TECHNICAL PRODUCT GUIDE
AND
INSTALLATION, OPERATION AND MAINTENANCE MANUAL
FOR

COLMAN
MODUCEL

FAN COIL UNITS

Eclipse W285

Excel W175

Elite W235

Maxima W335

Supreme A275

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BUSINESS SYSTEMS AND STANDARDS

GENERAL STATEMENT

Quality Management System

The Eaton-Williams Group are a registered company to BS EN ISO 9002:1994 Quality management standard. This standard covers all manufacturing areas and associated processes. The Group are now currently in the transition process for accreditation to the new standard ISO 9000: 2000. Target date for accreditation is December 2002.

Safety and Environmental Management

In addition to the above, the Group are currently working to implement an environmental management system in line with ISO 14001, which will be integrated with our existing Quality & Safety Management Systems. Target accreditation date is June 2003. As part of the implementation, the Group have already carried out an audit of the business to identify all significant environmental aspects. Targets and KPIs have been set for environmental impact reduction and the Group already complies with all current environmental legislation identified during the environmental audit, and as required by the local authority.

HR Management and Staff Development

The Group was successfully accredited to the Investors in People standard in February 2000.

Product Standards

The air conditioning products marketed and supplied by Eaton-Williams Limited, when installed and operated in accordance with EW information and instructions, conform to the EMC directive and essential Health & Safety requirements of the machinery directive 91/368/EEC-93/44/EEC & 93/68/EEC. This includes the EMC compatibility directive 89/336/EEC. As standard, units comply with an IP21 rating. The standards are also met where compliance to TÜV, UL and CSA are specific market requirements attained for that product.

CE

CONTENTS

SECTION: 1

SAFETY
AND
GENERAL INFORMATION

1.1. SAFETY

As with most electrical or mechanical equipment, there are potential hazards associated with installation and maintenance of Fan Coil Units.

All personnel carrying out installation, commissioning and maintenance should ensure that they have read entirely and understood the information contained in this manual.

The manual has been written with emphasis given to safe practices and working methods. However, the information contained in this manual is not exhaustive and does not cater for every installation scenario or potential hazard.

Note:
It is the responsibility of the installer to ensure that the equipment covered by this manual is installed correctly.

It is the responsibility of the owner/end user to ensure that the equipment is maintained and operated safely.

Above all other considerations, safe practices and working methods must be adopted at all times.

1.2. PERSONS PERMITTED TO INSTALL, COMMISSION AND MAINTAIN THE EQUIPMENT

Only personnel who have been properly trained in the respective phase of installation, commissioning and maintenance of this type of equipment should be permitted to carry out such work.

Trainees must be supervised by an authorised and competent person who is responsible for safety.

1.3. ELECTRICAL

Observe the following points:

- Electrical wiring must comply with national or local standards and safety regulations.
- The electrical power used in this equipment is potentially lethal. Before carrying out any work on the unit, always ensure that the unit is electrically isolated.

1.4. MECHANICAL

Observe the following points:

- Always ensure that fan(s) within a Fan Coil Unit have stopped rotating before carrying out work.
- Ensure that the weight and size of any parts

1.7. LEAKS OR CONDENSATION SPILLS

If a leak or condensation spill should occur, ensure that there is no risk of electrical hazards that might result from liquid penetrating live electrical equipment; for example, light fittings and wiring circuits. Electrically isolate any such equipment before carrying out any work or investigation.

1.8. HANDLING AND INSTALLATION

When moving and lifting the unit, caution must be observed at all times to ensure the safety of all personnel.

The installation and operation of the unit should be conducted in accordance with national and local regulations and accepted codes of good practice.

1.9. APPLICATION

The unit is only to be used in the application for which it was designed.

The unit **MUST NOT** be used in a hazardous environment, unless specially designed and approved for this application.

1.10. WARRANTY

Failure to comply with the manufacturers installation instructions may affect the reliability and performance of the unit and invalidate the warranty.

Warranty is also subject to the implementation of planned preventive maintenance as specified for the particular unit.

1.11. ELECTRICAL CONNECTION

The unit must be connected via an external isolator if one is not supplied fitted to the unit.

Electrical connections should be carried out in accordance with national and local regulations. In the UK, standard BS 7671 applies.

Never attempt to make any connections unless the electrical supply to the unit has been switched **OFF**.

Take adequate precautions to ensure that other personnel cannot inadvertently switch the electrical supply back **ON** while work is being carried out. Remove fuses and place suitable warning notices, where appropriate.

1.12. MAINTENANCE

Before commencing any work on the unit, ensure the electrical supply has been switched **OFF** and can not be accidentally switched on, (e.g. **LOCK OFF**

SECTION: 2

UNIT DESCRIPTION

2.0. INTRODUCTION

This section provides information about the function and main components of Colman Moducel Eclipse, Elite, Excel, Maxima and Supreme Fan Coil Units (FCUs).

2.1. APPLICATION

Colman Moducel FCUs are a purpose-built range of air cooling and heating units that incorporate filtration to remove particulates.

Designed to be mounted in concealed ceiling voids, these highly reliable FCUs are suitable for typical commercial uses and are ideal for hotels, hospitals, suites, offices, conference rooms and other similar spaces, where the air must be conditioned to be:

- Temperature controlled (heating is optional)
- Filtered clean of particulates

FCUs offer the most economical method of air conditioning, measured against VAV and main duct supply, have minimal main ducting, offer optimum flexibility and zone control and are ideal for refurbishment systems with low height ceiling voids.

Each unit is factory-built and is supplied fully assembled, factory wired and tested (except for BMS interface) ready for immediate installation.

Air heating and cooling are achieved by using hot or chilled water, respectively, while conditioned air flow into the room is ensured by one or more electrically driven fans.

To accommodate most site-specific dimensional constraints, the following standard depths are available.

Four waterside units:

Small 175 mm - **Excel**
Standard 235 mm - **Elite**
Medium 285 mm - **Eclipse**
Large 335 mm - **Maxima**

One airside unit:

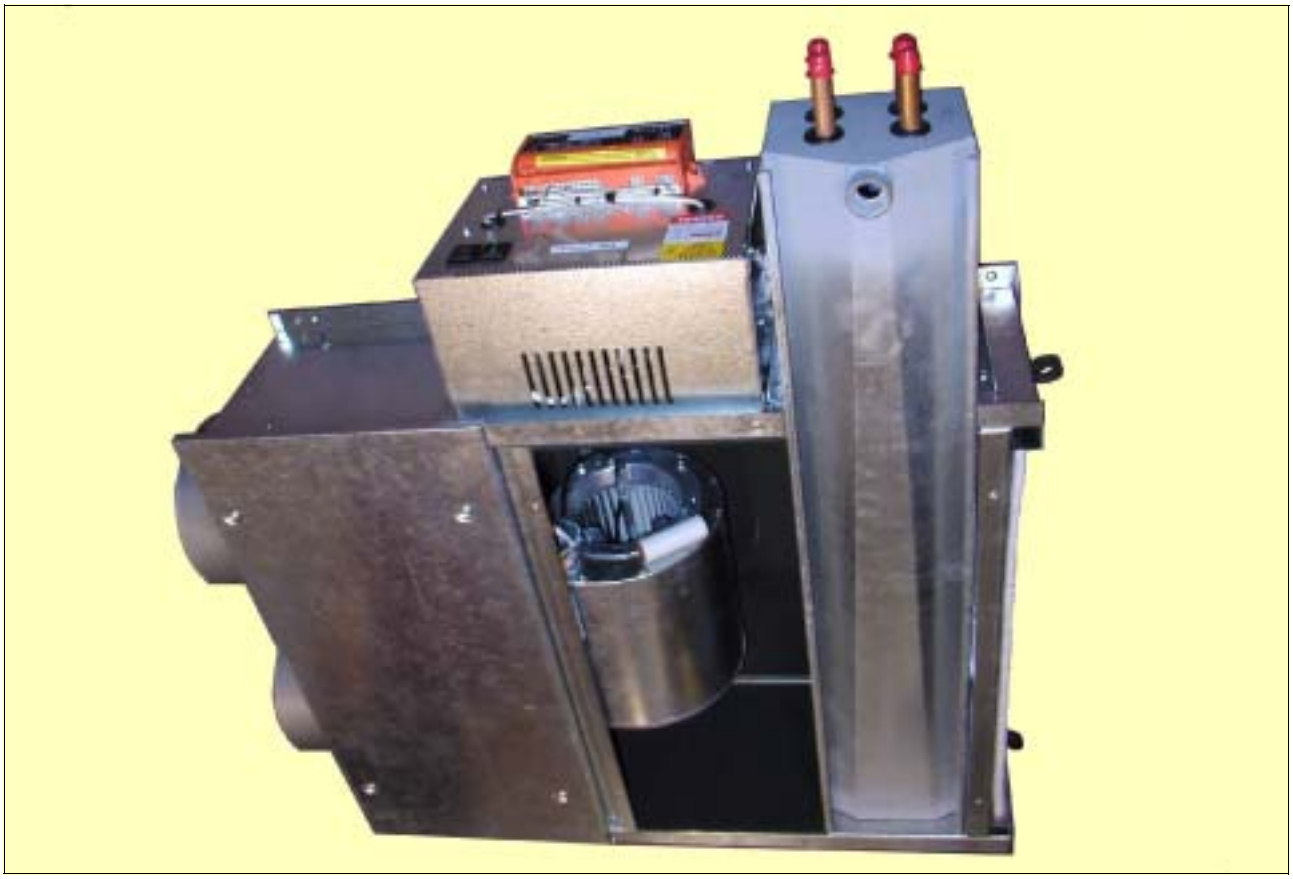
Standard 275 mm - Supreme

All units are offered in a range of widths, covering air flow volumes from 52 to 778 l/s, with associated total cooling duties up to 15.9 kW and heating outputs up to 15.8 kW based on 30 Pa.

