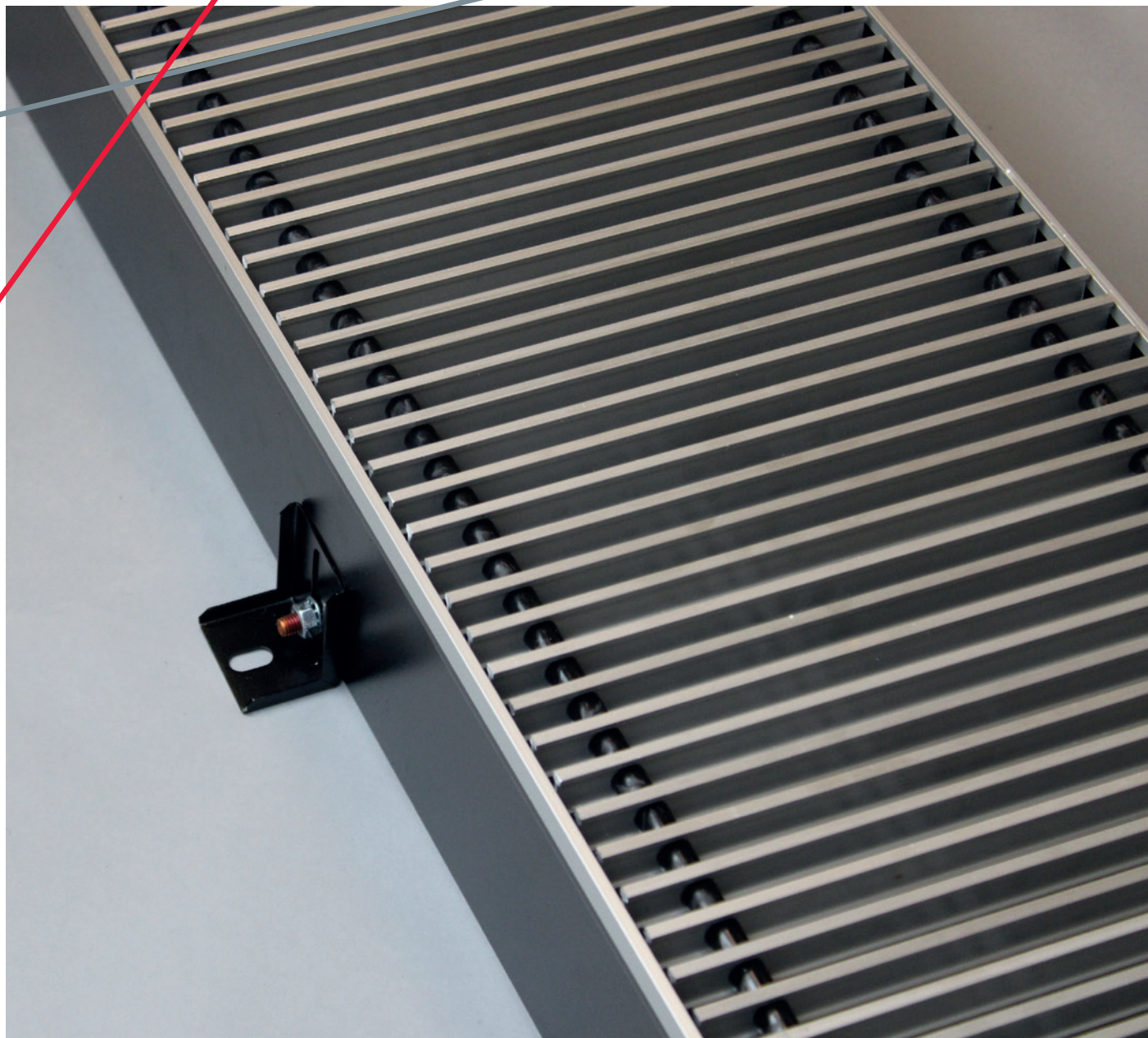




SPC HC Range of Trench Heating/Cooling Units

Installation, Operation & Maintenance Manual

IOM 101 Issue 1



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1. General

1.1 Description

This manual covers the SPC Metropolitan HC range of fan-assisted trench heating and cooling units. Units may be supplied as 4-pipe versions to provide both heating and cooling or 2-pipe versions for heating or cooling and changeover systems. If units are required to provide wet cooling using low temperature chilled water then they will be supplied with a drain tray below the coil and, optionally, with a condensate removal pump. 4 pipe units will have two sets of flow and return pipes at opposite ends of the unit.

Units are supplied in 4-off standard variations of height and width and a default set of lengths though this can be continually variable.

