

Installation, Operating and Maintenance Instructions

# ISOTHERM

Advanced Technology Fan Coils

**Biddle**

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## **For more information**

If you have any comments or questions about specific topics relating to this product, please do not hesitate to contact Biddle.

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## Introduction

The Isotherm fan coil units detailed in this instruction manual have been purpose built to provide comfort conditioning. The chassis units are intended for installation in a ceiling void or behind decorative casework. Cased units are intended for installation on show to the builds occupants.

This document covers the operation and maintenance of the units and is to be handed over to the end user to ensure the product is maintained over it's working life.

Information regarding unit capacities and general dimensional information can be obtained from the sales literature available from the website or available on request from the sales office.

The product is only for indoor use where dry conditions can be guaranteed, in an ambient temperature range of 0°C – 40°C, and at altitudes not exceeding 500m above sea level.

Chassis units are intended for installation in a ceiling void and or connection to one or more air distribution ducts. Cased units are intended to be wall or ceiling mounted and discharge their air straight into a room.

## Before Starting Work

Fan coils are typically installed as part of a system with boilers, chillers and electrical supplies typically controlled centrally. When carrying out work on any part of this system, the worker should ensure that the whole system is considered and not solely the equipment being worked on.

The installer is responsible for ensuring:

- Ensuring the equipment has been installed in a safe and suitable manner with consideration for the immediate environment and ongoing maintenance that will be required to maximize the working life of the unit
- Ensuring that the installation is in-line with the manufacturer's instructions and consideration of industry best practice and in agreement with all applicable statutory legislation and regulations.
- The work is carried out by competent workers who have fully read and understand these instructions, the scope of work and who have the required tools, equipment and personal protective equipment to minimize risks.

If there is any doubt then stop and contact the office using the details on page 2.

## Storage

The product must be stored in a dark, dry, frost free and well ventilated place out of the reach of children. Storage temperatures should be between 0-40°C. The original packaging should be used for long term storage.

## Transport

Prior to transporting the product, it should be removed and stowed safely so as to not incur damage. The original packaging should be used wherever possible and the product should be protected from any significant temperatures or vibration.

## Installation

### Unit Positioning and Accessibility



**Caution – Some parts of this product can become very hot and cause burns. Particular attention has to be given where children and vulnerable people are present.**

Chassis units are intended to be installed more than 1.8m above the floor level, above a suspended ceiling or at high level where there is no ceiling, exposed to view. Cased units are intended to be installed at floor level or at high level as needed.

Qualified and professional personnel should be used in all instances to determine exact methods of working using these instructions as a guide to good practice.



**It is the installer's responsibility to ensure that the operational and environmental limitations of the equipment meet with the project requirements.**

The installer should choose a suitable place to install the unit, noting clearance requirements for servicing and maintenance as detailed below:

**Fans** – An access panel is located on the bottom of the unit. This is the full width of the unit. Minimum 270mm beneath the units and clear access.

**Inlet Air Filter** – Access to the inlet air filter is from the bottom and out the back inlet of the unit. Minimum 270mm under the unit with clear access plus minimum 200mm at rear inlet of unit.

**Water and Drainage** – These are dependent on the specific handing of the unit, as defined during the manufacturing of the order. Should the handing be unsuitable for connection, please contact our sales office to discuss further.

**Electrical Connection** – From left or right hand side to suit handing (see 'Water and Drainage' above).

**Drain Tray Removal** – Access from the underside of the unit. The drain tray is held in place by 4 retaining screws, 2 on each side of the unit.

**Heat Exchanger (coil) removal** – Accessed from the underside of the unit with fixing points on both sides.

**Control/Electrical Enclosure** – From left or right hand of unit. Minimum 270mm from underside and 500mm from vertical cover.

**Valves** – The unit is typically supplied with either project specific (free issued) valves, or Biddle's standard 4 port offer. The customer is to ensure that isolation valves are placed suitably close to the unit to allow for disconnection during future servicing and maintenance.