By selecting various combinations of units, duty requirements can be matched accurately to customer requirements. Selections available are shown under 2.2.

The performance and design of FCUs have been defined and enhanced to provide a quality product that is in keeping with the Colman Moducel and Eaton-Williams names.

Fig. 2-1 Fan coil unit - viewed from below, with fan access panel removed



2.2. TECHNICAL AND PERFORMANCE DATA

The following information is provided for standard Fan Coil Units.

Please note that because of Colman Moducel's policy for ongoing development, information provided here may be subject to change without notification.

2.2.1. Unit Typical Coding

Units are coded typically as illustrated in Fig. 2-2.

Provided that the Colman Moducel code number is known, the full specification of a unit can be determined by referring to Fig. 2-2 and the appropriate table data under 2.2.4.

2.2.2. Electrical Fuses / MCBs

It is the responsibility of the customer/end user to ensure that appropriate fuses/MCBs (Miniature Circuit Breakers) are fitted in the power supply line to each unit.

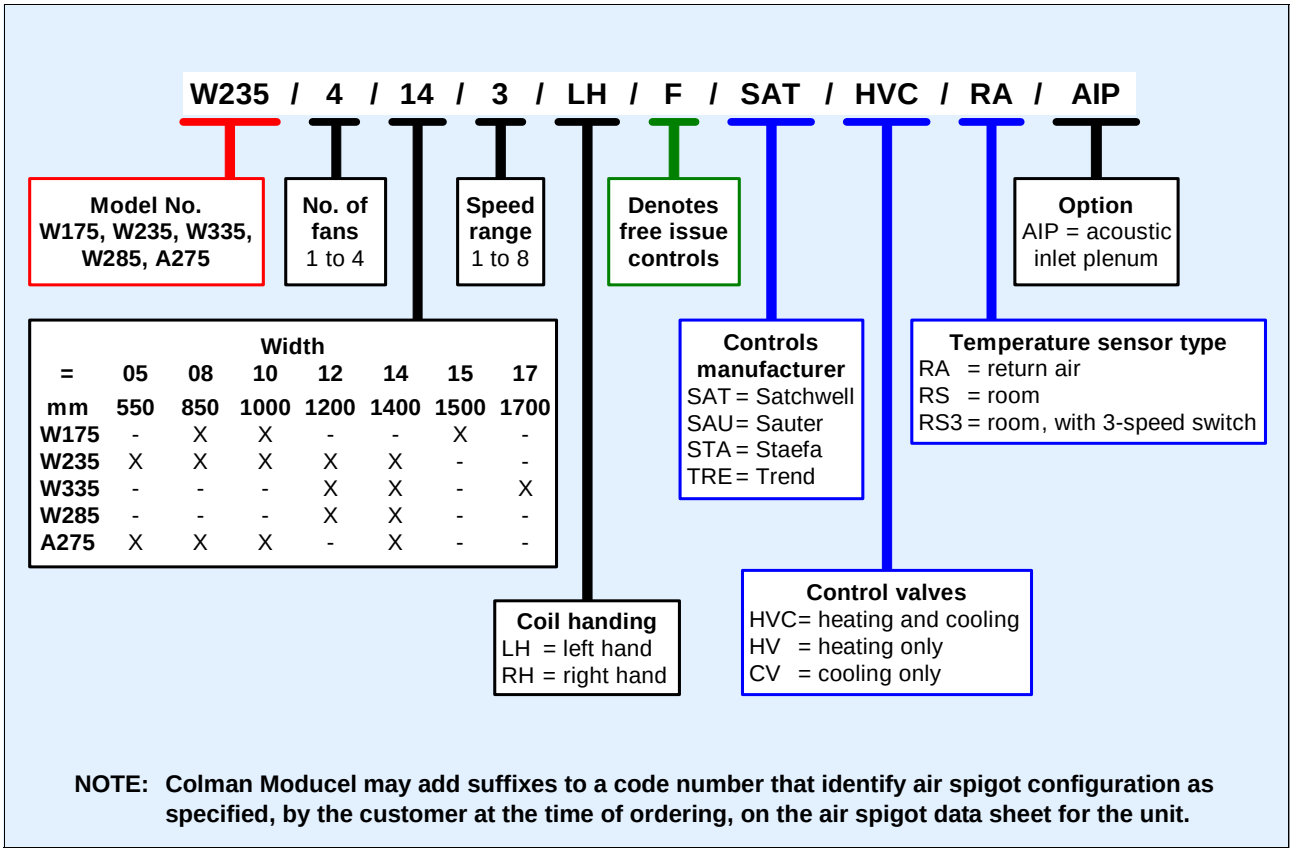
Maximum fuse rating must be adequate for the unit full load current (FLC).

2.2.3. Noise Ratings

Many factors can influence the actual resultant room NR level and it should therefore be calculated by a suitably qualified acoustic engineer.

Radiated and discharge sound power levels, tested in accordance with BS 4196 Part 1: 1991 are available on request.

Fig. 2-2 Unit typical coding



NOTE: Colman Moducel may add suffixes to a code number that identify air spigot configuration as specified, by the customer at the time of ordering, on the air spigot data sheet for the unit.

Table 2-2 : Technical data - Maxima W335, Eclipse W285 and Supreme A275 models

TECHNICAL DATA

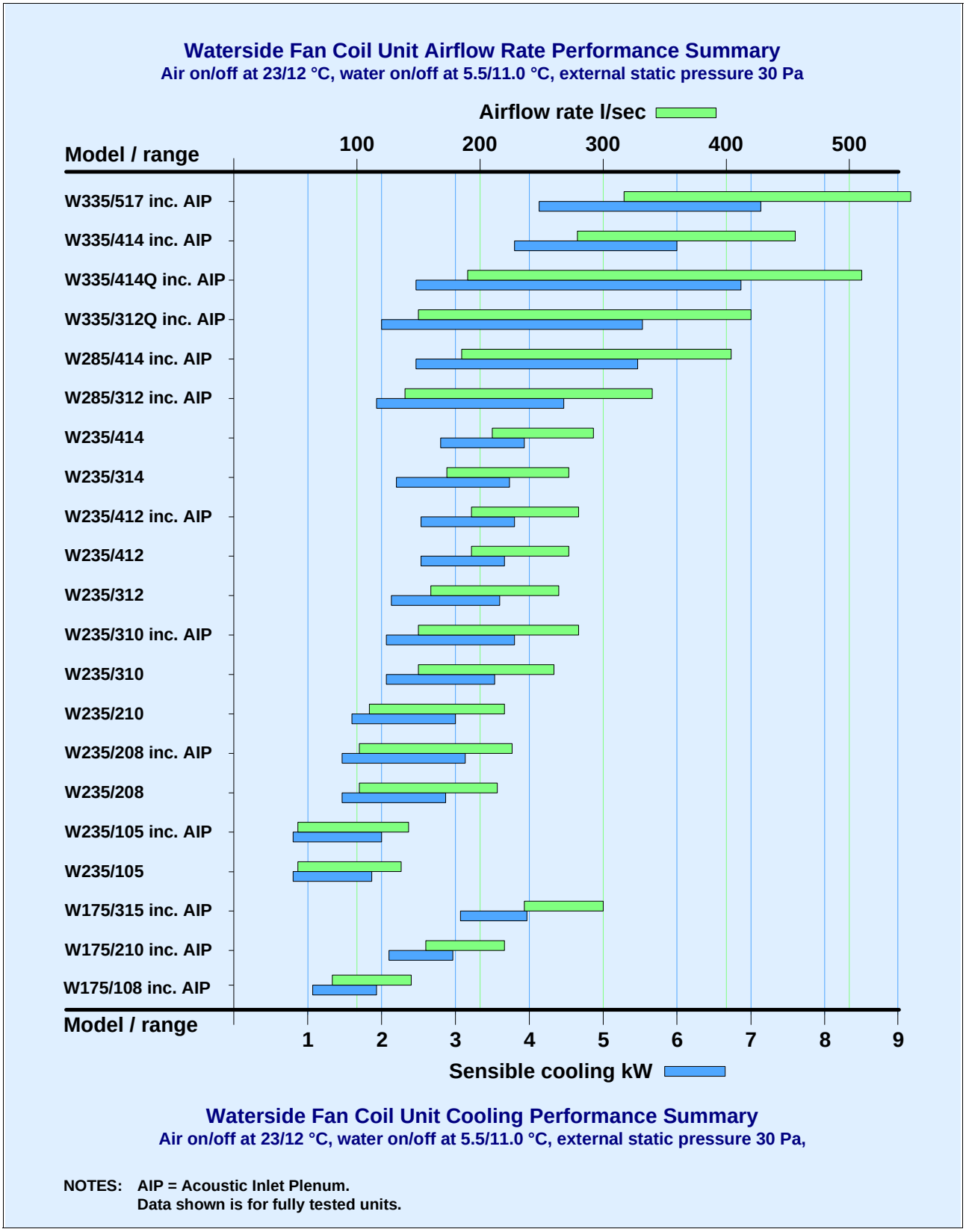
Model/Range		Maxima W335/				Eclipse W285/		Supreme A275/			
		312Q	414	414Q	517	312	414	105	208	310	414
Length	mm	1500				1500		1200			
Width	mm	1300	1500	1500	1800	1300	1500	650	950	1100	1500
Depth	mm	335				285		275			
No. of fans		3	4	4	5	3	4	1	2	3	4

2.2.5. Performance Data

The following information is provided to enable the performance of standard Fan Coil Units to be evaluated.