The trench unit consists of one or more fan assemblies, a coil heat exchanger and all necessary casing to allow fitting within the floor. Only the top grille is visible when the installation is complete. Standard grille is roll-up type from

anodised aluminium bars held by spacers and springs assembled to suit the overall length of the trench run. Individual trench elements can be butted together to form continuous runs but must be ordered as such. The grilles are supplied loose. Optional linear stainless steel grilles may be offered or units may be supplied without grilles.

The fan motors are brushless DC type (commonly known as EC) and require a 24V DC supply. Units have a built-in power supply to convert 230V AC to the 24V DC required.

The trench units are for internal use only, they must be installed by experienced contractors and electricians in compliance with all statutory regulations. Installers must read these instructions prior to commencing work and be aware of any risks highlighted.

Table 1 below gives the pertinent unit details.

Type	Fan-assisted trench heater/cooler
Heat exchanger	Copper tube/aluminium finned coil
Fan type	Tangential (crossflow)
Motor type	Brushless DC (EC)
Power supply	230V/1Ph/50Hz
Casing material	Powder coated steel
Roll up grille	Anodised aluminium bar, steel spring, plastic spacers
Grille trim	Anodised aluminium
Water connections	15mm copper
Min. chilled water flow temperature (°C)	5
Max. hot water flow temperature (°C)	85
Max. working pressure (bar)	10

Table 1. General data

All the motors used in this range of units are EC type; accordingly, maximum power draw figures rather than currents are displayed below for specific unit sizes. For non-listed sizes, refer to the figures for the next unit with lower width.

Trench length (mm)	Maximum power draw (W)
900	14
1200	15
1500	17
2000	30
2300	32
2600	34
3000	48

Table 2. Specific electrical data

Unit size	Width (mm)	Height (mm)	Internal volume (litres/m)	Trench dry weight (kg/m)	Grille weight (kg/m)
245x160	245	160	0.5	13	2.3
290x160	290	160	0.7	15	2.6
320x130	320	130	0.7	15	3.0
360x210	360	210	1.2	18	3.4

Table 3. Specific dimensional data.

Note that volumes and weights are given per metre of trench unit and are approximate, representing an upper limit.

Width (mm)	Height (mm)	Width at Feet (mm)
245	160	292
290	160	337
320	130	367
360	210	407

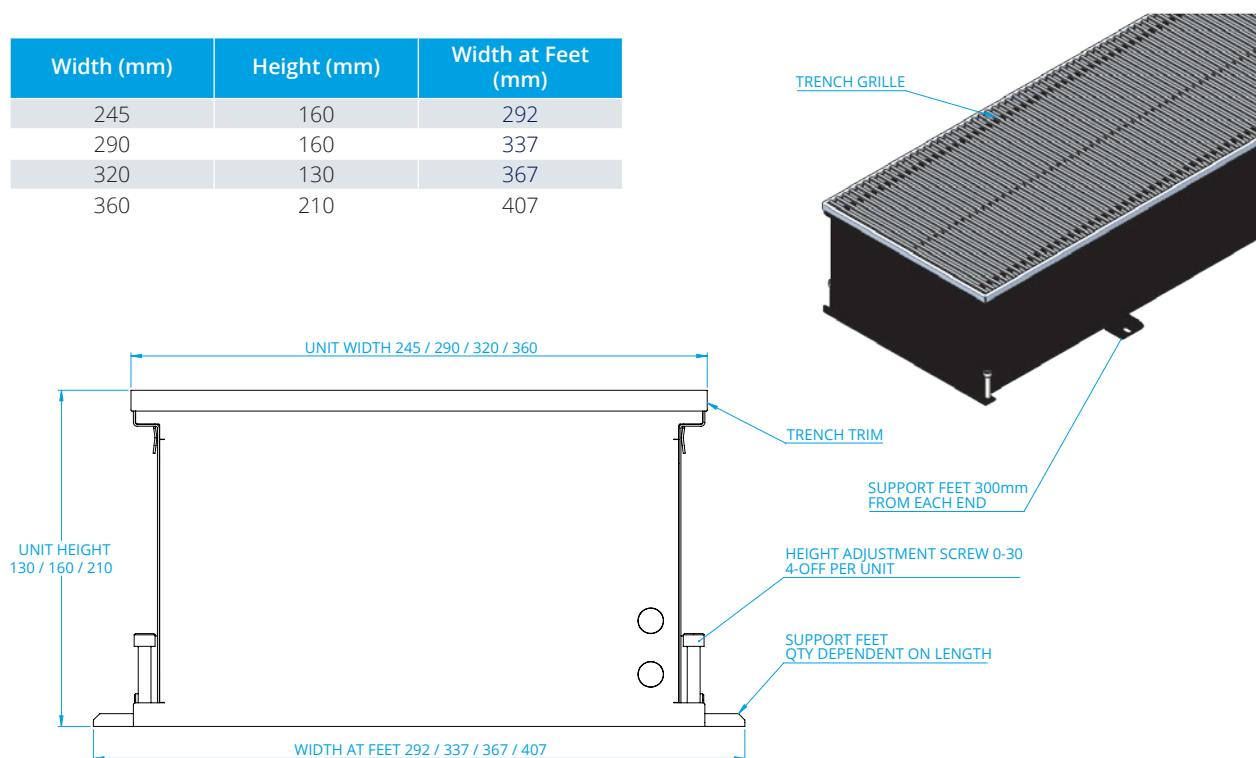
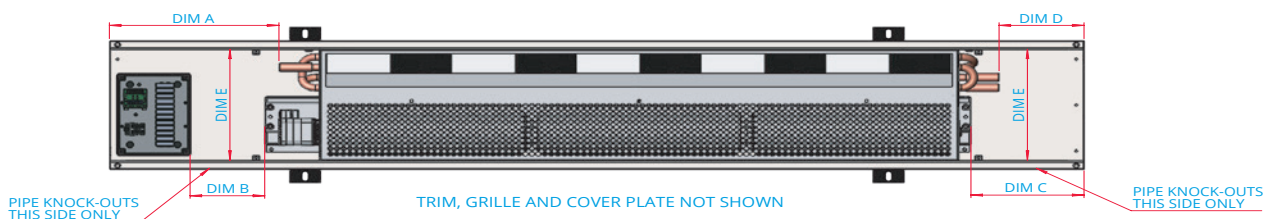


