



Authorised User No. 00007



INSTALLATION, OPERATING & MAINTENANCE MANUAL

Ultima FreeCool Free-Cooling Chiller 200 – 750 kW



ISO 14001
EMS52086



ISO 9001
FM00542

About Airedale Products & Customer Services

WARRANTY, COMMISSIONING & MAINTENANCE


The equipment carries Airedale's standard **Parts** (non consumable) & **Labour** warranty for a period of **12 months** from the date of commissioning or **18 months** from the date of despatch, which ever is the sooner. (Excludes the cost of any specialist access or lifting equipment.) Commissioning will be carried out by Airedale International Air Conditioning Ltd or an approved Airedale commissioning company.

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 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.

Where applicable, 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 on 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

For further assistance, please e-mail: enquiries@airedale.com or telephone:

UK Sales Enquiries	+ 44 (0) 113 238 7789	uk.sales@airedale.com
International Enquiries	+ 44 (0) 113 239 1000	enquiries@airedale.com
Spares Hot Line	+ 44 (0) 113 238 7878	spares@airedale.com
Airedale Service	+ 44 (0) 113 239 1000	service@airedale.com
Technical Support	+ 44 (0) 113 239 1000	tech.support@airedale.com
Training Enquiries	+ 44 (0) 113 239 1000	marketing@airedale.com

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

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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 and any related quotation.

The equipment carries Airedale's standard **Parts** (non consumable) & **Labour** warranty for a period of **12 months** from the date of commissioning or **18 months** from the date of despatch, whichever is the sooner. Commissioning must be carried out by Airedale or an approved Airedale company.

WARRANTY IS ONLY VALID IN THE EVENT THAT:

- 1 The equipment is properly protected & serviced in the period between delivery and commissioning.
- 2 The equipment is serviced & maintained by Airedale or an approved Airedale company in accordance with the Installation & Maintenance manual provided, during the Warranty Period.

In the event of a problem being reported, Airedale will cover the full cost of rectification (excluding costs for any specialist access or lifting equipment) if warranty is valid under these conditions.

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

- The on site contractor or service company place an official order on Airedale for the replacement part including site labour if required. Airedale will acknowledge this order with detailed prices for components, travel and labour rates.
- Should warranty be accepted, following inspection of the faulty component, a credit note will be issued against the invoice raised in line with the acknowledgement.
- Should warranty be refused the invoice raised against the acknowledgement becomes payable on normal terms.
- Airedale reserve the right to carry out site warranty labour work using their own direct labour or by sub contracting to an approved company of their choice.

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.

GENERAL

Dead on arrival or manufacturing defects are the responsibility of Airedale and should be reported immediately.

In the event of a warranty failure, dead on arrival or manufacturing defect, the Airedale Service department should be contacted and on receipt of an order, an Airedale engineer (or representative) will be directed to site as soon as possible.

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

FREE-COOLING CHILLER	
UFC	Ultima FreeCool
200 – 750	Model Size (Expressed as Nominal Cooling in kW)
D-	Double Circuit - Standard Chiller
DQ-	Double Circuit - Quiet Chiller
DSQ-	Double Circuit - Super Quiet Chiller
8 - 20	Number of Fans
Example	UFC200D-8

INTRODUCTION

The Airedale range of Ultima FreeCool air cooled liquid chillers covers the cooling capacity range 200kW to 750kW in 39 model sizes incorporating Standard **D**, Quiet **DQ** and Super Quiet **DSQ** variations.

Attention has been placed on maximising the unit's cooling and energy performance while keeping the sound, vibration levels and footprint to an absolute minimum.

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.

REFRIGERANTS

The range has been designed and optimised for operation with the ozone benign R407C refrigerant.

STANDARD FEATURES

Standard Chiller

- D

The Standard Ultima FreeCool chiller comes complete with:

- **AIRETronix** Microprocessor Controlled
- Condenser Coil & integral Free-cooling Coil Assembly
- Shell & Tube Evaporator with integral trace heating
- Single Screw Compressors
- Dual Independent Refrigeration Circuits
- Dual Circuit Electrical Isolator for maintenance
- Refrigeration Head Pressure Control
- Variable Speed Fans
- Compressor Enclosures
- Electronic Expansion Valve (EEV)
- 3 Way and Modulating Water Valve
- Water Flow Switch
- Dual Maintainable Pressure Relief Valve
- Sickled Bladed fans with Long Bellmouth 1200 rev/min
- Connections for External Trace Heating (240V/500W available)

With all the features of the Standard range, the Quiet and Super Quiet chillers are available with additional features:

Quiet chiller

- DQ

- Fan speed reduced to 900 rev/min

Super Quiet Chiller

- DSQ

- Fan speed reduced to 680 rev/min
- Acoustically lined compressor compartment
- Discharge Line Mufflers

General Description

STANDARD FEATURES

Refrigeration

Each refrigeration circuit is supplied with the following:

- Full operating charge of R407C
- Liquid injection oil cooling circuit fitted to each compressor as standard with filter, sight glass, strainer and non-return valve
- Electronic expansion valve
- Liquid line ball valve
- Discharge line ball valve
- Discharge line mufflers (DSQ MODELS ONLY)
- Large capacity filter drier with replaceable cores
- Liquid line sight glass
- Low pressure switch with manual reset via microprocessor controller
- High pressure switch with manual reset
- Suction and liquid pressure transducers
- Dual Pressure relief valve with integral rupture disc and indicator gauge offering easy maintenance complying with Pressure Regulations
- Valves for refrigeration head pressure control in simultaneous Free Cooling and Mechanical cooling mode

Water / Glycol

Each water glycol circuit is supplied with the following:

- Water Flow switch
- 3 way modulating valve to control free-cooling operation
- Strategically placed automatic air vents
- Strategically placed drain valves
- Butterfly shut off valves for Free-cooling coil isolation to allow for maintenance
- Pressure transducers across evaporator to monitor water pressure drop
- Inlet water filter 1/16" mesh


Controls

AIRETronix microprocessor controlled providing 6-8 stages of mechanical cooling (Depending on model size), modulating condenser fans and valve to offer 0-100% free-cooling when ambients permit. The controller incorporates full Building Management System capabilities, full details can be found in the **Controls** section.

