



INSTALLATION & MAINTENANCE MANUAL

AlphaCool Plus

Controlled by **AIRE Tronix**

**Downflow - Close Control System - Chilled Water
100 kW-125 kW**



ISO 14001
EMS52086



ISO 9001
FM00542

About Airedale Products & Customer Services

WARRANTY, COMMISSIONING & MAINTENANCE

As standard, Airedale guarantees all non consumable **parts only** for a period of **24 months**, variations tailored to suit product and application are also available, please contact Airedale for full terms and details.

To further protect your investment in Airedale products, we have introduced Airedale Service, who can provide full commissioning services, comprehensive maintenance packages and service cover 24 hours a day, 365 days a year (UK mainland). For a free quotation contact our Airedale Service or your local Sales Engineer.

All Airedale products are designed in accordance with EU Directives regarding prevention of build up of water, associated with the risk of contaminants such as Legionella.

Effective removal of condensate is achieved by gradient drainage to outlets and where used, humidification systems produce sterile, non-toxic steam during normal operation.

For effective prevention of such risk it is necessary that the equipment is maintained in accordance with Airedale recommendations.

CAUTION

Warranty cover is not a substitute for Maintenance. Warranty cover is conditional to maintenance being carried out in accordance with the recommendations provided during the warranty period. Failure to have the maintenance procedures carried out will invalidate the warranty and any liabilities by Airedale International Air Conditioning Ltd.

SPARES

A spares list for 1, 3 and 5 years will be supplied with every unit and is also available from our Spares department on request.

TRAINING

As well as our comprehensive range of products, Airedale offers a modular range of Refrigeration and Air Conditioning Training courses, for further information please contact Airedale.

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CUSTOMER SERVICES

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Training Enquiries	+ 44 (0) 113 239 1000	marketing@airedale.com

For information, visit us at our Web Site: www.airedale.com

Contents

GENERAL STATEMENT	3
WARRANTY	4
GENERAL DESCRIPTION	5
INSTALLATION DATA	6
ELECTRICAL DATA	10
CONTROLS	11
COMMISSIONING PROCEDURE	16
COMMISSIONING DATA	17
TROUBLESHOOTING	25
MAINTENANCE	26
PARTS IDENTIFICATION	27



General Statement

IMPORTANT

The information contained in this manual is critical to the correct operation and maintenance of the unit and should be read by all persons responsible for the installation, commissioning and maintenance of this Airedale unit.

SAFETY

The equipment has been designed and manufactured to meet international safety standards but, like any mechanical/electrical equipment, care must be taken if you are to obtain the best results.

- CAUTION**  1 **Service and maintenance of Airedale equipment should only be carried out by Technically trained competent personnel.**
- CAUTION**  2 **When working with any air conditioning units ensure that the electrical isolator is switched off prior to servicing or repair work and that there is no power to any part of the equipment.**
- 3 Also ensure that there are no other power feeds to the unit such as fire alarm circuits, BMS circuits etc
- 4 Electrical installation commissioning and maintenance work on this equipment should be undertaken by competent and trained personnel in accordance with local relevant standards and codes of practice.
- 5 Refrigerant used in this range of products is classified under the COSHH regulations as an irritant, with set Occupational Exposure Levels (OEL) for consideration if this plant is installed in confined or poorly ventilated areas.
- 6 A full hazard data sheet in accordance with COSHH regulations is available should this be required.

Warranty

GENERAL

To be read in conjunction with Airedale International Air Conditioning Ltd standard Conditions of Sale.

The equipment carries Airedale's standard warranty for a period of 24 months from the date of despatch or of invoice which ever is the sooner in respect of non-consumable parts only and does not include for the cost of labour incurred during the investigation or replacement of a defective item.

WARRANTY IS ONLY VALID IN THE EVENT THAT:

- 1 The equipment is serviced and maintained by Airedale or an approved Airedale company in accordance with the Installation & Maintenance manual provided, during the Warranty Period.
- 2 Commissioning is carried out by Airedale or an approved Airedale company.
- 3 **Commissioning documents have been completed and returned to Airedale within 28 days of the date of commissioning.**
- 4 Replaced faulty parts have been returned to Airedale within 21 days of replacement for evaluation.

Any spare part supplied by Airedale under the warranty shall be warranted for the unexpired period of the warranty or 3 months from delivery whichever period is the longer, with the exception of compressors on which a further 12 months warranty is granted.

PROCEDURE

When a component part fails a replacement part should be obtained through our Spares department. If the part is considered to be under warranty, the following details are required to process this requirement.

- Full description of part required, including Airedale's part number, if known
- The original equipment serial number
- An appropriate purchase order number

Faulty Component Return Tag		No	28401
CUSTOMER		DATE	
ADDRESS		AIREDALE LIno: _____ CURT. OIno _____ Ex G/S No _____	
TYPE OF UNIT		COMPONENT DESCRIPTION	
SERIAL No (where applicable)		FAULTY DESCRIPTION (Faulty or Defective: not sufficient)	
DATE OF INVOICE		1. Original Equipment _____	
DATE OF INSTALLATION		2. Component (if different) _____	
DATE OF FAILURE		CUSTOMER COPY	
<small>Airedale International Air Conditioning Limited Leeds Road, Ransden, Leeds LS19 4JZ Tel: 0113 253 9000 Fax: 0113 250 7219 700-006</small>			

A spares order will be raised under our warranty system and the replacement part will be despatched, usually within 24 hours should they be in stock.

When replaced, the faulty part must be returned to Airedale with a suitably completed and securely attached "Faulty Component Return" (FCR) tag. FCR tags are available from Airedale and supplied with each Warranty order.

On receipt of the faulty part, suitably tagged, Airedale will pass to its Warranty department, where it will be fully inspected and tested in order to identify the reason for failure, identifying at the same time whether warranty is justified or not.

On completion of the investigation of the returned part, a full "Report on Goods Returned" will be issued. On occasion the release of this complete report may be delayed as component manufacturers become involved in the investigation.

When warranty is allowed, a credit against the Warranty invoice will be raised. Should warranty be refused the Warranty invoice becomes payable on normal terms.

EXCLUSIONS

Warranty may be refused for the following reasons:

- Misapplication of product or component
- Incorrect site installation
- Incomplete commissioning documentation
- Inadequate site installation
- Inadequate site maintenance
- Damage caused by mishandling
- Replaced part being returned damaged without explanation
- Unnecessary delays incurred in return of defective component

RETURNS ANALYSIS

All faulty components returned under warranty are analysed on a monthly basis as a means of verifying component and product reliability as well as supplier performance. It is important that all component failures are reported correctly.

General Description

UNIT IDENTIFICATION

ALPHACOOOL PLUS CLOSE CONTROL RANGE	
DF	Downflow Configuration
100-125	Model Sizes
CW	Chilled Water
AT	AIRETronix Controls
eg	DF100CW-AT

INTRODUCTION

Designed to provide environmental Close Control tolerances within the conditioned space, such as Telecommunication Facilities, Computer Rooms and Clean Rooms, the AlphaCool Plus is available as chilled water in 2 model sizes. Full function units provide full control of temperature and humidity.

A full range of Airedale chillers are available to complement the chilled water indoor units.

CE DIRECTIVE



Airedale certify that the equipment detailed in this manual conforms with the following EC Directives:

Electromagnetic Compatibility Directive (EMC)	89/336/EEC
Low Voltage Directive (LVD)	73/23/EEC
Machinery Directive (MD)	89/392/EEC in the version 98/37/EC
Pressure Equipment Directive (PED)	97/23/EC

To comply with these directives appropriate national & harmonised standards have been applied. These are listed on the Declaration of Conformity, supplied with each product.

