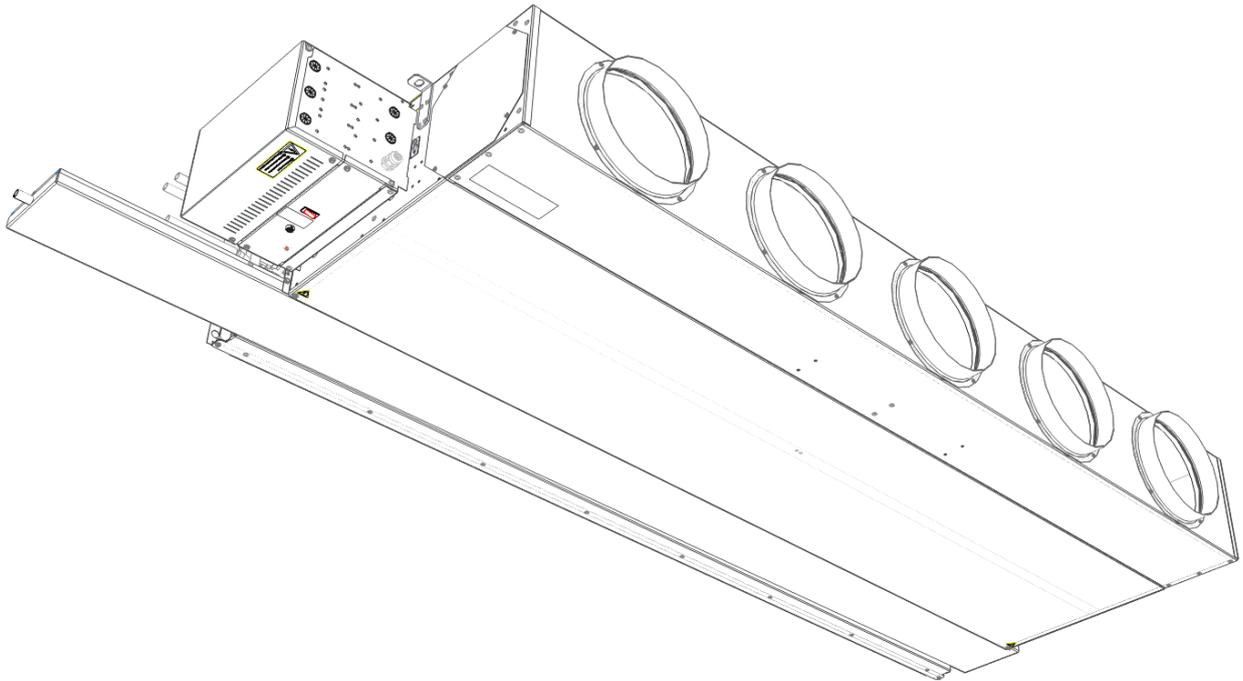


PROAIR SERIES

PROAIR235 & PROAIR270 Fan Coil Unit

INSTALLATION, OPERATING AND MAINTENANCE INSTRUCTIONS



Original Instructions



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Should you detect any errors or ambiguities in this manual then we would be pleased to hear from you: it helps us to improve our documentation.

Biddle retains the right to change the specifications stated in this manual.

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

This Installation, Operation and Maintenance manual relates to the PROAIR235 & PROAIR270 Horizontal Fan Coil Units (FCU) designed and manufactured by Biddle to provide cooling and heating to internal spaces.

The information contained in this document provides guidance on how this product is installed, operated and maintained. It is to be handed over to the end user to ensure the product is maintained over its working life.

You should refer to project specific documentation for performance information that is project related.

Safety

These product instructions detail the installation, operation and maintenance, of the PROAIR235 & PROAIR270 fan coil units. Such actions can have impact on safety. Where hazards have been identified the symbols below will be shown. Should any part of these instructions become damaged, unreadable or a copy is needed, they can be downloaded from the Biddle website listed on page 2.