Electrical

Weatherproof electrical power and control panels are situated at the end of the unit and contain:

- Individual mains power compartments for each refrigeration circuit
- Separate door locking electrical isolation for each mains compartment
- Dedicated control panel and isolator for fans and integral pumps (when fitted)
- Emergency Stop fitted to controls compartment door

CAUTION  **The Emergency Stop MUST NOT be used to stop the chiller other than in the event of an emergency.**

- Separate, fully accessible, controls compartment, allowing safe adjustment of microprocessor set points whilst the unit is operational
- Dedicated bus-bar chamber for connection of incoming 3-phase and earth mains power supply
- Circuit breakers for protection of all major unit components
- Phase Rotation Relay also incorporating loss of phase protection

The electrical power and control panel is wired to the latest European standards and codes of practice

Mains supply is 3 phase and a neutral is not required.

General Description

OPTIONAL EXTRAS - ENERGY SAVING

Power Factor Correction When applied to the motors of each compressor, the compressor power factor is controlled to a minimum operating value of 0.95 at the full operating capacity. This satisfies many supply authorities that may impose surcharges on equipment with power factor less than 0.95.

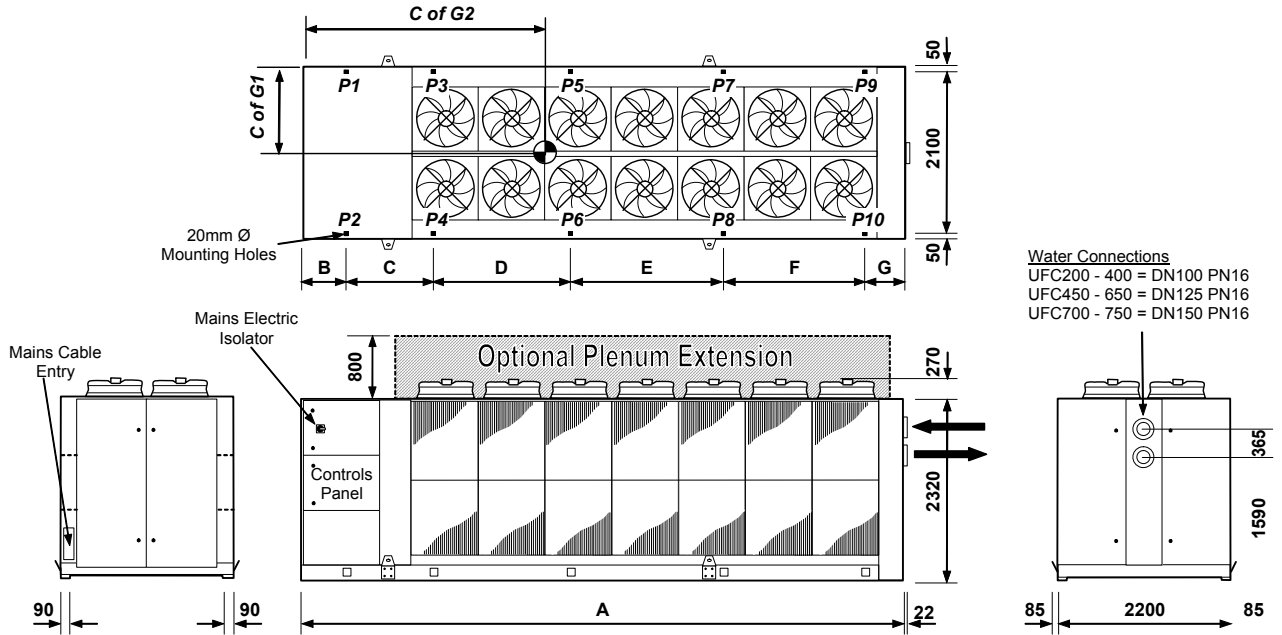
Closed Transition Star/Delta Compressor Start Closed transition Star/Delta starting can be incorporated to avoid high transient changeover current peaks when the compressor motor is switched over from Star to Delta. Refer to the **Commissioning Data** section for a detailed description.

OPTIONAL EXTRAS - GENERAL

- | | | | |
|----------------------------|---|---|--|
| Loose Item | <ul style="list-style-type: none"> • Anti Vibration Mounts • Condenser Fan Discharge Air Plenum • De-aeration | } | Instructions supplied with item |
| Factory Fitted | <ul style="list-style-type: none"> • Epoxy Coated Condenser Coils • Coil Guards • Closed Transition Star/Delta Compressor Start • Run & Standby Power Supply • Power Factor Correction • Pumps • Sequence Control • BMS Interface Card • Leak Detection Kit • Flushing Bypass Loop • Flushing Bypass Loop & Regulating Valve | } | Refer to Compressor Start-Up Information for details |
| Optional Unit Cover | <ul style="list-style-type: none"> • Commissioning • Chillerguard® Health Check • Chillerguard® Maintenance | } | For details and a competitive quotation, contact Airedale Service. |

Installation Data

DIMENSIONS




D Models		A	B	C	D	E	F	G
UFC200D-8	mm	4945	760	1850	1850	-	-	485
UFC225D-8	mm	4945	760	1850	1850	-	-	485
UFC250D-8	mm	4945	760	1850	1850	-	-	485
UFC275D-8	mm	4945	760	1850	1850	-	-	485
UFC300D-8	mm	4945	760	1850	1850	-	-	485
UFC350D-10	mm	5795	760	1550	1450	1550	-	485
UFC400D-10	mm	5795	760	1550	1450	1550	-	485
UFC450D-12	mm	6645	760	1800	1800	1800	-	485
UFC500D-12	mm	6645	760	1800	1800	1800	-	485
UFC575D-14	mm	7670	610	1100	1725	1920	1830	485
UFC650D-14	mm	7670	610	1100	1725	1920	1830	485
UFC700D-18	mm	9370	585	1100	2400	2400	2375	460
UFC750D-18	mm	9370	585	1100	2400	2400	2375	460

