

# ELECTRIC HEATER BATTERIES

RECTANGULAR · CIRCULAR · STAB-IN



# Introduction

Fastlane Ventilation design expertise and manufacturing skills provide an impressive range of standard sized electric heater batteries for a wide range of applications from air ducts to air handling units for re-heating and dehumidification.

The electric heater batteries are complimented by a range of standard controllers, all designed to suit your heater battery requirements.

At Fastlane, our expertise is built around the accumulated knowledge of HVAC engineers, and supported by the extensive test facilities of our larger parent, the ELTA Group, which means Fastlane offers quality products, with reliable and accurate data, which can be installed with confidence to meet your electric heater battery requirements.

Customers can select heater batteries quickly from our extensive range of ex-stock components, enabling a comprehensive offering of duct work sizes, kilowatt loadings and the number of steps which culminates in shorter lead times.

## Product Range

Fastlane's range of electric heater batteries comprise three types:

### FRHB range

A complete range of square or rectangular duct mounted units, flanged with 'Stab-in' heater battery sections to enable easy removal of the elements without having to take apart the duct work.

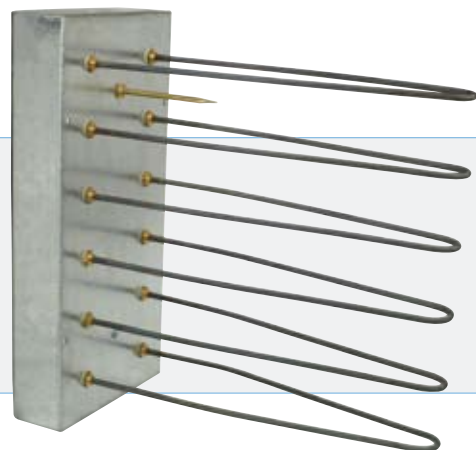


### FCHB range

A full range of circular heater batteries all designed to match specified spiral duct work requirements.

### FSHB range

A wide range of 'Stab-in' heater battery sections for installation in existing duct work, comprising a terminal box with the element bank sized to suit the precise duct work dimensions.



## Features

### Flexibility

Heaters can be supplied in either three phase or single phase supply with output and stages to suit.

### Safety

Overheat protection is provided on each heater by means of a manual reset high temperature cut-out. Airflow switches are available for installation into the duct work, however, a run on timer must be incorporated into the control system to allow the fan to run on after the heater has been switched off so as to dissipate any residual heat.

### Heater Selection

Contact Fastlane directly with your specific requirements, or alternatively, use our step by step quick selection guide in this brochure.

### Mounting arrangement

All electric heater battery models can be mounted in either a horizontal or vertical position, however, it is important to state the mounting arrangement when ordering so the thermal cut out can be selected to suit the specific application.

### Ease of maintenance

Rectangular FRHB units allow the terminal box and element bank to be withdrawn from the casing, which means the duct work does not have to be dismantled.



## Accessories

### Duct Thermostat

The duct thermostat senses the air temperature in or out of the unit. It is used on the air intake as a frost stat, or as a supply air temperature sensor on the discharge side of the unit.

Also available in a range of 1 to 4 step capillary thermostats, with an operating temperature range of -20 to +40°C, the liquid filled sensing element enables a rapid response to temperature changes. The enclosure rating is IP43.

### Controllers

A comprehensive range of controllers are available to compliment our range of heaters, with Thyristor or Step Controllers available and optional extras all designed to suit your requirements.



### Airflow Switch

Airflow switches are available for installation within the duct work. This consists of a low torque micro switch with a maximum operating torque of 10gcm, with silver plated contacts and is supplied in a normally open condition. The case material is made from phenolic resin. Actuation is achieved via a 85 x 0.66mm diameter wire which is mechanically bonded to a small light gauge aluminium flag. The switch has both UL and CSA approvals.



# Electric Heater Battery Selector

## Stage 1: Duct Selection Table Page 5

Please refer to the Duct Selection Table to establish that the volume flow rate you have selected falls between the minimum velocity of 2 m / s and the maximum velocity of 6 m / s for the duct size you have selected, whether rectangular or circular. If the volume flow rate does not fall between the minimum and maximum, please revise the duct size to match.

## Stage 2: Kilowatt Graph Page 6

Please refer to the Kilowatt graph. Having determined the volume flow rate in m<sup>3</sup>/s on the vertical axis, read up until it intersects the temperature rise required on the horizontal axis. Follow the diagonal line to determine the kW rating.

## Stage 3: kW Step availability Table Page 7

Please refer to the kW Step availability Table. Read off the number of steps required from either the single phase or three phase tables against the kW rating.

## Stage 4: Heater Battery Example

Duct size 400mm high x 500mm wide  
Air Volume 0.6 m<sup>3</sup> / s  
Temperature rise required 20°C

1. Duct Selection Chart 400 x 500 Air volume range between 0.4 and 1.2 m<sup>3</sup> / s therefore duct size is suitable

$$\text{By calculation Velocity m / s} = \frac{\text{Air Volume m}^3 / \text{s}}{\text{Duct area m}^2} = \frac{0.6}{0.4 \times 0.5} = 0.2 \text{ m}^2$$

Duct Velocity = 3.0 m / s

2. Kilowatt graph for the given air volume 0.6 m<sup>3</sup> / s with 20°C Temperature rise shows 15kW output

$$\text{By calculation Kilowatts} = \text{Air volume m}^3 / \text{s} \times \text{temperature rise} \times \text{constant} \\ 0.6 \text{ m}^3 / \text{s} \times 20^\circ\text{C} \times 1.25 = 15\text{kW}$$

3. Now select from Kilowatts step availability table the number of steps required to suit application i.e. 15kW / 2step / (380 to 415)V 3Ph / 50Hz  
Approximate current loads per phase = kW x 1.44 = 3.6 amp.