Before carrying out any maintenance to the unit, the user should ensure the unit has been electrically isolated from supplies, isolated from any pipework connections and the unit left to cool down sufficiently. Fan coils are installed as part of a system with boilers, chillers and electrical supplies that means 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.

	Electrical Hazard		Hot Surfaces Hazard
	General Warning		

The installer is responsible for 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.
- 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.

This equipment must be installed, cleaned and maintained by competent persons only. This equipment can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been

given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance.

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 0-30°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.

The 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.

The product is only for indoor use where dry conditions can be guaranteed, in an ambient temperature range of 10°C – 40°C.

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 235mm (PROAIR235) or 270mm (PROAIR270) 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 235mm (PROAIR235) or 270mm (PROAIR270) 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 235mm (PROAIR235) or 270mm (PROAIR270) 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 the underside of the unit - 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.

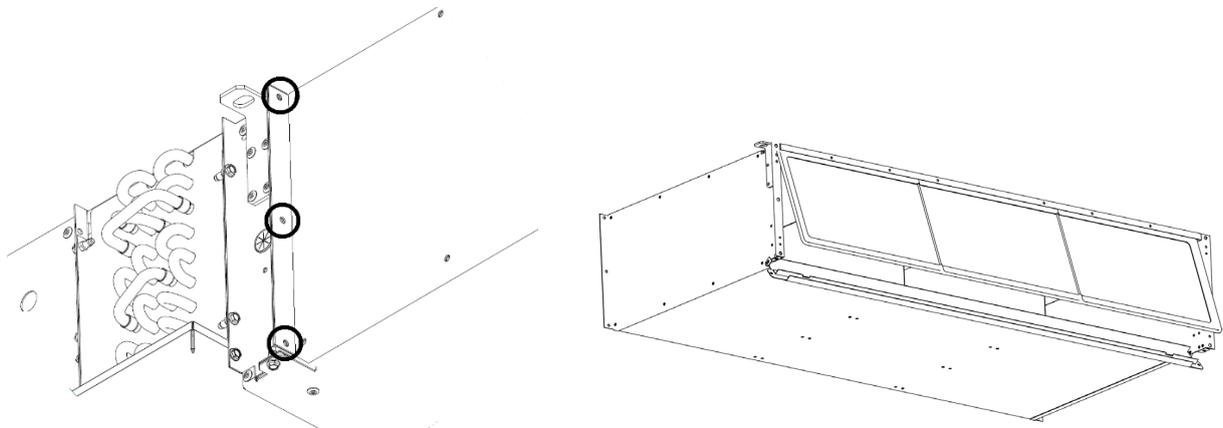
Each unit is provided with four fixed hanging points. These are designed for a M10 fixing or drop rod supports to take the full weight of the unit. Mechanical fixings must be used to fix the appliance - adhesives are not deemed suitable.



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.

Installing Inlet Extension (Optional)

The units are available with a separate inlet extension that's fitted to the unit once installed. Secure the extension onto the front of the unit, fixing it securely with the three fixings on either side circled below and the drop rod fixings. Remove the filter from the unit and reposition it to the front of the inlet extension.



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 copper 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. When the unit is purchased with Biddle's standard controls,

this alarm will be interlocked with the cooling actuator such that cooling will be disabled until the condensate is removed.

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 16 Bar (1600kPa).



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.

Connecting the Electrical Supply



It is the installer's responsibility to ensure the installation shall be installed in accordance with the local wiring regulations.

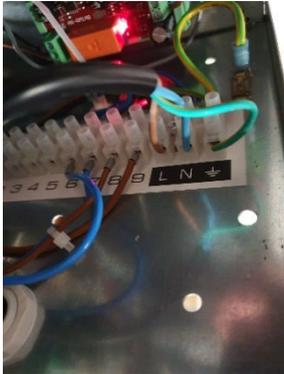
The equipment is intended to be connected to a 230 VAC 50 Hz, electrical supply.