Please note that because of Colman Moducel's policy for ongoing development, information provided here may be subject to change without notification.

Fig. 2-3 Waterside Fan Coil Units - cooling and airflow rate performance summary



NOTES: AIP = Acoustic Inlet Plenum.
Data shown is for fully tested units.

Table 2-3 : Excel W175 model - unit performance data

EXCEL W175 MODEL - UNIT PERFORMANCE DATA

Cooling duties[1] are based upon chilled water on/off at 5.5/11.0 °C, with air on at 23/16 °C dry/wet bulb.
Heating duties[1] are based upon Low Pressure Hot Water (LPHW) on/off at 82/71 °C, with air on at 20 °C.
For other water temperatures, apply correction factors from below the table.

Model/Range W175/	Speed Range Number	Noise Rating[2] NR	Airflow Volume[3] l/sec	Sensible Cooling kW	Total Cooling kW	Heating kW	Electrical Load kW
108	1	27	89	1.18	1.42	2.57	0.142
	4	32	119	1.54	1.83	3.09	0.142
	8	37	158	1.97	2.32	3.63	0.142
210	1	31	158	2.16	2.63	3.75	0.284
	4	36	222	2.86	3.41	4.75	0.284
	8	39	278	3.39	3.94	5.35	0.284
315	1	31	234	3.36	4.20	5.73	0.426
	4	36	331	4.45	5.42	7.13	0.426
	8	40	421	5.34	6.36	8.33	0.426

Correction factors for other water on/off temperatures

LPHW		Chilled Water	
Temp. °C	Factor	Temp. °C	Factor
82/71	1.00	5.5/11	1.00
70/60	0.79	6/12	0.87
60/50	0.59	7/12	0.88
-	-	10/15	0.60

NOTES:
[1] All cooling and heating duties shown are coil duties only and do not allow for any fan motor or duct gains.
[2] All NR figures have been calculated making the following assumptions:
a. Room absorption of 8 dB.
b. Ceiling loss of: dB 4 7 9 11 14 16
In the frequency of Hz 125 250 500 1k 2k 4k
c. A one metre length of non-regenerative, unlined PVC flexible ducting being fitted in each supply duct, and a maximum air velocity of 3 m/sec at each outlet spigot.
d. Reverberant field.
[3] All airflow volumes shown are based upon 30 Pa external static resistance.

Table 2-4 : Elite W235 model - unit performance data

ELITE W235 MODEL - UNIT PERFORMANCE DATA

Cooling duties[1] are based upon chilled water on/off at 5.5/11.0 °C, with air on at 23/16 °C dry/wet bulb.
Heating duties[1] are based upon Low Pressure Hot Water (LPHW) on/off at 82/71 °C, with air on at 20 °C.

Table 2-5 : Maxima W335 model - unit performance data

MAXIMA W335 MODEL - UNIT PERFORMANCE DATA

Cooling duties[1] are based upon chilled water on/off at 5.5/11.0 °C, with air on at 23/16 °C dry/wet bulb.
Heating duties[1] are based upon Low Pressure Hot Water (LPHW) on/off at 82/71 °C, with air on at 20 °C.
For other water temperatures, apply correction factors from below the table.

Model/Range W335/	Speed Range Number	Noise Rating[2] NR	Airflow Volume[3] l/sec	Sensible Cooling kW	Total Cooling kW	Heating kW	Pre-11/02[4] Elec. Load kW	Post 11/02[4] Elec. Load kW
312Q	1	24	155	2.98	3.65	3.60	0.51	0.36
	4	29	256	4.57	5.60	4.80	0.51	0.36
	8	34	398	6.49	7.95	6.15	0.51	0.36
414	1	29	283	5.18	6.35	8.02	1.08	1.08
	4	34	409	6.98	8.55	10.13	1.08	1.08
	8	41	635	9.87	12.10	13.44	1.08	1.08
414Q	1	25	191	3.71	4.56	4.35	0.68	0.48
	4	29	300	5.47	6.70	5.60	0.68	0.48
	8	34	469	7.92	9.70	7.20	0.68	0.48
517	1	30	310	5.88	7.20	9.25	1.35	1.35
	4	34	486	8.57	10.50	12.28	1.35	1.35
	8	40	720	11.75	14.40	15.79	1.35	1.35

NOTES:

1 All cooling and heating duties shown are coil duties only and do not allow for any fan motor or duct gains.

2 All NR figures have been calculated making the following assumptions:
   a. Room absorption of 8 dB.
   b. Ceiling loss of: dB 4 7 9 11 14 16
      In the frequency of: Hz 125 250 500 1k 2k 4k
   c. A one metre length of non-regenerative, unlined PVC flexible ducting be dible

Eaton-Williams

Fig. 2-4 Airside Fan Coil Units - cooling performance summary

Table 2-7 : Supreme A275 model - unit performance data

SUPREME A275 MODEL - UNIT PERFORMANCE DATA

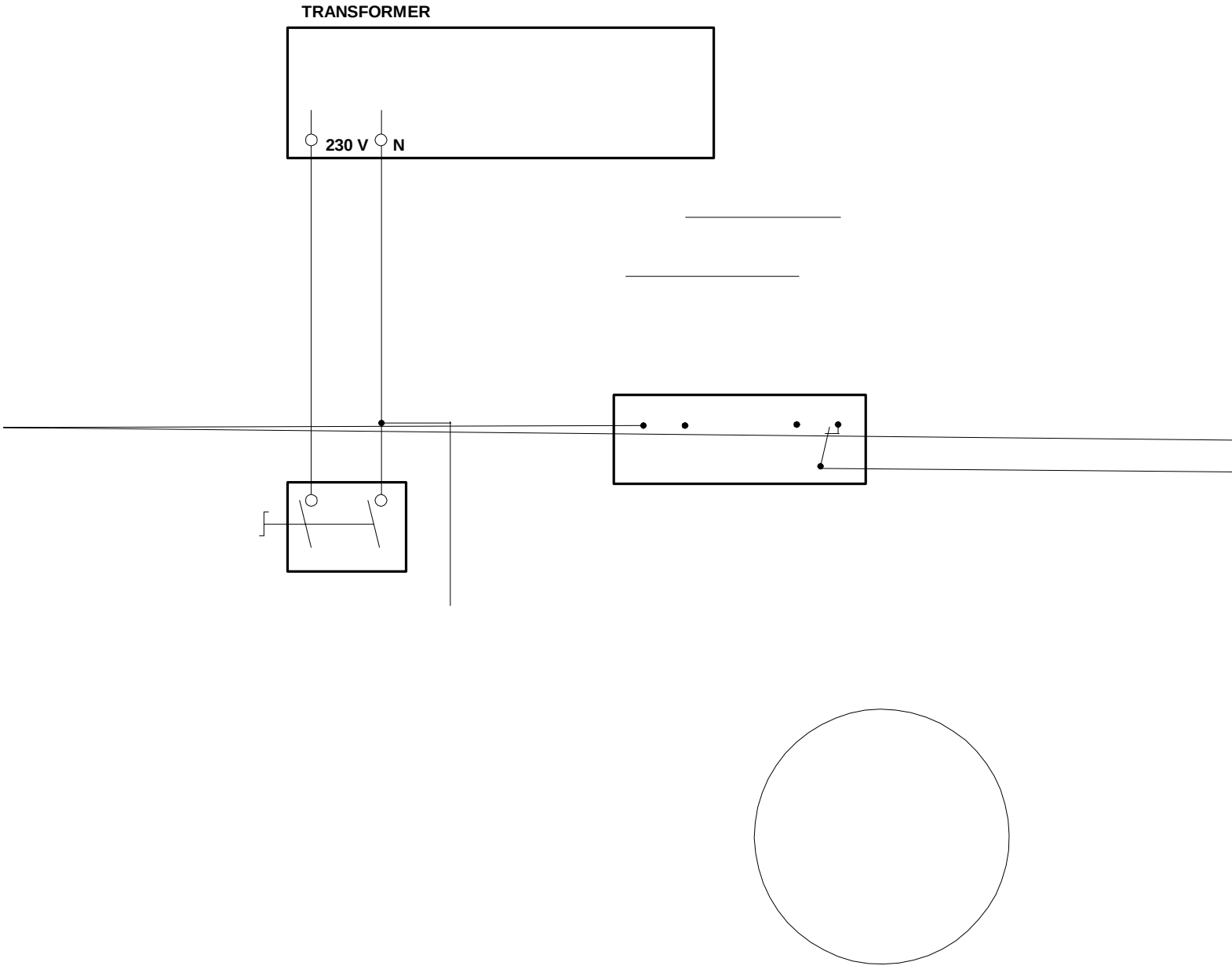
Cooling duties[1] are based upon chilled water on/off at 5.5/11.0 °C, with air on at 23/16 °C dry/wet bulb.
Heating duties[1] are based upon Low Pressure Hot Water (LPHW) on/off at 82/71 °C, with air on at 20 °C.
For other water temperatures, apply correction factors from below the table.