DQ Models		A	B	C	D	E	F	G
UFC200DQ-8	mm	4945	760	1850	1850	-	-	485
UFC225DQ-8	mm	4945	760	1850	1850	-	-	485
UFC250DQ-8	mm	4945	760	1850	1850	-	-	485
UFC275DQ-8	mm	4945	760	1850	1850	-	-	485
UFC300DQ-8	mm	4945	760	1850	1850	-	-	485
UFC350DQ-12	mm	6645	760	1800	1800	1800	-	485
UFC400DQ-12	mm	6645	760	1800	1800	1800	-	485
UFC450DQ-14	mm	7670	610	1100	1725	1920	1830	485
UFC500DQ-14	mm	7670	610	1100	1725	1920	1830	485
UFC575DQ-16	mm	8520	610	1100	2375	2120	1830	485
UFC650DQ-16	mm	8520	610	1100	2375	2120	1830	485
UFC700DQ-18	mm	9370	585	1100	2400	2400	2375	460
UFC750DQ-18	mm	9370	585	1100	2400	2400	2375	460

Installation Data

DIMENSIONS (CONT.)

DSQ Models		A	B	C	D	E	F	G
UFC200DSQ-8	mm	4945	760	1850	1850	-	-	485
UFC225DSQ-8	mm	4945	760	1850	1850	-	-	485
UFC250DSQ-8	mm	4945	760	1850	1850	-	-	485
UFC275DSQ-10	mm	5795	760	1550	1450	1550	-	485
UFC300DSQ-10	mm	5795	760	1550	1450	1550	-	485
UFC350DSQ-14	mm	7670	610	1100	1725	1920	1830	485
UFC400DSQ-14	mm	7670	610	1100	1725	1920	1830	485
UFC450DSQ-16	mm	8520	610	1100	2375	2120	1830	485
UFC500DSQ-16	mm	8520	610	1100	2375	2120	1830	485
UFC575DSQ-18	mm	9370	585	1100	2400	2400	2375	460
UFC650DSQ-18	mm	9370	585	1100	2400	2400	2375	460
UFC700DSQ-20	mm	10220	585	1100	2400	2800	2825	460
UFC750DSQ-20	mm	10220	585	1100	2400	2800	2825	460

CAUTION  8 Lifting points on 20 fan models.

Mounting Holes x 20mm Ø	Quantity
8 Fan Unit	6
10 Fan Unit	8
12 Fan Unit	8
14 Fan Unit	10
16 Fan Unit	10
18 Fan Unit	10
20 Fan Unit	10

POINT LOADING & CENTRE OF GRAVITY

Please contact Airedale.

Installation Data

WEIGHTS

STANDARD D		UFC200D-8	UFC225D-8	UFC250D-8	UFC275D-8	UFC300D-8
Weight - Machine	kg	3340	3360	3380	3480	3670
Weight - Operating	kg	3940	3960	3980	4070	4310
QUIET DQ		UFC200DQ-8	UFC225DQ-8	UFC250DQ-8	UFC275DQ-8	UFC300DQ-8
Weight - Machine	kg	3270	3290	3310	3410	3600
Weight - Operating	kg	3870	3890	3910	4000	4240
SUPER QUIET DSQ		UFC200DSQ-8	UFC225DSQ-8	UFC250DSQ-8	UFC275DSQ-10	UFC300DSQ-10
Weight - Machine	kg	3270	3290	3310	3780	3980
Weight - Operating	kg	3870	3890	3910	4500	4750


STANDARD D		UFC350D-10	UFC400D-10	UFC450D-12	UFC500D-12	UFC575D-14
Weight - Machine	kg	4130	4170	4870	5000	5490
Weight - Operating	kg	4890	4920	5860	5980	6570
QUIET DQ		UFC350DQ-12	UFC400DQ-12	UFC450DQ-14	UFC500DQ-14	UFC575DQ-16
Weight - Machine	kg	4410	4440	5170	5290	5760
Weight - Operating	kg	5300	5320	6290	6390	6970
SUPER QUIET DSQ		UFC350DSQ-14	UFC400DSQ-14	UFC450DSQ-16	UFC500DSQ-16	UFC575DSQ-18
Weight - Machine	kg	4820	4850	5560	5690	6140
Weight - Operating	kg	5840	5860	6810	6920	7480

STANDARD D		UFC650D-14	UFC700D-18	UFC750D-18
Weight - Machine	kg	5560	6630	7000
Weight - Operating	kg	6690	7990	8450
QUIET DQ		UFC650DQ-16	UFC700DQ-18	UFC750DQ-18
Weight - Machine	kg	5830	6470	6840
Weight - Operating	kg	7090	7830	8290
SUPER QUIET DSQ		UFC650DSQ-18	UFC700DSQ-20	UFC750DSQ-20
Weight - Machine	kg	6210	6860	7220
Weight - Operating	kg	7600	8350	8800

Installation Data

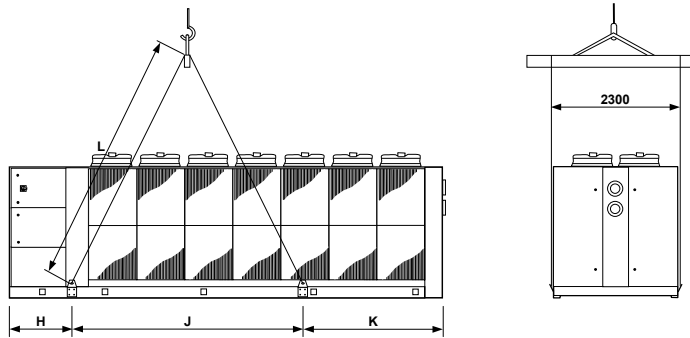
UNIT LIFTING

- Employ lifting specialists.
- Local codes and regulations relating to the lifting of this type of equipment should be observed.
- Use the appropriate spreader bars/lifting slings with the holes/lugs provided.
- Attach lifting chains to the 4 lifting lugs provided, each chain must be capable of lifting the whole chiller.
- Lifting hole/lug dimension: 40mm
- Lift the unit slowly and evenly.
- If the unit is dropped, it should immediately be checked for damage and reported to Airedale Service.

