



# Introduction to Heat Emitters

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This section features the range of Copperad heat emitters available through your local BSS branch. Full specification data is included together with dimensional details and other necessary information. Our technical specialists are pleased to visit clients and advise on the most suitable equipment for a proposed application.

Products supplied by BSS are generally in accordance with British or other international Standard Specifications where applicable and as interpreted by the manufacturers, and present no hazard to health or safety if properly installed. There are however, many occasions when goods are ordered from us without any reference being made to the intended use, in which case, the company must assume that the users will take all necessary steps to ensure that the products purchased are suitable for the conditions in which they are intended to operate.

Our current catalogues generally indicate the Standards and Classes with which the products comply, but if in doubt, please consult your nearest BSS branch. This equipment complements our existing range of heating products, which include our well known range of boilers, heat exchangers, flue and chimney equipment and a comprehensive package of heating and ventilating controls all of which are ex-stock from our central warehouse and readily available to all our depots.

## Copperad – A Brief History

Copperad originated in 1932 as the British Unit Heater Company, founded by Mr. S. J. Holmes and a Mr. R. F. Jarratt. The name “Copperad” first appeared in 1939 when the company moved to St. Pancras Place, London, as the brand name for the unit heaters. In 1945 a second piece of apparatus was designed, to replace radiators, and the fan convector was born. In 1946 Copperad Limited became the company name.

Although there have been many changes of ownership, and indeed design, in the intervening years, Copperad has maintained a high level of respect as a brand throughout this period. The most significant change has been the decision to sell all Copperad products into the UK exclusively through nationwide distributor BSS (UK). This decision was not surprising as BSS has been one of Copperad’s major accounts since the early days of the 1930’s and continues to offer major benefits to designers and contractors from its network of local branches.





## Fan Convectors

The Copperad fan convector is the latest, stylish range offered with the flexibility to meet the wide variety of site applications encountered by designers, specifiers and installers for varied applications including schools, colleges, offices and public buildings. A full range of casing styles is available to cover all applications, available in four major types:

- Floor mounted
- Concealed
- Horizontal
- Hideaway

The free-standing floor mounted and concealed types are supplied in two heights, low level (600mm), ideal for under sill or under worktop applications and extended (2100mm). The Horizontal and Hideaway styles are 600mm high and 340mm high respectively. A style selection guide is given on pages 1.12 - 1.13.

Single sloping units can be floor or wall mounted, whilst the double sloping unit is designed for ceiling mounting, but could be used on a wall. Both utilise 600mm high cases.

For safety, and aesthetics, all low level units feature curved top and bottom front edges, and pencil proof grilles prevent the ingress of any unwanted items into the casing, making them particularly suitable for use in buildings where children or elderly people are accommodated. Grilles, where fitted, are finished in dark grey RAL 7000 which complements the casing finish of light grey RAL 9002 chosen to look attractive in a variety of surroundings.



The style selection chart shows certain installation suggestions, where the unit is completely enclosed behind builders work panels, e.g. styles 50 or 83. It is important that when using this method, the builders work panelling has an easily removable section, at least corresponding to the front access panel of the unit this is necessary to achieve access for filter cleaning etc.

The hideaway units style 90 are designed to be entirely hidden behind builder's work. The heat exchanger is enclosed but no spigot is provided for air inlet. The fan tray is removable, and contains the filter. These units can be mounted either vertically or horizontally and a builders work access panel must be provided, large enough to remove the fan tray.

### EC Motors

BOSS™ Copperad fan convectors now come with EC motors as standard; they offer significant energy savings compared to conventional AC motor fan convectors. These energy savings are particularly marked at low speeds where the efficiency of conventional AC motors decreases the most.

Current building regulations specify maximum SFP (specific fan power). This is the ratio of the power drawn by the motor in watts to the airflow generated in l/s. This gives an indication of the efficiency of the air moving equipment. To comply with part L Building Regulations (2010), fan coil units need to demonstrate an SFP figure of less than 0.6. The BOSS™ Copperad fan convector motor range exceeds this requirement with a maximum SFP of 0.36. For full datasheet see page 1.15.

### Ease of Access

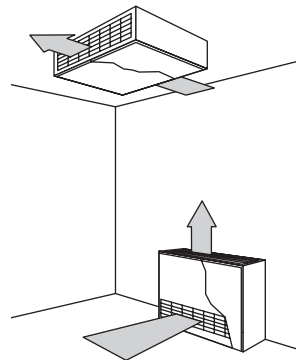
Access to all units is via the front panel; and this is easily removed by undoing two screws which retain the front panel to the case, unlocking the key locks if fitted, allowing access to the heat exchanger, pipe connections and fan tray. The fan tray is disconnected from the main electrical supply (and all ancillary equipment) at the terminal block thus making it safe to handle. The fan tray slides out to reveal the washable filter, on the rear inlet and hideaway models. For front and bottom inlet units, the filter is located across the inlet grille or opening, with extended units the filter is positioned in the top half of the unit directly below the fan tray assembly.

### Slideaway Fan Tray

This is fitted immediately below the heat exchanger and is a self-contained unit carrying the fans, motor, terminal block and the optional speed control switch and thermostats.



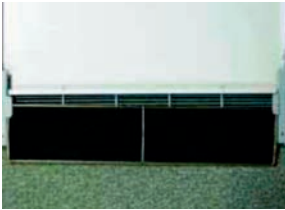
Both units right handed as viewed on front access panel





## Connections

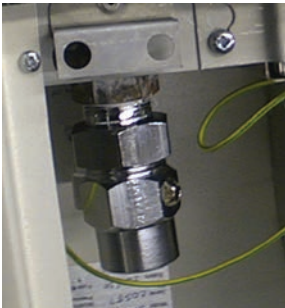
All heat exchanger connections are screwed 3/4" BSP female. Flow and return connections are always together at the same end of the unit, at the opposite end to the electrical connections. The required pipe connection end (i.e. left or right hand) should always be specified when ordering. Please note that the handing is determined when facing the access panel. When conditions demand a change in handing, this can easily be accommodated on site (see instructions in IOM). The heat exchanger can also be inverted on site to bring the pipework in from above.



**Note:** Right hand connections will be supplied if handing is not stated.

## Heat Exchanger

Heat exchangers are available for use on low and medium temperature hot water. These are made in either a one, two or three row configuration to give the emission required, and include a low temperature cut out thermostat as standard. Also available are heat exchangers suitable for use with steam.



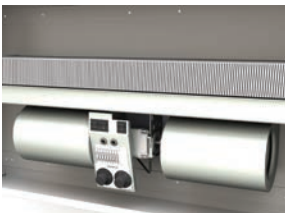
## Filters

Air filters made from washable flame retardant bonded polyester material are fitted as standard. They are situated in the top of the fan tray and can be removed after only partially sliding out the tray on rear inlet and hideaway units. Front and bottom inlet units have the filter located across the grille or opening. Extended casings have the filter positioned in the top half of the units below the fan tray assembly.



## Concealed Valves

All units have been designed to accommodate isolating valves within the casing, access being available only after removing the front panel. Screw operated straight type Ballofix type valves can be supplied in 3/4" BSP sizes on both flow and return pipework.



## Air Vents

All heat exchangers, except those intended for use in steam systems, are fitted with air vents as standard. As an optional extra these can be replaced with either automatic air vents or extended air vents accessible from the front without removing the front panel.

## Multi-Speed Motors

The new EC motor comes as standard and gives three operating speeds. The motors shall be electronically commutated external rotor type with an in-built electronics enclosure. The motor incorporates maintenance free ball bearings. Motors are IP44 and insulation is class B rated. Rotational speed is controlled via a 0-10v signal to the terminal

block of the motor. Twin shaft motors are fitted to the 1200mm long units and single shaft to the 900mm and 600mm units.

### Voltage

All units are suitable for use on a 230V 50Hz single phase supply. Recommended fuse not more than 3A.

### Overheat Cut-Out

Motors will have built in Standard Thermal Overload Protection (S.T.O.P) with automatic reset.

### Speed Control Switch

This can be built into all floor/wall mounted and concealed styles. The switch is a rocker type with three positions; low, medium and high speed. The switch is concealed behind a plain front access panel. A separate on/off rocker switch is provided. The switch can also be supplied fitted into a wall mounted switch box suitable for the remote control of all styles. A standard electrical back box is used, suitable for either surface or flush mounting, which is fitted with a white plastic switch plate. A summer/winter rocker switch can be fitted if required, either mounted on the plate internally or into the external remote switch box.

### Full Range of Controls

As optional extras, inbuilt thermostats may be fitted to automatically switch the unit on/off (T1) or to provide speed change (med/low (T2) or medium/high (T3).