**Data Label** - Each unit is supplied with a serial number marked on the data label on either the underside of the unit (chassis) or internally behind an access panel (cased) - this should be visible once installed to allow for accurate unit identification.



**Failure to provide adequate access will prevent adequate servicing and maintenance of the unit that can negatively impact the life expectancy of the unit and any warranty.**

### Installing the Fan Coil Unit

None of the connection points, spigots/drain connection/coil connections/controls enclosure, are designed to be load bearing or support external equipment during installation or thereafter.

The unit must be installed horizontal and level across both its width and length, however a slight incline of 2 or 3 degrees towards the condensate drain point is acceptable.

Each unit is provided with four fixed mounting points. These are designed for a M10 fixing or drop rod supports to take the full weight of the unit. Mechanical fixings must be used to fix the appliance - adhesives are not deemed suitable.

In normal operation the unit will not exhibit a significant level of vibration, however vibration mitigation treatment may be necessary in certain situations. Where units are installed with vibration limiting equipment, flexible connections should be applied to all other services connected.

## Connecting Ductwork

Standard ductwork connections to units are circular or angular slip joints and must be independently supported to not impose any load/weight on the unit spigot connections. The installer is responsible for sealing the ductwork connections to the unit to ensure air tightness requirements are met. Flexible ductwork is sometimes used to connect the unit to the grille plenums. The amount of flexible ductwork should be limited to the final 1m to allow for small alignment issues between the solid ductwork and the plenum connection. Acoustic flexible ductwork should be used to ensure final noise levels meet with levels specified for the project. All ductwork is to be sized by the installer to suit the product performance. Overly small ductwork can cause increased pressure drop, resulting in increased noise levels and fan wear.

### Connecting the drain tray

**During normal operation condensation may occur that will need to be moved away from the unit. This is captured by the drain tray for collection and removal.**

Standard connection to the drain tray is 15mm plastic tube and this should be connected to a suitable drainage system.

Condensate pumps can be fitted to the unit to provide an initial lift to a gravity drain system. The pump contains an alarm function that can signal either pump failure, or that excessive condensation is being produced.

### Connecting hot and cold water services

**The unit incorporates a water to air heat exchanger with provision to connect to both cooling and hot water services.**

All connections on the heat exchanger are 15mm copper plain ends at 40mm centres in the horizontal plane. The connections are identified by a label indicating supply and return connections on the side of the unit requested by the customer. The coil is designed as counterflow operation and is used to maximise thermal performance whilst minimising energy consumption.

The coil connections must be damage free before installing the unit, and care must be taken not to create any undue stress which may cause a fracture to the copper tails. If specified at time of order, the unit will come with a factory fitted valve set. For connection to these please refer to the project specific documentation sent with the product.

Coils must be protected from extreme temperatures that would result in freezing and damage to the copper pipes.

The maximum operating pressure of the coil is 6 Bar (600kPa).



**It is the installer's responsibility to check and ensure that any water treatment required is in place and meets with the requirement of the project.**



**It is the installer's responsibility to ensure all relevant industry standards and codes of practice are followed and must conform to all statutory legislation or regulations that are applicable.**

## Connecting the Electrical Supply


**The electrical installation must conform to all relevant Standards.**

The equipment is intended to be connected to a 230 VAC 50 Hz, electrical supply.

The power supply must be via a single phase local isolator (customer supplied) with a contact separation on both Live and Neutral poles of at least 3mm. Please note the isolator must be fitted within an accessible position and labelled accordingly.

Alternatively, the equipment is provided with a loose cable gland for connection via a suitable 3 core cable from the local fused spur. If the supply cord is damaged it must be replaced by the manufacturer, it's service agent or similarly qualified person in order to avoid a hazard.

On electric heating units, access to the connection electrical block is via removing the enclosure cover on the electric heating plenum section.

The connection block is clearly labelled with L (Live), N (Neutral) and  (Earth).

Once installed, care must be taken to ensure that the fixed wiring insulation is protected from hot surfaces by either positioning it away from the surfaces, or using insulating sleeving with an appropriate temperature rating.