# Duct Selection Table

## Rectangular Electric Heaters

Minimum Velocity = 2m / s

Maximum Velocity = 6m / s

AIR VELOCITY	DUCT HEIGHT (mm)	MIN & MAX VOLUMES m <sup>3</sup> / s								
		DUCT WIDTHS (mm)								
		100	200	300	400	500	600	700	800	900
MIN	100	0.02	0.04	0.06	0.08	0.10	12	0.14	0.16	0.18
MAX		0.60	0.12	0.18	0.24	0.30	0.36	0.42	0.48	0.54
MIN	200	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36
MAX		0.12	0.24	0.36	0.48	0.60	0.72	0.84	0.96	1.08
MIN	300	0.06	0.12	0.18	0.24	0.30	0.36	0.42	0.48	0.54
MAX		0.18	0.36	0.54	0.72	0.90	1.08	1.26	1.44	1.62
MIN	400	0.08	0.16	0.24	0.32	0.40	0.48	0.56	0.64	0.72
MAX		0.24	0.48	0.72	0.96	1.20	1.44	1.68	1.92	2.16
MIN	500	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
MAX		0.30	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70
MIN	600	0.12	0.24	0.36	0.48	0.60	0.72	0.84	0.96	1.08
MAX		0.36	0.72	1.08	1.44	1.80	2.16	2.52	2.88	3.24
MIN	700	0.14	0.28	0.42	0.56	0.70	0.84	0.98	1.12	1.26
MAX		0.42	0.84	1.26	1.68	2.10	2.52	2.94	3.36	3.78
MIN	800	0.16	0.32	0.48	0.64	0.80	0.96	1.12	1.28	1.44
MAX		0.48	0.96	1.44	1.92	2.40	2.88	3.36	3.84	4.32
MIN	900	0.18	0.36	0.54	0.72	0.90	1.08	1.26	1.44	1.62
MAX		0.54	1.08	1.62	2.16	2.70	3.24	3.78	4.32	4.86

N.B. Fastlane is able to provide Electric duct heaters that are outside the selection table above.

Please advise specific requirements.

Duct Velocity must be between 2m / s and 6m / s.

To calculate Velocity:  $m / s = \frac{\text{Air Volume } m^3 / s}{\text{Duct Area } (m^2)}$

## Circular Electric Heaters

PRODUCT CODE	DUCT DIAMETER	kW	STAGE	PHASE	AIRFLOW m <sup>3</sup> / s	
					MINIMUM	MAXIMUM
FCHB-100	100	0.75	1	1	0.016	0.047
FCHB-125	125	1.0	1	1	0.025	0.074
FCHB-150	150	1.5	1	1	0.035	0.106
FCHB-160	160	1.5	1	1	0.040	0.120
FCHB-200	200	2.0	1	1	0.063	0.189
FCHB-250	250	3.0	1	1	0.098	0.299
FCHB-315	315	4.5	3/1	1/3	0.156	0.468
FCHB-355	355	7.5	3/1	1/3	0.198	0.593
FCHB-400	400	9.0	3/1	1/3	0.251	0.784
FCHB-500/18	500	18.0	2	3	0.490	1.178
FCHB-500/27	500	27	3	3	0.490	1.178