STANDARD FEATURES

The unit features as standard:

- **AIRETronix** Microprocessor controlled
- 3 port valve/actuator
- EU4 filters
- Floorstand with integral plug fans
- Fan speed control
- Mains Electric Isolator

OPTIONAL EXTRAS

Loose Items

- Water Detector

Factory Fitted

- Variable Humidifier
- Cleanable Humidifier Cylinder
- Electric Heating
- Condensate Pump
- Constant Air Volume
- Firestat
- Floor Tile Mounting Kit
- Water Control Valve

Installation Data

MECHANICAL DATA

		DF100CW	DF125CW
Capacity (1)			
Nom Cooling Capacity (Gross)	kW	111.1	136.4
Nom Fan Gain	kW	4.8	7.2
Dimensions			
H x W x D - Cabinet	mm	2140 x 2450 x 800	2400 x 2700 x 900
H x W x D - Floorstand/Fan	mm	500 x 2450 x 800	500 x 2700 x 900
Weight			
Machine - Cabinet	kg	435	520
Machine - Floorstand/Fan	kg	230	315
Construction			
Material/Colour		Galvanised Sheet Steel, Epoxy Baked Powder Paint– Light Grey (RAL 7035)	
Cooling Coil			
Face Area	m ²	Copper Tube/Turbulated Aluminium Fins	
Cooling/Dehum Stages		3.1	4.0
		1/1	1/1
Fan & Motor (2)			
Motor Size / Quantity	kW	Backward Curved Motorised Impeller Plug Type	
Maximum ESP	Pa	4.1 x 2	4.1 x 3
Speed @ Maximum ESP	rpm	145	220
Nominal Airflow	m ³ /s	1380	1380
		6.9	8.3
Connections			
Inlet/Outlet	mm	54	54
Condensate Drain Hose	mm	19	19
Filtration			
Quantity		Pleated Disposable to BS EN 779 – G4 – 97mm Deep	
Size H x W		4	5
		720 x 575	800 x 520
Optional Extras			
Heating	kW	30.0	37.5
Humidifier			
Capacity	kg/hr	15	15
Feed/Drain		3/4" BSPF Braided flexible hose/16mm barbed hose connection	
Condensate Pump			
Head	m	4.5	4.5
Flow	l/m	0.65	0.65
Drain		3/8" OD Copper	

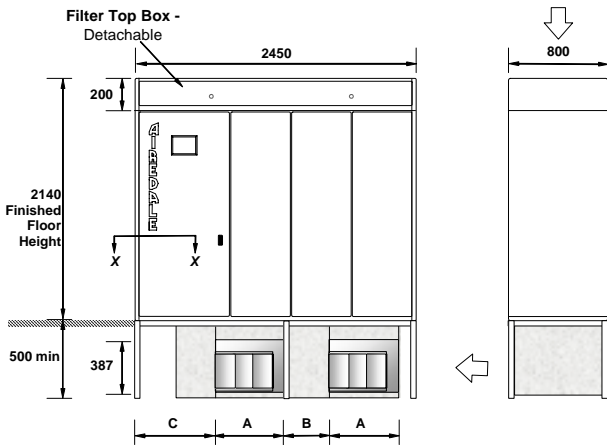
(1) Entering air 24°C/45% RH water 7°C/12°C.

(2) ESP quoted available with standard filters and nominal airflow, for additional information please refer to **System Airflow Characteristics**.

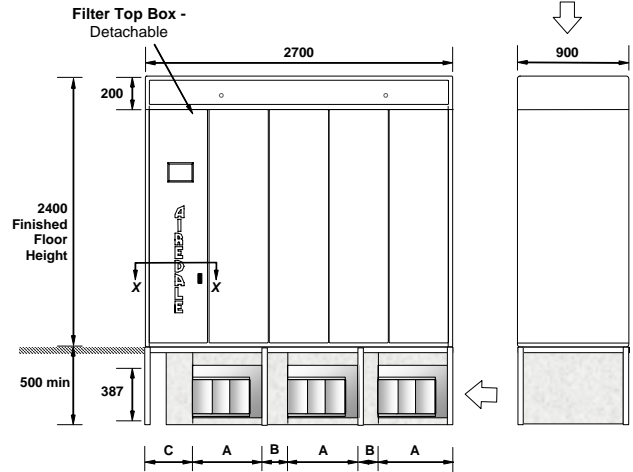
Installation Data

DIMENSIONS (MM) & WEIGHTS (KG)

DF100CW



DF125CW

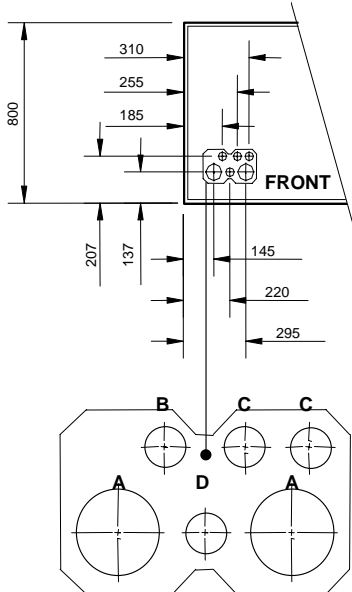


Model Size	Dimensions (mm)			Weights (kg)	
	A	B	C	Cabinet	Floorstand
DF100CW	739	272	590	435	230
DF125CW	616	212	370	520	315

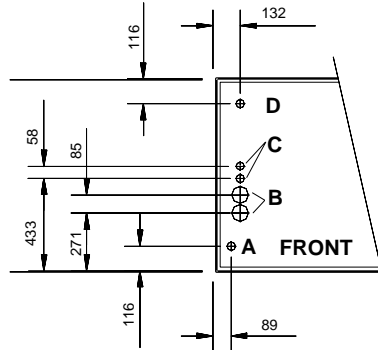
1 Units shown with floorstand/fan assembly & fan housing in place with standard front discharge.

VIEW ON X - X FOR SERVICE POSITIONS (MM)

DF100CW



DF125CW



Showing Pipework Hole Terminations

- A = 75mm Ø - Water Inlet/Outlet
- B = 38mm Ø - Drainage
- C = 38mm Ø - Humidity Services
- D = 38mm Ø - Electrical Services


- A = 38mm Ø - Electrical Services
- B = 75mm Ø - Water Inlet/Outlet
- C = 38mm Ø - Humidity Services
- D = 38mm Ø - Drainage

Installation Data

LIFTING

Whenever a unit is lifted, it should be from the base and, where possible, with all packing and protection in position. If any type of slinging is used, due care should be taken to ensure that the slings do not crush the casework.

If the unit is dropped, it should immediately be checked for damage.

CAUTION  If necessary the height of the unit can be reduced by detaching the Filter Top Box and replacing once in position.

POSITIONING & LEVELLING

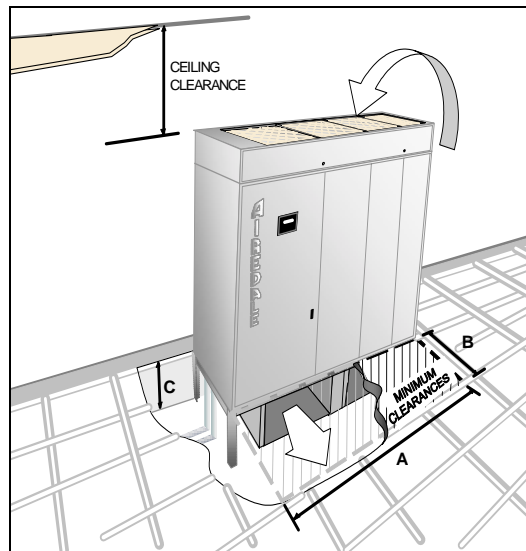
The unit should be positioned on a stable and even base. This base should be levelled to ensure that the condensate trays can allow condensate to drain away freely. Misalignment of the doors indicates an uneven base. If this is the case, then use a spirit level to realign the base to suit.

Positioning the unit should be achieved by the use of rollers or skids. Crowbars must not be used as they impose a point load on the unit frame which may cause damage and distortion.

- Check the unit is as ordered. Discrepancies or transit damage should be reported to Airedale immediately.
- This small footprint unit is relatively tall and heavy. Care should be taken during handling and lifting, that the unit is well supported and properly balanced.
- Observe airflow and maintenance clearances.
- Check all services are present and accessible.

CAUTION  Airedale will accept no responsibility for mishandling during the positioning of the equipment.