However with inverted, horizontal, hideaway and those floor/wall mounted and concealed styles fitted with fresh air inlets, inbuilt thermostats are not recommended. For such applications a remote wall mounted thermostat should be used. Access to inbuilt thermostats is via the front panel.

### Terminal Block

The terminal block is a combined three section plug and socket, allowing the fan tray, with all controls and wiring, to be removed to a convenient and safe position for maintenance purposes.

### Manual and Motorised Dampers

Where a mixture of fresh air and recirculated air is required, a manually operated damper mechanism is available, this allows the fresh air inlet spigot to be closed off when required. The damper is fitted to the lower rear panel without incurring any increase in height of the units. Unauthorised adjustment of the damper is prevented, by making it accessible only after removing the front panel. Motorised versions of the damper mechanism are available to order (factory fitted only), further details upon application.



Damper



Recessed with spigots



Loose grilles



Key lock access panel

## Recessed Installation

All styles having front outlet can if required be partly or fully recessed into a wall, cupboard or shelf unit, resulting in a very slim and unobtrusive installation. These units are supplied with factory fitted spigots (20mm) to allow for site connection of duct section / plenums (by others).

## Separate Grilles

For all styles having a spigotted inlet and/or outlet, separate loose grilles of a similar style to those fitted to units, but mounted in a slim attractive architrave frame, can be provided as optional extras. These are finished in light grey with a mid grey grille. Screw holes are provided for easy fixing. Please note that these grilles are not weatherproof and therefore are unsuitable for external use.

## Key Operation

Locks which can only be operated by a special key, can be fitted to the front panel as an option. (Standard on style 21, SS and DS models). Units without key locks have screws in the top grille which fix the panel to the case.

## Sound Insulation

All units are quiet in operation, with the moving parts isolated from the structure and internal surfaces lined, where applicable, with sound absorbing material.

## Fuse Protection

Overload protection is not normally required. The circuit should be fused in the normal way. 3 amp fuse rating is recommended. A switched fuse box can be supplied as an optional extra (SF).

## Automatic Control

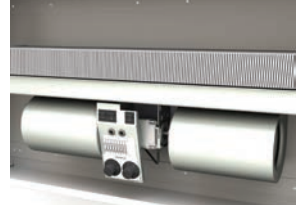
By fully using all the optional control equipment, the unit can operate completely automatically under normal ambient conditions. They can be built in and hidden out of sight if required. The motor can be controlled from an inbuilt switch mounted on the fan tray or from a remote control box. The two lower speeds (low and medium) are used for the majority of applications whilst the high speed is kept for occasions such as rapid warm-up prior to occupancy. The lowest speed is recommended where low noise transmission is essential, such as churches and libraries. A full range of thermostats is also available.

## Fitted as standard Low Water Temperature Cut-out (LTC)

Fitted as standard is a fixed setting thermostat attached to the heat exchanger and easily detachable from the fan tray wiring by the plug and socket provided. This avoids cold



draughts being circulated, by switching off the fans when the hot water temperature drops below 35°C (95°F). The fans are automatically switched on again when the water temperature rises to 43°C (110°F). An adjustable stat is also available if required (ALTC).



## Optional Controls

### 1. On/Off control Thermostat (T1)

An adjustable thermostat with its control knob calibrated in degrees Celsius provides On/Off control for the motor in response to changes in ambient air temperature. It is of the liquid expansion type with a sensing bulb located on a bracket attached to the fan scroll on the incoming airstream.

### 2. Automatic Speed Change Thermostats (T2 and T3)

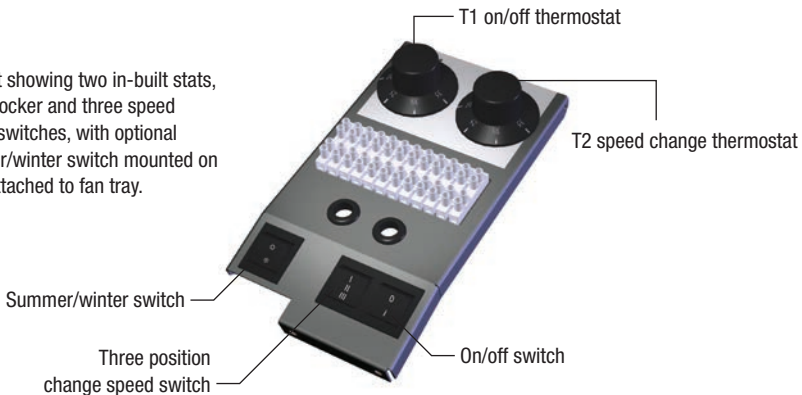
The same specification as the T1 used by itself or in a pair. Speed can automatically be changed from high to medium (T3) and/or then from medium to low (T2) at any predetermined temperature setting. Normally a temperature difference of between 3°C and 6°C is used between the T1 and T2 and between the T2 and T3. Preset at the time of installation, these thermostats can simply provide a rapid warm-up on high speed which is automatically switched to medium and then low speed when the room is occupied. A constant temperature control is then achieved by the On/Off thermostat (T1). More accurate and sensitive room control may be obtained by using a remote wall mounted T1 thermostat, which must always be used when combining a T2 and T3 together. Remote mounted T1, T2 and T3 thermostats should always be used on horizontal or inverted units or those having fresh air inlets. If a concealed switch is fitted this must be set at a high speed for a T3 or medium speed for a T2.

A combined electronic two-stage thermostat has been introduced to provide T1 and T2 functions from one control. Details on application.

### 3. Special Controls Fan Enable Relay

A 24 AC relay can be fitted, to allow a heater to be switched on/off remotely by a controlled 24 A.C. supply.

Bracket showing two in-built stats, on/off rocker and three speed rocker switches, with optional summer/winter switch mounted on plate attached to fan tray.





## Model Reference and Accessories

The complete model reference is made up of a number of sections. This is an example of how a typical reference should be presented.

- Basic Reference
- LTC and filter fitted as standard

**e.g. 21 09 R / CS / LTC / T1 / T2**

21	Style of fan convector (21 bottom inlet, top outlet, with grilles)
09	Size of coil (to suit 600/900/1200mm wide unit)
R / L	R = right hand pipe connections (std) L = left hand pipe connections
CS	Separate On/off and 3 speed switches mounted internally on a carrier plate
LTC	Low temperature cut out to prevent fans running when water below pre-set temperature (approx 45°C)
T1	Inbuilt on/off thermostat
T2	Inbuilt speed change thermostat, medium to low

Suffix	Description	Available with styles
(S)	Signifies steam coil where used	
T1	Thermostat on/off control	All except hideaway, horizontal and inverted units and those with fresh air inlets. Fitted individually or in pairs of T1 and T2 or T2 and T3 or T1 and T3
T2	Thermostat speed control med/low	
T3	Thermostat speed control high/med	NB Only two inbuilt stats can be accommodated, if all three stats selected one (usually on/off) must be remote
2-stage	Remote combined on/off and speed change thermostat	
CS	Concealed three speed control on/off rocker switches	Standard on 21 and SS units
K	Key locks on access panel	11, 13, 15, 23, 24, 25, 27, 30, 31, 32, 33 & 40
VE	Extended air vent	All except units with steam coils
VA	Automatic air vent	All except units with steam coils and where operating horizontally
LTC	Low temperature cut out to prevent fans running when water below pre-set temperature (approx 45°C)	
ALTC	Adjustable low temperature cut out	All styles
FER	Fan enable relay 24 VAC	All styles
V075	Factory fitted valves, pair ¾"	All styles. Screw operated type, straight pattern, threaded. Restricted for use with temps up to 120°C (250°F) max
EX	Extended height other than standard 2100mm (overall height in mm)	30, 31, 32, 33, 50, 51, & 52. Height to be stated from floor to top of unit, and to be within 1300mm min and 2300mm max
SF	Switched fuse (supplied loose)	All styles
LG600	Loose grille in support frame 600mm	
LG900	Loose grille in support frame 900mm	
LG1200	Loose grille in support frame 1200mm	
RS1R	Remote on/off rocker switch	Box 1 for single switch or box 2 for multi-switches required (surface (S) or flush mount (F) available)
RS2R	Remote summer/winter rocker switch	
RS3R	Remote three speed selector rocker switch	
RS123R	Remote on/off, summer/winter and three speed selector switch	
WMT1	Wall mounting thermostat on/off (loose)	
WMT2	Wall mounted thermostat, speed control med/low (loose)	
WMT3	Wall mounted thermostat, speed control high/med (loose)	
PL600	Plinth 600mm	Supplied loose for low level floor standing units only
PL900	Plinth 900mm	
PL1200	Plinth 1200mm	
INV	Inverted case	Outlet at bottom of case instead of top
RAF	Reversed air flow	Air in at top, out at bottom. Recommended where case inverted
SPF	Special paint finish (Specify RAL)	Standard colour light grey case RAL 9002 with dark grey grilles RAL 7000
SS	Single slope	
DS	Double slope	

### Style number

Indicates the arrangement of the air inlet and outlet positions on each unit and whether it is a low-level, extended, hideaway or ceiling mounted unit.