To calculate kW rating

$kW = \text{air volume } m^3 / s \times \Delta tC \times 1.25$

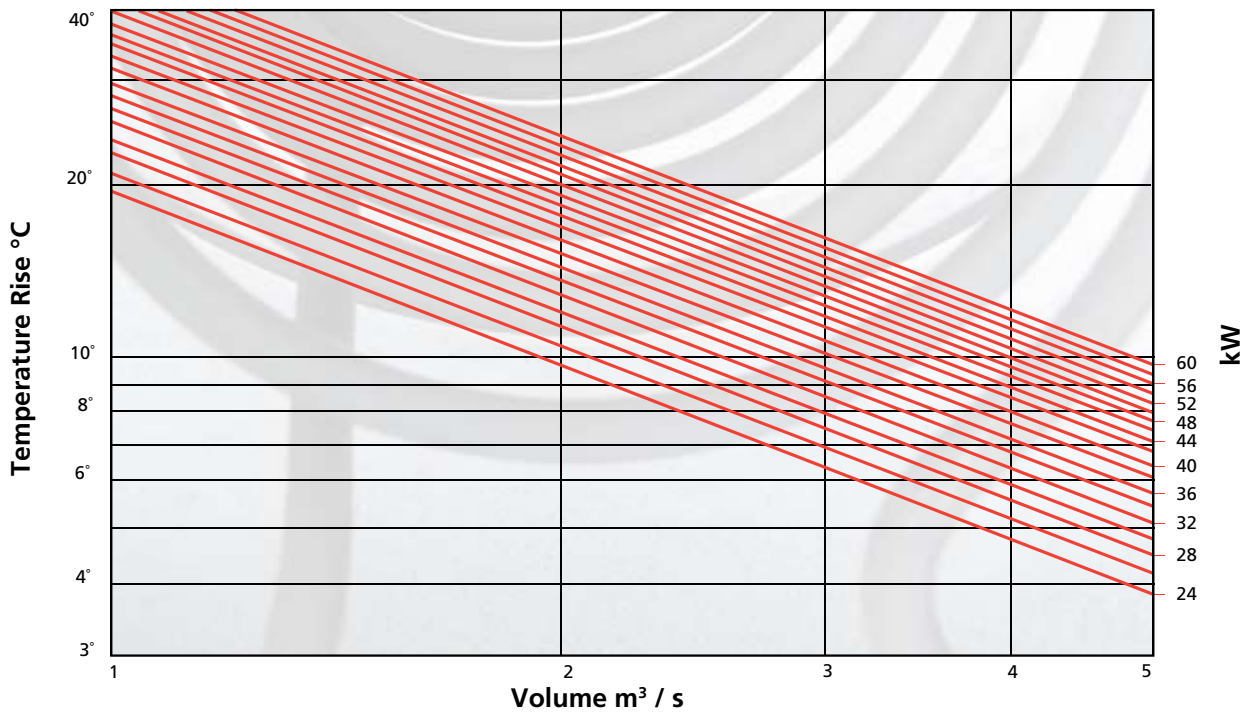
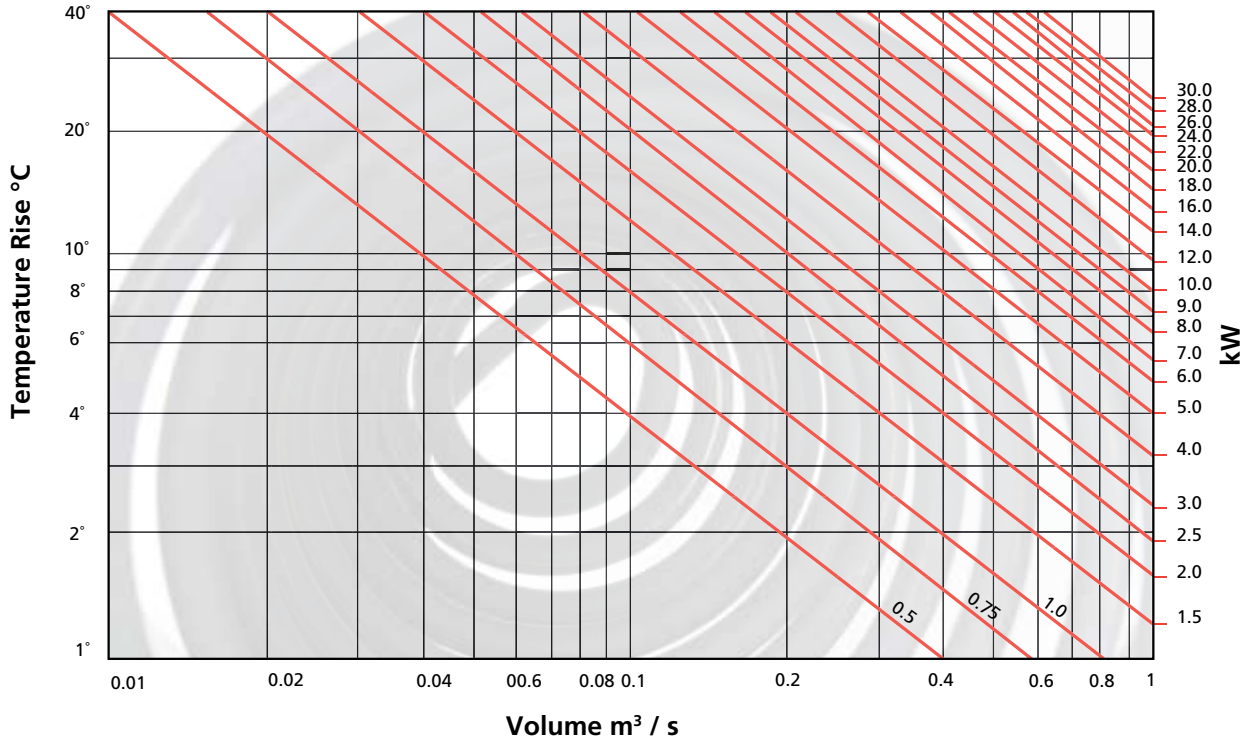
Approximate current loading

Single Phase (230/50Hz) Amps =  $kW \times 4.35$

Three Phase (400V/50 Hz) Amps per phase =  $kW \times 1.44$



# Kilowatt Graph



N.B. To calculate kW Rating

$$kW = \text{Air Volume } m^3 / s \times \Delta t^{\circ}C \times 1.25$$



# kW Step Availability Table

## Single Phase

kW	STEPS					
	1	2	3	4	5	6
0.75	✓	-	-	-	-	-
1.0	✓	-	-	-	-	-
1.5	✓	✓	-	-	-	-
2.0	✓	✓	-	-	-	-
2.5	✓	✓ <sup>o</sup>	✓ <sup>o</sup>	-	-	-
3.0	✓	✓	✓	✓	-	-
3.5	✓	-	✓ <sup>o</sup>	-	-	-
4.0	✓	✓	✓ <sup>o</sup>	✓	-	-
4.5	✓	✓	✓	✓ <sup>o</sup>	-	✓
5.0	✓	✓	✓ <sup>o</sup>	✓	✓	✓ <sup>o</sup>
5.5	✓	✓	✓ <sup>o</sup>	✓ <sup>o</sup>	✓ <sup>o</sup>	✓ <sup>o</sup>
6.0	✓	✓	✓	✓	✓ <sup>o</sup>	✓
7.0	✓	✓	✓ <sup>o</sup>	✓	✓ <sup>o</sup>	✓ <sup>o</sup>
7.5	✓	✓	✓	✓ <sup>o</sup>	✓	✓
8.0	✓	✓	✓ <sup>o</sup>	✓	✓ <sup>o</sup>	✓ <sup>o</sup>
8.5	✓	✓	✓	✓ <sup>o</sup>	✓ <sup>o</sup>	✓ <sup>o</sup>
9.0	✓	✓	✓	✓	✓ <sup>o</sup>	✓
9.5	✓	✓	✓ <sup>o</sup>	✓ <sup>o</sup>	✓ <sup>o</sup>	✓ <sup>o</sup>
10.0	✓	✓	✓ <sup>o</sup>	✓	✓	✓ <sup>o</sup>
10.5	✓	✓	✓	✓ <sup>o</sup>	✓ <sup>o</sup>	✓
11.0	✓	✓	✓ <sup>o</sup>	✓	✓ <sup>o</sup>	✓ <sup>o</sup>
11.5	✓	✓	✓ <sup>o</sup>	✓ <sup>o</sup>	✓ <sup>o</sup>	✓ <sup>o</sup>
12.0	✓	✓	✓	✓	✓ <sup>o</sup>	✓