Model/Range A275/	Speed Range Number	Noise Rating[2] NR	Airflow Volume[3] l/sec	Sensible Cooling kW	Total Cooling kW	Heating kW	Pre-11/02[4] Elec. Load kW	Post 11/02[4] Elec. Load kW
105	1	24	49	0.87	1.19	1.11	0.17	0.12
	4	30	79	1.33	1.77	1.51	0.17	0.12
	8	36	119	1.93	2.58	1.94	0.17	0.12
208	1	27	104	1.74	2.32	2.18	0.34	0.24
	4	34	155	2.57	3.42	2.73	0.34	0.24
	8	42	233	3.66	4.75	3.53	0.34	0.24
310	1	30	142	2.30	3.03	2.86	0.51	0.36
	4	36	218	3.52	4.63	3.76	0.51	0.36
	8	44	313	4.76	6.11	4.66	0.51	0.36
414	1	31	200	3.24	4.26	3.82	0.68	0.48
	4	36	286	4.65	6.11	4.82	0.68	0.48
	8	44	411	6.24	8.01	6.02	0.68	0.48

NOTES:

1 All cooling and heating duties shown are coil duties only and do not allow for any fan motor or duct gains.
2 All NR figures have been calculated making the following assumptions:

Fig. 2-5 Fan coil unit controls standard wiring diagram

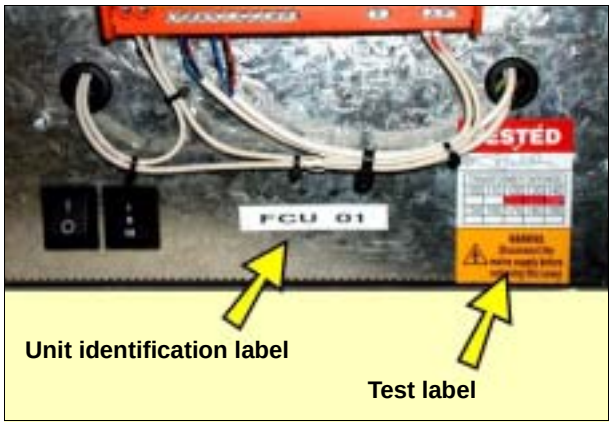


2.5. UNIT IDENTIFICATION

Each unit is identified by a white label on the control box, as indicated in Fig. 2-6.

The unit identification number should always be quoted when ordering service parts or if it should be necessary to make a warranty claim.

Fig. 2-6 Location of identification label and test label



2.6. TEST LABEL

After manufacture, each unit is factory-tested for earth continuity, insulation, flash and functionality (where applicable).

The Test Label is then affixed to the unit as indicated in Fig. 2-6 and illustrated in Fig. 2-7.

Fig. 2-7 Test label (typical example)

As well as being signed to show that the unit has passed stringent testing, the test label is also marked to indicate the voltage tappings used to provide power to the fan(s).

Fig. 2-7 shows a typical example of a Test Label, where the Transformer Tappings table has been marked in red to indicate the three tappings for fan power supply, according to specified duty rating of the particular unit.

Each of the three connections made to tappings on the transformer corresponds to one of the three positions of the fan speed control switch:

- I - fan low speed.
- II - fan normal (design rated) speed.
- III - fan high speed.

The number of tappings available on the transformer for fan power is eight - from 160 to 230 V ac, in increments of 10 V ac - thereby enabling output to be changed according to requirements, within the duty range of the unit.

Transformers fitted to units manufactured before November 2002 (nominally) have eight tappings, from 110 to 180 V ac.

In addition to the eight fan speed range options provided by the transformer, a -5 V tapping is provided, to enable fine-tuning of fan speed (should this be necessary).

Using the -5 V tapping reduces tappings on the transformer by 5 V, thereby effectively increasing the number of speed range options available, from eight to sixteen.

For details on changing the fan speed control range of a unit, refer to 5.13.

Note that a 24 V ac tapping is also provided for temperature controller power supply.

2.7. RELIABILITY

To ensure long-term reliability, fans and motors are each fitted with sealed-for-life bearings that enable mounting in any attitude.

L10 life expectancy is between 30,000 and 50,000 hours, depending on ambient conditions.

2.8. SERVICEABILITY

The average time required to carry out routine maintenance, replace/renew service items and return the unit to operational condition is approximately 1 hour, provided that free access to the unit is available.

For details of recommended service parts for each unit, together with contact and ordering details, refer to Section 7 - SERVICE PARTS.

2.9. MAIN COMPONENTS

Each Fan Coil Unit comprises the following main components as standard.

- **Fans**
- **Heating and cooling coil matrix heat exchanger**
  Copper tube/aluminium fins
- **Air filters**
  Semi-washable, EU2/3 grade to Eurovent 4/5
- **Casing insulation**
  Class '0'
- **Condensate drain tray**
  3-way fall
- **Circular air spigots**
- **Inlet plenum**
  (Certain models only)
- **Control housing**
- **Transformer**
  Fitted within the control housing, pre-wired to the fan and with 24 V ac tapping available for temperature controller power supply.
- **240 V ac fused connection block**
  Fitted within the control housing
- **DIN rail**
- **On/Off control switch**
  Fitted to the control housing
- **Manually operated, three-speed, fan control switch**
  Fitted to the control housing

2.10. OPTIONS

The following components are available as optional extras:

- **Hot water and chilled water flow control valves and actuators**
  Either modulating or on/off type
- **Compression fittings**
  For pipe connections
- **Air inlet plenum(s)**
  Certain models only
- **Acoustic inlet plenum**
- **Oval spigots**
- **Rectangular spigots**
- **Top access**
- **1.2 mm thick steel, galvanised, casing**
- **Condensate pump**
- **Extended condensate drain tray**
- **ST8 binder points, tees and bushes**
- **Controller**
  Stand-alone, may be mounted on the control housing or remote.
  (not Building Management System compatible)
- **Intelligent control**
  For interfacing with a system control centre (Building Management System compatible).
- **Return air temperature sensor**
- **Room air temperature sensor**
  (Non-adjustable)
- **Room air temperature sensor with set point adjustment**
- **Remote 3-speed control switch**
- **Room occupancy sensors**
  For energy conservation
- **Isolator switch**
- **Water detection device**
- **Electrical heater**

2.11. AIRFLOW SPIGOT OPTIONS

2.12. COOLING PROCESS

Chilled water is piped to the cooling section of the heat exchange coil block via either a four or two port control valve, which may be either of the modulating or on/off type.

Modulating valves are actuator operated in response to sensed air temperature and can therefore be controlled to precisely meter the flow of chilled water to closely match the cooling requirement.

The flow volume and temperature of chilled water determines the cooling effect of the unit.

2.13. HEATING PROCESS

There are two types of heating systems that can be specified:

- Low Pressure Hot Water (LPHW)
- Electrical (optional)

2.13.1. Low pressure hot water heating system

LPHW is piped to the heating section of the heat exchange coil block via either a four or two port control valve, which, similar to as for the cooling process, may be either of the modulating or on/off type.

Modulating valves are actuator operated in response to sensed air temperature and can therefore be controlled to precisely meter the flow of hot water to closely4(e)145.3(e)6.6(t)lh12.1(p)-13.3(t)11.4(e)-1.2(e)-15 cl lnpg
treq10.1(u)-7.2(oi10.9(r)6.1(temen9.1(t10.94.)]TJETEMC/Body <MCID 78BDCBT9 0 0 9 56.52 43845603 Tm0.00658

2.15. TEMPERATURE CONTROL

All units can be fitted with any type of fan coil controller currently manufactured.

Such controllers can function from remote sensors and have built-in or remote set point adjustment, and control the operation of 2, 3 or 4-port valves, which can be either the on/off type, or the modulating (positioning3(c)-62(l)-087a814.4(o) 56.52 (-622.8(ng3(c)-sn17.89.1(5d(o)1p(io)-13-14.8(r)-1.5(e)-5.9(d)-

2.20. HEAT EXCHANGER

As standard, heat exchanger coil matrix blocks are manufactured from seamless copper tubes, which are mechanically expanded to fit the plate type aluminium fins.

In this way, good mechanical contact is achieved between the tube and fin, thereby ensuring efficient heat transfer from tube to fin and vice versa.