Figure 1. Dimensional details showing extension of support feet

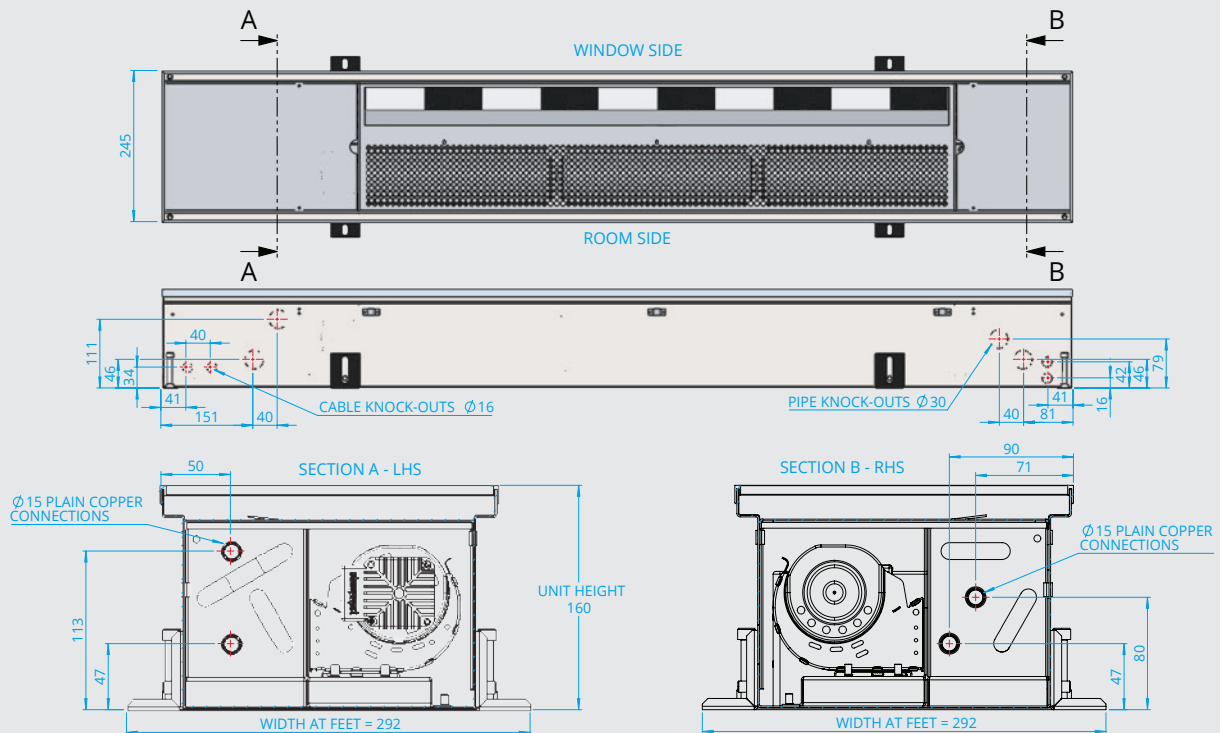


UNIT LENGTH	DIM A	DIM B	DIM C	DIM D
900	292.6	146.8	205.8	162.6
1000	342.6	196.8	255.8	212.6
1100	392.6	246.8	305.8	262.6
1200	276.6	130.8	189.8	146.6
1300	326.6	180.8	239.8	196.6
1400	376.6	230.8	289.8	246.6
1500	260.6	114.8	173.8	130.6
1600	310.6	164.8	223.8	180.6
1700	360.6	214.8	273.8	230.6
1800	410.6	264.8	323.8	280.6
1900	460.6	314.8	373.8	330.6
2000	300.6	154.8	212.8	169.6