### Type

This indicates the heat exchanger for the operating conditions and also defines the unit length (S indicates a steam coil). The type number defines the nominal emission (kW) when operating on hot water or steam at medium speed (03 and 04 are 600mm units, 05,06 and 08 are 900mm units and 09,12 and 15 are 1200mm units).

### Handing

Left or right handing is determined when facing the access panel – right hand will be supplied unless specifically otherwise stated.

### Options

There are options which can be added to the above basic units to suit individual circumstances. These are identified on the previous page with their suffixes, which should be separated by oblique strokes as in the example on the previous page.

## Selection Criteria

- **Quantity Required?** – and full reference number)
- **Heat Output Required** – kW or Btu/hr
- **Which Model?** – Floor mounting (most popular), Ceiling mounting, Concealed, Extended model, Chassis model
- **Which Medium?**  
LPHW 82°C flow, 71°C return  
MPHW 110°C flow, 90°C return  
Steam (Maximum 8.5 bar)
- **Electrical Supply?** – 200/240 Volt, single phase only
- **Mounting Height?** – If ceiling mounted only LPHW/high level, max. 3m
- **Options Required?** – Inbuilt ON/OFF thermostat (T1), speed change thermostat (T2) takes the fan speed from medium to low when temperature is reached, speed change thermostat (T3) takes the fan speed from high to medium when temperature is reached.

### Note

Only two combinations of thermostat can be used on a single unit, i.e. T1/T3 or T2/T3, etc. Wall mounted thermostat (WMT) can replace inbuilt (T1) thermostat if required. Recommended applications for ceiling mounted unit.

## Selection Guide

Knowing the application required for the unit, the style necessary to suit that application can easily be chosen. The tabulated data of thermal duties is then referred to. As the emission required and operating speed is usually known, together with the flow and return temperatures and ambient conditions, the overall length required can be found from the tables. Factors may have to be used where mean water temperatures differ, etc. The full model reference for ordering can then be built up quite easily.

### Note

It is recommended that wherever possible units are sized for normal usage on low or medium speed conditions, leaving the higher speed available for quick warm-up situations, units should not be sized on the high speed outputs. If higher water temperatures or low pressure steam are required, then within the limitations mentioned above, the following control systems can be used provided that the water flow temperature does not exceed 115°C (240°F) or the steam pressure exceed 0.7 bar gauge (10lb/in<sup>2</sup> gauge).

1. Operate the fan continuously at one speed or use a remote changeover thermostat(s) and modulate by switching fan speeds (the fan must still run continuously) or
2. Ensure the heating medium is shut off prior to switching the motor off; an automatic valve controlled by a remote thermostat will provide this facility for up to say four fan convectors. Note that these comments apply equally to inverted wall mounted convectors, but if mounted low down, higher leaving air temperatures could be used.

When connecting duct work to concealed / hideaway units, the external static resistance should not exceed 24pa (max.). Care should be taken on mounting heights with ceiling mounted units. As a rough guide:

**Model 03, 05 & 09 units up to 3.08 metres (10 feet) from floor level.**

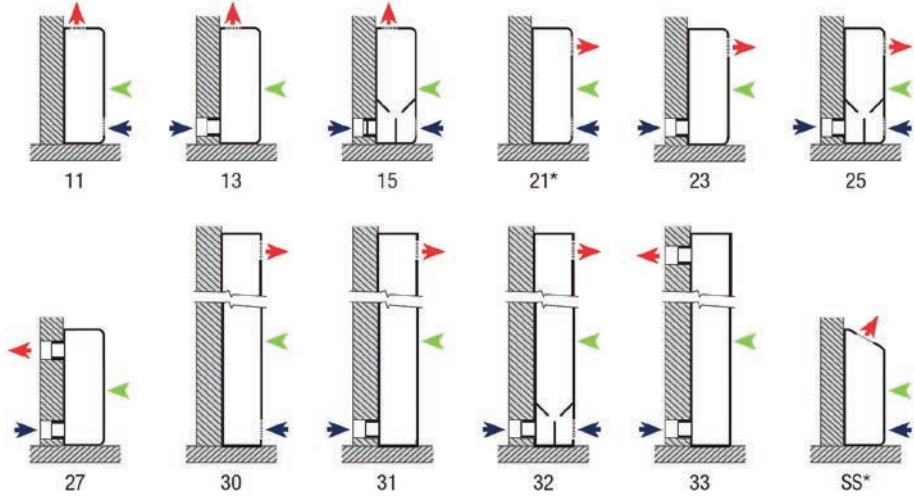
**Model 06 & 12 units up to 2.77 metres (9 feet) from floor level.**

**Model 04, 08 & 15 units up to 2.45 metres (8 feet) from floor level.**

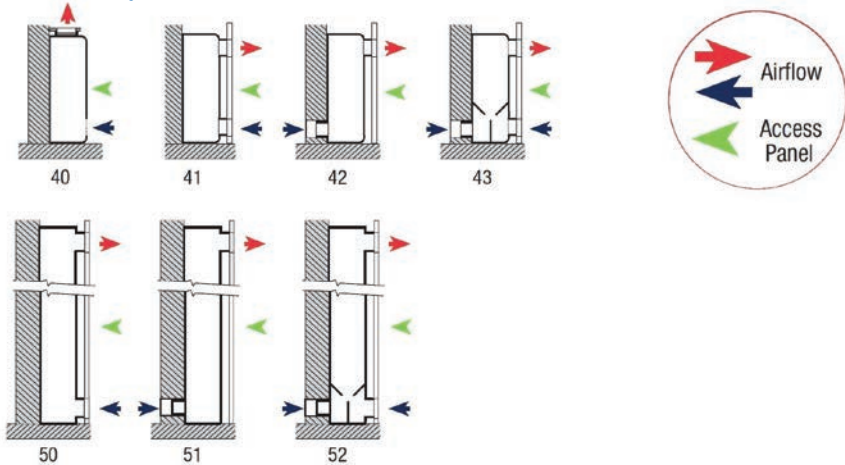
(Based on LPHW system 75°C mean, 10°C drop). A higher leaving air temperature obtained with deeper batteries reduces the mounting height. Avoid using low speed on horizontal applications.

## Style Selection

### Free Standing Styles



### Concealed Styles

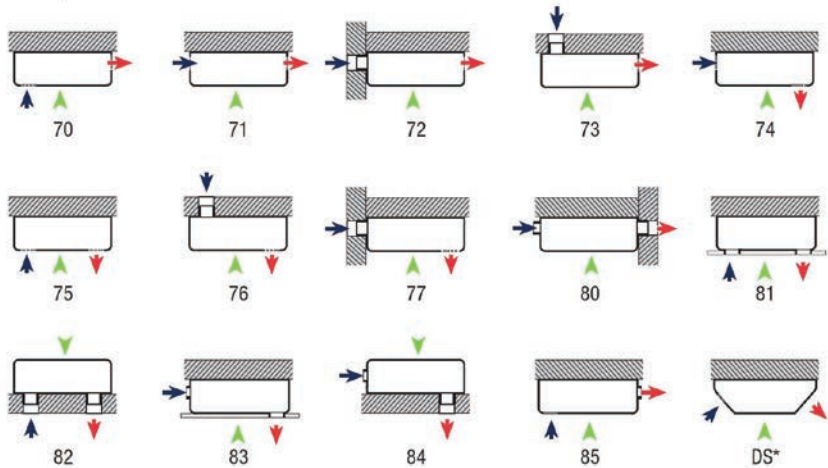


#### \* Stocked Units

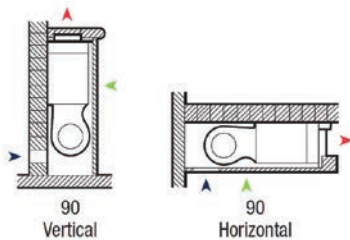
Stocked models for floor or low level wall mounting styles 21 and SS have fitted key locks to access panel, CS speed control, T1 thermostat and LTC as standard.

Stocked models for ceiling or high level wall mounting styles SS and DS will require control at low level via a rocker switch (RS1R) or wall mounted thermostat (WMT1).