Please refer to the wiring diagram supplied with the unit for any separate controls that need to be fitted.

## Commissioning and Setting to Work

With the unit isolated, the following should be checked:-

- Check filter is clean and free from dust
- Check coil is clean and free from obstructions
- Hand spin fans to ensure no damage has occurred during transportation and installation
- Check all water connections for leaks
- Vent the coil to ensure that any trapped air is vented
- Put a small amount of water into the condensate tray to prime the system
- Check that all access panels are in place
- Check that the controls enclosure cover is fitted
- Check operational isolators and controls
- Check that all secondary ductwork balancing dampers are fully open

The unit must not be put into operation until any issues found are resolved.

## Initial Startup

**After the initial commissioning and setting to works checks, the unit may be started.**

- Connect/Switch on the power supply.
- Check that the correct speed control signal is being applied by the local controller and/or potentiometer.
- Run the fans for at least 10 minutes.
- If required, proportionally balance the FCU secondary air volumes.
- Adjust the fan speed control voltage so that the unit delivers the design air volume.

## Operation

Once setup the unit is designed to be controlled by the Free Issued controller that is supplied fitted with the unit. Please refer to the documentation provided by the respective controls company for how this unit should be operated.

## Maintenance & Procedures

### Maintenance Schedule

The unit should be checked at the intervals detailed below to ensure the lifetime of the product is maximized and the efficiency isn't impacted detrimentally. The intervals suggested below are based on a normal environment and the unit should be checked frequently initially to ensure the recommendations are sufficient.

Failure to adhere to the below will reduce performance in the first instance and may impact the products warranty.

	Every 3 Months	Every 6 Months	Every 12 Months
Filters	Yes		
Coil		Yes	
Fan		Yes	
Condensate Tray		Yes	
Controls & Wiring			Yes

### Filters

The filter should be kept in good order to ensure the unit can operate effectively. Typical symptoms of dirty filters are a reduction in heating/cooling capacities, increased wear on the fan and increased the noise levels.

The filter is carried in a channel on the air inlet of the unit and is installed behind the main access panel on cased units and behind the quarter turn fasteners on chassis units.

The filter is of sectional non-woven nylon manufacture and should be regularly cleaned from the dirty side with a vacuum cleaner or can be partially cleaned by gentle tapping.

After repeated cleaning, the filter performance will become degraded and the filter media will need replacing.

The period between cleaning is dependent on operating conditions. In a very dirty atmosphere, the filter will require frequent cleaning.

### Fan Deck Replacement

Internal to the unit are the fans that are double inlet single blower type driven by a single phase motor pre-lubricated sealed-for-life sleeve bearings requiring no maintenance. The below process should be followed in the case of the fan needing to be replaced during the lifetime of the product.

Step 1:- Safely isolate



Step 2:- Remove access panel

Step 3:- Disconnect (unplug) the fan deck cables

Step 4:- Loosen the clamps holding the fans into the unit.

Step 5:- To install a new fan, repeat steps 1-4 in reverse and ensure the cables are fixed sufficient to not be drawn into the fan when the unit is running.

## Coil Maintenance And Removal

Provided the filter is regularly serviced, the coil will require little or no attention. However, if the filter is allowed to get very dirty, some dust will percolate through, and become entrained between the fins. Should this occur, the coil should be cleaned by applying an air jet to the air leaving face.

Step 1:- Isolate and drain coil. Isolate any electrical supplies.

Step 2:- Remove the main access panel to gain access to the coil. For chassis units, you'll also need to remove the plastic drain tray.