2100	350.6	204.8	262.8	219.6
2200	400.6	254.8	312.8	269.6
2300	284.6	138.8	196.8	153.6
2400	334.6	188.8	246.8	203.6
2500	384.6	238.8	296.8	253.6
2600	268.6	122.8	180.8	137.6
2700	318.6	172.8	230.8	187.6
2800	368.6	222.8	280.8	237.6
2900	418.6	272.8	330.8	287.6
3000	257.6	111.8	295.6	252.4

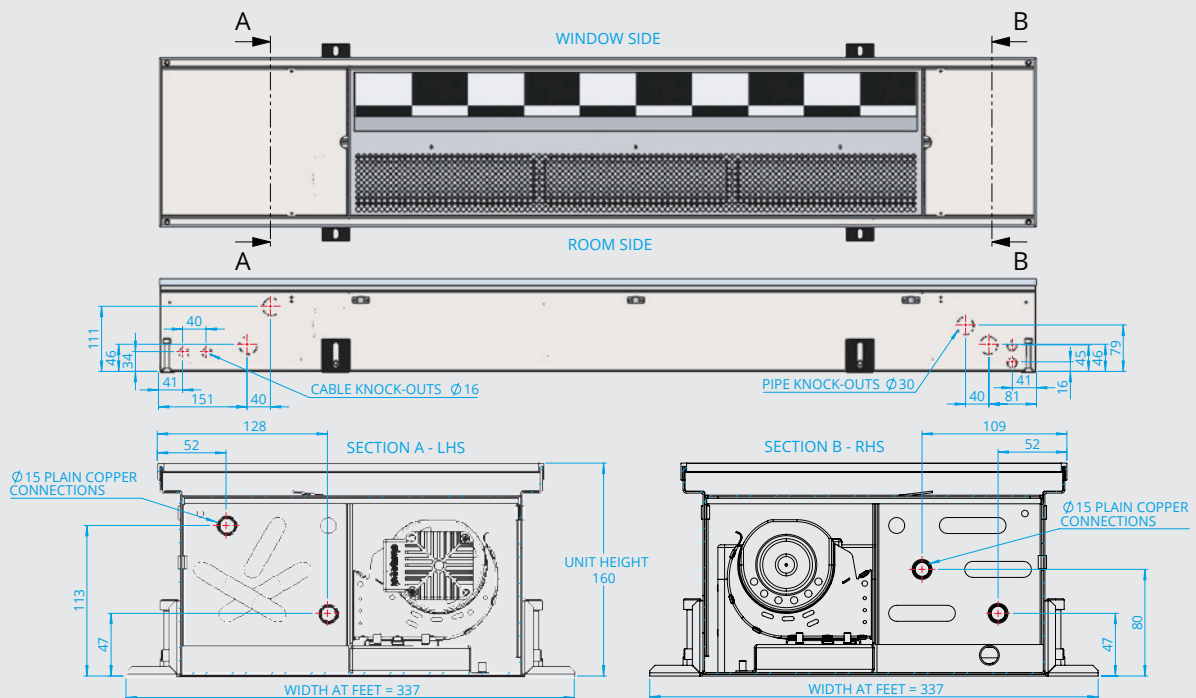
The table above shows internal dimensions common to all sizes. The table below shows dimensions that are unit dependent. For 2 pipe units, dimensions E and D are not relevant."