✓<sup>o</sup> = Only available in uneven steps

Approximate current loading

1. Single phase (230V/50Hz) Amps = kW x 4.35

2. Three Phase (400V/50Hz) Amps per phase = kW x 1.44

## Three Phase

kW	STEPS				
	1	2	3	4	5
2.25	✓	-	-	-	-
3.0	✓	-	-	-	-
3.75	✓	-	-	-	-
4.5	✓	✓	-	-	-
5.25	✓	✓ <sup>o</sup>	-	-	-
6.0	✓	✓	-	-	-
6.75	✓	✓	✓	-	-
7.5	✓	✓	✓ <sup>o</sup>	-	-
8.25	✓	✓ <sup>o</sup>	✓ <sup>o</sup>	-	-
9.0	✓	✓	✓	✓	-
9.75	✓	✓ <sup>o</sup>	✓ <sup>o</sup>	✓ <sup>o</sup>	-
10.5	✓	✓	✓ <sup>o</sup>	✓ <sup>o</sup>	-
11.25	✓	✓ <sup>o</sup>	✓ <sup>o</sup>	✓	-
12.0	✓	✓	✓ <sup>o</sup>	✓	✓ <sup>o</sup>
13.5	✓	✓	✓	✓ <sup>o</sup>	✓ <sup>o</sup>
15.0	✓	✓	✓ <sup>o</sup>	✓	✓
18.0	✓	✓	✓	✓	✓ <sup>o</sup>
19.5	✓	✓	✓ <sup>o</sup>	✓ <sup>o</sup>	✓ <sup>o</sup>
21.0	✓	✓	✓ <sup>o</sup>	✓	✓ <sup>o</sup>
22.5	✓	✓	✓	✓ <sup>o</sup>	✓
24.0	✓	✓	✓ <sup>o</sup>	✓	✓ <sup>o</sup>
27.0	✓	✓	✓	✓	✓ <sup>o</sup>
28.5	✓	✓	✓ <sup>o</sup>	✓ <sup>o</sup>	✓ <sup>o</sup>
30.0	✓	✓	✓ <sup>o</sup>	✓	✓
31.5	✓	✓	✓	✓ <sup>o</sup>	✓ <sup>o</sup>
33.0	✓	✓	✓ <sup>o</sup>	✓	✓ <sup>o</sup>
36.0	✓	✓	✓	✓	✓ <sup>o</sup>
37.5	✓	✓	✓ <sup>o</sup>	✓ <sup>o</sup>	✓
39.0	✓	✓	✓ <sup>o</sup>	✓	✓ <sup>o</sup>
40.5	✓	✓	✓	✓ <sup>o</sup>	✓ <sup>o</sup>
42.0	✓	✓	✓ <sup>o</sup>	✓	✓ <sup>o</sup>
43.5	✓	✓	✓ <sup>o</sup>	✓ <sup>o</sup>	✓ <sup>o</sup>
45.0	✓	✓	✓	✓	✓
48.0	✓	✓	✓ <sup>o</sup>	✓	✓ <sup>o</sup>
49.5	✓	✓	✓	✓ <sup>o</sup>	✓ <sup>o</sup>
51.0	✓	✓	✓ <sup>o</sup>	✓	✓ <sup>o</sup>
52.5	✓	✓	✓ <sup>o</sup>	✓	✓
54.0	✓	✓	✓	✓	✓ <sup>o</sup>
55.5	✓	✓	✓ <sup>o</sup>	✓ <sup>o</sup>	✓ <sup>o</sup>
57.0	✓	✓	✓ <sup>o</sup>	✓	✓ <sup>o</sup>
60.0	✓	✓	✓ <sup>o</sup>	✓	✓

Other loadings available upon request



# Specification



Fastlane provide a range of electric heater battery's and controllers to suit most air conditioning and ventilation applications. Sheathed elements provide a clean and safe method of air heating. These heaters are intended for use in application where the air leaving temperature is below 40°C (70% RH db).

The heaters are available in 3 model types.

## Circular Duct Heaters

Comprises of a circular duct section manufactured from 0.9mm or 1.2mm galvanised sheet steel to suit ISO standard spiral ducting from 100mm to 500mm diameter with a factory fitted galvanised sheet steel terminal box. Element banks have been sized to give a range of steps and phases to suit the heating load requirements. The heater can be connected to the ducting system utilising fast clamps.



