should be zoned and controlled via a thermostat and 2 port valve as shown in figure 5. A range of thermostats are available from SPC along with a 2 port thermo-electric actuator. The wall-mounted thermostat can be a basic dial, digital display or programmable model but will switch 230V mains. The switched live will open or close the 2 port valve in the pipework to the run of trench units or to the individual unit.

If a valve is used to control a single trench heater then the valve can be fitted inside the casing of the trench heater; if it is used to control a zone or run of trench heaters then it must be fitted in the main flow or return pipework. If the valve/actuator is fitted inside the trench casing then a suitable junction box will be required.

*Note. On natural convection trench heaters it is permissible to fit the 2 port valve to either the flow or return piping.

Wiring details for particular actuators and thermostats will be supplied in the packing of the individual accessory, figure 5 gives a generic description of the wiring required. Note that if the trench heater is embedded in concrete then the necessary electrical conduit needs to have been laid and wiring taken to the actuator of the 2 port valve prior to concreting.

It is not recommended that individual trench heaters are controlled by thermostatic radiator valves; if the heads are positioned inside the trench heater itself they will not properly register the space temperature.

Figures 6 details the fitting of isolating valves, hoses, 2 port valves and actuators and wall mounted thermostats

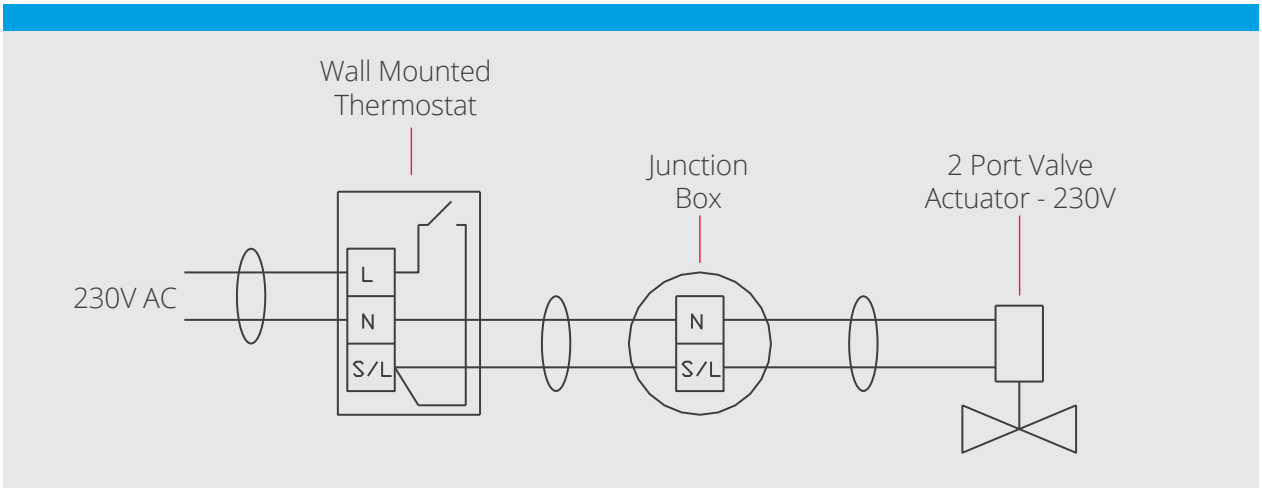
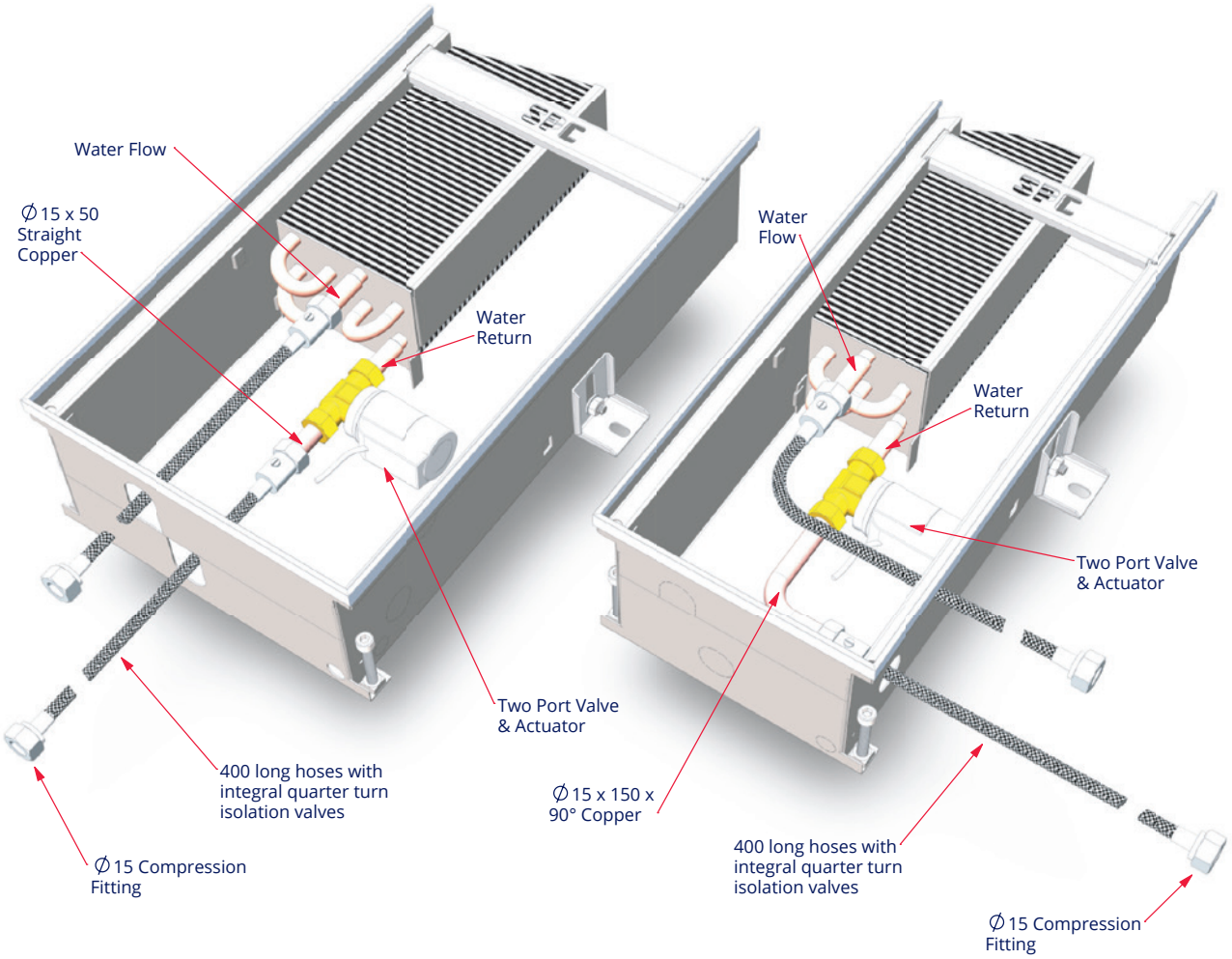


Figure 5. Wiring arrangement-thermostat and on/off valve

4. Connections

Connections can be front or side entry



The 2-port valve and actuator will not fit inside the two smallest sizes, and must be fitted externally to the trench unit.

*Hose lengths are approximate.

Two Port Valve & Actuator Fitting			
Height Width	90	145	200
150	External Only	External Only	External or as Shown
225	External or as Shown	External or as Shown	External or as Shown
300	External or as Shown	External or as Shown	External or as Shown

Figure 6

5. Commissioning

Commissioning of natural trench heaters is limited to 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 operation of any controls by adjusting the thermostat set-point

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 casing can be cleaned with a dry or wet cloth using mild detergent; do not allow moisture to remain within the casing. 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.

7. Fault finding

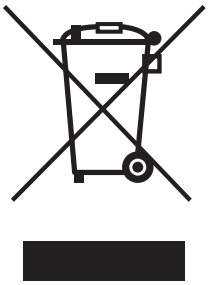
Below is a list of common faults and the steps required to resolve them.

Fault	Cause	Remedy
Flow and return pipes cold	Boiler not working	Check boiler controls and circuit
	Pump not working	Check electricity supply to pump
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
	Thermostat	Check setpoint temperature

Table 2. 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. 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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