## Horizontal Styles



## Hideaway Styles



\* Stocked units

### Notes on Style Selection

Inbuilt concealed switch (CS) fitted as accessory.

11, 13, 15, 21, 23, 25, 27, 30, 31, 32, 33 and 40  
(Stocked model 21 and SS fitted as standard)

Designed for remote control,

41, 42, 43, 50, 51, 52, 70, 71, 72

No inbuilt switch

73, 74, 75, 76, 77, 80, 81, 82, 83, 84, 85, 90, DS, CT

Intended for floor or wall mounting

11, 13, 15, 21, 22, 23, 25, 27, 40, 41, 42, 43, SS

Intended for floor mounting only

30, 31, 32, 33, 50, 51 and 52

Standard for ceiling mounting. Not generally suitable for medium and high temperature hot water or steam unless certain precautions are taken.

70, 71, 72, 73, 74, 75, 76, 77, 80, 81, 82, 83, 84  
85, DS and 90 (horizontal version)

# Performance Data – Fan Convectors

Low temperature hot water 75°C, 10°C drop

Length mm	Coil Type	EAT °C	High Speed				Medium Speed				Low Speed						
			Duty kW	Mean basic rating	Air volume M <sup>3</sup> /s	NR Guide	LAT °C	Duty kW	Mean basic rating	Air volume M <sup>3</sup> /s	NR Guide	LAT °C	Duty kW	Mean basic rating	Air volume M <sup>3</sup> /s	NR Guide	LAT °C
600	03	15	3.15	0.052	0.080	37	47.8	2.95	0.049	0.073	39	49.7	2.35	0.041	0.061	37	49.2
		18	2.98				50.2	2.61				50.8	2.22				51.3
	04	15	4.32	0.072	0.074	37	63.6	4.07	0.068	0.065	39	67.2	3.49	0.058	0.054	37	68.9
		18	4.08				63.9	3.85				67.4	3.28				68.6
	05	21	3.84				64.2	3.62				67.4	3.09				68.7
		15	6.34				48.7	5.56				48.8	4.97				51.0
900	06	18	5.99	0.105	0.165	33	49.8	5.26	0.092	0.144	37	50.0	4.69	0.082	0.121	33	52.0
		21	5.60				50.7	5.00				51.4	4.42				53.0
	08	15	7.00	0.116	0.157	33	52.2	6.56	0.108	0.137	37	54.9	5.92	0.098	0.115	33	57.9
		18	6.59				53.0	6.18				55.6	5.57				58.4
	08	21	6.20				53.9	5.80				56.3	5.2				58.7
		15	8.42	0.138	0.151	39	61.5	7.48	0.124	0.132	37	60.5	6.82	0.113	0.108	33	64.4
1200	09	18	7.88	0.138	0.151	39	61.5	7.06	0.124	0.132	37	60.9	6.45	0.113	0.108	33	64.7
		21	7.46				62.2	6.63				61.3	6.05				64.8
	12	15	11.52	0.191	0.250	38	53.4	10.38	0.172	0.230	35	52.6	9.07	0.150	0.191	31	54.6
		18	10.9				54.3	9.8				53.5	8.56				55.3
	12	21	10.27				55.2	9.2				54.3	8.06				56.2
		15	13.17	0.218	0.238	38	61.1	11.58	0.192	0.219	35	59.1	9.95	0.165	0.180	31	61.1
15	18	12.42	0.242	0.227	38	61.5	10.92	0.217	0.208	35	59.6	9.42	0.179	0.170	31	61.6	
	21	11.71				62.0	10.3				60.2	8.84				61.9	
21	15	14.59	0.242	0.227	38	68.6	13.04	0.217	0.208	35	67.2	10.81	0.179	0.170	31	68.0	
	18	13.81				68.7	12.38				67.6	10.23				68.1	
		21	13.15			69.3	11.66				67.7	9.6				68.1	

To calculate duties for units operating on conditions different to the previous page. We recommend you use the “mean basic rating” data.

Calculate the temperature difference (TD) between the heating medium (Mean Water Temp.) and the Entering Air temp.  $MWT - EAT$  ( $60 - 18 = TD \ 42^{\circ}C$ )

Select an appropriate size unit from the catalogue and note its Mean Basic Rating (BR). The basic rating is then multiplied by the

TD to equal the unit output.

(E.g.: 08 fan convector at medium speed on  $18^{\circ}C$  EAT and 60 mean water temp.

$BR = 0.124$ ;  $TD = 42$  Therefore:  $0.124 \times 42 = 5.21kW$  output)

For Temperature Drops other than  $10^{\circ}C$  – apply the following factors to the kilowatt duty:

$5^{\circ}C = 1.04$     $10^{\circ}C = 1.00$     $15^{\circ}C = 0.94$   
 $20^{\circ}C = 0.87$     $25^{\circ}C = 0.81$     $30^{\circ}C = 0.75$   
 $40^{\circ}C = 0.68$

SPF and energy saving comparison of AC and EC motors in BOSS **Copperad<sup>eco</sup>** Fan Convertors

Model	Size	Speed	AC Air Volume l/s	AC power draw (W)	AC SPF (W/l/s)	EC Air Volume l/s	EC power draw (W)	EC SPF (W/l/s)	% saving
EC2013	600mm Long 03 coil	Low	61	46	0.75	61	14	0.26	73
		Medium	73	49	0.67	73	18	0.28	63
		High	80	52	0.65	80	27	0.36	41
EC2013	600mm Long 04 coil	Low	54	46	0.75	54	14	0.26	73
		Medium	65	49	0.67	65	18	0.28	63
		High	74	52	0.65	74	27	0.36	41
EC2013	900mm Long 05 coil	Low	121	65	0.53	121	21	0.18	77
		Medium	144	76	0.53	144	29	0.21	62
		High	165	90	0.55	165	40	0.25	38
EC2013	900mm Long 06 coil	Low	115	65	0.53	115	21	0.18	77
		Medium	137	76	0.53	137	29	0.21	62
		High	157	90	0.55	157	40	0.25	38
EC2013	900mm Long 08 coil	Low	108	65	0.60	108	21	0.18	77
		Medium	132	76	0.58	132	29	0.21	62
		High	151	90	0.60	151	40	0.25	38
EC2013	1200mm Long 09 coil	Low	191	96	0.60	191	25	0.14	78
		Medium	230	104	0.58	230	35	0.16	66
		High	250	116	0.60	250	46	0.19	52
EC2013	1200mm Long 12 Coil	Low	180	96	0.60	180	25	0.14	78
		Medium	219	104	0.58	219	35	0.16	66
		High	238	116	0.60	238	46	0.19	52
EC2013	1200mm Long 15 Coil	Low	170	96	0.60	170	25	0.14	78
		Medium	208	104	0.58	208	35	0.16	66
		High	227	116	0.60	227	46	0.19	52

Copperad<sup>eco</sup> fan convectors are compatible with existing speed control and switching features.

The EC technology allows the use of safe low voltages for remote thermostats and switches.

The use of EC motors not only enhances the **efficiency but also allows the possibility of direct** control of the fan speed via a 0-10V BMS signal.

EC motorplates are interchangeable with existing units, offering a refurbishment option where energy saving motors are required.

**For more information contact the BOSS Technical Team**

**T:** 0116 256 7052

**E:** [technicalteam@bssgroup.com](mailto:technicalteam@bssgroup.com)

Or visit our website [www.bssindustrial.co.uk](http://www.bssindustrial.co.uk) to find your nearest BSS branch

## Copperad Fan Convectors

Steam Temperature – 0.5 bar gauge (111°C)

Length mm	Coil Type	EAT °C	High Speed			Medium Speed			Low Speed					
			Duty kW	Mean basic rating M <sup>3</sup> /s	Air volume M <sup>3</sup> /s	LAT °C	Duty kW	Mean basic rating M <sup>3</sup> /s	Air volume M <sup>3</sup> /s	LAT °C	Duty kW	Mean basic rating M <sup>3</sup> /s	Air volume M <sup>3</sup> /s	LAT °C
600	05(S)	15	<b>5.45</b>	0.057	0.08	71.8	<b>5.08</b>	0.053	0.073	73	<b>4.29</b>	0.045	0.061	73.6
		18	<b>5.26</b>			72.8	<b>4.91</b>			74.1	<b>4.15</b>			74.7
		21	<b>5.08</b>			73.9	<b>4.73</b>			75	<b>4</b>			75.6
900	09(S)	15	<b>11.56</b>	0.12	0.157	76.4	<b>9.61</b>			73.5	<b>8.57</b>	0.089	0.115	77.1
		18	<b>11.16</b>			77.2	<b>9.28</b>	0.1	0.137	74.4	<b>8.28</b>			78
		21	<b>10.77</b>			78.2	<b>8.95</b>			75.4	<b>7.98</b>			78.8
1200	16(S)	15	<b>18.8</b>	0.195	0.25	77.7	<b>16.77</b>			75.8	<b>13.88</b>	0.144	0.191	75.6
		18	<b>18.11</b>			78.4	<b>16.19</b>	0.174	0.23	76.7	<b>13.41</b>			76.5
		21	<b>17.47</b>			79.2	<b>15.6</b>			77.5	<b>12.92</b>			77.4

To obtain duties at steam pressures other than those in the above table, multiply the kW duty by the factors in the table right.