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.

The unit can be supplied with a UK 3 pin plug and 1m flex lead if specified at time of order. It is the installer's responsibility to ensure correct connection of the mains wires and installation of the cable gland (supplied) to secure the cable.

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, its service agent or similarly qualified person in order to avoid a hazard.

Access to the connection electrical block is via removing the Controls Enclosure cover.



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.

Connecting the Controls Cabling

The unit's controls cables, sensor leads and BMS communication cable should not be routed alongside or in the same cable tray as the mains 230 Volt power. A separation gap, in line with current industry best practice, should be maintained to ensure any interference is kept to a minimum.

The product is available with multiple options for controls:

- No controls – the unit is supplied for the installer to supply and fit their own controls.
- Project specific controls (free issued) – for information on how to use the product, the installer should refer to the project specific wiring guides and controller data sheets to ensure correct connection and operation of the unit.
- Biddle specified controls – a digital controller is supplied and fitted to control the temperature and fan speeds with optional wall controllers.

The remainder of this section is related wholly to the Biddle Specified Controls.

Biddle Specified Controls

If specified at time of order, the product will be delivered with a factory fitted Johnson Controls TUC03 to allow the unit to operate in the following ways:

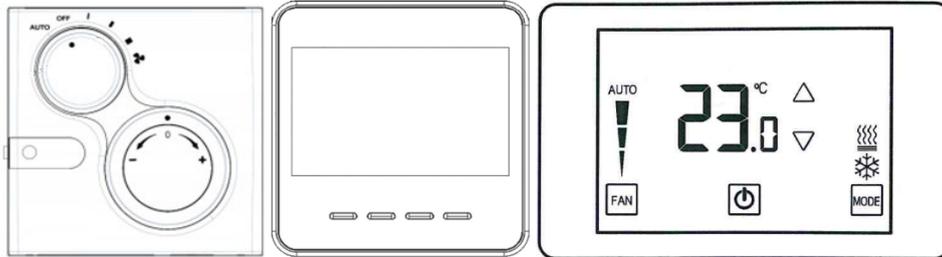
- Standalone
- Standalone with a room controller
- Master/Slave with other Biddle units
- From a Building Management Systems (BMS) with Bacnet MS/TP interface

Standalone

The TUC03 is a configurable direct digital controller (DDC) that will control the fan speed and valve actuators based on sensors fitted within the product to effectively manage the space temperature. By default, the product will operate from a fixed set-point of 22°C. For optimal user comfort and control we recommend that a room controller (detailed below) is fitted.

Standalone with Room Control Module (RCM)

The product is supplied as above but with a room control module allowing users to adjust the temperature and fan speeds of the product. Each wall controller is supplied with a separate user manual about how to fit, wire and control the unit with it.



The RCM should be fixed to a wall near to the product within the space that the unit is heating/cooling, away from any cold draughts or radiative heat sources. Wiring to the product should be done with twisted cable with a length of less than 25m.

Master/Slave with other Biddle units

The TUC03 will allow multiple similar products to be connected together to ensure they all heat/cool collectively. Where multiple units are used in the same space, Biddle recommend that this function is enabled to avoid each unit competing against each other causing substantial increase in running costs. For users who wish to use this feature please ask our sales team for wiring diagram ENG001 that details the wiring and DIP switch settings needed.

From a Building Management Systems (BMS) with Bacnet MS/TP interface

The TUC03 contains a Bacnet MS/TP interface that will allow full and advanced control of the product from external devices over the network. These options are only available for advanced users and will alter the functionality of the product. Any changes of the controller's internal values will invalidate any warranty concerning the product's controls and should only be attempted by competent users.

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.