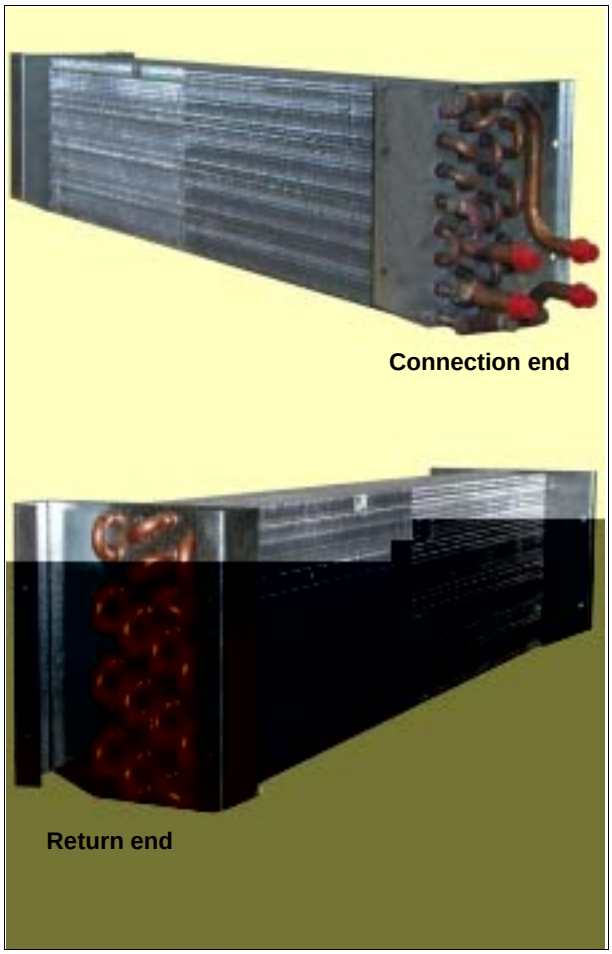
To obtain maximum heat transfer, the aluminium fin, die-formed collars are consistently spaced and completely cover the straight lengths of the matrix tubing within the block.

Fin spacing is limited to 470 fins per metre. Coil headers are manufactured from heavy gauge seamless copper tube.

All coils are individually pressure tested to 15 bar g, using dry air, in water at 20 °C.

Any condensate droplets resulting from the cooling process drain from the coil block and fall into the condensate drain tray, described under 2.21.

Fig. 2-11 Heat exchanger coil matrix



2.21. CONDENSATE DRAIN TRAY

The condensate drain tray, shown in Fig. 2-12, is fitted to the bottom of the heat exchanger and collects any condensate droplets resulting from the cooling process.

The tray extends beyond the heat exchanger coil block to include the area below the 2, 3 or 4-port flow control valves and their pipe connections.

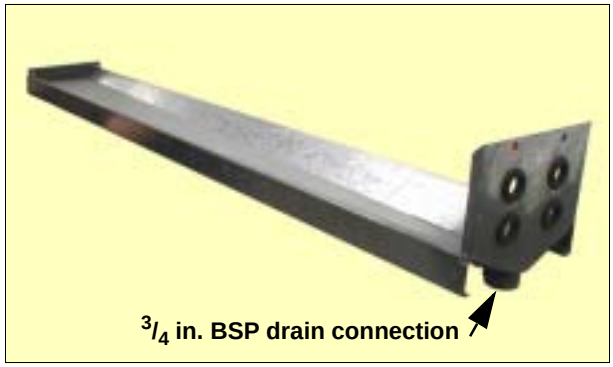
As an option, a longer extended tray can be specified that will include the area below additional equipment, such as commissioning valves.

The tray has been specially designed to incorporate a built-in fall toward the drain connection, thereby ensuring that condensate drains quickly and does not accumulate in the tray.

To prevent condensation from forming on the underside of the tray, it is insulated underneath using Class '0' rated thermal insulation.

Hot, and cold, pipework entry points are identified by red, and blue dot labels, respectively, positioned above the grommeted entry holes for pipework.

Fig. 2-12 Condensate drain tray



2.22. EMERGENCY SHUTDOWN (optional)

In an emergency, the unit must be shutdown by using the quickest means possible.

WARNING! **In an emergency, do NOT attempt to use controller functions to shutdown equipment, as this will initiate a controlled shutdown that is unlikely to be effective immediately.**

It is recommended that an external Emergency Stop button is fitted, which when pressed will interrupt the power supply, shutting down the unit(s). For details on connection and operation, refer to the controller manufacturer's instruction manual and the unit wiring diagram.

2.23. FLOOD DETECTION (optional)

If required, a condensate pump flood detection device can be fitted at site and arranged to interrupt power to the unit in the event of a flood.

2.24. ELECTRICAL EQUIPMENT

All components are internally wired to terminals. External wiring must be made by customer, to local regulations.

The following electrical connections are required for standard units:

- **230 Volt, 3-wire, single phase, neutral and earth mains supply**
- **Temperature control sensor** (option)
- **Controller** (option)
- **Remote start/stop** (option)
- **Remote 3-speed control switch** (option)
- **Control housing**
- **Transformer**

  The model of transformer fitted and the range of Voltage tappings available is dependent on

Note the following points:

- The equipment will, under all conditions, function within the limits required by Electromagnetic Compatibility Standards BS EN 50081-1:1992 and BS EN 50081-2:1994.
- Wiring cable is PVC insulated to BS 623, or BS 6004 as appropriate and is installed in accordance with BS EN60204.
- Conductors are identified by colour coded cables or by numbered ferrules, enabling easy identification and reference to the circuit diagram.
- Where cables are grouped together in runs and subject to movement, they are suitably secured and protected from mechanical abrasion by a PVC sheath.

SECTION: 3

INSTALLATION

3.0. INTRODUCTION

The purpose of this section is to provide an overall guide for the installation of Fan Coil units and is not an exhaustive step-by-step installation guide. Each site will vary in requirements regarding layout and obstacles to overcome.

WARNING! **The unit must remain electrically isolated throughout the installation procedure.**

If there are queries or points of uncertainty, refer to Colman Moducel for clarification.

3.1. PERSONS PERMITTED TO CARRY OUT INSTALLATION

Only personnel who have been properly trained in the installation of fan coil units should be permitted to carry out installation of the equipment covered by this manual.

3.2. ARRIVAL AT SITE

On arrival of a unit at site, any damage found must be reported to Colman Moducel, or their appointed distributor, immediately.

Units are normally despatched enclosed in suitable packaging for protection during transit. The arrangement and type of packaging will vary according to the method of transportation, site location, unit type and quantity, etc.

Before Acceptance

- Before unpacking, check all packaging for any evidence of damage that could indicate possible damage to a unit within.
- Carefully remove all packaging and then thoroughly check each unit for damage. Do not allow the unit to become wet.
- Report any unit damage to the carrier and to Colman Moducel immediately.

Colman Moducel cannot be held responsible for any damage occurring during transit.

3.3. HANDLING

Before moving units, check the weight by referring to the Technical Data table in the Unit Description section. Add an adequate allowance for any significant packaging, such as wooden crating.

CAUTION! **Do not allow a unit to drop, otherwise it may be irreparably damaged.**

To avoid damage to the unit or injury to personnel, observe the following points:

- Observe Health and Safety guidelines at all times.
- Ensure that any lifting and handling gear used is of adequate specification.
- Do not allow a unit to drop.

Units can be moved around using appropriate equipment, such as a forklift truck.

3.4. STORAGE

Units that are not installed directly following arrival at site must be stored in a weatherproof, dry, well-ventilated and vermin-free area.

To prevent Brinelling of bearings, units must be stored in a vibration-free area, otherwise adequate steps must be taken to prevent such damage.

3.5. INSTALLATION CONSIDERATIONS

A number of factors must be assessed regarding the installation of Fan Coil units.

3.5.1. Unit service requirements

- **Air ductwork**
- **Chilled water pipework** - must be suitably lagged to minimise heat transfer and condensation.
- **Hot water pipework** - must be properly lagged to minimise heat transfer.
- **Condensate drain** - must be arranged to discharge directly into a properly designed drain.
- **Electrical fittings and installations** - must be suitably rated.

3.5.2. Noise

Fan Coil Units are specifically designed to keep noise levels to a minimum. However, the installation must be checked regarding noise levels generated during operation, to ensure that local requirements and limitations are adhered to.

3.5.3. Positioning

To facilitate routine maintenance, it is essential that units are sited so that adequate access is provided for routine maintenance.

NOTE: Fan Coil Units are designed for indoor use only.

Allow for the following:

- Removal and replacement of the condensate drain tray, which is removed downwards out of the unit.
- Removal and replacement of the heat exchange coil matrix block, which drops downwards through the base of the unit.
- Removal and replacement of the air filter.
- Control housing access; the door open downwards.
- Internal cleaning of the casing and fan and motor servicing; either from below the unit (standard), or above the unit (option).

3.6. INSTALLING IN POSITION

The unit must be installed in accordance with good engineering practice and must be upright and table; i.e. level in both planes.

Suspend the unit according to the CORRECT examples shown in **Fig. 3-1**.

3.6.1. Installation clearances

Allow clearance for maintenance.

3.7. PIPING UP THE SYSTEM

3.9.1. Condensate pump

If the drain line is required to rise above the condensate tray a suitably rated condensate pump may be fitted.

The pump should be installed so that the length of drain line between the drain connection and the pump is kept to a minimum.