Factors for EAT °C	Steam Pressure (bar gauge)					
	0.5	1	2	4	6	
15	111	120	134	152	165	
18	1	1.1	1.27	1.48	1.63	
21	0.96	1.07	1.23	1.44	1.6	
	0.92	1.04	1.2	1.41	1.56	

## External Ducting Resistance Factors

The data given in both the Hot Water and steam emission table is based on an external static resistance of nil.

Multiply the following factors by the Duties, Basic Ratings (BR) and Air Volumes given in the tables to obtain the duties of units fitted with external ducting when operating at the following resistances. (Max. 24Pa)

Resistance Pa	High Speed		Medium Speed		Low Speed	
	Air volume factor	Duty and BR factor	Air volume factor	Duty and BR factor	Air volume factor	Duty and BR factor
0	1	1	1	1	1	1
12	0.87	0.92	0.84	0.9	0.82	0.89
18	0.81	0.88	0.78	0.86	0.75	0.85
24	0.74	0.84	0.71	0.82	0.69	0.81



## Engineering Data – Copperad Fan Conectors

Minimum flow rate		Coil type						
	03	04	05	06	08	09	12	15
Kg/s	0.009	0.018	0.026	0.018	0.018	0.03	0.03	0.042

Hydraulic resistance in kPa													
MWT			Drop			Coil Type							
°C	°C	°C	°C	°C	°C	03	04	05	06	08	09	12	15
75	15	10	6.6	3.8	2.8	11.8	14.2	11.9	14.1	14.1	7.0		

Electrical characteristics of fan connector motors				
Unit length (mm)	Speed	Power drawn (W)	Full Load Current (A)	SFP* (W/l/s)
600	Low	14	0.11	0.26
	Medium	18	0.14	0.28
	High	27	0.21	0.36
900	Low	21	0.16	0.18
	Medium	29	0.19	0.21
	High	40	0.25	0.25
1200	Low	25	0.15	0.14
	Medium	35	0.21	0.16
	High	46	0.28	0.19

The data given is for motors operating on the standard 240V 50HZ single phase supply. \*SFP = Specific Fan Power

Length mm	Type	Water content kg	Styles – weights in kg															
			11, 13, 21, 23, 27, 40, 41, 42, 70, 71, 72, 73, 74, 75, 76, 77, 80, 81, 82, 83, 84, 85, SS, CT	24, 25, 43, DS	30, 31, 33, 50, 51	32, 52	44	45	60	61	62	76	77	79	83			
600	03	0.40	22	25	44	46	12											
	04	0.61	23	26	45	47	13											
900	05	0.55	30	34	60	64	16											
	06	0.86	31	35	61	65	17											
	08	0.86	32	36	62	66	18											
1200	09	1.15	37	41	76	81	19											
	12	1.15	38	42	77	82	20											
	15	1.73	39	44	79	83	21											

Net weights are listed, for shipping weights add 20%.

## Engineering Specification

### Heat Exchanger

- (a) The primary tubes shall be of solid drawn copper. Arrangements shall be made to permit free and unrestricted expansion of each tube.
- (b) The headers shall be of formed steel construction, the primary tubes being securely fixed thereto by brazing.
- (c) The secondary surface shall comprise continuous “plate-type” non-ferrous fins having accurately formed collars held in close metallic contact with the primary tubes.

### Casing

The casing shall be adequately stiffened to prevent distortion, and shall have curved top and bottom front edges on low level units, using castings. All casings shall be constructed from heavy gauge steel, degreased, pretreated and finished with a high grade low gloss polyester powder paint to RAL 9002, with grilles RAL 7000. Alternatively, units can be finished in any BS colour in eggshell, semi gloss or full gloss at extra cost. A separate plinth may also be specified.

### Insulation

Internal parts of the unit shall, where necessary, be insulated with suitable material to restrict the transmission of sound. All metallic parts in contact shall be securely fixed to prevent chatter.

### Grilles – Material & Construction

Pencil proof extruded aluminium grilles shall be provided as standard equipment for the air inlet and outlet apertures except for styles having spigotted inlets/outlets when they shall be supplied loose if specified. Grilles shall be of the extruded aluminium type of construction. Loose grilles for use with spigotted units shall be contained within a frame. All grilles will be finished dark grey to RAL 7000 with a light grey frame to RAL 9002.

### Motors

The motors shall be electronically commutated totally enclosed type. The bearings shall be of the sleeve type for quiet running, sealed-in and factory lubricated. No re-oiling shall be necessary during the life of the motor.

All motors shall have the choice of operating speeds and overload protection is not required. Motors are tested to relevant sections of BS5000 part II. An overheat cut-out is inbuilt as standard.

### Fans

The fans shall be double inlet width centrifugal type with curved forward blades. They shall be statically and dynamically balanced, and the fans shall be directly mounted and secured onto the motor shaft (single on 600mm and 900mm wide and double on 1200mm wide units).

### Access Panel

The access panel shall be removable within the height of the casing, and be fixed by two screws through the grille. Key locks may also be specified, standard on styles 21, SS and DS.

### Motor/Fan Tray Assembly

The motor shall be resiliently mounted to the fan tray or scrolls. The motor/fan tray assembly itself shall be also resiliently mounted to the casing structure. The tray shall be easily withdrawable for inspection and cleaning after disconnection from the mains supply and ancillaries with the plugs and sockets provided.

## Control Gear

A three position manual control switch shall be provided where specified, enabling low, medium and boost speed to be selected. A separate on/off switch can also be provided.

## Low Water Temperature Cut-out

Suffix LTC (fitted as standard) to prevent fans running if water temperature falls below preset value. Not fitted to coils on steam duty.

## Automatic Control

Where specified, each unit shall have automatic control gear comprising one or more of the following:

- Thermostatic On/Off control – Suffix T1.
- Thermostatic speed control Medium/Low – Suffix T2.
- Thermostatic speed control High/Medium – Suffix T3.
- Adjustable water temperature cut-out – Suffix ALTC.

## Filters

Filters, which shall be provided as standard, shall be of washable flame retardant bonded polyester material.

## Connections

They shall be either left or right hand as specified (right-hand unless specified). Connections shall be screwed female 3/4" BSP. Manual air vents shall be provided as standard, except on heat exchangers for use with steam. Automatic or extended air vent options are available. Local isolating valves are recommended.

## Pressure Test

The heat exchanger shall be tested to 21.25 BAR G (350 PSI). Air under water.

## Maximum Working Pressure

All heat exchangers shall be suitable for maximum permitted working pressure of 8.5 bar gauge (125 PSI).

## Performance

The fan convector shall be tested and rated in accordance with BS. 4856 Part 1 – 1972. (1983).

## Packaging

Each fan convector shall be packed, together with full installation instructions, in a purpose made carton on which shall be clearly marked the model number and such reference as may be called for in the schedule.