## Square and Rectangular Duct Heaters

Comprises of a square or rectangular duct section manufactured from 0.9mm or 1.2mm galvanised sheet steel with 25mm Ductmate flanges fitted where width or height is less than 600mm or a total perimeter of 1800mm and 35mm Ductmate flanges where greater than 600mm, or 1800mm perimeter. Flanges are fitted to both ends of the duct section. The duct sections are factory fitted with galvanised sheet steel terminal box and element bank sized to suit duct section, kilowattage, steps and phase for the heating load requirements. For servicing and inspection purposes the complete terminal box with element bank can be easily removed from the housing without dismantling the duct work.



## Stab-in Duct Heater

Comprises a galvanised sheet steel terminal box and a bank of elements sized to suit duct the required section with Kilowatts, steps and phase to suit the heating load requirements.



## Elements

Elements are constructed from Nichrome 5 spiral resistance wire surrounded by magnesium oxide powder and sheathed in stainless steel. The elements are formed and arranged to be evenly spread over the open area of the duct and secured into the terminal box. The elements are either linked with a copper busbar or fitted with a terminal as required to achieve step and phase control requirements.

Heaters are designed to have a black heat surface temperature of 400°C at an air velocity of 2.5m / s.



## High Temperature Cut-Out

A high temperature cut-out is provided to protect the system and element bank against temperatures in excess of the design conditions and wired in series to ensure that the heater is shut down until the fault is rectified.

## Manual reset

This is manually reset when the fault has been rectified.

## Auto reset

This type of reset is designed to automatically reset when the heater has cooled to a predetermined level, it is therefore essential that when the cut-out has operated the heater remains electrically isolated and a visual and/or audible alarm is provided.

Any tripping out of the heater must be investigated and the cause rectified before the heat is reset.

The standard electric heaters are suitable for horizontal mounting as standard. Please advise if the heater is to be vertically mounted so that the high temperature cut-out can be selected to suit this application.

## Important

A run on timer must be incorporated into the control system to allow the fan to run on after the heater has been switched off to dissipate any residual heat.

## Heater Selection

Calculate Heater Duty

Output = Air Volume x Constant x Temperature Rise

$kW = m^3 / s \times 1.25 \times \Delta t^{\circ}C$

## Order Details

When ordering please state the following information:

- Type of heater – Circular, Duct mounted, or Stab-in
- Air Volume ( $m^3 / s$ )
- kW Loading
- Electrical Supply – (220 to 240)V 1Ph or (380 to 415)V 3Ph
- Number of Steps
- Duct Size – width x height or diameter (mm)
- Vertical Airflow if required
- Any Special Requirements

Care must be taken when positioning the heater to prevent any damage or overheating of any other equipment in the system.

## Important

It is the responsibility of the final installation or commissioning person on site to ensure that all safety control interlocks function correctly and to shut down systems or part systems as designed to do so, within several seconds of activation.

## Technical Data

Maximum Leaving Air Temperature	40°C
Maximum Element Temperature	400°C
Maximum Air Velocity	6 m / s
Minimum Air Velocity	2 m / s
Voltage	(220 to 240)V 1Ph or (380 to 415)V 3Ph
Three Phase Connection	Star connection 3 wire for step control or 4 wires for thyristor control
Electrical testing	Flash tested at 1750 volts for 2 seconds
Insulation Test	1 Meg Ohm minimum



# Controllers

## Product Range: FHCS

The Fastlane stepped controllers for electric heater batteries cover a range of 1 – 6 steps dependant on load and phase requirements, with concealed set-point adjustment and room or duct mounted sensor.

### Features

- Step control.
- Door interlock isolator.
- Individual fusing for each step/phase, thermal. Overload and fuse protection for fan built in run on timer.

### Front Panel Controllers

- Fan on/off heater rocker switch.
- Power on indication.
- Heater on indication.
- Manual/auto rocker switch.
- Fan run indication.
- Fan failure indication.

### Connections

- Electric heater battery.
- Supply fan.
- External time clock.
- Temperature sensor via duct or room thermostat.
- Airflow switch (normally open.)
- Filter pressure differential switch.
- High temperature cut-out (an integral part of a heater battery.)

### Optional Extras

- Extract fan connections.
- Damper motor connection.
- Fire relay.
- B.M.S (on/off.)
- Volt free contacts for fan fail.
- Filter pressure differential switch.
- Internal time clock.



Range	
Up to 9kW	1-3 steps (220 to 240)V 1Ph / 50Hz
9kW - 12kW	2-4 steps (220 to 240)V 1Ph / 50Hz
Up to 30kW	1-6 steps (380 to 415)V 3Ph / 50Hz
Over 30kW	2-6 steps (380 to 415)V 3Ph / 50Hz



Range	
Up to 12kW	1-3 step (220 to 240)V 1Ph / 50Hz
6kW - 18kW	1-3 step (380 to 415)V 3Ph / 50Hz

## Product Range: FHCY

The Fastlane thyristor controllers for heater batteries cover ranges of, 1 – 45kW single step and above 45kW two step, all with room or duct mounted sensor.

### Features

- Thyristor control.
- Accurate heating control.
- Electrically noise free (low EMC emissions.)
- Optional control via 0-10vDC or 4-20mA signal from BEMS.
- Door interlock isolator.
- Individual fusing for each phase, thermal overload and fuse protection for fan built in run on timer.

### Front Panel Controllers

- Fan on/off heater rocker switch.
- Power on indication.
- Heater on indication.
- Manual/auto rocker switch.
- Fan run indication.
- Fan failure indication.

### Connections

- Electric heater battery.
- Supply fan.
- External time clock.
- Temperature sensor via duct or room thermostat.
- Airflow switch (normally open.)
- Filter pressure switch.
- High temperature cut-out (an integral part of the heater battery.)