To ensure that any latent condensation is removed form the tray, the pump should always overrun after the unit stops.

3.10. POWER SUPPLY

Units must be provided with a reliable power supply of 230 Vac, 1 ph, 50 Hz.

Where a number of units are installed, ensure that the supply is adequately rated to meet maximum demand.

This point is particularly important if units restart simultaneously following a temporary cut in the power supply to the building, and especially where electrical heating (optional) is used.

3.11. ELECTRICAL CONNECTIONS

All terminals for customer connection of power supply and control circuits are located in the control housing.

Cable entry points are grommeted.

Note the following points:

- Do not run power and any controller signal wiring close together.
- If it is necessary for signal wiring to cross power cables, ensure that they cross at right angles to each other.

For details of mains power supply and control circuits, refer to specific unit wiring diagrams.

SECTION: 4

COMMISSIONING

4.0. INTRODUCTION

The purpose of this section is to describe commissioning of Colman Moducel Fan Coil Units.

Information provided in this section is intended for guidance only and is not an exhaustive step-by-step commissioning guide. Although similar, each installation will have characteristics peculiar to it.

Any queries or points of uncertainty should be discussed with the Colman Moducel, or their authorised agents, for clarification.

Read through these instruction carefully before commencing the commissioning process.

4.1. PERSONS PERMITTED TO CARRY OUT COMMISSIONING

Only personnel who have been properly trained in the commissioning of this type of equipment should be permitted to carry out commissioning of the equipment covered by this manual.

4.2. COMMISSIONING PROCEDURE - UNIT(S) NON-OPERATIONAL

This part of the commissioning procedure is carried out with the unit(s) non-operational and before the power supply is turned on.

WARNING! **Do NOT supply power to the unit while carrying out this part of the commissioning procedure.**

Carry out the following in order of sequence.

1. Check that the power supply to the unit is switched **OFF** at the external isolator (if fitted), fuse box, or distribution board. For increased safety, remove any fuses in the power supply to the unit.

WARNING! **To prevent personnel from restoring power to the unit, place warning notices where applicable.**

2. Check that the earth connection is correctly made to the unit.
3. Check that the earth connection is correctly made to flow and return pipework and any metal condensate drain pipes (where fitted).
4. Remove any remaining packing material from the outside of the unit.
5. Ensure that all units, duct work and louvres are clean and free of any installation debris.

   The area must be made clean of light litter, such as sawdust or paper particles, that may become airborne and clog the air filter(s).
6. Check that each cooling and heating pipework circuit has been connected correctly and that flow and return connections are correct.

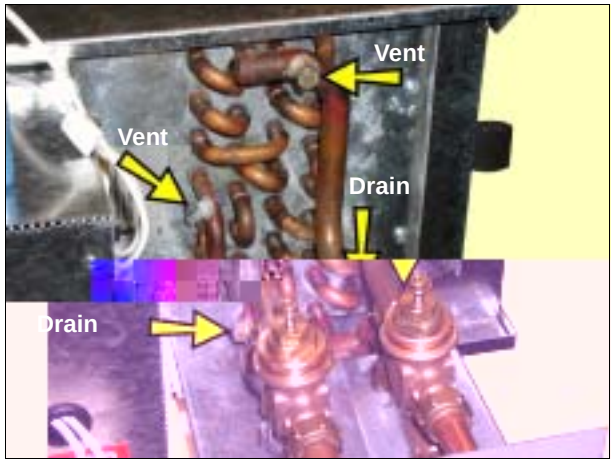
   This may seem obvious, but it is surprisingly easy for system pipework to be inadvertently cross-connected during installation.
7. Check that all pipework is insulated correctly, including any through-wall pipework.
8. Check that all unit coil vent and drain valves are closed.
9. Fill the cooling system circuit by opening appropriate isolating valves.

   Purge as much air as possible from the system by using the highest of any manually operated external vent valves.

   Check the system for leaks and make any repairs as necessary.
10. After allowing the system to fill as much as possible, start the cooling system circulating pump.

    Continue to purge as much air as possible from the system.
11. Purge air from the coil by partially opening the cooling coil vent valve; refer to Fig. 4-1.

Fig. 4-1 Coil block vent and drain plug locations



When all air has been purged from the coil, close the vent valve.

For multiple installations, purge all air from the unit closest to the pump in the system circuit flow first. Then proceed to the next closest and so on round the system circuit until each unit has been purged of air.

Note:
Failure to purge all air from the system and coil block will result in poor performance from the unit.

12. Repeat steps 9 to 11 for the heating system and each unit heating coil (if fitted).
13. Ensure that the power supply is of the correct voltage and that all electrical connections made at site are correct.
14. Ensure that external controls, such as Fire Shutdown (if fitted) and Smoke Detection (if fitted) are in the normal state; i.e. operative.

15. Check that all mains electrical connections are tight and secure.
16. Check that the gap between the coil block and the condensate tray, and tray itself, are free of debris.
17. Check that mating surfaces of all ductwork are sealed correctly.

4.3. UNIT OPERATIONAL CHECKS

1. Switch **ON** unit at external isolator switch, fuse box or distribution board.

2. Switch the fan control 3-speed switch to select medium speed.
3. Switch **ON** the unit at its **ON / OFF** switch.
4. Check the airflow and for any adverse noises.

   If any adverse noises are noticed, investigate the cause as follows, otherwise proceed to step **a**.

   a. Switch **OFF** the unit at its **ON / OFF** control switch and at the external isolator (if fitted), fuse box, or distribution board. For increase1CBf-6.3xchyr bvb.stbt.

SECTION: 5

PREVENTIVE AND GENERAL MAINTENANCE

5.0. INTRODUCTION

The purpose of this section is to provide an overall guide for first line preventive maintenance tasks for standard Colman Moducel Fan Coil Units and is not an exhaustive step-by-step maintenance guide.

If there are queries or points of uncertainty, refer to Colman Moducel for clarification. Also refer to any special instructions issued by Colman Moducel for a specific project.

Maintenance checklists are provided under **5.8** and should be completed by the maintenance engineer.

5.1. PERSONS PERMITTED TO CARRY OUT PREVENTIVE MAINTENANCE

Only personnel who have been properly trained in the maintenance of this type of equipment should be permitted to carry out maintenance of the equipment covered by this manual.

Tasks should be programmed initially to take place at quarterly intervals. However, the frequency with which air filters require attention will vary, depending on site location, air quality and demand, etc.

The frequency of preventive maintenance checks and tasks should therefore be adjusted upwards or downwards according to local conditions and based on practical experience.

5.2. PREVENTIVE MAINTENANCE OBJECTIVES

Performing the tasks in this section will ensure that air filters are changed before contamination restricts airflow and, high air quality is maintained.

5.3. TOOLS AND CONSUMABLES

The following items are required:

- Standard tool set.
- Polythene dustbin liner for handling/disposal of filters.
- Adhesive tape or string to seal the dustbin liner and prevent dust escaping.
- New filter elements, where renewal is necessary. For details, refer to **Section 7**.
- Vacuum cleaner.

5.4. PREVENTIVE MAINTENANCE TASKS

Carry out preventive maintenance by adhering to the following procedure:

NOTE! **If the installation comprises a**

Note that cleaning will not remove all discolouration from the filter surface.

If filters are to be renewed instead of cleaned, seal the old ones in a dustbin liner for disposal.

5. Fit cleaned or new filter panels by reversal of the removal process.

NOTE! **Ensure that the air filter surfaces are fitted in the correct orientation for the airflow, otherwise, when the unit next starts, residual dust particles will be driven from the filter surface and enter the supply airflow to the room.**

The 'dirty' surface of the filter must face into the airflow; i.e. face outwards.