## Installation

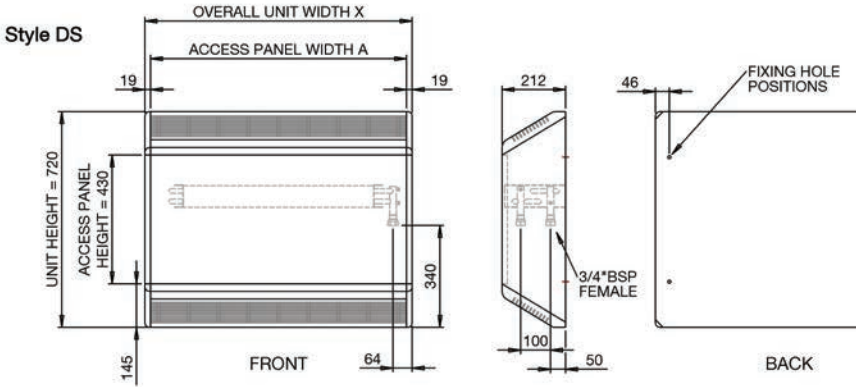
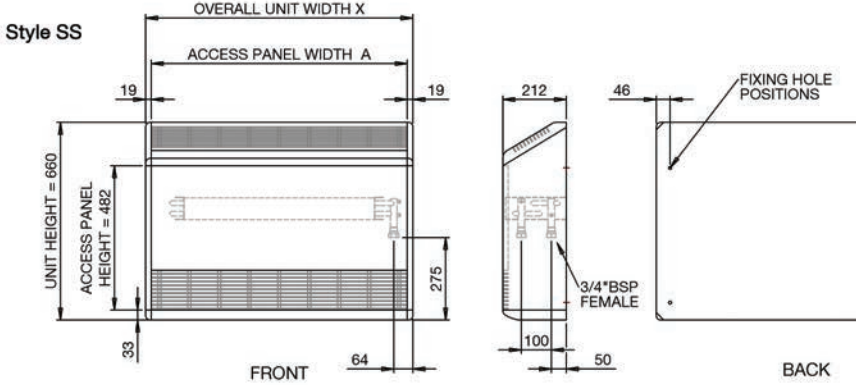
All units are supplied with an installation, operating and maintenance manual

## Quality Assurance

The manufacturer of Copperad products has been inspected and holds manufacturing systems controlled to ISO9001 standards, and all products conform to the latest CE requirements.

# Dimensions

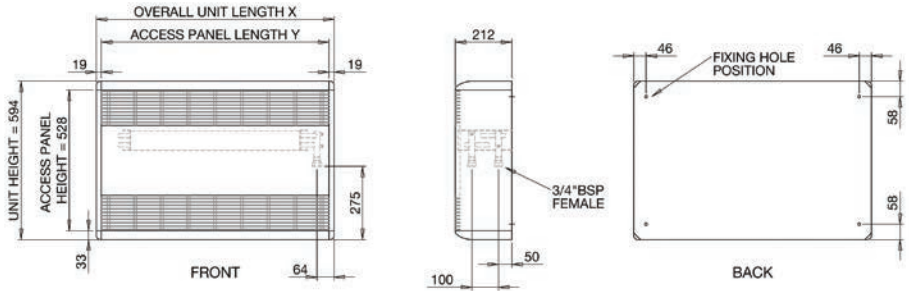
## Sloping Top Units Style SS & DS



Dimensions	Unit length mm		
	600	900	1200
X	592	892	1192
A	554	854	1154

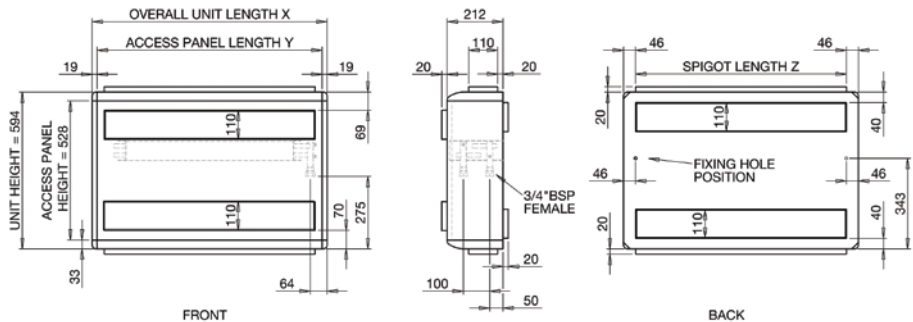
# Dimensions

Low Level Units Style Numbers 11 to 27, 40 to 43  
and High Level Units Style Numbers 70 to 85

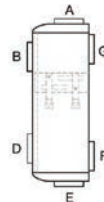


These basis dimensions apply to all low level units irrespective of whether they are grilled or spigoted and vertical or horizontally mounted. Although style 21 grille positions are shown, any other combination of grille positions selected from the style selection chart does not affect these dimensions. Heat exchanger connections - screwed 2/3" BSP female.

## Spigot Dimensions and Locations



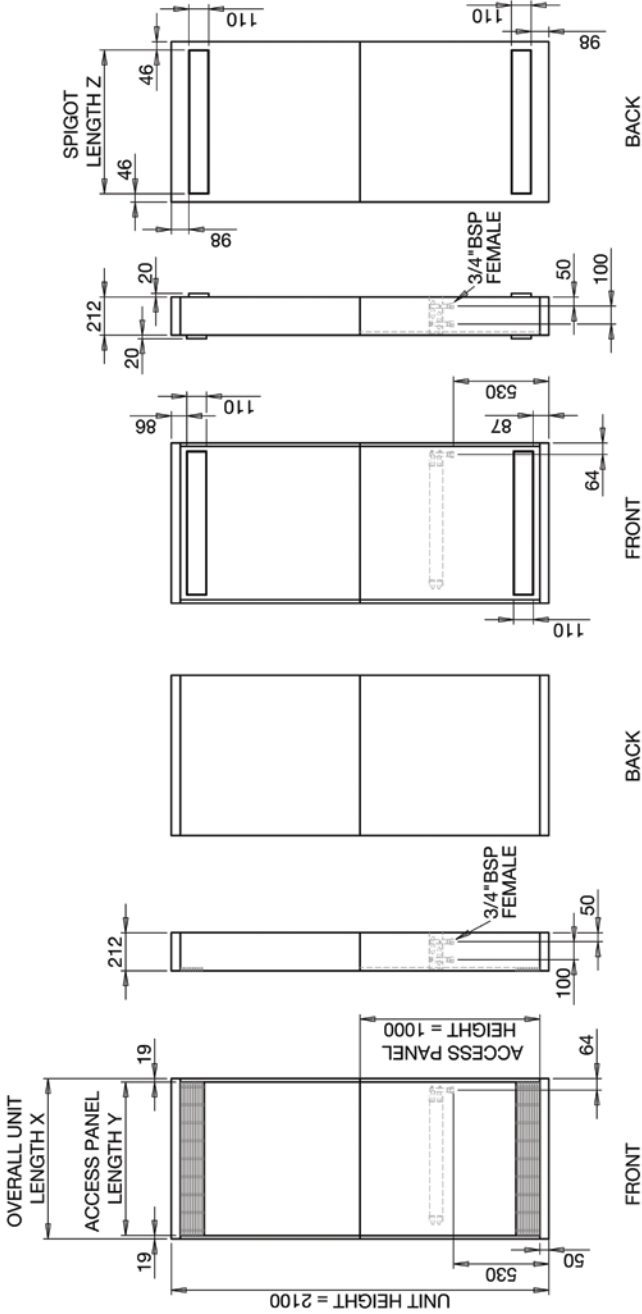
Dimensions	Unit Size mm		
	600	900	1200
X	592	892	1192
Y	554	854	1154
Z	500	800	1100



Spigot Location	Style Number										
	13, 15, 23, 25, 73, 76	27, 82	40	41, 81	42	43	72, 77	80	83	84	85
Spigot Location	F	FG	A	BD	BF	BDF	E	AE	BE	EG	AD

# Dimensions

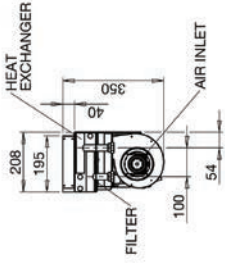
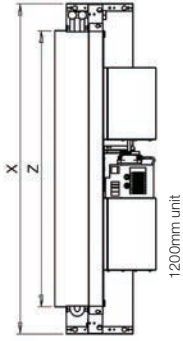
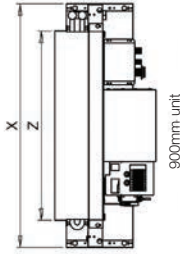
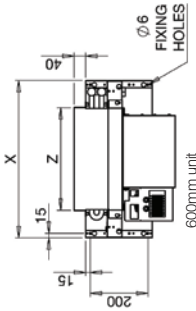
Extended Height Units – Style Nos. 30 to 33 and 50 to 52



Dimensions	600	900	1200
X	592	892	1192
Y	554	854	1154
Z	500	800	1100

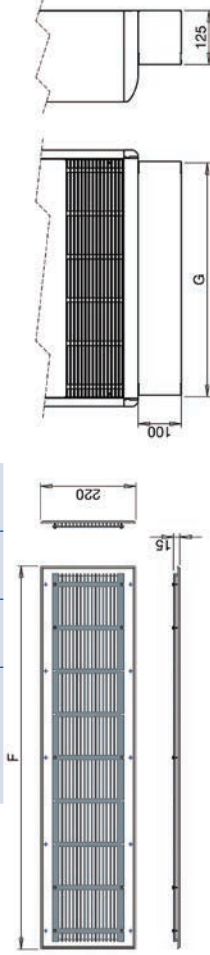
# Dimensions

## Hideaway Units – Style Number 90



Dimensions	Unit Size (mm)	
	600	1200
X	545	820
Z	355	655
Loose Grill		
F	586	886
Plinth		
G	540	840
F		1140