### Optional Extras

- Extract fan connections.
- Damper motor connection.
- Fire relay.
- B.M.S (on/off.)
- Volt free contacts for fan fail.
- Filter pressure switch.
- Internal time clock.

## Range

Up to 12kW	1 step	(220 to 240)V 1Ph / 50Hz
Up to 45kW	1 step	(380 to 415)V 3Ph / 50Hz
Over 45kW	2 step	(380 to 415)V 3Ph / 50Hz



## Product Range: FHCT

The Fastlane thermostatic controllers for heater batteries cover a range of, 1 – 12kW single phase and 6 – 18kW three phase with between 1-3 steps. All panels are complete with either room or duct sensors.

### Features

- Thermostatic control.
- Door interlock isolator.
- Individual fusing for each phase, thermal overload and fuse protection for fan built in run on timer.

### Front Panel Controllers

- Fan on/off heater rocker switch.
- Power on indication.
- Heater on indication.
- Manual/auto rocker switch.
- Fan run indication.
- Fan failure indication.

### Connections

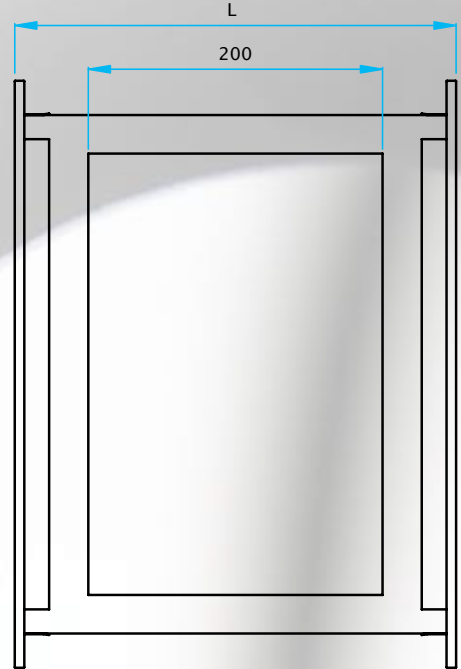
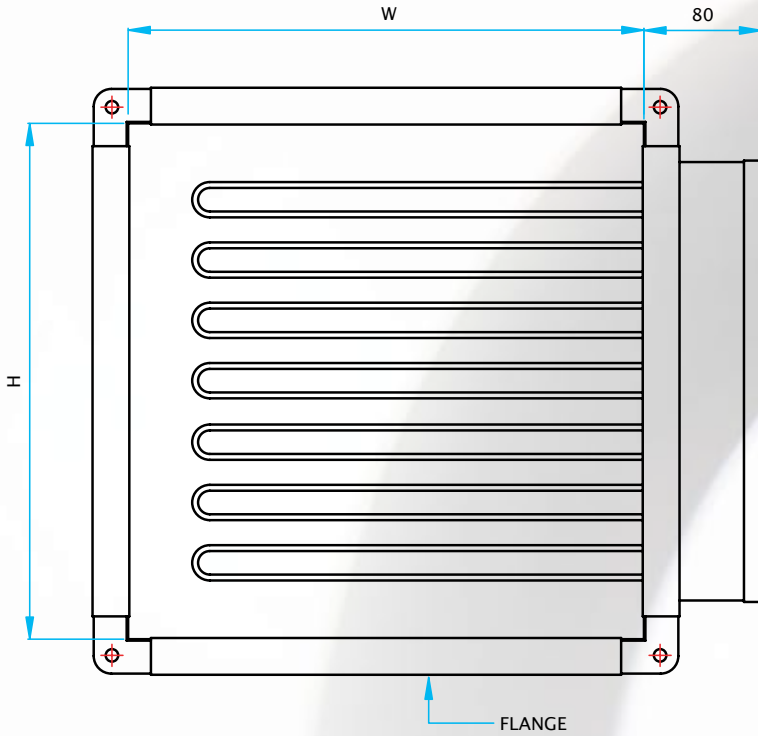
- Electric heater battery.
- Supply fan.
- External time clock.
- Temperature sensor via duct or room thermostat.
- Airflow switch (normally open.)
- Filter pressure switch.
- High temperature cut-out (an integral part of the heater battery.)

### Optional Extras

- Extract fan connections.
- Damper motor connection.
- Fire relay.
- B.M.S (on/off.)
- Volt free contacts for fan fail.
- Filter pressure switch.

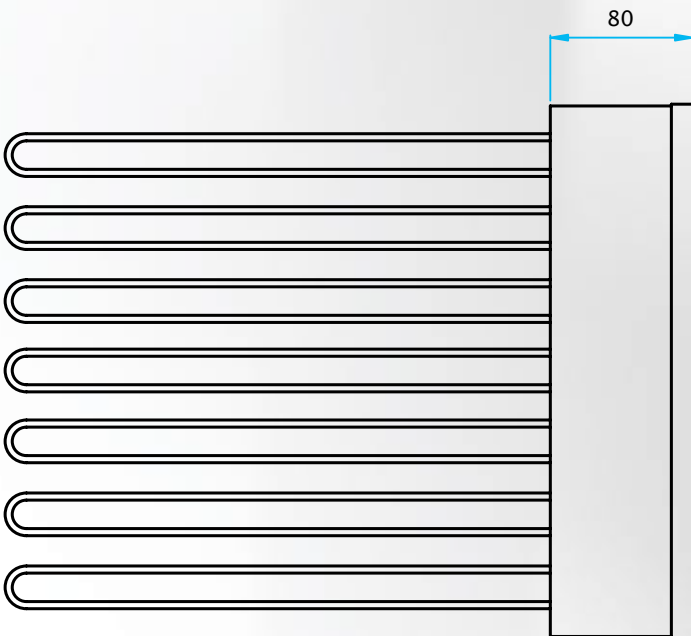
When the system is switched off, either manually or from a time clock the fan will continue to run for a few minutes to dissipate any residual heat in the duct or air handling unit.