Fig. 5-1 Air filter removal - current design

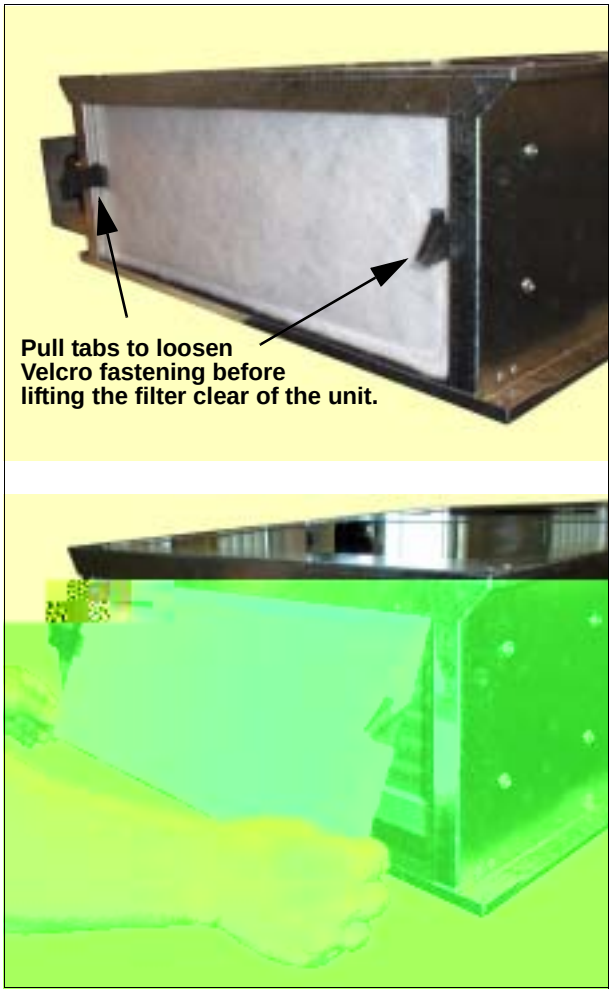
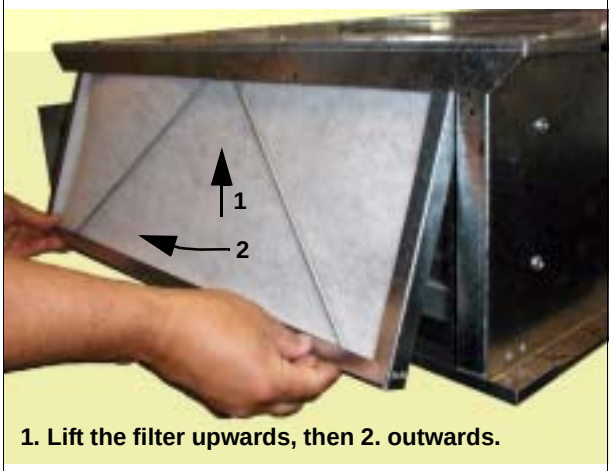
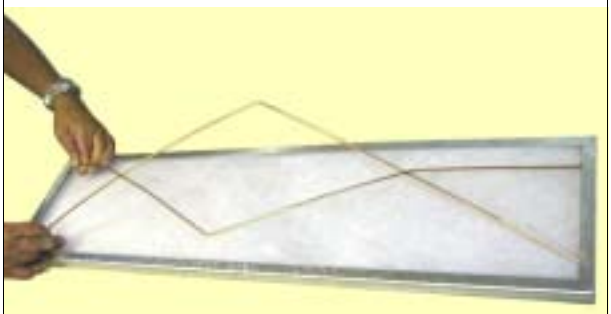


Fig. 5-2 Air filter removal - original design



1. Lift the filter upwards, then 2. outwards.



Remove retaining wire to remove the filter element.

5.4.2. Unit Cabinet and Components

Referring to Figs. 5-3 to 5-7, carry out the following cleaning and inspection procedures:

1. Vacuum and clean out the inside of the cabinet, paying attention to all surfaces.
2. Clean out the condensate tray and check for blockages. Pour 1.5 litres of disinfected water into the tray and check that the water flows to drain.
3. Inspect fan impeller(s) and bearings for wear and mechanical movement.
4. Check the condition of electrical connections to heater elements (if fitted).
5. Check all wiring for damage to insulation and tightness of electrical connections.
6. Closely inspect unit suspension fittings for secureness and signs of failure.

5.4.3. Earth Wiring and Connections

Check the integrity of all earth connections, including external connections.

5.5. UNIT OPERATIONAL CHECKS

Ensure that all access panels are in place and secured correctly, restore power to the unit and then bring it into operation by switching **ON** at the unit.

Carry out unit operational checks as described under each heading following:

5.5.1. Fan(s)

With the unit operating, listen for any adverse noises or vibrations. If neee87 TD0.0054 Tc0 Tw57 Tw(5)-10(.)4iocntonnecc.7(b)11.ecbte TfEMC7(y adv)2t.6(c)-4(2.

Table 5-2 : Maintenance checklist

SIX-MONTHLY MAINTENANCE CHECKLIST			
Refer to Para.	**Task Description**		**✓**
5.4.1	**Air Filters** - clean or renew. Part of the three-monthly (nominal) maintenance.		
5.4.2	**Unit Cabinet and Components**		
	Vacuum and clean internally		
	Condensate tray - clean and check drainage		
	Inspect fan impeller(s) and bearings for wear and movement		
	Check heater element electrical connections for tightness		
	Check all wiring for insulation damage and tightness of connections		
	Inspect unit suspension fittings for secureness and signs of failure		
5.4.3	**Earth Wiring and Connections** - check connections		
5.5.1	**Fan(s)** - check for noise or vibration		
5.5.2	**Condensate pump (if fitted)** - carry out maintenance and check operation		
5.5.3	**Return air temperature sensor** - clean and check		
5.5.4	**External controls (if fitted)**		
	Emergency Stop - check function		
	Fire Shutdown - check function		
	Smoke Detection - check function		
	Flood detection - check function		
5.5.5	**Electrical Heater (if fitted)**		
	MPCB trip		
	Overload setting	value	
	High temperature safety thermal cut-out function	value	
	Airflow switch function	value	
	Overrun control function (if applicable)	value	
5.5.6	**Control Functions** - check the function of each		
5.5.7	Cooling **ON** temperature control	value	
	Cooling **OFF** temperature control	value	
	Heating **ON** temperature control (if applicable)	value	
	Heating **OFF** temperature control (if applicable)	value	
	Temperature set point	value	
	Finalising Preventive Maintenance Checks		
	Restore temperature control to its normal value	value	
	Record return air temperature	value	

Maintenance carried out by:

Printed Name **Signature**

Organisation **Date**

5.9. FAN RENEWAL

To renew a fan, referring to Figs. 5-3 to 5-7, carry out the following procedure:

WARNING! **A fan is a relatively heavy item, therefore, before attempting removal, check the weight in the appropriate Table under 2.2.4 and take necessary precautions to manage the weight safely during removal.**

1. Switch **OFF** the unit at its control switch.
2. Switch **OFF** the unit external isolator (if fitted) and padlock (if possible).

WARNING! **Place a suitable notice to prevent the isolator from being inadvertently switched ON by other personnel.**

3. Open the unit access panel(s).
4. Disconnect the fan motor wiring.
5. Unscrew the fan mounting screws and carefully lift the fan clear of the unit.

Reverse the above procedure to fit a new fan.

Fig. 5-3 Fan access panel

Fig. 5-4 Removing the fan access panel.

Fig. 5-5 Fan access panel removed.

Fig. 5-6 Fan motor wiring.

Fig. 5-7 Fan removal

5.10. REMOVAL OF THE HEAT EXCHANGE COIL BLOCK, COMPLETE WITH CONTROL VALVES AND CONDENSATE DRAIN TRAY

To remove the coil block / control valves / condensate tray sub-assembly, adopt the following procedure:

1. Switch **OFF** the unit at its on/off control switch.
2. Switch **OFF** the unit external isolator (if fitted) and padlock (if possible).
3. Isolate the unit from the system pipework by closing flow and return isolating valves as close as possible to the unit.
4. Drain the coil block of system water by opening coil block vent and drain plugs; **Fig. 5-8** shows typical locations.

   Allow condensate and system water from the coil block to drain into the condensate drain tray. If necessary, operate the condensate pump (if fitted) to remove the water from the drain tray.
5. Remove control valve actuators. Disconnect wiring as necessary, noting connections for later reference during reassembly.
6. Disconnect or temporarily reposition any wiring, such as the return air temperature sensor (if fitted), so that it will not be damaged or restrict removal of the condensate tray and coil block. If wiring must be disconnected, note connections for later reference.
7. Disconnect and remove all external flow and return pipework to and from flow control valves.
8. After as much water as possible has been drained from the coil block and drain tray, disconnect the condensate drain line from the bottom of the drain tray; $^{3}/_{4}$ in BSP

5.13. CHANGING THE FAN SPEED RANGE

Should the airflow volume be too low or too high and altering the fan speed by using the fan control 3-speed switch is found to be inadequate, the fan speed range of a unit may be changed to increase or decrease the airflow volume.

This is achieved by altering the voltage tappings at the transformer and is carried out as follows:

NOTE:
Increasing the fan speed range to increase airflow volume will increase the NR level.

Design speed range voltage tappings for a unit are indicated on its Test Label; see Figs. 2-6 and 2-7. Also refer to the standard wiring diagram shown in Fig. 2-5.

1. Switch **OFF** the unit at its **ON / OFF** switch and external isolator (if fitted) and padlock (if possible).

WARNING! **Place a suitable notice to prevent other personnel from inadvertently switching the isolator back ON.**

2. Unscrew the control box front cover securing screws (normally thumbscrews), then open the control box front cover, which is hinged and opens downwards.
3. Check that the control box is electrically isolated.
4. The transformer is fixed to the base inside the control box and is marked to indicate voltage tappings.

   The model of transformer fitted and the range of Voltage tappings available is dependent on the date (nominal) of manufacture; before or after November 2002, as shown in Table 5-3.

Table 5-3 : Transformer tappings available

Tapping Voltages	Pre-Nov. 02	Post Nov. 02
110	✓	
120	✓	
130	✓	
140	✓	
150	✓	
160	✓	✓
170	✓	✓
180	✓	✓
190		✓
200		✓
210		✓
220		✓
230		✓

These tappings provide a range of eight main fan control speed options.

Three wires (usually yellow, orange, and grey) are connected (as built to specification) from the appropriate transformer voltage tappings to the fan control 3-speed switch.

For example:

Yellow may be connected from the 160 V tapping to switch position 'I', for low speed control.

Orange may be connected from the 170 V tapping to switch position 'II', for medium speed control.