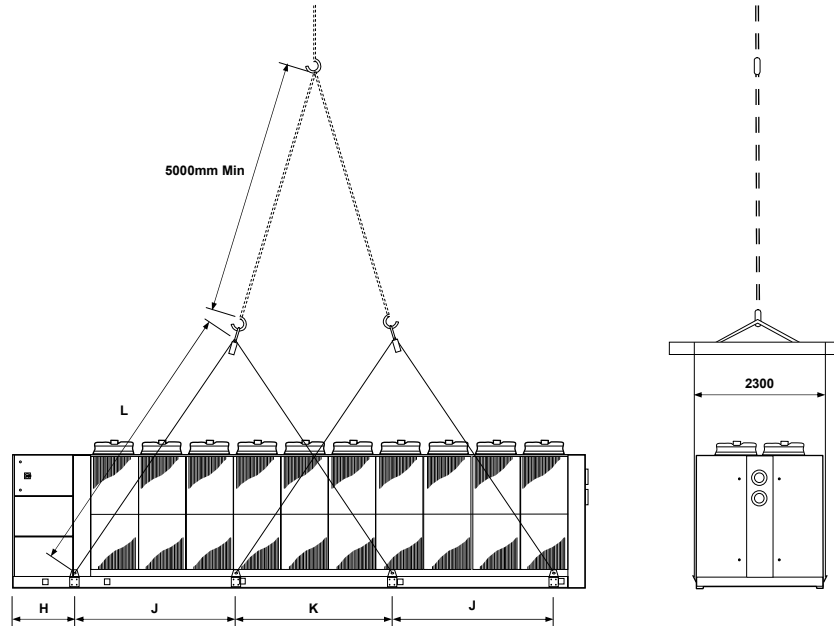
CAUTION  Only use lifting points provided.

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

8 – 18 Fans



20 Fans



LIFTING DIMENSIONS

		H	J	K	L (min)
8 FANS	mm	425	3150	1370	3200
10 FANS	mm	425	3480	1890	3500
12 FANS	mm	425	4105	2115	4200
14 FANS	mm	1100	4035	2535	4200
16 FANS	mm	1100	4885	2535	5000
18 FANS	mm	1075	5585	2660	5800
20 FANS (8 lifting points)	mm	1125	2850	2775	5000

Date: 18/10/05

MANUAL AFFECTED: TECHNICAL & INSTALLATION

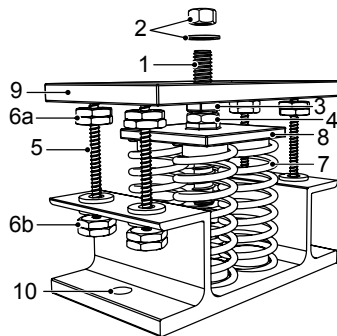
ULTIMA: UCC/UCCU 30-450
UCFC/URAC/UWC75-450
UFC/USC200-750

MANUAL PART NO: 901-108 TM E 02/05/A

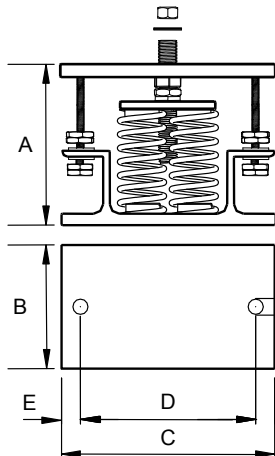
CHANGE: ANTI-VIBRATION MOUNT (SPRING TYPE) SPECIFICATION & INSTALLATION INSTRUCTIONS:

COMPONENTS:

- 1 Locating Screw
- 2 Retaining Nut & Washer
- 3 Levelling Screw
- 4 Levelling Lock Nut
- 5 Retaining Studs
- 6a Upper Retaining Nuts
- 6b Lower Retaining Nuts
- 7 Spring assembly
- 8 Pressure Plate
- 9 Top Plate
- 10 Bolting-down holes



DIMENSIONS:



		A ⁽¹⁾	B	C	D	E	FØ
UCC30-70 UCC75, 80, 100, 125 & 150 UCCU30-70 UCCU75, 80, 100, 125 & 150 UCFC75-150	2 SPRING	136	110	180	148	16	11
UCC110, 130, 160-450 UCCU110, 130, 160-450 UCFC160-450 UFC200-750 URAC75-450 USC200-750 UWC75-450	4 SPRING	180	130	225	186	20	16

- (1) Unloaded dimension
- (2) Refer to relevant **Loose Parts Instructions** sheet for positioning of each mount.

INSTALLATION

- 1 Locate and secure mount using bolting down holes (10) in base plate.
- 2 Ensure mounts are located in line with the unit base.
- 3 If applicable, remove compressor enclosure covers to allow access to mount fixing holes in the unit base.
- 4 Lock the upper retaining nuts (6a) to the underside of the top plate (9) before a load is applied.
- 5 Remove retaining nut and washer (2), lower the unit onto the mounts and replace retaining nut and washer.
- 6 Beginning with the mount with the largest deflection, adjust the height of each mount using the levelling screw (3).

CAUTION **Mountings must be adjusted incrementally in turn. Do not fully adjust 1 mount at a time as this may overload and damage springs.**

- 7 When all mounts are level, lock each into place using the levelling lock nut (4).
- 8 Lock all retaining nuts (6a and 6b) to the extreme ends of the retaining studs (5).