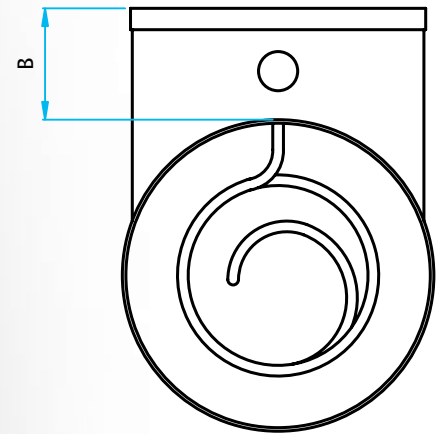
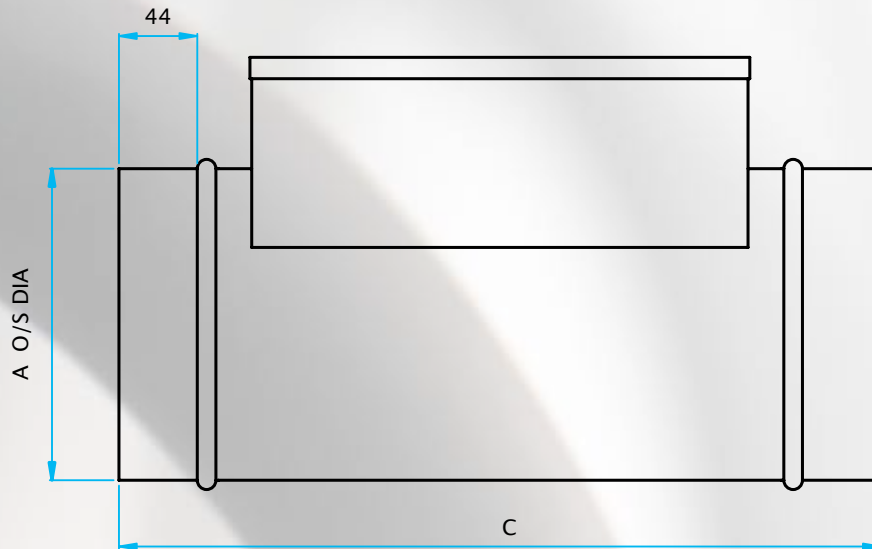
# Dimensions



Duct sections W/H up to 600mm<sup>2</sup> or total perimeter of 1800 - 25mm flange.  
 Duct sections W/H over 600mm<sup>2</sup> or total perimeter of over 1800 - 35mm flange.  
 Duct section length are subject to heater rating and dependant on the element configuration.

N.B. High kilowatt loading in small units may require an increased casings length (enquire for details).  
 Dimensions W and H are the width and height of the duct section which heaters are to be fitted into.  
 Terminal box length (200mm) may increase subject to kilowatt loading required.



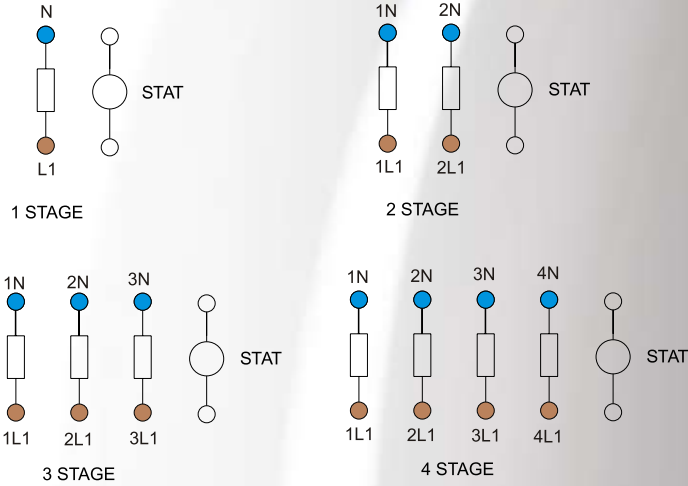


N.B. High kilowatt loading in small units may require longer casings.  
2m / s is the min velocity on table, 6m / s is the max.  
Single or three phase.