UNIT	DIM E	MAX INTERNAL HEIGHT
245 X 160	209.6	130
290 X 160	254.6	130
320 X 130	284.6	100
360 X 210	324.6	180

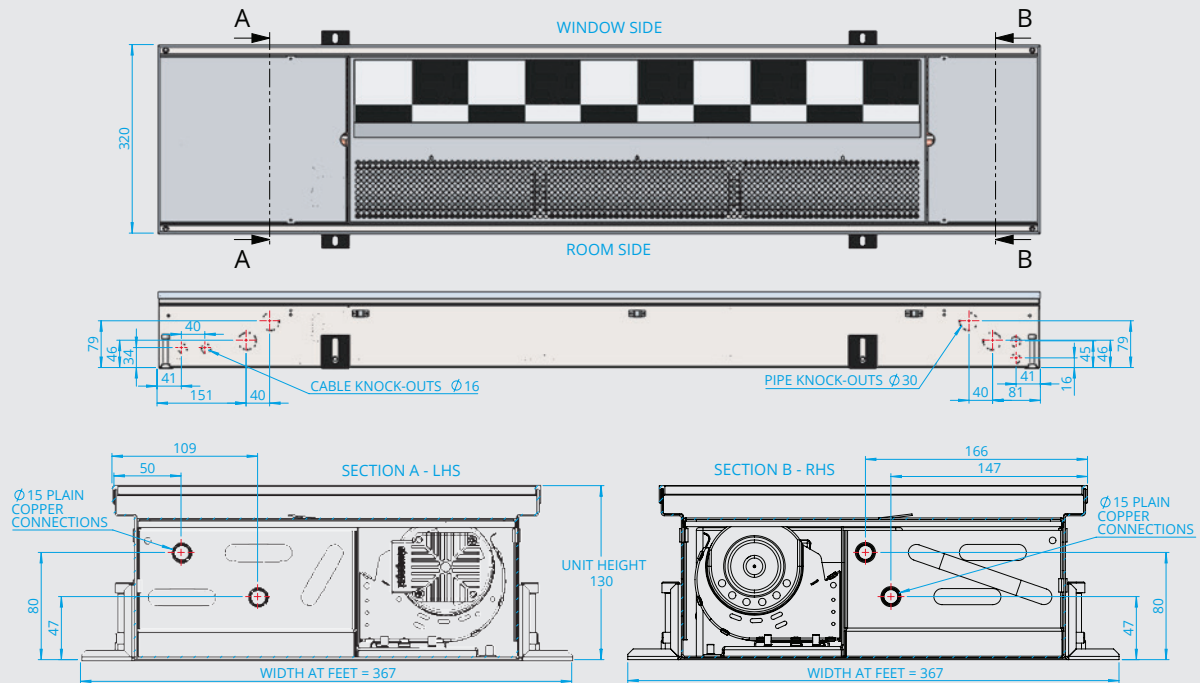
HC Trench - 245 Wide X 160 Height



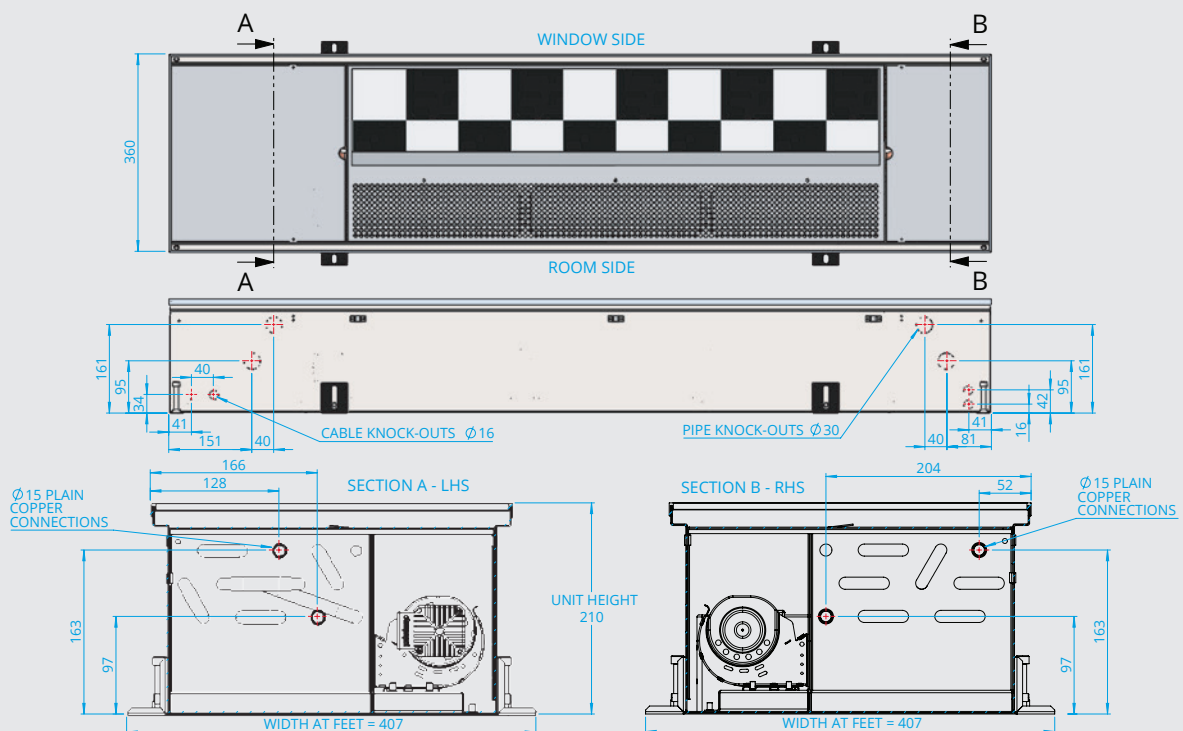
HC Trench - 290 Wide X 160 Height



HC Trench - 320 Wide X 130 Height



HC Trench - 360 Wide X 210 Height



1.2 Receipt and preparation

Units are wrapped and display the serial number, model reference and site reference where appropriate. Relevant installation, operation and maintenance instructions along with relevant wiring diagrams are supplied with the units. If any instructions are missing then they can be downloaded from the website or made available by contacting SPC directly. Do not attempt to install the units without reading the manuals.