CAUTION **Do not connect any services until all anti vibration mounts have been fully adjusted.**

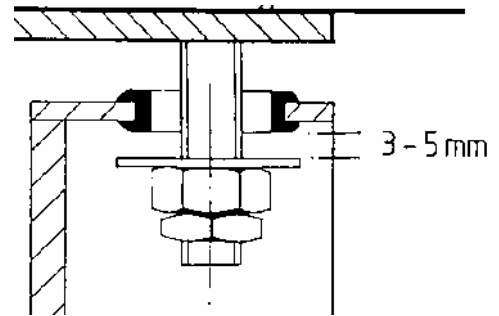
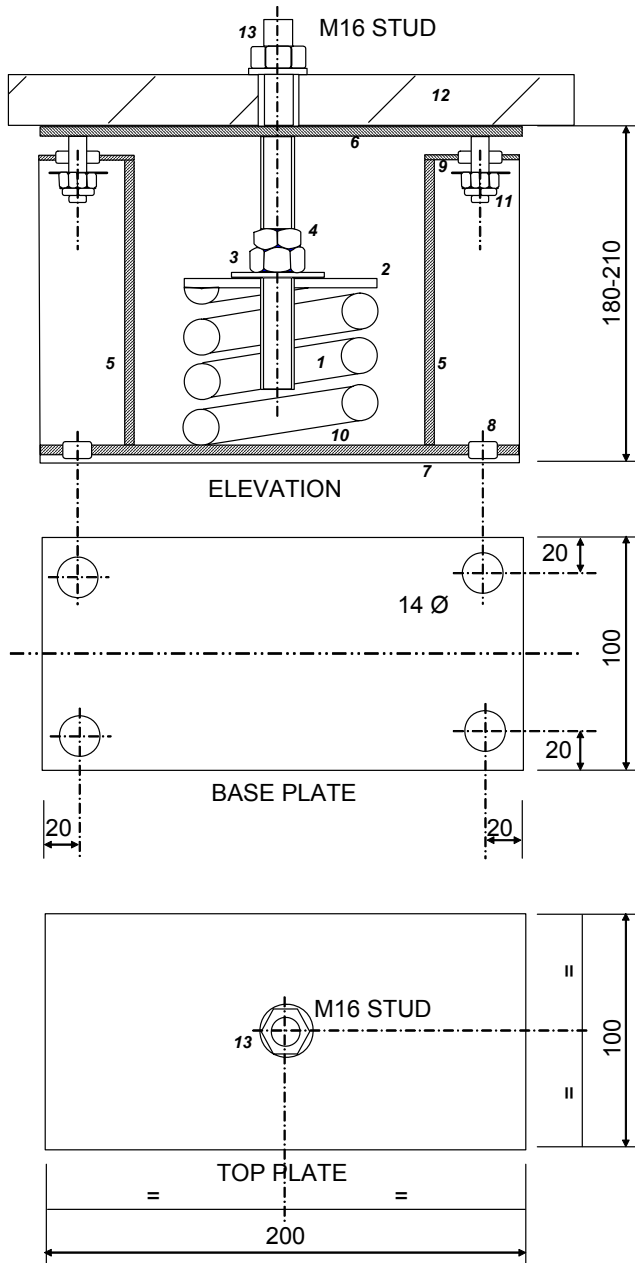
Installation Data

ANTI VIBRATION MOUNTING CLS Type (Optional)

- 1 Locate and secure mount using bolting down holes provided in base plate.
- 2 Ensure mounts are located in line with the chiller base.
- 3 If applicable remove compressor enclosure covers to allow access to AV fixing points on the chiller base.
- 4 Position the machine using the centrally located stud, which allows the machine to be bolted down securely.
- 5 Loosen transit bolts and turn nut 3 clockwise until top plate 6 lifts clear of support posts.
- 6 Adjust and lock nuts on transit bolts such that a small (3-5mm) gap is left between washer and grommet. Refer diagram below.

CAUTION  Mountings must be adjusted incrementally in turn. Do not adjust 1 mount at a time as this may overload and damage springs.

Do not connect any services until all anti vibration mounts have been fully adjusted.



COMPONENTS

- 1 High deflection steel spring
- 2 Spring pressure plate
- 3 Height adjusting nut
- 4 Locking nut
- 5 Load bearing supports
- 6 Load bearing top plate
- 7 High frequency isolation pad
- 8 10 dia holding down bolt holes
- 9 High frequency isolation grommets
- 10 Steel spring location rings
- 11 Transportation/restraining bolts
- 12 Machine frame
- 13 Machine holding stud/nuts

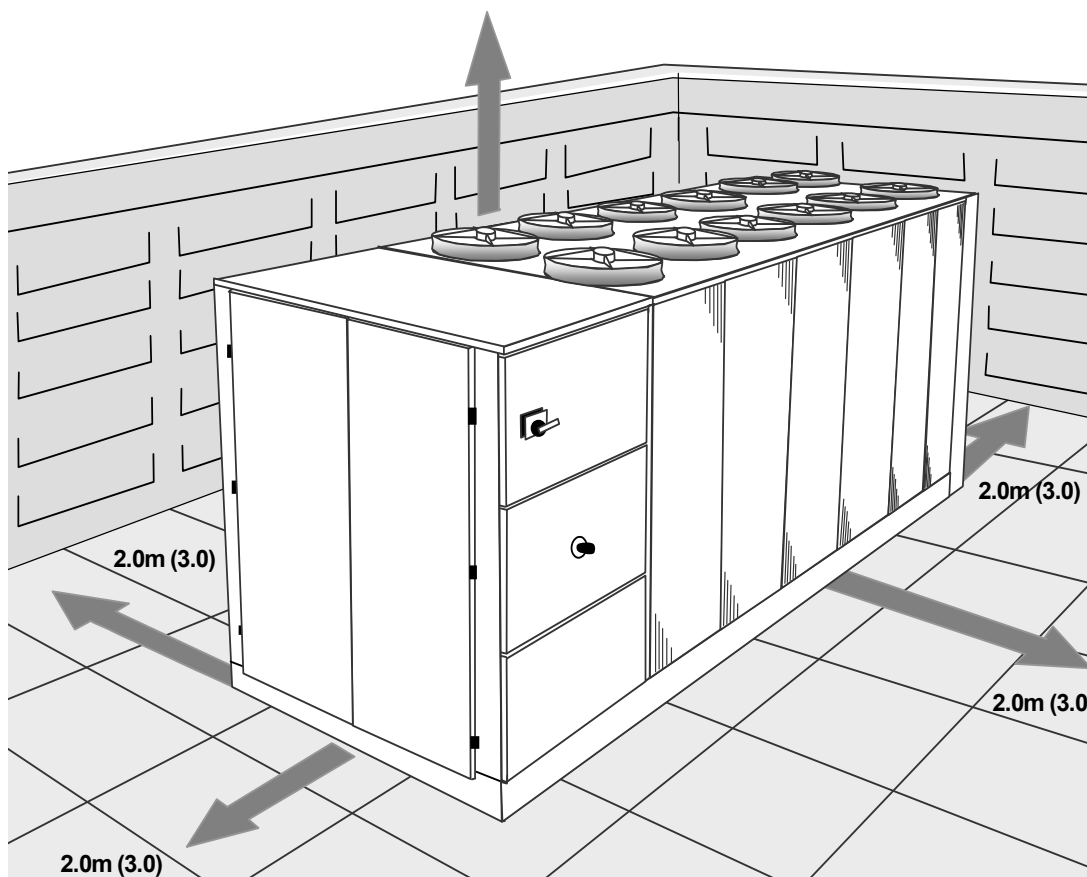
Installation Data

POSITIONING

The installation position should be selected with the following points in mind:

- Position on a stable and even base, levelled to ensure that the compressor operates correctly.
- Levelling should be to +/- 5mm
- Where vibration transmission to the building structure is possible, fit spring anti-vibration mounts and flexible water connections.
- Observe airflow and maintenance clearances.
- Pipework and electrical connections are readily accessible.
- Where multiple units are installed, due care should be taken to avoid the discharge air from each unit adversely affecting other units in the vicinity.
- Within a side enclosed installation, the fan MUST be higher than the enclosing structure.
- Figures in brackets indicate airflow and maintenance clearances for side-enclosed or multiple chiller applications.
- Ensure there are no obstructions directly above the fans.
- Allow free space above the fans to prevent air recirculation.

CAUTION  Ensure the unit is completely level and secured prior to connecting services.




Installation Data

- WATER SYSTEM DATA** Chilled water pipework and ancillary components must be installed in accordance with:
- National and Local Water supply company standards.
 - The manufacturer's instructions are followed when fitting ancillary components.
 - The system liquid is treated to prevent corrosion and algae forming.
 - Glycol required as standard, with the correction concentration to suit the lowest ambient the equipment will experience

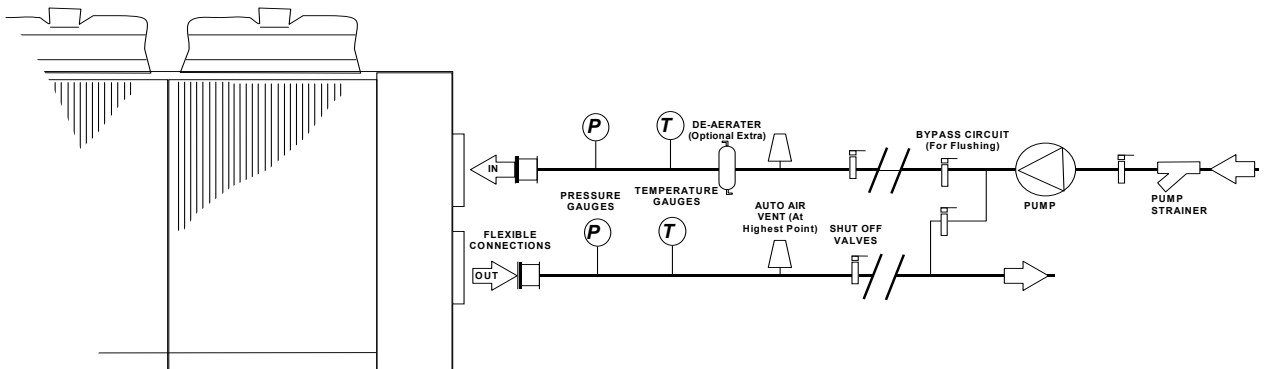
CAUTION  The unit water connections are **NOT** designed to support external pipework, pipework should be supported during installation.

CAUTION  No liability for externally connected pipework will be regarded by Airedale International Air Conditioning Ltd.

STANDARD RECOMMENDED INSTALLATION

CAUTION  The following installation recommendations should be adhered to. Failure to do this could invalidate the chiller warranty.

The water flow commissioning valve set is not shown in the diagram, as the valve can be fitted elsewhere within the Chilled Water circuit.



- Recommended Minimum Component Requirements** The recommended requirements to allow commissioning to be carried out correctly are:
- A water-flow commissioning valve set fitted to the system
 - In multiple chiller installations, 1 commissioning valve set is required per chiller
 - Air vents are to be installed at all high points and where air is likely to be trapped at intermediate points.
 - Drain points are to be installed at all low points in the system and in particular adjacent to the unit for maintenance to be carried out.
 - Isolating valves should be installed adjacent to all major items of equipment for ease of maintenance.
 - Balancing valves can be installed if required to aid correct system balancing.
 - All chilled water pipework must be insulated and vapour sealed to avoid condensation.
 - If several units are installed in parallel adjacent to one another, reverse return should be applied to avoid unnecessary balancing valves.

Pump Statement

When installing circulating water pumps or equipment containing them, the following rules should be applied:

- Ensure the system is filled with liquid then vented and the pump primed with water before running the pump. This is required as the pump bearings and mechanical seal faces are cooled by the pumped liquid.
- To avoid cavitation the NPSH (Net Positive Suction Head) incorporating a safety margin of 0.5m head must be available at the pump inlet during operation.

CAUTION  Where pumps are installed by others, a timer **MUST** be installed to ensure that the pumps run for at least 3 minutes after a remote off signal is received by the chiller.

Installation Data

WATER SYSTEM DATA

Pressure Testing

When all the pipework has been connected in the system, proceed as follows:

- Ensure all shut off and control valves are fully open.
- Pressurise system to the operating pressure, hold for 1 hour (a gradual fall in pressure shown on the gauge indicates a leak).
- Leaks should be found and repaired and the unit pressure tested for a further hour.

When the pressure remains at the operating pressure for 1 hour, the system can be considered leak free.

CAUTION ▽ Although a pressure of 1.5 x working pressure is adequate for testing purposes, most local water authorities require 2 x working pressure.

CAUTION ▽ All free-cooling units should use minimum 20% glycol concentration.