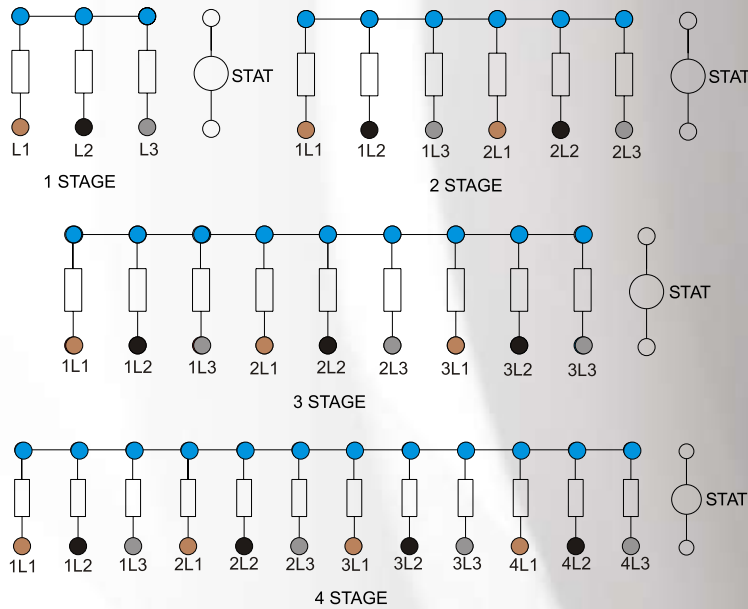
PRODUCT CODE	kW	STAGE	PHASE	AIRFLOW m <sup>3</sup> / s		A	B	C	WEIGHT kg
				MIN	MAX				
FCHB-100	0.75	1	1	0.016	0.047	100	55	400	2.0
FCHB-125	1.0	1	1	0.025	0.074	125	80	400	3.0
FCHB-150	1.5	1	1	0.035	0.106	150	80	400	4.5
FCHB-160	1.5	1	1	0.040	0.120	160	80	400	4.5
FCHB-200	2.0	1	1	0.063	0.189	200	80	400	6.0
FCHB-250	3.0	1	1	0.098	0.299	250	80	400	7.0
FCHB-315	4.5	3/1	1/3	0.156	0.468	315	80	400	8.0
FCHB-355	7.5	3/1	1/3	0.198	0.593	355	80	400	10.0
FCHB-400	9.0	3/1	1/3	0.251	0.784	400	80	400	12.0
FCHB-500/18	18.0	2	3	0.490	1.178	500	80	500	16.00
FCHB-500/27	27.0	3	3	0.490	1.178	500	80	500	21.0

# Wiring Diagrams

## Single Phase



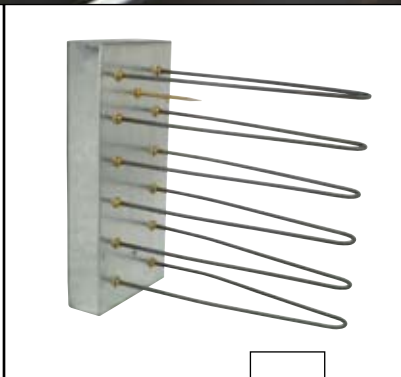
## Three Phase

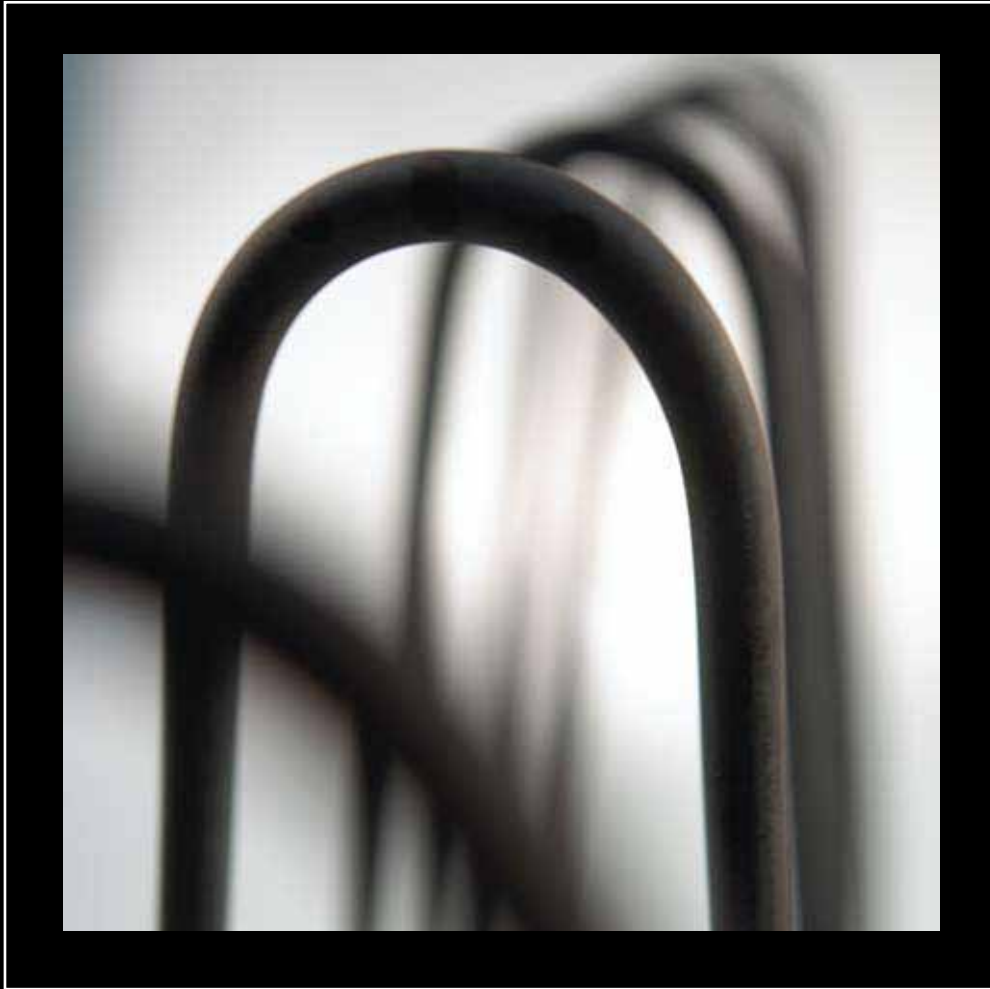


Connection diagrams shown are schematic only.  
Some elements may require linking in parallel to achieve the required kW rating.

The STAT (high temperature cut-out) must be wired to a suitable control circuit which disconnects the heater from the power supply in the event of an over temperature condition.

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