On receipt check that all order details are correct

to the customer schedule prior to opening the packaging. Any damages/shortages etc must be reported to SPC immediately. If units are to be stored on site then they should be kept in their packaging until required and not exposed to direct sunlight or temperatures above 40°C. If transported on site then this should only be while the units are still packed and undertaken with care to ensure no damage can result.

2. Installation

2.1 Clearances

As trench units are designed to be fitted adjacent to full height glazing there is no requirement for clearance on the window side of the unit. Clearance on the room side is required for pipework and cabling to be run to the units. If the units are to be fitted in a concrete screed then

allowance must be made in the screed for the pipework and the cables; the clearance required is dependent on the routing of same. If units are fitted in a false or suspended floor then it is recommended that a clearance of at least 300mm is allowed on the room side of the units.

2.2 Mounting general

Trench units are packed fully assembled, apart from the grilles and grille trims which are supplied separately for fitting after the complete run of trench units has been installed. Any other optional accessories specific to the order will be packed separately.

Trench units are suitable for fitting in either suspended/false/hollow floors or in concrete flooring. If fitted in concrete flooring then the width of the trench must extend at least beyond the support feet which protrude beyond the sides of the trench, see dimensional details.

Dependent upon the order details trench units can be supplied as individual heating/cooling units or can form larger continuous runs. For continuous runs it is important that the full complement of units is laid in the trench or suspended floor prior to finally fixing down. Continuous runs may incorporate angle pieces, corner pieces and dummy sections; these must all be included in the initial laying out of the equipment.

If units are supplied as sections of runs then they will be marked accordingly; intermediate sections and one side of end sections have reduced height

ends to allow continuous grilles to be rolled out. For continuous runs the grilles are supplied to suit the overall run length rather than the individual trench section lengths. Grilles for long run lengths will be supplied in a number of sections for butting together.

The trench units/run should be installed close to the window (50mm to 500mm recommended). They should be installed with the heat exchanger on the window side whenever possible to operate at their most efficient, this is the conventional orientation.

The standard aluminium roll-up grilles supplied with the units are suitable for occasional footfall but must not be exposed to high point loads or they will be damaged. Chair legs must not be allowed to rest on top of the grilles. Grilles must not be covered as this prevents proper airflow through the units. Units must not be fitted in front of doorways or in areas of constant footfall; this will not only lead to grille damage but to the build up of debris inside the units from the bottom of footwear.

2.3 Suspended/hollow floor

The important considerations when fitting into a hollow floor are that the trench units should finish flush with the top of the flooring and that they are held firmly in position.

The units include fixing feet on both sides of the casing and these are slotted to allow height adjustment up to 25mm. Levelling screws are also included at the four corners of each unit to allow fine adjustment of the height.

The units should be unpacked and placed into the floor at the location where they are to be fitted. The floor should be marked through the mounting feet and drilled for suitable anchors. The grilles

and trim are supplied loose and the trim should be fitted around the edge of the trench casing to determine the overall finished height. While there will be little or no noise or vibration conducted from the trench unit to the floor, if the installation is particularly sensitive then rubber or foam pads can be fitted between the floor and the mounting feet.

Any timber panels supplied on top of the trench units are for protection and should be kept in place for as long as possible and removed only when ready to fit the roll-up grille.

2.4 Solid/concrete floor

The trench cut in the concrete floor must be large enough to accommodate the trench and the extended mounting feet. If cabling or pipework is to run alongside the trench units then space must be made available for same.

The volume between the trench casing and the trench will need to be filled with a slurry but this should only be done after the units are properly levelled and made flush with the level of the finished flooring. Measurement must be made and the mounting feet and levelling screws finely adjusted in a dry run. Trim should be fitted to the

lip of the trench to ensure the true top is in line with the finished floor.

After ensuring the height is properly adjusted the trench should be offered back into the trench and the floor of the trench marked through the holes in the mounting feet, drilled for suitable anchors and then screwed down. Any holes in the casing and pipework need to be blanked or taped off during the final concreting. Any timber panels provided with the trench should be left in place as long as possible and removed only when ready to fit the roll-up grille.