Step 3:- Remove the 7mm bolts at the connections side of the unit

Step 4:- Lift out the coil

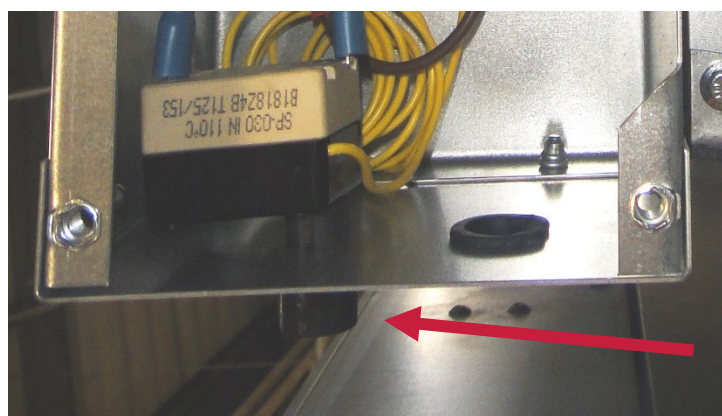
Step 5:- To refit the coil, repeat steps 1-4 in reverse taking care to place the coil into the unit.

## Resetting And Replacement of Thermal Cut Out (Only Applicable To Electrically Heated Unit Types)

Units with electric heating are fitted with a manually resettable thermal cutout that is designed to operate in the case of the unit overheating. The sensor is feed down a copper tube that sits central to the elements.

### Procedure for Resetting:

Step 1:- Unscrew the black plastic cover as shown by the arrow below



Step 2:- Press the red button to restore functionality.

Please note the thermal overload device is designed to only operate periodically as a safety feature and repeated nuisance tripping constitutes a fault with the unit that will need to be investigated as to the cause.

Should the thermal cutout not reset once the unit has cooled down then it may be faulty. To replace the thermal cutout:

Step 1: Isolate unit

Step 2: Remove the 4 x 7mm hex headed screws holding on the access panel on the electric heating plenum

Step 3: Remove the nut under the plastic cover and withdraw the thermal cutout from behind.

Step 4: Pull the spade connectors off the electrical terminals with a set of pliers gripping the spade connector and not the wire.

Step 5: To refit, repeat steps 1-4 in reverse.

## **Element Replacement (Chassis Units)**

Units with electric heating are fitted an additional discharge plenum that houses multiple Incoloy 800 elements to achieve the design specified duty. With no mechanical parts, the elements will typically last many years but can occasionally break. A failed element can be detected by driving the unit into full heating and then monitoring the electrical current drawn from the supply.

To replace an element:

Step 1:- Isolate unit

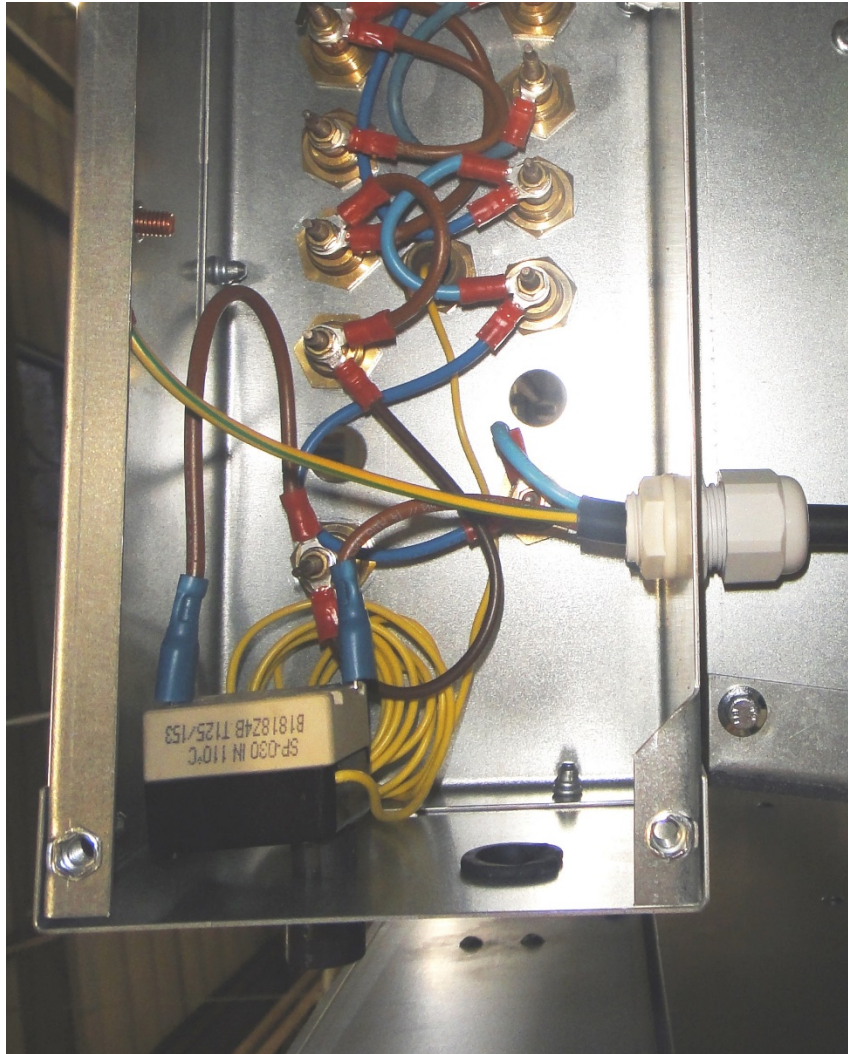
Step 2:- Remove access panel from electric heating plenum