POSITIONING (MM)



Model Size		A	B	C
DF100CW	mm	2450	1300	Minimum 500
DF125CW	mm	2700	1300	Minimum 500

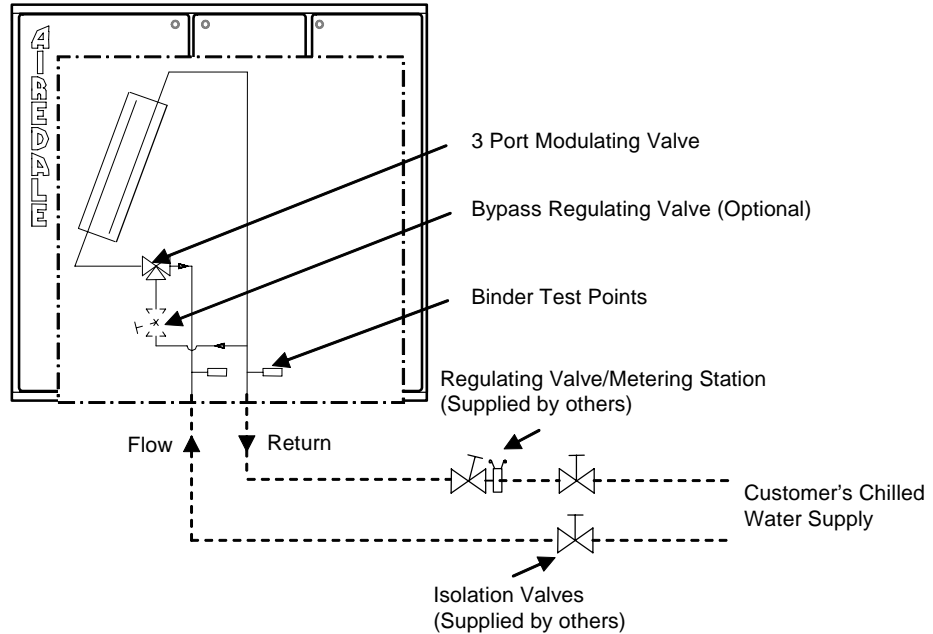
MINIMUM CEILING CLEARANCE (MM)

		Front Only	Front & 1 Side	Front & 2 Sides	All Faces
When Return air is limited to:	mm	650	550	450	350

- 1 Units shown with floorstand/fan assembly & fan housing in place with standard front discharge.
- 2 Shaded area indicates minimum service and maintenance requirements.
- 3 Dimension C: standard maximum floorstand height 750mm, please contact Airedale for larger sizes.

Installation Data

SYSTEM PIPEWORK SCHEMATIC



HUMIDIFIER WATER SUPPLY

A suitable water supply should be installed to supply the humidifier. The humidifier inlet is fitted with a braided flexible hose, having $\frac{3}{4}$ in BSPF connection. A stop cock should be fitted to allow isolation for service and maintenance purposes. The supply water pressure must be within the range 1.0 Bar to 8.0 Bar. If the mains water pressure is greater than this a pressure reducing valve should be fitted. A minimum flow rate of 1.21 l/min is required.

CONDENSATE / HUMIDIFIER DRAIN

All drain trays are fitted with their own trap assembly and they may be run to waste via ordinary plastic waste pipe.

The humidifier, however, will cause hot water to drain away at intervals and thus the pipe used for the drain should be capable of withstanding temperatures of 100°C.

All drain pipework operating under gravity should be sloped away from the equipment and the gradient should be made as steep as possible. Suitable rodding positions should be incorporated particularly if the run is long.

WATER CONDUCTIVITY

The range of conductivity of which the electrode boiler will operate is 125-1250 μ s/cm (refer to **Commissioning Data - Humidifier (Optional Extra)**). The range of hardness of which the electrode boiler will operate is 50-500 ppm or mg/l.

SAFE OPERATION OF HUMIDIFIER

To protect the humidifier bottle from dangerous pressures in event of the steam supply pipe becoming blocked, a tundish is installed between the water inlet solenoid and the cylinder to act as a reservoir and to feed water to the humidifier inlet manifold as required.

CAUTION

An overflow weir is incorporated in the common fill/drain tundish. Any pressure build up in the cylinder would be allowed to vent through the tundish to atmosphere. It is **MOST IMPORTANT** that the steam distribution pipe is not damaged or kinked at any time to avoid the risk of unacceptably high pressure building up in the electrode bottle.

Electrical Data

GENERAL

Once the refrigeration pipework is complete the electrical supply can be connected by routing the cable through the appropriate casing hole and connecting the cables as per the wiring diagram supplied with each unit.

- A fused and isolated electrical supply of the appropriate rating should be installed.
- As standard the equipment is designed for 230V, 1 Phase, 50Hz or 400V, 3 Phase, 4 wire 50Hz to all relevant IEE regulations, British standards and IEC requirements.
- All mains and interconnecting wiring should be carried out to National and Local codes.
- Wires should be capable of carrying the maximum load current under non-fault conditions at the stipulated voltage.
- Avoid large voltage drops on cable runs, particularly low voltage wiring.
- Should there be a separate supply for each unit, a control neutral must be fitted between the indoor and outdoor units.
- **Each unit requires an independently fused and isolated power supply.**

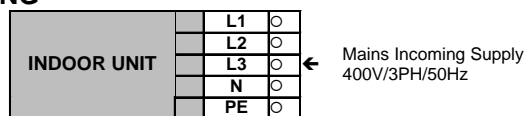
CAUTION 

		DF100CW	DF125CW
Unit Data - Standard (1)			
Nominal Run Amps	A	14.1	20.9
Maximum Start Amps	A	58.5	87.5
Recommended Mains Fuse Size	A	25	40
Max Mains Incoming Cable Size	mm ²	4	6
Mains Supply	V	400V/3Ph/50Hz (+/- 10%)	
Control circuit	VAC	24VAC (+/- 10%)	
Unit Data - Full Function (2)			
Nominal Run Amps	A	73.3	91.0
Maximum Start Amps	A	73.3	91.0
Recommended Mains Fuse Size	A	100	125
Max Mains Incoming Cable Size	mm ²	25	35
Mains Supply	V	400V/3Ph/50Hz (+/- 10%)	
Control circuit	VAC	24VAC (+/- 10%)	
Cooling Coil Fan - Per Fan			
Motor Rating	kW	4.1	4.1
Full Load Amps	A	6.8	6.8
Locked Rotor Amps	A	29	29
Optional Extras			
Electric Heating			
Stage of Reheat		3	3
Number of Elements		12	15
Rating	kW	30	37.5
Current Per Phase	A	43.5	54.3
Humidifier			
Capacity	kg	15	15
Rating	kW	11.25	11.25
Full Load Amps	A	15.80	15.80

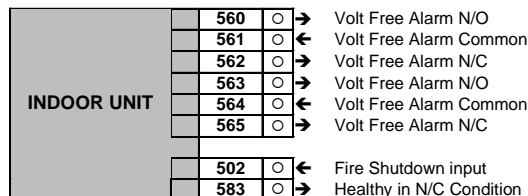
(1) Values given for standard cooling only unit at ARI conditions.

(2) Values given for full function units (incl. electric heating and humidification) at ARI conditions.

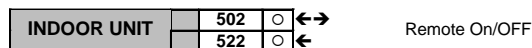
INTERCONNECTING WIRING



Indoor Controls Only



Remote On/Off



CABLE INSTALLATION

In line with IEE Wiring Regulations, the following should be observed:

- Extra low voltage control cables (ELV) and mains power cable should be segregated by a minimum distance of 50mm.
- If cables must cross, it is recommended that they cross at right angles.
- Airedale recommends that ELV cables are screened at both end to earthed enclosures.

AIRETronix Controls

GENERAL

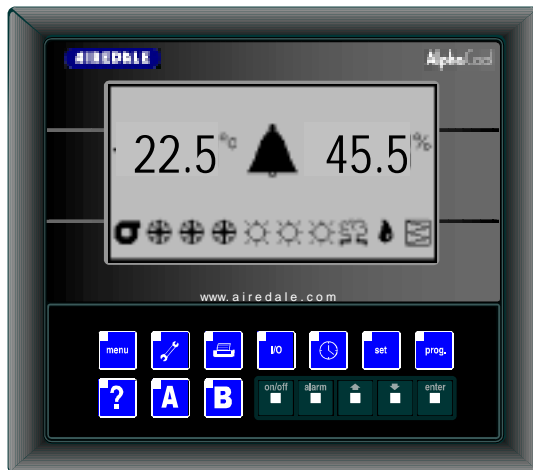
The Airedale range of chilled water close control units have been specifically designed for today's modern working environment. The present day demands for efficient operation of computer rooms, telecommunication centres, operating theatres, laboratories and clean rooms, which utilise stand-alone or multiple in room air handling units, require a high degree of control flexibility. The Airedale design philosophy has taken this fully into account offering an adaptable control system, utilising a microprocessor controller taking full advantage of the latest state of the art technology.

The control system comprises 2 main parts, the controller and the display keypad. The controller offers powerful analogue and digital control to meet a wide range of monitoring and control features including a real time clock and RS232 communication port plus industry standard RS485 network connections. The display keypad is used for viewing the unit operating status and making adjustments to control parameters by allowing the operator access to a series of display pages. Visual and audible alarm mute and the facility to adjust and display control settings are available at the display keypad for local operator information and control.