Filling

CAUTION ▽ It is recommended that the whole system be flushed prior to filling to remove debris left in the water pipework by using a flushing bypass as shown to avoid serious damage to the tubes in the cooler.

During filling the system should be vented at all high points.

Once the system has been completely vented all vents should be closed.

To prevent air locking in the system it is advisable to fill the systems from the lowest point, ie drain point on pipework.

Auto air vents are fitted, Airedale strongly recommends an auto pressurisation unit be fitted to the system.

Model		UFC200D-8	UFC225D-8	UFC250D-8	UFC275D-8	UFC300D-8
Connections						
Water Inlet / Outlet - Unit	(4)	DN100	DN100	DN100	DN100	DN100
Water Drain/Bleed - Evap	in	1/2	1/2	1/2	1/2	1/2
Water System						
Min. System Water Volume	(5) l	1454	1577	1750	1915	2074
Max. System Operating Press	Bar	10	10	10	10	10

Model		UFC350D-10	UFC400D-10	UFC450D-12	UFC500D-12	UFC575D-14
Connections						
Water Inlet / Outlet - Unit	(4)	DN100	DN100	DN125	DN125	DN125
Water Drain/Bleed - Evap	in	1/2	1/2	1/2	1/2	1/2
Water System						
Min. System Water Volume	(5) l	2398	2606	3046	3413	3967
Max. System Operating Press	Bar	10	10	10	10	10


Model		UFC650D-14	UFC700D-18	UFC750D-18
Connections				
Water Inlet / Outlet - Unit	(4)	DN125	DN150	DN150
Water Drain/Bleed - Evap	In	1/2	1/2	1/2
Water System				
Min. System Water Volume	(5) l	4392	4135	3726
Max. System Operating Press	Bar	10	10	10

(4) Flanged to PN16.

(5) For minimum system volume refer to the **Technical Manual - Design Features & Information - Minimum Volume Calculations** section.

Installation Data

GLYCOL DATA

CAUTION  All free-cooling units should use minimum 20% glycol concentration.

Ethylene Glycol Nominal Correction Factors


Glycol in System / Freezing Point °C	20% / -9°C	30% / -15°C	40% / -23°C
Cooling Duty	1.00	0.98	0.96
Input Power	1.00	0.98	0.97
Water Flow	1.00	1.02	1.05
Pressure Drop	1.00	1.15	1.31

Propylene Glycol Nominal Correction Factors

Glycol in System / Freezing Point °C	20% / -6°C	30% / -12°C	40% / -20°C
Cooling Duty	1.00	0.96	0.93
Input Power	1.00	0.98	0.97
Water Flow	1.00	0.98	0.98
Pressure Drop	1.00	1.13	1.25

Example UFC500D-12 operating at 7/12, 30°C Ambient, 30% Ethylene Glycol

Cooling kW	(484.9)	(refer to <i>Technical Manual</i>)	x 0.98	30% Ethylene Glycol =	475.2 kW
Input kW	(194.0)	(refer to <i>Technical Manual</i>)	x 0.98		190.1 kW
Flow l/s	(24.2)	(calculated: $\frac{(DX \text{ Cooling kW})}{\Delta T \times 4}$)	x 1.02		24.7 l/s
Pressure Drop kPa	(122.0)	(refer to <i>Waterside Pressure Drops</i>)	x 1.15		140.3 kPa

CAUTION  Waste glycol needs to be handled responsibly, recycled or turned over to professional personnel for correct disposal. Most anti-freeze manufacturers recommend that used anti-freeze be collected and disposed according to Local Legislation. Waste glycol should NOT be drained onto the ground, rainwater drainage system or natural waters.

If the glycol contains heavy metals or other contaminants from gas or oil, the level of hazard posed by the glycol is increased and could be characterised as hazardous waste.

STEPS IF GLYCOL IS RELEASED/SPILLED

Small spill - soak up with absorbent material.

Large spill - contain spill and pump to suitable container for disposal.

Installation Data

ELECTRICAL DATA

General

- As standard the equipment is designed for 400V, 3 phase, 3 wire 50Hz and a separate permanent 230V, 1 phase, 50Hz supply, to all relevant IEE regulations, British standards and IEC requirements.

CAUTION

- **Ensure correct phase rotation.**
- A fused and isolated electrical supply of the appropriate phase, frequency and voltage should be installed.
- The control voltage to the interlocks is 24V. Always size the low voltage interlock and protection cabling for a maximum voltage drop of 2V.

CAUTION

- **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.
- Once the connecting pipework is complete the electrical supply can be connected by routing the cable through the appropriate casing hole and connecting the cables, refer to the **Wiring Diagram** supplied with each unit.

CAUTION

A separately fused, locally isolated, permanent single phase and neutral supply **MUST BE FITTED** for the compressor sump heater, evaporator trace heating and control circuits, **FAILURE to do so could INVALIDATE WARRANTY.**

CAUTION

The Emergency Stop **MUST NOT** be used to stop the chiller other than in the event of an emergency.

Interlocks & Protection

Always electrically interlock the operation of the chiller with the pump controls for safety reasons. **Failure to do this will invalidate the chiller warranty.**

CAUTION

Do not rely solely on the BMS to protect the chiller against low flow conditions.
An evaporator pump interlock MUST be directly wired to the chiller, refer to *Interconnecting Wiring* diagram.

Installation Data

INTERCONNECTING WIRING

No Pumps

UFC200 – UFC750		L1	○	←	Mains incoming supply 400V/3PH/50Hz
		L2	○	←	
		L3	○	←	
		E	○	←	
		L4	○	←	Separate Permanent Supply 230V/1PH/50Hz
		N1	○	←	
		E	○	←	
		11	○	→	External Trace Heating Connections 240V/500W max
		N	○	←	
		502	○	→	(1) Evaporator Pump Interlock 24VAC
		503	○	←	
		502	○	→	Unit Remote On/Off 24VAC
		505	○	←	
		502	○	→	Setback Setpoint Temperature switch
		507	○	←	
		573	○	←	Circuit 1 Volt Free Common Alarm Volt Free Alarm N/O Volt Free Alarm N/C
		574	○	→	
		575	○	→	
	576	○	←	Circuit 2 Volt Free Common Alarm Volt Free Alarm N/O Volt Free Alarm N/C	
	577	○	→		
	578	○	→		

CAUTION  (1) MUST be directly wired to the chiller to validate warranty.