Grey may be connected from the 180 V tapping to switch position 'III', for high speed control.

To change the transformer voltage tappings to give the next highest speed range:

Grey would be moved to the 190 V tapping.

Orange would be moved to the 180 V tapping.

Yellow would be moved to the 170 V tapping.

Note that the wiring remains in the same colour sequence.

Conversely, to change the transformer voltage tappings to give the next lowest speed range, the wiring would be changed to the next lowest tapping, starting with yellow, then orange, then grey.

5. Once the required connections have been made, close and secure the control box cover.
6. Check that controller wiring has not been disturbed and is secure.

If required, fan speed control can be fine-tuned as described under 5.13.1.

Fig. 5-12 Transformer - post November 2002

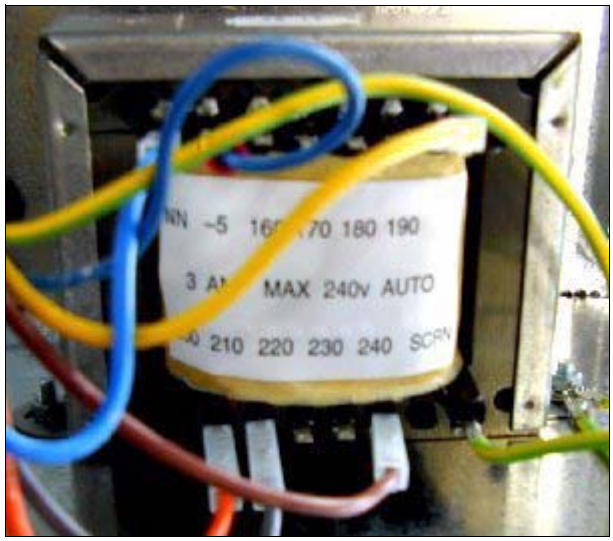
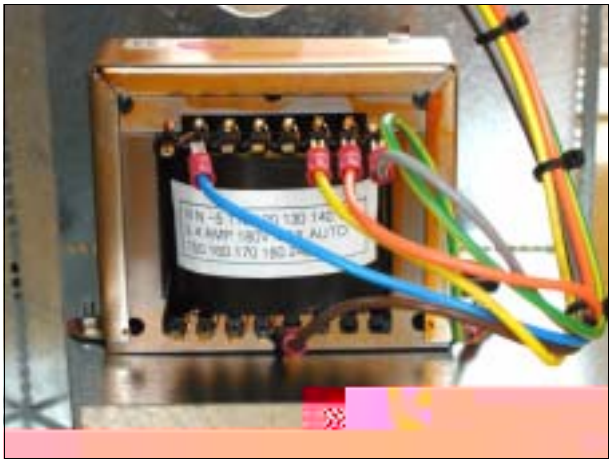


Fig. 5-13 Transformer - pre-November 2002



5.13.1. Fine-tuning fan speed control

In addition to the eight main speed range options, as described under **5.13**, a -5 V tapping is provided, that enables fine-tuning of fan speeds.

NOTE:
Using the -5 V tapping reduces voltage output from tappings on the transformer by 5 V.

To use the -5 V tapping:

1. Carry out steps 1 to 3 under **5.13**.

WARNING! **Do not omit or bypass these steps. The unit MUST be electrically isolated before work is carried out.**

2. Change the Neutral connection over to the **-5** tapping.
3. Close and secure the control box cover.
4. Check that controller wiring has not been disturbed and is secure.

SECTION: 6

FAULT FINDING PROCEDURES

6.0. FAULT FINDING

In the event of a malfunction, the fault finding chart shown in **Table 6-1** may be used to assist in fault diagnosis, identification of possible causes and remedial action

This information is provided for guidance only and is not exhaustive.

WARNING

BEFORE COMMENCING ANY WORK - ELECTRICALLY ISOLATE THE UNIT!

For increased safety, place suitable notices to prevent other personnel from inadvertently restoring the power supply.

CAUTION

Never allow mains voltage to be applied to any connection to the controller, otherwise it may be irreparably damaged.

For this reason, be especially careful if using low impedance instruments for checking voltage, etc.

No field repairs to the controller should be attempted.

Table 6-1 : Fault finding.

FAULT FINDING		
Symptoms	**Possible Cause**	**Remedial Action**
NO AIR FLOW - fan motor not running	a. No control signal.	a. Check that demand is required. Check control signal and wiring continuity. Check controller function - renew if necessary.
	b. No power supply to the motor.	b. Check supply and wiring continuity. Check that control switches are wired correctly.
	c. Fan / motor failure.	c. Check for free rotation, bearings for wear, and adequate clearances. Check fan resistance for stall conditions in ducts etc. Check motor for fault and renew if necessary; see **5.9**.
	d. Capacitor faulty or incorrectly rated.	d. Renew capacitor.
	e. Fan power supply transformer fault.	e. Renew transformer.
NO AIR FLOW - but fan runs	a. Duct blockage.	a. Clear blockage.
	b. Damper(s) partially closed.	b. Reposition damper(s) to give correct air flow.
NO AIR FLOW - motor runs but fan does not run	a. Fan impeller loose on its shaft.	a. Renew fan; see **5.9**.
AIR FLOW VERY LOW	a. Air filter severely choked.	a. Clean or renew the filter - increase frequency of maintenance; see **5.4.1**.
	b. Duct partially blocked.	b. Clear blockage.
AIR FLOW MARGINALLY LOW	a. Leakage on pressure side of the system ducting.	a. Repair leakage point.
	b. Duct resistance exceeds design.	b. Poor duct design or velocity too low - check and take corrective action, and/or, increase the fan speed setting either at the 3-speed switch or by changing the transformer tappings to give a faster fan speed as necessary; see **5.13**.

AIR FLOW HIGH	a. Large air leak into ceiling void or out of ducting.	a. Repair leakage point.
	b. Air filter missing.	b. Fit air filter.
	c. Duct resistance marginally below design.	c. Lower the fan speed setting either at the 3-speed switch or by changing the transformer tappings to give a slower fan speed as necessary; see **5.13**.
NO AIR COOLING	a. Water chilling plant not operating or faulty.	a. Check that the water chilling plant is operative - repair
	b. Cooling control thermostat set too high or faulty.	
	c. Flow control valve fault.	
	d. Airlock present.	
	e. Blockage in chilled water system.	
	f. Chilled water system strainer choked.	

Table 6-1 : Fault finding.

FAULT FINDING		
Symptoms	**Possible Cause**	**Remedial Action**
CONDENSATE LEAK	a. Drain line blocked. b. Condensate pump (if fitted) inoperative or faulty. c. Inadequate fall to drain. d. Air filter clogged. e. High lateral resistance. f. Leaking condensate tray.	a. Clear blockage. b. Check for correct operation - repair or renew if faulty; refer to the manufacturer's instructions. c. Check fall - correct as necessary. d. Clean or renew air filters; see **5.4.1**. e. Check system design - correct as necessary. f. Repair or renew the condensate tray; refer to **5.11**.

SECTION: 7

SERVICE PARTS

Table 7-2 : Service parts

Service Parts										
Unit	**Handing**	**Component / Part Number**								
		Coil	**Reload-able Filter**	**Wire Frame Filter**	**Fan Pre-11/02**	**Fan Post 11/02**	**Trans-former Pre-11/02**	**Trans-former Post 11/02**	**On/Off Switch**	**3-Speed Switch**
W235/105	L	4COI1976	4FIL2145	4FIL7003	4FAN1982	4FAN2000	5TRA0001	5TRA0006	4SWI2085	4SWI2086
	R	4COI1990								
W235/208	L	4COI1978	4FIL2146	4FIL7004						
	R	4COI1991								
W235/210 W235/310	L	4COI1980	4FIL2147	4FIL7005						
	R	4COI1992								
W235/312 W235/412	L	4COI2028	4FIL2148	4FIL7006						
	R	4COI1993								
W235/314 W235/414	L	4COI1981	4FIL2144	4FIL7007						
	R	4COI1994								
W335/ 312Q	L	4COI1985	n/a-	4FIL7014						
	R	4COI1986								
W335/414	L	4COI1982	4FIL2143	4FIL7015	4FAN2368	-	5TRA0002	5TRA0002		
	R	4COI1979								
W335/ 414Q	L	4COI1982	4FIL2143	4FIL7015	4FAN1982	4FAN2000	5TRA0001	5TRA0006		
	R	4COI1979								
W335/517	L	4COI1983	4FIL2142	4FIL7016	4FAN2368	-	5TRA0003	5TRA0003		
	R	4COI1984								
W285/312	L	4COI2800	n/a	4FIL7012	4FAN1982	4FAN2000	5TRA0001	5TRA0006		
	R	4COI2801								
W285/414	L	4COI2802	n/a	4FIL7013	4FAN1982	4FAN2000				
	R	4COI2803								
W175/108	L	4COI2030	4FIL1751	4FIL7000	4FAN2101	-		5TRA0001		
	R	4COI2022								
W175/210	L	4COI2031	4FIL1752	4FIL7001	4FAN2101	-	5TRA0001			
	R	4COI2023								
W175/315	L	4COI2032	4FIL1753	4FIL7002	4FAN2101	-				
	R	4COI2024								