2.5 Fluid piping

The heat exchangers (coils) terminate in 15mm copper stubs. If a 4 pipe (heating and cooling) unit has been specified then there will be 2 sets of pipe connections; the cooling connections will be at the same end as the electrical box and the heating connections at the opposite end. If the unit is 2 pipe then the connections will just be at the same end as the electrical box.

The flow pipe for both heating and cooling circuits is the one further away from the fan and the return nearer the fan i.e. flow pipe towards the window in the standard orientation.

Knock-outs are available in the sides at both ends of the trench and it is recommended that flexible hoses be used in order to simplify the final connections. If the trench heaters are supplied with valve(s) then they should be fitted directly to the flow connections via the integral compression fittings and flexible hoses can then be used to bring the pipes out of the trench. If used for cooling it is recommended that the pipework to

and from the heat exchanger be insulated if chilled water temperatures are low enough to cause them to sweat.

It is recommended that pipes enter the trench units from the sides rather than the ends and this is the only option for continuous runs made up of several individual units. All units must be piped in parallel; series pipework will lead to a considerable reduction in output.

Manual air vents may be fitted to high points in the coil and these should be opened to remove any trapped air during the commissioning process. Make sure to hold off on the socket when operating the vent plug.

Before making any connections to the coil pipes it is important that the pipes are deburred and rounded in order to ensure an efficient joint. System pressure testing up to 10 bar is acceptable.

2.6 Condensate removal

If units are to be used for cooling and chilled water temperatures are below the dewpoint of the room air then there is potential for condensation to be formed on the finned surfaces of the coil. In these instances the trench units should be supplied with driptrays which extend beneath the coil and the bends at the end.

The driptray terminates in a 15mm connector and if gravity drainage is employed then a flexible, preferably clear, tube should be fitted around the connector and run to waste. Knock-outs are available in the side of the trench for running condensate piping.

The driptray is fitted loosely beneath the coil heat exchanger with its ends extended beneath the bends. The driptray is fabricated with small baffle plates towards either end to minimise air bypass; the tray should be located such that the baffles sit as close as possible underneath the tubeplates of the heat exchanger.

If the units are supplied with condensate pumps then these should again be fitted to the 15mm connector using the flexible piping supplied in the condensate pump kit. Please see separate instructions supplied with the condensate pump.

2.7 Wiring

All units require a 230V single phase supply and must be earthed. The power terminals are available after releasing the screws from the top of the electrical box. To access the electrical box the grille must first be removed and the two screws holding the coverplate in position released. Power terminals are marked L/N/E. The electrical box incorporates glands/grommets through which the power cable can be introduced.

The sides/end of the trench unit incorporates knock-outs which can be suitably grommeted for

the power cables. The knockouts can be removed using a flat head screwdriver and hammer.

Prior to removing the coverplates and working on the units they must be electrically isolated. A suitable fcu (switched fused spur box etc) must be positioned as close as is reasonably possible to the unit. Only persons with the necessary electrical qualifications and competences should work on the units and all work should be undertaken in line with the latest applicable legislations.

2.8 Control/operation

The HC range incorporate EC type fans and performance is best controlled by changing the fan speed. Units are designed to minimise output whenever the fan(s) are not energised. Control would normally be via a centralised BMS though local control of individual units is possible.

A wiring diagram is supplied with each unit which identifies the control wiring requirements for the specific project; this must always be consulted prior to commencing installation and all wiring must be in line with this otherwise the warranty will be invalidated.

Fan speeds are controlled via a 0-10V dc signal to the motor. The signal would normally be generated by the BMS and terminals inside the unit's electrical box are provided to receive this. If on/off valves are incorporated they can be powered by 24V signals from the BMS and terminals are provided inside the trench unit for this.

Options are available for local rather than BMS control; these include remote thermostats, remote switches etc. Follow the wiring diagram supplied with the unit for all these options.

3. Commissioning

After completing the install commissioning involves ensuring that the operation of the units is as designed by a check of the following:

- In heating mode ensure that the hot water generator (boiler/heat pump) is generating warm water and that it is being correctly pumped to the heat exchanger in the trench units and that all valves are in their correct positions.
- In cooling mode ensure that the chiller/reversible heat pump is generating a supply of chilled water and that this is properly reaching the heat exchanger in the trench units via the pump and pipework system.
- Check that the fans are rotating at the correct speed and that they respond properly to the control system.
- Check the temperatures at the flow and return pipes and adjust any regulating valves accordingly.
- Ensure that all the air is purged from the heat exchanger. The heat exchanger is supplied with vent plugs at high points which can be turned with a key and then closed as soon as liquid starts to flow out.
- If a condensate pump is being used then its operation should be checked by filling the driptray until the water level allows the pump to operate.