## Loose Grilles

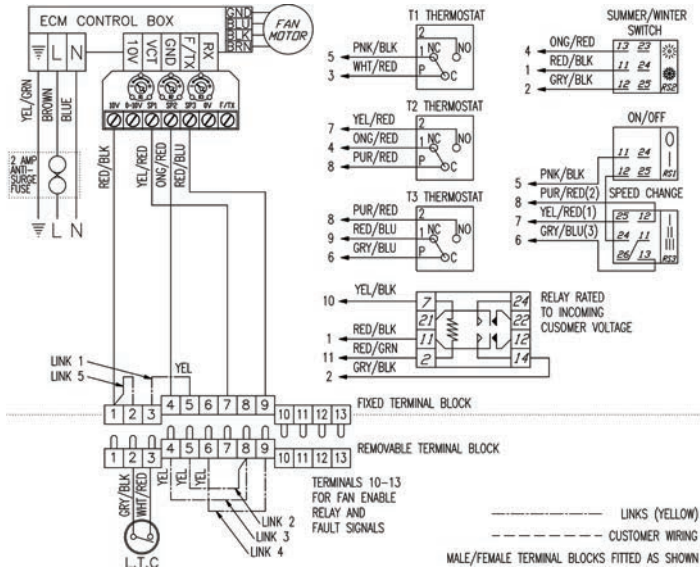


Use Number 8 countersunk screws.  
Typical loose grille arrangement.

**Note 1:** Dimensions are to the outside of the spigot. The optional loose grille can be used with these units by fitting a change section duct or butting the spigot up to the underside of a builders work sealing panel, thus forming a plenum chamber between the spigot and the grille. Builders work access panel size to be overall length less 50mm by 300mm high. Heat exchanger connections – screwed 3/4" BSP Female.

**Note 2:** Aperture for spigot to be spigot size + 10mm.

## Electrical diagram



The basic wiring shown above is for a unit without optional control equipment fitted – as such it is set to run continuously at the medium speed setting. Note that the wires in a single solid colour are subject to 230V ac while the twin colour cables and yellow links are the 10V dc control wires.

The optional switch and thermostats which can be inbuilt are shown together with the arrows and numbers indicating the connecting wire and terminal block positions that they would occupy if fitted. If any of these options are inbuilt, then some of the dotted links shown numbered 1 to 5 are removed as follows.

- If on/off thermostat (T1) is required, then link 1 would not be fitted.
- If speed change thermostat low to medium (T2) is required, then link 3 would not be fitted.
- If speed change thermostat high to medium (T3) is required, then link 4 would not be fitted and link 2 must be fitted between 5 and 6.
- If speed control switch is required, then link 2 would not be fitted.
- If summer/winter switch is required, then link 5 would not be fitted.
- If fan enable relay is required, then terminals 10 and 11 would be fitted.

### Notes

1. The LTC is factory fitted as shown in diagram no 1. If LTC is not required, link terminals 2 and 3.
2. T1, T2 and T3 cannot all be inbuilt and wired in together as indicated in the diagram. They must be fitted in combinations of T1 and T2, T1 and T3 or T2 and T3. If however, a control system involving all three is required, then it is recommended that the T1 thermostat is remotely mounted.
3. If summer/winter switch and fan enable relay are required, terminal 12 would be fitted. The fan enable relay will be linked between terminals 1 and 12 and the summer/winter switch linked between terminals 12 and 2.
4. 0-10v direct BMS control is possible using the incoming 0-10v on terminal 10 and incoming 0v on terminal 11. Link 5 should then be removed, terminal 10 wired to 0-10v on the board and terminal 11 wired to 0v on the board.
5. If a unit wired for single speed running is required to operate at low speed, then alter link 2 to connect between positions 5 and 7 on the terminal block. Similarly, for high speed re-connect link 2 between positions 5 and 9.







## Ceiling Tile Fan Convectors

The BOSS™ Copperad ceiling tile range gives the freedom to place a heat source anywhere within a suspended plasterboard, T-bar or solid ceiling. They are ideal where glass walls, equipment, fixtures or interior design features limit wall space.

The ceiling tiles' combination of air throw and rapid energy transfer brings immediate heat to the area below which offers a great solution for schools, libraries, hotels, leisure centres, shops and offices.

Available in two model sizes, 595 x 595mm (Solo) and 1,195 x 595mm (Duo) and with EC motors as standard, both Solo and Duo units can be laid in configuration within a ceiling grid.

The BOSS™ Copperad units come as a standard LPHW option.

### Installation

For plasterboard ceilings, the grille bezel always sits below the plasterboard, whereas with T-bar ceilings the bezel can be fixed above or below the T-bars according to preference. The main body of the ceiling tile is supported by rods from the solid ceiling above. Due to the unit's slim-line 210mm profile, it fits small ceiling voids (fixings not included).



## Ease of Access

Access to the unit is via a hinged drop-down grille, this allows immediate access to every piece of equipment and every electrical and pipework connection, including the washable filter. This makes the unit easily maintained and serviced.

## Connections

Heat exchanger connections are all 15mm plain copper ends suitable for standard compression fittings. The low temperature hot water flow should be connected to the heat exchanger inner pipe and return connected to the outer pipe.

## Heat Exchanger

Heat exchangers for use on low temperature hot water are made from a fin block construction, comprising of aluminum fins mechanically bonded to copper primary tubes brazed, in turn, to 15mm flow and return pipes. A 1/8" BSP air bleed to be provided as standard, with drainage to be provided by pipe connection breakage.

They are equipped with a 2-row heat exchanger so as to provide suitable leaving air temperatures and outputs against conventional hot water supplies

## Filters

Filters are made from a washable type Bondina P15/150 non woven polyamide or equivalent, bonded with synthetic resin, and rated at EU2 arrestance complying with BSEN 779. Filters are removable for cleaning.

## Motors

The new EC motor comes as standard and gives three operating speeds. The motors shall be electronically commutated external rotor type with an in-built electronics enclosure. The motor incorporates maintenance free ball bearings. Motors are IP44 and insulation is class B rated. Rotational speed is controlled via a 0-10v signal to the terminal block of the motor.

## Voltage

Are suitable for operation with a standard single phase 230V/50Hz supply.

## Electrical Connection

The customer's electrical supply cable (230V) is connected to the L.E.N terminals provided at the connection unit. Also all external control wiring is to be connected to the appropriate terminal provided in the connection unit (see wiring diagram on page 1.24). Two types of wire are used; solid coloured indicates 230Vac, twin coloured is 10Vdc control wiring.

## Fitted Controls

Units are supplied as standard with a low water temperature cut out (integral).

## Full Range of Controls

The BOSS™ Copperad ceiling tile fan convector has BMS control via 0-10 volt signal as standard.

There are a full range of controls available including on/off and speed change thermostats and switches for mounting at low level. For the full range of options see page 1.28.

## Grilles

The grilles are hinged for straightforward installation and servicing. High free area, egg-crate style core, all from aluminum construction with a white powder coat finish. CT units have an all white RAL 9010 finish.

## Fuse Protection

A switched fuse box can be supplied as an optional extra (SF).

## Model Reference and Accessories

The complete model reference is made up of a number of sections. This is an example of how a typical reference should be presented.

Our standard CT units are coded (please see codes below) optional accessories are listed in the table to the right.