TEXT DISPLAY



















GRAPHIC DISPLAY



AIRETronix Controls

OPERATION

Key Functions

	If pressed in any menu but the manufacturer menu, returns to the Menu branch (M0) main screen. If pressed in the Manufacturer loop, returns to the manufacturer selection screen. In the Menu branch displays unit status and control probe readings.
	Goes to the first screen in the Maintenance loop (A0) first screen. The Maintenance loop is used to check the status of the devices and probes, carry out maintenance and calibration operations, and start the manual procedure.
	Goes to the alarm log (H000), showing the most recent first.
	Goes to the first screen in the I/O loop (I1). The I/O loop displays the status of the digital and analogue inputs / outputs.
	Goes to the first screen in the Clock loop (K0). The Clock loop is used to display/set the time, date and On-Off, Temperature and Humidity time bands.
	Goes to the screen for setting the temperature and humidity set points (S0). This loop also displays the set points modified by the time zone function, if enabled.
	Goes to the screen to enter the user password (P0). The User loop is used to display/set the unit parameters, referred to the devices connected (valves, probes) and the functions enabled.
	Goes to the screen to enter the manufacturer password (Z0). The Manufacturer loop is used to configure the type of unit and select the connected devices and functions enabled.
	Displays the AIRELan address of the connected board for a couple of seconds. If pressed in the menu loop of the shared terminal, it switches the displayed board.
	Temporary displays the AIRELan address of the connected board.
	No function, reserved for future use.
	Allows the unit to be switched on or off.
	When pressed the alarm key will mute the audio alarm and also display information regarding the active alarm. If pressed a second time, the active alarm will be reset.
	If the up key is pressed within a loop the display will move to the previous screen. If the up key has been pressed whilst the cursor is on an adjustable parameter the parameter will change.
	If the down key is pressed within a loop the display will move to the next screen. If the down key has been pressed whilst the cursor is on an adjustable parameter the parameter will change.
	When pressed it allows the cursor to be moved from the home position to an adjustable parameter. When pressed whilst on an adjustable parameter the current value will be entered and the cursor will move either to the next parameter or return to the home position.


AIRETronix Controls

OPERATION

Navigation

The display is used for **Viewing Unit Operating Status** and **Adjusting Customer Control Settings** by allowing the operator access to a series of **Menus & sub-menus**. Viewing information is unrestricted, however set up and adjustment requires password entry, refer to **Password Protection**.

Use the  key to **move** the flashing **cursor**  to adjustable **fields** and the   keys to change the values.

Press the  key to **move** the **cursor** to the next **field** or **Home**.

When the cursor is **Home** either use the   keys to scroll to next **sub-menu** or the  to **exit** and **return** to the **Standard Operating** page.

Standard Operating Page

The **Operating Page** will appear and remain present following start up of the controller as illustrated:

```
09:50 23/04/03 M0
Temperature 18.6°C
Humidity 48.8%
Unit ON U:01
```

Indicates current time and date and unit status

```
Unit status M1
?Cooling ?Heating
?Humidification
?Dehumidification
```

Indicates current time and date and unit status




```
Unit status M2
?Supply Air Limit
?Dehumidification
Limit
```

Indicates current time and date and unit status

Password Protection



To guard against unauthorised adjustments, a password is required to gain access to certain menus as defined below.

FACTORY SET PASSWORD PIN NUMBER: 4648 (or Customer chosen number).

When a password PIN number is requested use the   keys to enter the number and  to select and enter the number. This process will be repeated until all 4 digits of the PIN have been entered. Once a number has been entered it will be hidden by an asterisk.

SETTING UP

Unit ON/OFF

Press  to switch the unit on. To switch the unit off press  again.

Real Time Clock

The units leave factory set, however follow the **Navigation** instructions if necessary.

Time Zones

The programme provides 2 On/Off periods per day, 7 days per week. The unit is factory set for continuous operation.

Technical Support

For further details, please contact Airedale.

AIRETronix Controls

VIEWING UNIT OPERATING STATUS

Status Menu

Allows access to view operating status of Digital and Analogue Inputs and Outputs.

Using the **Navigation** instructions, the following **Sub-Menus** shown in sequence can be accessed:

Analogue inputs

	CW Unit
B1	Return air humidity
B2	Humidifier supply water conductivity
B3	Humidifier current
B4	Return air temperature
B5	Supply air temperature
B6	CW Inlet Temperature
B7	CW Outlet Temperature
B8	Differential air pressure sensor
B9	Not used
B10	Not used

Digital inputs


	CW Unit
ID1	Remote on/off
ID2	Airflow differential pressure switch
ID3	Filter change differential pressure switch
ID4	Overheat cut-out
ID5	Humidifier water level
ID6	Not used
ID7	Fire / smoke alarm
ID8	Water flood
ID9	Not used
ID10	Not used
ID11	Not used
ID12	Not used
ID13	Not used
ID14	Not used

Analogue outputs

	CW Unit
Y1	Supply fan speed controller
Y2	Not used
Y3	Not used
Y4	Not used

Digital outputs

	CW Unit
NO1	CW valve open
NO2	CW valve close
NO3	Not used
NO4	Heat & Stage 1
NO5	Heat & Stage 2
NO6	Heat & Stage 3
NO7	Supply fan
NO8	Not used
NO9	Humidifier
NO10	Humidifier fill valve
NO11	Humidifier drain valve
NO12	Non critical alarm
NO13	Critical alarm
NO14	Not used
NO15	Not used
NO16	Not used

CAUTION  Inputs or outputs not required will not be connected nor will they appear on the display keypad.








AIRETronix Controls

ALARMS

The controller logs and allows viewing of the last 100 conditions recorded in descending chronological order.

```
Alarm Log      H001
Fan Fail
Alarm Clear
10:07         23/04/03
```

ALARM HANDLING

- 1 A buzzer will sound and a **Red LED** behind the **Alarm**  key will light in the event of an alarm. To view the active alarms, simply press the  key and the   keys to scroll through.
- 2 Auto reset alarms will clear following this first depression of the **Alarm**  key. If however the **Red LED** behind the **Alarm**  key remains illuminated, the unit requires some form of manual reset.
- 3 For manual reset alarms, isolate the affected circuits before further investigation.
- 4 To reset or delete the alarms displayed in the alarm screen, simply press  again.

ALARMS

Common Alarms

Outlined below is a selection of Common Alarms, a full list is available, please contact Airedale.

Fire / Smoke

A normally closed contact. On initiation, all control outputs are disabled and an alarm is generated at the display.

Water Flood

A normally closed contact. On initiation, all control outputs are disabled and an alarm is generated at the display.

Airflow Fail

A normally closed contact. On initiation, all control outputs are disabled and an alarm is generated to the display (after a delay adjustable via Airflow Alarm Delay).

Filter Change

A normally closed contact. An alarm is generated after a 5 minute delay.

Overheat Cut-Out

A normally open contact. On initiation, all control outputs to the heating relays or valve are disabled and an alarm is generated at the display.

Return Air Temperature High / Low Limits

Return Air Temperature high and low limit alarms are generated when the sensor values exceed the limits set. 1 minute delays are built into both high and low limits.

Return Air Humidity High / Low Limits

Return Air Humidity high and low limit alarms are generated when the sensor values exceed the limits set. 1 minute delays are built into both high and low limits.

Supply Air Temperature High / Low Limits

This alarm is provided to monitor and limit and includes a 1 minute delay in both the high and low limit alarms. If the sensor value reaches its high limit, all control outputs to the heating are disabled. Likewise, if the sensor value reaches its low limit, all control outputs to the cooling are disabled.

Communications Fail

This alarm is available on networked units and checks for communications with the other units on the network. Because a controller cannot generate its own alarm when it has no power, each unit on the network is monitored by the next unit. When a unit fails to receive a message from the previous unit for a period exceeding 1 minute the communications fail alarm is generated. This alarm can also indicate that there is:

- 1 A break in network preventing messages travelling successfully from 1 controller to the next.
- 2 The controller's address is set incorrectly.

Commissioning Procedure

CAUTION  All work must be carried out by technically trained competent personnel.

The equipment contains live electrical and moving parts, isolate prior to maintenance or repair work

PRE-START CHECK

- 1 Check all electrical connections are tight, including contactor and all terminal connections.
- 2 Check supply is available at the correct voltage and that any external fuses / circuit breakers are the correct rating.
- 3 Check that there is a proper earth connection to the unit.
- 4 Check filters are positioned and seated correctly.

AIRFLOW FAILURE SWITCH

As standard the airflow fail and filter blocked switches have been set up for the fans to operate at the standard design airflow and external static, as quoted in the Technical manual.

However in instances where the operating conditions are to be varied from the standard then the procedure to set up the switches must be followed thus:

- 1 Set airflow to required operating parameter with the use of microprocessor either manually or with the constant volume option (if fitted), refer to **Fan Speed Adjustment**.
- 2 Open only doors to the control panel section.
- 3 Turn airflow switch to maximum setting to test electrical control. Controls should switch off.
- 4 Adjust switch downwards until the control circuit is reactivated.
- 5 Switch off fan (1 fan only on twin fan units) controls should switch off.
- 6 Turn on fan and re set unit.
- 7 Repeat stages 5 and 6 for 2nd and 3rd fan.