Step 3:- Remove the brass nuts holding the ring terminals onto the elements

Step 4:- Remove the larger brass nuts holding the elements against the sheet metal.

Step 5:- Remove the discharge plenum from the unit

Step 6:- Loosen the bolts clamping the elements



## Element Replacement (Cased Units)

Units with electric heating are fitted an extended height cab to allow the elements to be housed within the unit. The unit will house multiple Incoloy 800 elements to achieve the design specified duty. With no mechanical parts, the elements will typically last many years but can occasionally break. A failed element can be detected by driving the unit into full heating and then monitoring the electrical current drawn from the supply.

To replace an element:

- Step 1:- Isolate unit
- Step 2:- Remove main access panel
- Step 3:- Remove the brass nuts holding the ring terminals onto the elements
- Step 4:- Remove the larger brass nuts holding the elements against the sheet metal.
- Step 5:- Loosen the clamps holding the body of the elements

## Wiring & Controls

**IMPORTANT:** Isolate the unit before opening electric's box.

Due to having free issue controls, for all guidance on the controller module inside the electrical box, please refer to the respective controller company's guidance about unit controls. Occasionally check that all terminals are tight and that the cable insulation is in good condition. After servicing, ensure that no parts have been disturbed in such a manner that open terminals (especially spade type) are short circuited to the unit casing.

## Spares

When ordering spares from Biddle Air Systems, please quote the works order number, the serial & model number of each unit concerned together with the individual article number for the component required (see tables below for article numbers). Details of the unit can be found on the rating plate located inside the unit.

93010000	Fan/Motor - AC (per each)
93010001	Fan/Motor - EC (per each)
93031000	A1 Replacement filter cartridges (per set)
93032000	A2 Replacement filter cartridges (per set)
93033000	A3 Replacement filter cartridges (per set)
93034000	A4 Replacement filter cartridges (per set)
93031000	B1 Replacement filter cartridges (per set)
93032001	B2 Replacement filter cartridges (per set)
93033000	B3 Replacement filter cartridges (per set)
93034001	B4 Replacement filter cartridges (per set)
93040008	EC Speed Potentiometer and PCB
93040003	Condensate Pumps (complete)
93040005	Kettle Type Plugs - Male & Female
93040001	Fuse & fuse holder - Panel type
93040000	Speed Control Transformer
94040033	24V Relay & Base
93161000	Replacement drain tray - A1 - Horizontal unit
93162000	Replacement drain tray - A2 - Horizontal unit
93163000	Replacement drain tray - A3 - Horizontal unit
93164000	Replacement drain tray - A4 - Horizontal unit

## Wiring Diagrams

Wiring diagrams can be supplied on request. Please contact the sales office.

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