Service and Maintenance

Always disconnect and isolate the mains electricity supply before installing, maintaining or repairing this equipment. All maintenance/repairs should only be carried out by a competent electrician or Biddle appointed technician. To ensure the Fan Coil Unit operates efficiently the air inlet filter and outlet grilles, fan impellers, housings and motors must be kept free of dust and debris. Regularly vacuum and clean any build-up of dirt and debris within the unit (please note that the motor is permanently lubricated and requires no additional lubrication). Once the unit has been cleaned check all electrical connections within the unit, ensuring terminals are tight and that crimped connections have not become loose.

Warranty and Repairs

If any problems are encountered, please contact your installer or supplier. Failing this please contact the Biddle warranty department. All units are covered by a one year warranty on parts and labour, followed by two addition years parts only.

Care has been taken in compiling these instructions to ensure they are correct, although Biddle disclaims all liability for damage resulting from any inaccuracies and/or deficiencies in this documentation. Biddle retain the right to change the specifications stated in these instructions.

Recycling and Disposal

This product will offer many years of service when used and maintained in line with these instructions. When the product does need to be disposed of, recycling should be made a priority. Waste electrical products should not be disposed of with household waste.

Maintenance & Procedures

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 from reduced airflow,

increased wear on the fan and increased the noise levels.



The filter is removed by undoing the two retaining screws situated beneath the filter that allows a hinged section to be pulled down giving access to the filter.

The filter is of 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 will need replacing. It is advisable to keep a number of new replacement filters, please contact our sales office for pricing and availability. Stock codes for spares can be found in the spare parts section at the end of this document.

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

The filters are wire framed and the correct way round to install them is with the bare filter frame on the coil side, inside the unit.

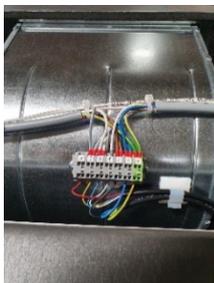
Fan Replacement

Internal to the unit is a fan plate fitted with 1 to 5 individual external rotor motor fans. Each fan can be individually removed and replaced using the following procedure.

Step 1 - Isolate the electrical mains supply



Step 2 - Remove access panel by removing the 2 hex headed screws



Step 3 - Disconnect (unplug) the fan to be changed from the wiring loom

Step 4 - Whilst supporting the weight of the fan remove the 4 retaining screws that secure the fan to the unit

Step 5 - Remove the fan

Fit the replacement fan by following the above in reverse.

Condensate Drain Trays

Drain trays should be periodically checked to ensure they are clean, unobstructed and free draining. Should they become excessively dirty or blocked, they should be removed and cleaned.



To remove the drain tray you first have to remove the fan access panel as previously described.

The drain pan is secured by 4 screws, two at each end. Once these are removed the drain tray can be lowered.

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. In this case, the element should be cleaned by applying an air jet to the air leaving face.

The coil can be accessed once the fan access panel and drip pan have been removed as previously described.

The coil is secured in place with 8 screws, 4 at each end. Once these are removed the coil can be taken out of the unit.



To replace the coil follow the instructions in reverse followed by the drip tray and the fan access panel.

Wiring and Controls

It's likely this product has been supplied with project specific (free issued) controls, for guidance on the controller module inside the electrical box, please refer to the respective controller company's data sheets 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 are short circuited to the unit casing.

Visually inspect the wiring, terminals and all other components for any sign of discolouration, arcing or charring.



Check for blown fuses. If a fuse is blown check the circuits and components it protects thoroughly before re energising. Any blown fuse must be replaced with an equivalent fuse of the same specification, size and rating.