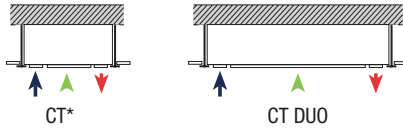
50072526 CT2014 ECO SOLO

50072537 CT2014 ECO DUO

Optional accessories	
Thermostatic controls	WMT1 On/off thermostat (remote)
	WMT2 Speed change thermostat (remote)
	ALTC Adjustable low water temperature cutout
	2 STAGE Remote combined on/off and speed change thermostat
Switches	RS1R Remote on/off rocker switch (excluding switch box)
	RS2R Remote summer/winter rocker switch (excluding switch box)
	RS3R Remote three speed selector rocker switch (excluding switch box)
	RS123R Remote combined on/off, summer/winter and 3-speed selector rocker switch
Switch boxes	Box1F Metal flush mounting box for single rocker switch
	Box1S Plastic surface mounted box for single rocker switch
	Box2F Metal flush mounting box for combined rocker switches
	Box2S Plastic surface mounted box for combined rocker switches
Electrical connections	SF Fused spur box for direct mains connection
	CCB Customer connection box for external controls (Fitted as standard)
BMS	FER Relay for remote enable/disable signal
	BMS Direct control of fan speed via 0-10V BMS signal (Fitted as standard)
Valves	V050 Isolating valves for flow and return pipes

## Style Selection

CT2014 eco



# Performance Data

Fan setting	High Speed				Medium Speed				Low Speed			
	Air Flow		Pressure		Air Flow		Pressure		Air Flow		Pressure	
	Rate l/s	Output kW	Exit Air Temp C	Drop kPa	Water Flow Rate l/s	Water Flow Rate l/s	Exit Air Temp C	Drop kPa	Water Flow Rate l/s	Water Flow Rate l/s	Exit Air Temp C	Drop kPa
Solo	95	3.9	49	6.5	0.10	0.09	50	5.8	70	3.2	53	4.7
Duo	190	9.0	54	48.7	0.22	0.21	56	43.0	140	7.3	58	34.0

Based on 80/70°C water and 15°C entering air

Fan setting	NR LEVELS		
	High	Medium	Low
	Solo	42	40
Duo	44	42	38

Performance	CORRECTION FACTORS														
	80			70			60			50					
	Mean Water Temperature (°C)	Water Temperature Drop (°C)	Entering Air Temperature (°C)	5	10	20	5	10	20	5	10	20	5	10	20
	10	1.22	1.19	1.11	1.03	1.00	0.92	0.86	0.81	0.69	0.67	0.61	-	-	-
	15	1.14	1.11	1.03	0.94	0.92	0.83	0.78	0.72	0.61	0.58	0.53	-	-	-
	20	1.06	1.03	0.94	0.86	0.83	0.75	0.64	0.64	0.50	0.50	0.44	-	-	-
	25	0.97	0.92	0.86	0.78	0.75	0.64	0.58	0.56	0.31	0.42	0.33	-	-	-

\* Factors are approximate. The BOSS Technical Team can provide more accurate data if required.

FAN ASSEMBLY ELECTRICAL DATA									
230 V / 50 HZ SUPPLY									
Fan setting	High Speed			Medium Speed			Low Speed		
	Air Flow Rate l/s	“EC Power” draw (W)	“EC SPF Air Flow” Rate l/s (W/l/s)	Air Flow Rate l/s	“EC Power” draw (W)	“EC SPF Air Flow” Rate l/s (W/l/s)	Air Flow Rate l/s	“EC Power” draw (W)	“EC SPF Air Flow” Rate l/s (W/l/s)
Solo	95	18	0.19	85	14	0.16	70	12	0.17
Duo	190	36	0.19	170	28	0.16	140	24	0.17

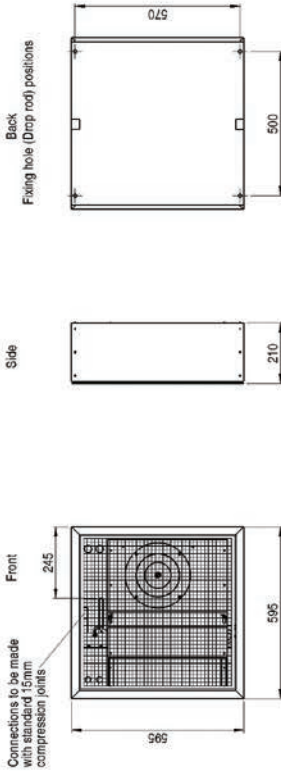
### Notes:

1. Dimensions and weights are given including unit cases and grilles
2. Coil supplied with 15mm connections on flow and return
3. Motors are high efficiency EC type
4. Filters are rated at EU-2 arrestance
5. Grilles are hinged, egg-crate style core, all aluminium construction with powder coated (all white RAL9010 as standard) or satin silver finish

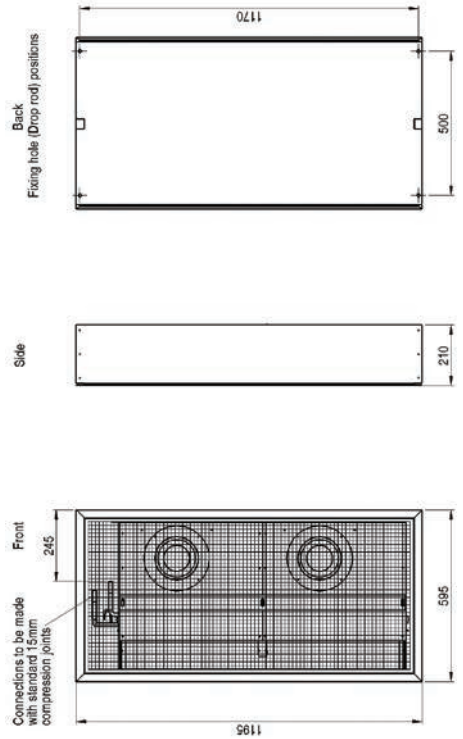
# Dimensions

## CT2014 ECO

### Solo

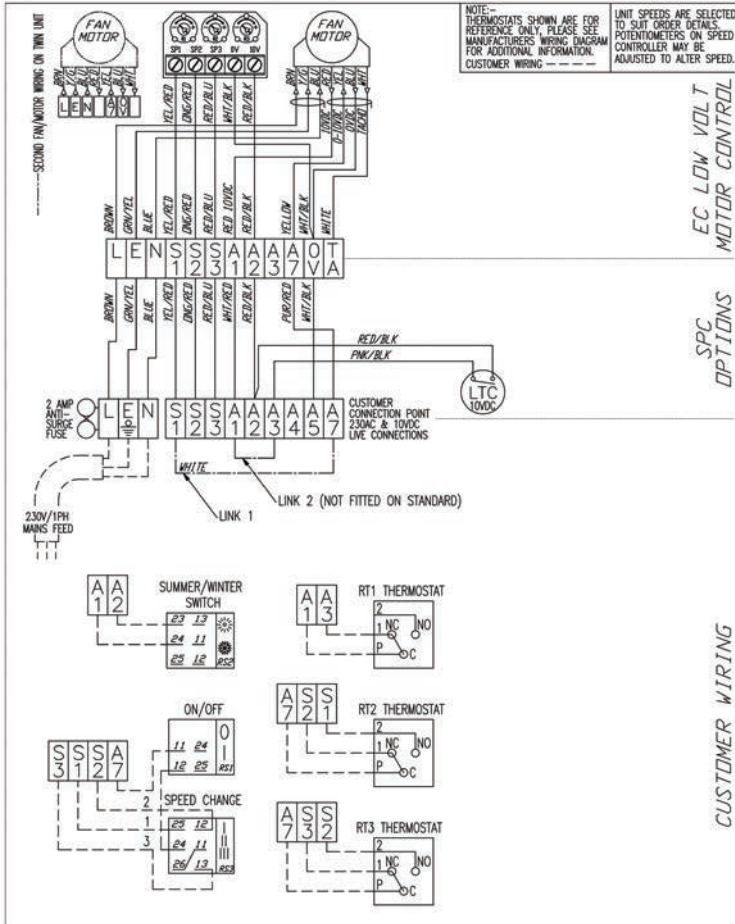


### Duo



Model	SOLO	DUO
Length (mm)	595	1195
Width (mm)	595	1170
Depth (mm)	210	210
Maximum Weight (kg)	18	35

## Wiring Diagram



### Notes:

- Standard CT supplied wired for LTC+RT1 so link 2 is removed
- Drawing pictured is suitable for the following options:
  - LTC (add link 2)
  - LTC+RT1 (standard)
  - LTC+RT1+RT2 (remove link 1)
  - LTC+RT1+RT3 (remove link 1)
  - LTC+RT2 (remove link 1 add link 2)
  - LTC+RT3 (remove link 1 add link 2)
  - LTC+SUMMER/WINTER (add link 2)
  - LTC+RT1+SUMMER/WINTER
  - LTC+SUMMER/WINTER+ON/OFF CS (remove link 1 add link 2)

- LTC+RT1+SUMMER/WINTER+ON/OFF CS (remove link 1)
  - LTC+ON/OFF CS (remove link 1 add link 2)
  - LTC+RT1+ON/OFF CS (remove link 2)
- BMS direct control is also available via a 0-10VDC control signal on A5 (0V) and A7 (0-10VDC) from a BMS, all links must be removed.
  - Any other options require a bespoke wiring diagram.
  - Solid wire + GRN/YEL colours are 230VAC. Twin colours and links are 10VDC.