FILTER CHANGE SWITCH

- 1 Cover the surface of the filter until the alarm activates.
- 2 Slowly remove cover from the filter surface until 2/3 of the filter area is blocked.
- 3 Adjust the filter change switch until the alarm activates.
- 4 Remove cover from the surface of the coil completely and ensure that the switch resets.

Commissioning Data

ETHYLENE GLYCOL CORRECTION FACTORS

For conditions outside those quoted, please refer to Airedale.

The Use of Glycol

Glycol is recommended when a supply water temperature of +5°C or below is required or when static water can be exposed to freezing temperatures.

The effect of glycol in the system has a direct effect upon the Cooling Duty, the Design Flow Rate and the unit Pressure Drop.

For a given percentage of glycol in the system there are correction factors that need to be applied.

Correction Factors

		Ethylene Glycol (Volume) / Freezing Point °C			
		10% / -4°C	20% / -9°C	30% / -15°C	40% / -23°C
Cooling Capacity	Q_{χ}	0.98	0.94	0.89	0.83
Flow Rate	F_{χ}	4.051	3.794	3.537	3.302
Pressure Drop	P_{χ}	1.041	1.083	1.133	1.200

To Calculate the Cooling Capacity (kW)

The chilled water cooling capacity can be calculated using the following equation:

$$Q = Q_W \times Q_{\chi}$$

Where:

Q = Total Cooling Capacity (kW)

Q_W = Equivalent Water Cooling Capacity. Refer to **Technical Manual**.

Q_{χ} = Cooling Capacity Correction Factor. Refer to **Correction Factors**.

To Calculate the Design Volumetric Flow Rate (\dot{V})

The maximum design volumetric flow rate can be calculated using the following equation:

$$\dot{V} = \frac{Q}{F_{\chi} \times \Delta T}$$

Where:

Q = Total Cooling Capacity (kW) (as calculated from above equation)

ΔT = Temperature Difference between Water/Glycol Inlet/ Outlet (°C).

F_{χ} = Flow Correction Factor. Refer to **Correction Factors**.

To Calculate the Indoor Unit Pressure Drop (kPa)

The maximum indoor unit pressure drop can be calculated using the following equation:

$$\Delta P_S = \Delta P_W \times P_{\chi}$$

Using the volumetric flow rate calculated above, the pressure drop (ΔP_W) can be taken from the chilled water pressure drop graph. Refer to **Waterside Pressure Drop (kPa)**.

Where:

ΔP_S = Maximum Water/Glycol Pressure Drop for the indoor unit (kPa).

ΔP_W = Equivalent Water Pressure Drop for indoor unit (kPa).

P_{χ} = Pressure Drop Correction Factor. Refer to **Correction Factors**.

Commissioning Data

ETHYLENE GLYCOL CORRECTION FACTORS

Example

Model Ref.	= DF100CW-AT
Air on Conditions	= 24°C dB / 45%RH
Glycol Content	= 20% Ethylene Glycol
Inlet Water/Glycol Temp.	= 7°C
Outlet Water/Glycol Temp.	= 12°C (5°C ΔT)

CHILLED WATER COOLING CAPACITY (kW)

$$Q = Q_w \times Q_\chi$$

Where:

$$Q_w = 111.1 \text{ kW}$$

$$Q_\chi = 0.94$$

$$Q = 111.1 \times 0.94$$

Cooling Capacity $Q = 104.43 \text{ kW}$

DESIGN VOLUMETRIC FLOW RATE (l/s)

$$\dot{V} = \frac{Q}{F_\chi \times \Delta T}$$

Where:

$$Q = 104.43 \text{ kW (As calculated from above equation)}$$

$$\Delta T = (12^\circ\text{C} - 7^\circ\text{C}) = 5$$

$$F_\chi = 3.794$$

Glycol content = 20%

$$\dot{V} = \frac{104.43}{3.794 \times 5}$$

$$\text{Flow Rate } \dot{V} = 5.5 \text{ l/s}$$

MAXIMUM INDOOR UNIT PRESSURE DROP (kPa)

$$\Delta P_S = \Delta P_W \times P_\chi$$

Where:

$$\Delta P_W = 94 \text{ kPa (at flow rate 5.5 l/s)}$$

Taken from CW pressure drop graph

$$P_\chi = 1.083$$

$$\Delta P_S = 94 \times 1.083$$

Pressure Drop $\Delta P_S = 101.8 \text{ kPa}$

SUMMARY

Model Ref.	= DF100CW-AT - 20% Ethylene Glycol
Gross Total Cooling Capacity	= 104.39 kW
Design System Flow Rate	= 5.5 l/s
Indoor Unit Pressure Drop	= 101.8 kPa

Note: No noticeable change to sensible heat ratio.


Commissioning Data



FAN SPEED ADJUSTMENT


Input Voltage Value



If the required Airflow and External Static is known, the correct input voltage can be determined using the following graphs. The input voltage can be adjusted to suit via the AireTronix display as described below.


The fan speed input voltage value is factory set based on customer specification however, adjustment via the display keypad is achieved by the following procedure:


Press the  key and enter the User Password (PO).

Using the   keys, scroll down through the various parameters to **main fan speed** page (Pa).

Press the  key to edit **fan speed voltage**.

Using the   keys, scroll to the desired value.

Press the  key to confirm the set point. Fan speed will adjust automatically.