Example - controls enclosure internal wiring

Example – Wiring Diagram

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



Spare Parts

Item		PROAIR235 - Unit Size										
		61	91	92	122	123	153	183	184	214	215	
Filters	Qty Fitted:	1	1	1	1	1	1	1	1	1	1	
G2	Stock Code:	95200010	95200011	95200011	95200012	95200012	95200013	95200014	95200014	95200015	95200015	
G3	Stock Code:	95200016	95200017	95200017	95200018	95200018	95200019	95200020	95200020	95200021	95200021	
Fans	Qty Fitted:	1	1	2	2	3	3	3	4	4	5	
	Stock Code:	95200034	95200034	95200034	95200034	95200034	95200034	95200034	95200034	95200034	95200034	
Coil	Qty Fitted:	1	1	1	1	1	1	1	1	1	1	
	Stock Code:	95200040	95200041	95200041	95200042	95200042	95200043	95200044	95200044	95200045	95200045	
Drain Tray	Qty Fitted:	1	1	1	1	1	1	1	1	1	1	
Shorter	Left Hand	Stock Code:	95200170	95200171	95200171	95200173	95200173	95200175	95200176	95200176	95200178	95200178
	Right Hand	Stock Code:	95200180	95200181	95200181	95200183	95200183	95200185	95200186	95200186	95200188	95200188
Standard	Left Hand	Stock Code:	95200130	95200131	95200131	95200133	95200133	95200135	95200136	95200136	95200138	95200138
	Right Hand	Stock Code:	95200140	95200141	95200141	95200143	95200143	95200145	95200146	95200146	95200148	95200148
Room Module	RS-7080-002	95200000					200mm Spigot Ring	Galv	95200060			
	RTRM-0312-OW	95200001						Black RAL9005	95200060-B1			
	TM-2160-0007	95200002						White RAL9010	95200060-W1			
Supply Air Connection 200mm	Galv	95200006					Return Air Sensor		95200004			
	Black RAL9005	95200006-B1					Supply Air Sensor		95200008			
	White RAL9010	95200006-W1					Condensate Pump		95200005			
						TUC03 Controller		95200003				
						Plenum Cover Plate		Galv	95200061			
								Black RAL9005	95200061-B1			
								White RAL9010	95200061-W1			



Item		PROAIR270 - Unit Size										
		61	91	92	122	123	153	183	184	214	215	
Filters	Qty Fitted:	1	1	1	1	1	1	1	1	1	1	
G2	Stock Code:	95200022	95200023	95200023	95200024	95200024	95200025	95200026	95200026	95200027	95200027	
G3	Stock Code:	95200028	95200029	95200029	95200030	95200030	95200031	95200032	95200032	95200033	95200033	
Fans	Qty Fitted:	1	1	2	2	3	3	3	4	4	5	
	Stock Code:	95200035	95200035	95200035	95200035	95200035	95200035	95200035	95200035	95200035	95200035	
Coil	Qty Fitted:	1	1	1	1	1	1	1	1	1	1	
	Stock Code:	95200046	95200047	95200047	95200048	95200048	95200049	95200050	95200050	95200051	95200051	
Drain Tray	Qty Fitted:	1	1	1	1	1	1	1	1	1	1	
Shorter	Left Hand	Stock Code:	95200150	95200151	95200151	95200153	95200153	95200155	95200156	95200156	95200158	95200158
	Right Hand	Stock Code:	95200160	95200161	95200161	95200163	95200163	95200165	95200166	95200166	95200168	95200168
Standard	Left Hand	Stock Code:	95200110	95200111	95200111	95200113	95200113	95200115	95200116	95200116	95200118	95200118
	Right Hand	Stock Code:	95200120	9520021	95200121	95200123	95200123	95200125	95200126	95200126	95200128	95200128

Room Module	RS-7080-002	95200000
	RTRM-0312-OW	95200001
	TM-2160-0007	95200002

250mm Spigot Ring	Galv	95200063
	Black RAL9005	95200063-B1
	White RAL9010	95200063-W1

Plenum Cover Plate	Galv	95200064
	Black RAL9005	95200064-B1
	White RAL9010	95200064-W1

Supply Air Connection 250mm	Galv	95200007
	Black RAL9005	95200007-B1
	White RAL9010	95200007-W1

Return Air Sensor	95200004
Supply Air Sensor	95200008

Condensate Pump	95200005
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TUC03 Controller	95200003
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