4. Maintenance

Maintenance must only be carried out after the units have been isolated electrically.

In order to maintain the trench heater operating at maximum efficiency the heat exchanger should be periodically cleaned of debris. The regularity of cleaning required will depend upon the environment into which the unit is fitted and the quantity of dust and other objects which could fall or be drawn inside the casing. The heat exchanger should be examined initially every three months and then at suitable subsequent intervals. Light fouling can be removed using a brush or vacuum cleaner but if the debris is deep within the core of the heat exchanger then it should be removed from the trench in order to facilitate a more thorough clean. If the heat exchanger is connected via flexible hoses then it may be able to be lifted upwards without the need to fully isolate or drain. The coil heat exchanger is only loosely fitted to the side of the casing via tabs and can be easily lifted upwards. To access the heat exchanger tabs the roll-up grille needs to be removed followed by the dividing plate/fingerguard (held by self-tapping screws).

The fans have sealed for life bearings and are maintenance free but should objects fall or become trapped in the impellers then these need to be removed. The impellers are accessible after

removal of the roll-up grille and dividing plate/fingerguard.

If a driptray is fitted then this needs to be periodically cleaned. Note that cleaning would only normally be required if the unit is actively condensing moisture on the fin block; if the unit is running dry then the driptray should remain clean. The ends of the driptray are accessible and cleaning fluid can be added via the ends; the driptray terminates in a 15mm pipe and a hose needs to be fitted to the end. If the driptray needs to be removed then this can be accomplished after removing the coil heat exchanger; the drip tray is only loosely held in place below the coil.

If the outer casing of the trench or the roll-up grille need to be cleaned then this should be undertaken with a dry cloth or dilute cleaning agent. Liquid must not be allowed to remain inside the trench after cleaning.

Water flowing through the trench heating/cooling coil should be treated with suitable inhibitors to prevent the build-up of scale and formation of bubbles. The heat exchanger in the trench unit is fabricated from copper waterways and any solutions used should be suitable for same.

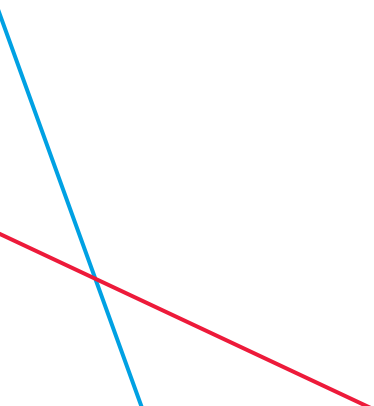
5. Fault finding

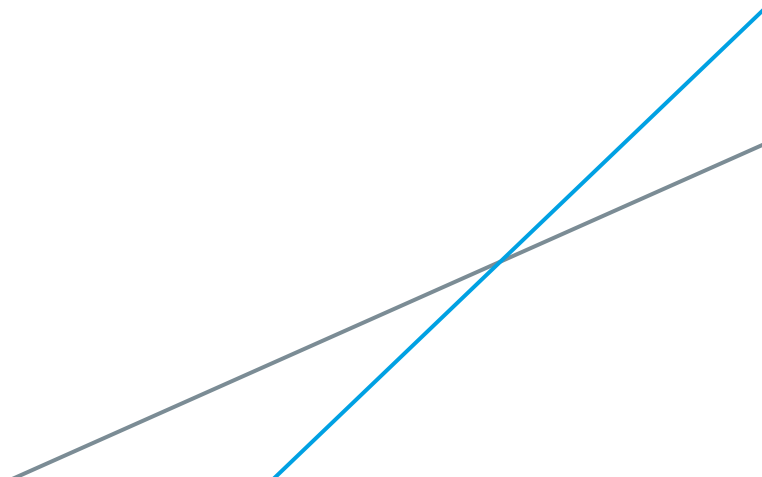
Fault	Cause	Remedy
Fan(s) not running	No power	Check supply
	Blown fuse	Check/change
	Loose wire/connector	Check connections
	Controls	Check correct functionality
Some fans running others not	Faulty motor	Replace
	Loose wire connector	Check connections
Fans noisy	Faulty motor	Replace
	Debris in impeller	Clear debris
	Heat exchanger blocked	Clean coil heat exchanger
Leaving air not warm/cool in heating/cooling	No water flow	Check pump and valves
	Low water flow	Check pump and valves
	Boiler/chiller/heat pump not operative	Check operation
	Wrong water temperatures	Check settings
Water in trench	Leak	Check joints, heat exchanger and pipework
	Draintray drain point not connected	Connect drain pipework to drip tray
	Condensate pump not functioning	Check/change

6. Disposal

The HC range of units are constructed from copper tube/aluminium fin heat exchangers and mild steel casings. Grille 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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