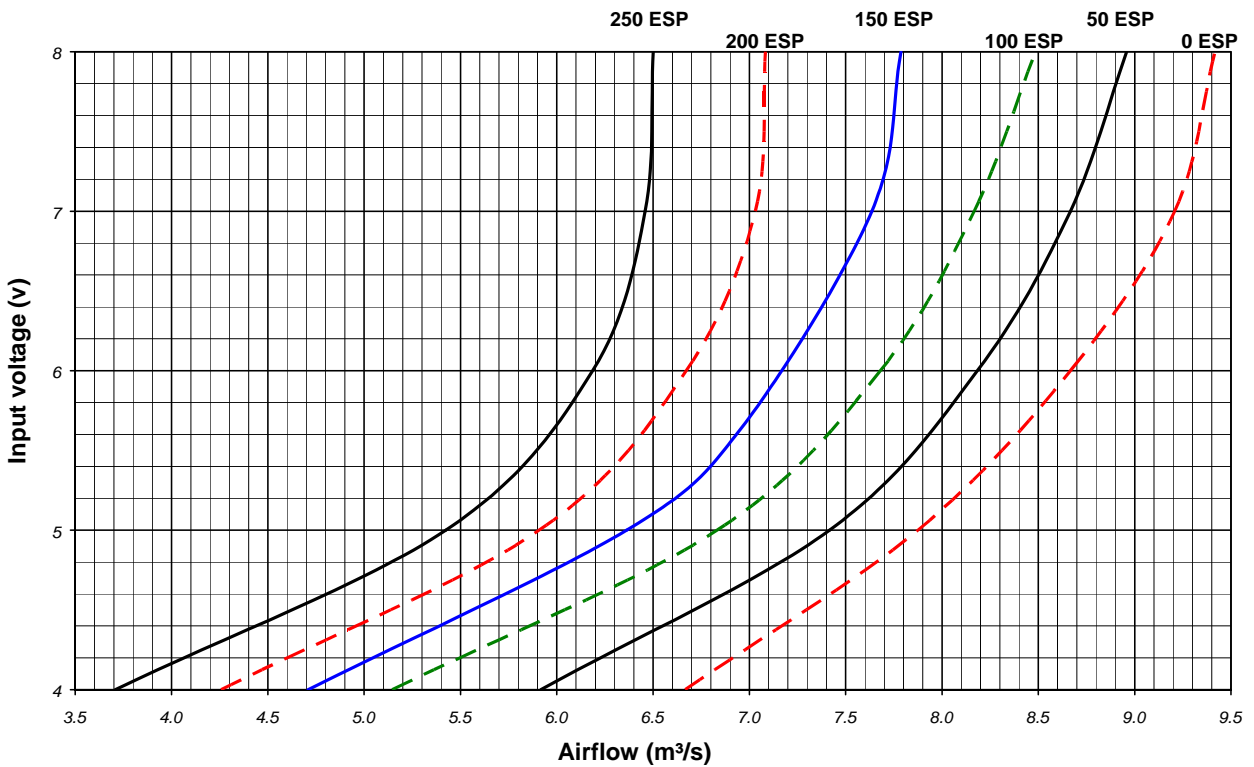
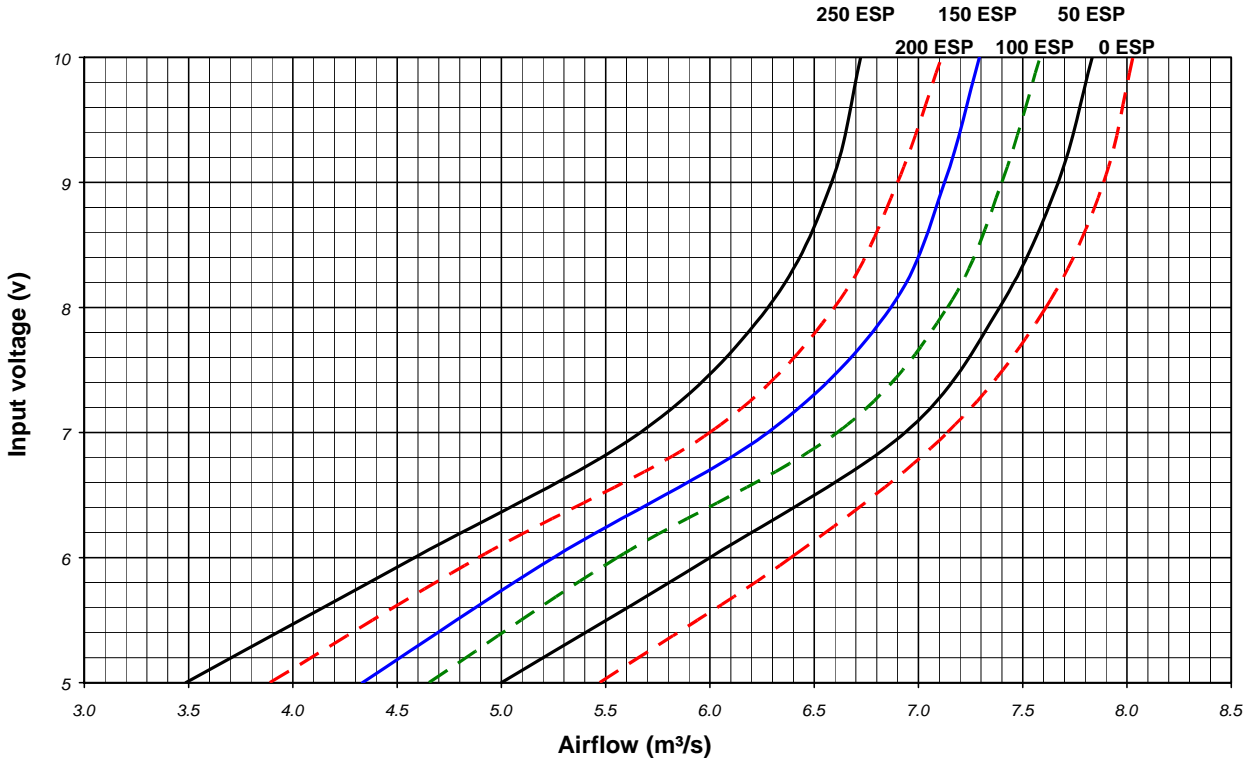
Press the  to exit to the main screen.

CAUTION  **To protect the motor, the fan speed starts slowly and will increase to the desired speed over a short period.**

Commissioning Data

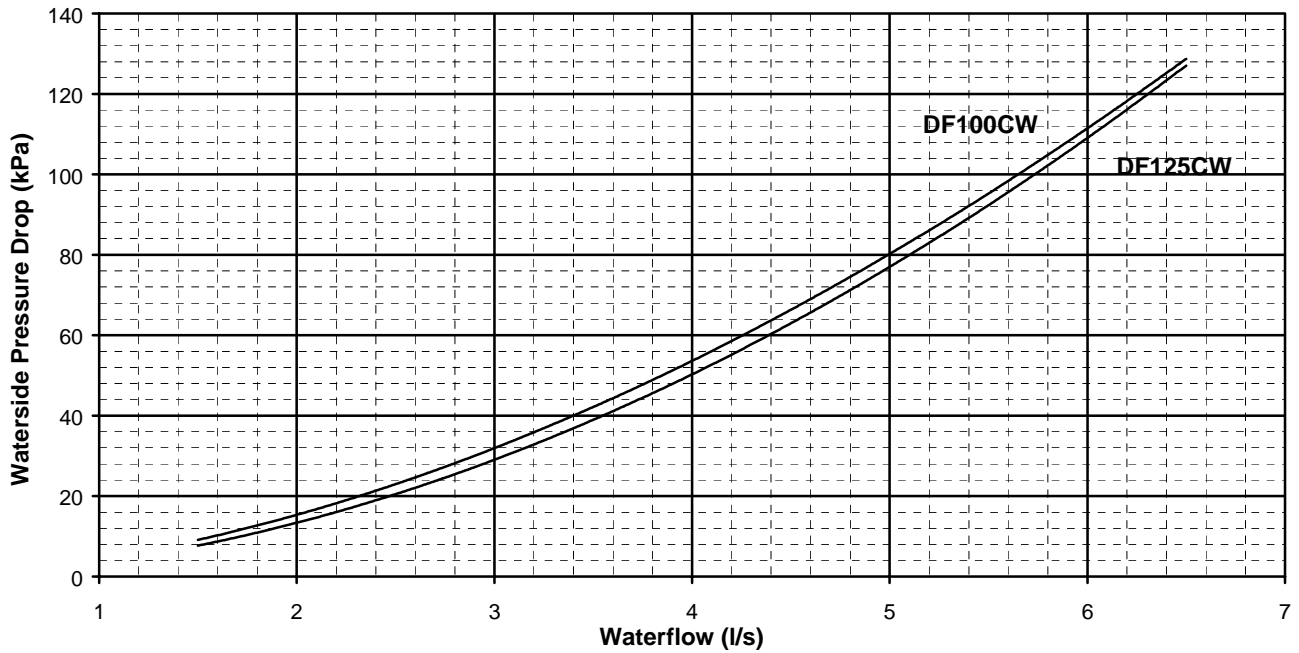
SYSTEM AIRFLOW CHARACTERISTICS

DF100CW



Commissioning Data

WATERSIDE PRESSURE DROP (KPA) ⁽¹⁾



- (1) Includes coil, 3 port valve and pipework.
- (2) To calculate 3 port valve pressure drop

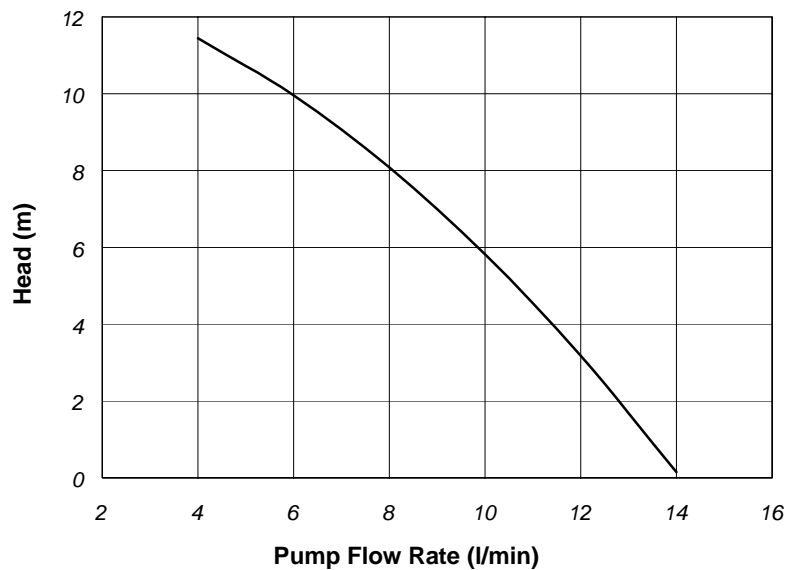
$$\Delta P_{\text{valve}} = \left(\frac{Q}{M} \right)^2 \quad \text{where } \Delta P = \text{Pressure Drop in kPa, } Q = \text{Water Flow Rate in l/s and } M = \left(\frac{Kv}{36} \right)$$

M Values for Chilled Water Valves

Model	DF100CW	DF125CW
Chilled Water	1.11	1.11

CONDENSATE PUMP (OPTION)

Performance



Commissioning Data

HUMIDIFIER (OPTIONAL EXTRA)

Initial Start-up

Initially the humidifier cylinder will be empty. The cylinder will then fill with water from the tundish until sufficient current is passed between the electrodes, at which point the feed solenoid valve will close.

During the start up phase, the current will remain low until either;

there is a sufficient concentration of conductive salts built up within the bottle

Or

the immersion level of the electrodes is enough to pass the required current.

As a guide, 1A of current passed between the electrodes will generate approximately 1kg/hr of steam.

The desired operating current is reached, the process taking a few minutes or several hours according to the hardness of the water. Following the initial installation of a new bottle, this process may take several hours in soft water areas or a matter of minutes in hard water areas. The water conductivity levels ie hardness/softness can be viewed from the **AIRETronix** display.

Refer to **Mechanical Data** for Capacity Data.

Normal Operation

Once the start-up period has been completed, the cylinder will operate automatically, ensuring the correct quantity of steam is delivered.

CAUTION  All **AIRETronix** humidifiers provide variable steam production as standard.

Once this current value is exceeded with a cylinder in normal operation, the drain solenoid energises to allow the high salt content water to drain. During this process the power supply to the bottle is cut.

After this pre-set time the drain solenoid will close and the feed valve will open until the correct water operating height is reached. The water being below its boiling point will then re-heat and continue to operate at the correct output.

The humidifier will then operate under the dictates of the humidistat following this procedure.

As the electrodes become scaled the electronic sensing device allows the conductivity (solids of the water in the cylinder) to gradually rise keeping the current reasonably static at the desired value.

Once the electrodes become badly corroded or there is sufficient build up of scale, an alarm (bottle change) will be initiated to the microprocessor necessitating a bottle change. When this has been carried out the initial start-up sequence is repeated and normal running resumed.

Commissioning Data

HUMIDIFIER (OPTIONAL EXTRA)

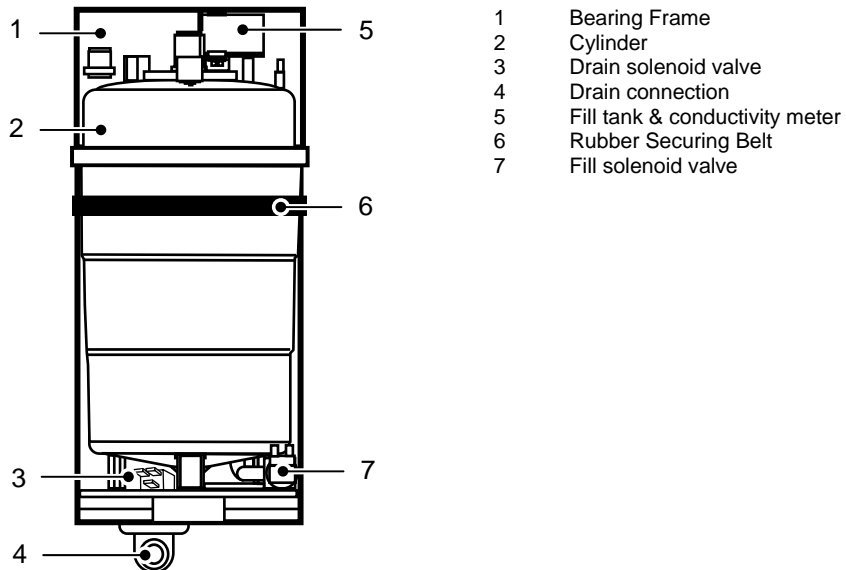
Humidification is provided by an electrode boiler. The sealed humidifier design ensures that only clean sterile steam is supplied to the conditioned area and corrosive salts and minerals are held in the disposable bottle. The steam is distributed through a sparge pipe fitted to the coil assembly.

Featuring modulating capacity output control as standard, the system provides continuous modulation of steam output in response to a proportional control signal. The output control range is 20%-100% of the humidifier rated value and is designed to give an approximate steam output of +/- 3%, thus ensuring precise control of the conditioned space.

The cylinder operating life time is automatically optimised via the integrated water conductivity sensor, which combined with the **AIRETrox** controls monitors and regulates the water refill cycle to reduce excessive salt deposits and the progressive wear of the cylinder.

All humidifier parameters and alarms are accessible and adjustable via the microprocessor display unit, main features include:

- Supply water conductivity ($\mu\text{S}/\text{cm}$)
- Actual steam output (kg/h)
- Required steam output (kg/h)
- Actual current rating (A)
- Required current rating (A)
- Status mode (Start Up, Running, Filling, Draining)



HUMIDIFIER RECONNECTION

- A) Reconnect the plug and spade leads for the drain (item 3) and fill solenoid valves (item 6).
- B) Firmly push the humidifier bottle into place and fasten the rubber belt round waist until secure.
- C) Reconnect the sparge pipe, ensuring the Jubilee clips and plastic interconnection are tight.

Commissioning Data

WATER CONDUCTIVITY & CYLINDER TYPE

Conductivity is a measure of the ability of water to pass an electric current, measured in micro Siemens / centimetre ($\mu\text{S}/\text{cm}$). 3 different cylinders are available which correspond to the supply water conductivity.

Matching the correct cylinder type with the conductivity of the supply water ensures optimum performance and increases the life span of the cylinder (up to 2,500 working hours).

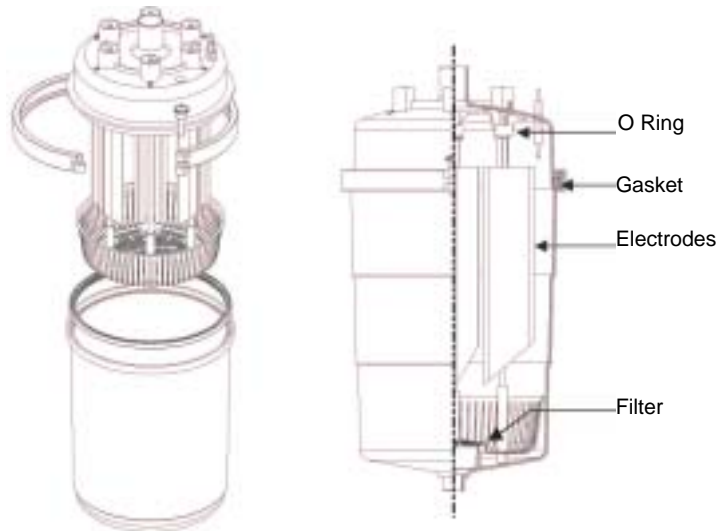
1	Low Conductivity	(Soft Water)	125 to 350 $\mu\text{S}/\text{cm}$
2	Standard Conductivity	(Moderate/Hard Water)	350 to 750 $\mu\text{S}/\text{cm}$
3	High Conductivity	(Very Hard Water)	750 to 1250 $\mu\text{S}/\text{cm}$

As standard the humidifier is fitted with the standard conductivity cylinder which covers the majority of water supplies. Where the water conductivity is known, this should be specified at the time of order. For further details please contact Airedale.

CLEANABLE HUMIDIFIER CYLINDER

The humidifier can be fitted with a take apart cylinder enabling the bottle and the electrodes to be cleaned and reused. The cylinder can typically be cleaned 3 times before replacing either the electrodes or the entire cylinder.

The cleanable humidifier cylinders are available in 8kg and 15kg bottle sizes with standard or high conductivity levels only. For further details please contact Airedale.



HUMIDIFIER SET UP

The following procedure should be carried out on all types of unit whether fully pre-charged with refrigerant or shipped to site with a holding charge. Humidifiers are NOT factory set-up.

Pre Start Checks

- 1 Ensure a water supply is available to the humidifier at the correct pressure and quality.
- 2 Ensure the drain line is connected and that water flows away freely. This can be carried out by first checking free draining from the tundish, prior to filling then draining the cylinder.
- 3 Ensure that the steam distribution pipe is connected securely at both the distribution and cylinder ends and is not kinked or damaged.

Commissioning

- 1 Open the (customer supplied) water supply valve adjacent to the unit.
- 2 Ensure that the water is feeding via the tundish to the humidifier. Watch the initial start-up procedure commence. Fit clamp on ammeter onto 1 of the wires feeding the electrodes and observe the current.
- 3 The current can also be viewed through the microprocessor display. Compare the clamp on ammeter with the display reading to ensure they concur (0.5A tolerance).
- 4 The steam output can be reduced by changing the output demand through the microprocessor display menu.

Troubleshooting

HUMIDIFIER (OPTIONAL EXTRA)

FAULT	POSSIBLE CAUSE	REMEDY / ACTION
Main fuses / MCB trips when initially switched on.	Cylinder damage (shorted electrode(s))	Test with Megger - Replace cylinder.
Humidifier 'called for' but not filling.	Water not available at cylinder.	Check all mains cold water valves. Check any strainers fitted. Check inlet solenoid valve (yellow) strainer - clean as necessary. Inlet water solenoid not operating - check for feed. Replace solenoid / control board as necessary. Mains water pressure over 8 Bar - fit pressure reducing device.
The humidifier loads with water but does not produce steam.	Too high steam delivery back pressures Cylinder inlet filter clogged Limestone inside the supply tank Drain solenoid valve faulty	Check steam delivery pipe is not blocked with debris. Clean the filter Clean the supply tank Check 24 Vac anomalous presence on the drain solenoid valve and/or replacement of drain solenoid valve
The humidifier wets the underlying floor.	Supply or overflow hydraulic circuit leaking Steam delivery pipe not properly fastened to the cylinder	Check the entire hydraulic circuit Check fastening of the clamp on the steam delivery pipe
Cylinder operating - Low Current / Low output.	Humidifier in start-up phase Cylinder nearing end of useful life.	Wait for impurity concentration to build up through natural drain cycle. This will allow an increase in passed current. Strip and clean or replace.

Maintenance

CAUTION  All work must be carried out by technically trained competent personnel.

The equipment contains live electrical and moving parts, isolate prior to maintenance or repair work

GENERAL MAINTENANCE

The maintenance schedule indicates the time period between maintenance operation. Access to the various components is via key-locked doors on the front of the unit.

FILTERS

Unit filter condition is monitored via the microprocessor and the Filter Change Switch will indicate when they require replacing. However, it is good practice to check filters at each maintenance visit.

3 MONTHS	ACTION	NOTES
SYSTEM	Check the following against the commissioning records. <ul style="list-style-type: none"> Control settings. Alarm log for unusual occurrences. Chilled water control maintains design temperature. Chilled water flow is within design limits of zero to plus 10%. Check condition of filters Check operation of "filter blocked" pressure switch Check condensate drain is free from dirt and obstructions. Check water runs away freely Check condensate trays are clean and free from sediment Ensure that the 3/2 way valves operate through their full travel 	Investigate and adjust as necessary. Replace as necessary
Finally!	Record operating conditions.	
FABRIC	Visually inspect the unit for general wear and tear, treat metalwork. Visually inspect pipe and pipework insulation. Check chilled water coil and fins for disfigurement Visually check the following: <ul style="list-style-type: none"> Pipework clamps are secure. Tightness and condition of fan and compressor mounts. Anti-Vibration mounts fixings (if fitted). 	Rust should be inhibited, primed and touched up with matching paint (available from Airedale or your Distributor). Repair/rectify as necessary. Do not damage fins and comb out if necessary. Secure/tighten as necessary.
Finally!	Ensure control panel lids and access panels have been correctly replaced and securely fastened in position.	
HUMIDIFIER (if fitted)	Check through sequence of boiler – operate by hand if necessary. Check tundish is clean and free of sediment Check drain water flows away freely Check amperage against commissioning data.	If cylinder near end of life change and clean drain solenoid and manifold. Operate manual drain if necessary. Adjust is necessary.
12 MONTHS	ACTION	NOTES
	Repeat 3 month checks plus the following:	
SYSTEM	Check glycol concentration if appropriate. Check heater thermal cut out operation Inspect all water connections.	Adjust as necessary. Adjust as necessary Rectify as necessary.
ELECTRICAL	Tighten all electrical terminals.	
HUMIDIFIER (if fitted)	Clean feed solenoid, drain, solenoid manifold and strainer. Ensure cylinder is back to full operating current. Clean drain pipe adjacent to unit. Tighten all terminals in panel and electrodes.	Using rodding positions is necessary.

FAN REMOVAL

In the unlikely event of fan breakdown/failure, Airedale recommend that for health and safety reasons the fan assembly be removed with the aid of a fan removal winch kit. Airedale Part No. FRW-AC-001, this can be purchased from Airedale at the time of ordering a spare fan assembly.

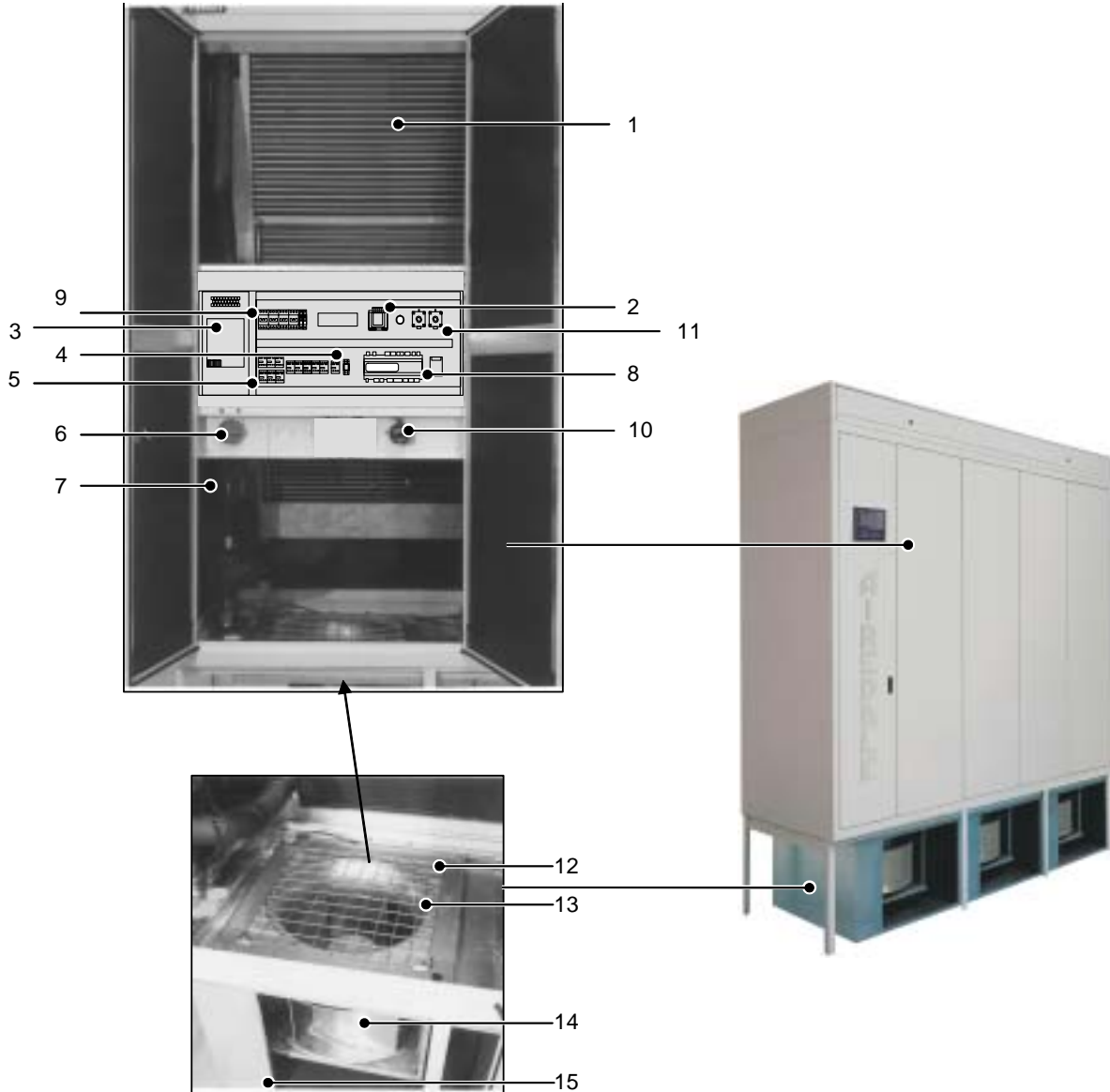
Parts Identification

SPARES

For ease of identification when ordering spares or contacting Airedale about your unit, please quote the unit type, unit serial number and the date of manufacture, which can be found on the unit serial plate.

A spares list for 1, 3 and 5 years will be supplied with every unit and is also available from our Spares department on request.

The serial plate can be located on top of the control panel



- 1 Chilled Water Coil
- 2 24V Transformer
- 3 Voltage Controller (Fan Speed)
- 4 Relay
- 5 Contactors
- 6 Mains Electric Isolator
- 7 3 Way Valve
- 8 **AIREtronix** Microprocessor Controller
- 9 MCBs

- 10 Pressure Transducer (Used with Constant Air Volume Option)
- 11 Airflow Pressure Switch
- 12 Fan Guard
- 13 Fan Inlet Ring (2 types: Standard & Optional (as shown) with pressure tapings for constant air volume option)
- 14 Backward Curved Fan & Motor Assembly
- 15 Floorstand



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PART NO:	ISSUE	DATE
901-068 IM E	A	01/09/04
	B	27/09/04
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