With Pumps

UFC200 – UFC750		L1	○	←	Mains incoming supply 400V/3PH/50Hz
		L2	○	←	
		L3	○	←	
		E	○	←	
		L4	○	←	Separate Permanent Supply 230V/1PH/50Hz
		N1	○	←	
		E	○	←	
		11	○	→	External Trace Heating Connections 240V/500W max
		N	○	←	
		502	○	→	Pump/s Remote On/Off 24VAC
		506	○	←	
		502	○	→	Unit Remote On/Off 24VAC
		505	○	←	
		502	○	→	Setback Setpoint Temperature switch
		507	○	←	
		573	○	←	Circuit 1 Volt Free Common Alarm Volt Free Alarm N/O Volt Free Alarm N/C
		574	○	→	
		575	○	→	
	576	○	←	Circuit 2 Volt Free Common Alarm Volt Free Alarm N/O Volt Free Alarm N/C	
	577	○	→		
	578	○	→		

Installation Data

ELECTRICAL DATA

Model		UFC200D-8	UFC225D-8	UFC250D-8	UFC275D-8	UFC300D-8
Unit Data (1)						
Nominal Run Amps	(2) A	141	154	167	174	183
Maximum Start Amps	A	289	335	348	356	336
Permanent Supply	VAC	230V 1PH 50Hz				
Mains Supply	VAC	400V 3PH 50Hz				
Rec Permanent Fuse Size	A	16	16	16	16	16
Rec Mains Fuse Size	A	200	200	250	250	250
Max Permanent Incoming Cable Size	mm ²	4mm ² Terminal				
Max Mains Incoming Cable Size	mm ²	Direct to Bus Bar				
Control Circuit	VAC	24V / 230VAC				
Evaporator						
Trace Heater Rating	W	200	200	200	200	250
External Trace Heating						
Available (fitted by others)	W	500	500	500	500	500
Condenser Fan - Per Fan						
Full Load Amps	A	2.60	2.60	2.60	2.60	2.60
Locked Rotor Amps	A	15.00	15.00	15.00	15.00	15.00
Motor Rating	kW	1.70	1.70	1.70	1.70	1.70
Compressor - Per Compressor						
Motor Rating	kW	33 + 33	41 + 33	41 + 41	48 + 41	48 + 48
Nominal Run Amps	(2) A	60 + 60	73 + 60	73 + 73	81 + 73	81 + 81
Crankcase Heater Rating	W	150	150	150	150	150
Start Amps	(3)	208 + 208	254 + 208	254 + 254	234 + 254	234 + 234
Type Of Start		Star / Delta				
QUIET DQ						
		UFC200DQ-8	UFC225DQ-8	UFC250DQ-8	UFC275DQ-8	UFC300DQ-10
All data as above except:						
Condenser Fan - Per Fan						
Full Load Amps	A	1.75	1.75	1.75	1.75	1.75
Locked Rotor Amps	A	6.20	6.20	6.20	6.20	6.20
Motor Rating	kW	0.98	0.98	0.98	0.98	0.98
SUPER QUIET DSQ						
		UFC200DSQ-8	UFC225DSQ-8	UFC250DSQ-8	UFC275DSQ-10	UFC300DSQ-10
All data as above except:						
Condenser Fan - Per Fan						
Full Load Amps	A	1.15	1.15	1.15	1.15	1.15
Locked Rotor Amps	A	2.10	2.10	2.10	2.10	2.10
Motor Rating	kW	0.70	0.70	0.70	0.70	0.70
OPTIONAL EXTRAS - Power Factor Correction						
Fitted to standard D models - for data on DQ & DSQ please refer to Airedale.						
Nominal Run Amps	(2) A	129	140	151	158	165
Maximum Start Amps	(3) A	289	335	348	356	336
Recommended Mains Fuse	A	160	200	200	250	250
Compressor Nominal Run Amps - Per Compressor	A	54 + 54	65 + 54	65 + 65	72 + 65	72 + 72
Closed Transition						
Nominal Run Amps	(2) A	141	154	167	174	183
Maximum Start Amps	A	289	335	348	356	336
Recommended Mains Fuse	A	200	200	250	250	250
Compressor Nominal Run Amps - Per Compressor	A	60 + 60	73 + 60	73 + 73	81 + 73	81 + 81

- (1) Refers to standard speed fans.
 (2) Based at 12/7°C water and 30°C ambient
 (3) Starting amps refers to the Star connection only.

Installation Data

ELECTRICAL DATA

Model		UFC350D-10	UFC400D-10	UFC450D-12	UFC500D-12	UFC575D-14
Unit Data (1)						
Nominal Run Amps	(2) A	212	236	275	308	347
Maximum Start Amps	A	432	456	531	564	643
Permanent Supply	VAC			230V 1PH 50Hz		
Mains Supply	VAC			400V 3PH 50Hz		
Rec Permanent Fuse Size	A	16	16	16	16	16
Rec Mains Fuse Size	A	315	355	400	400	450
Max Permanent Incoming Cable Size	mm ²			4mm ² Terminal		
Max Mains Incoming Cable Size	mm ²			Direct to Bus Bar		
Control Circuit	VAC			24V / 230VAC		
Evaporator						
Trace Heater Rating	W	250	250	250	250	250
External Trace Heating						
Available (fitted by others)	W	500	500	500	500	500
Condenser Fan - Per Fan						
Full Load Amps	A	2.60	2.60	2.60	2.60	2.60
Locked Rotor Amps	A	15.00	15.00	15.00	15.00	15.00
Motor Rating	kW	1.70	1.70	1.70	1.70	1.70
Compressor - Per Compressor						
Motor Rating	kW	62 + 48	62 + 62	81 + 62	81 + 81	109 + 81
Nominal Run Amps	(2) A	105 + 81	105 + 105	138 + 105	138 + 138	173 + 138
Crankcase Heater Rating	W	150	150	150	150	150
Start Amps	(3)	325 + 234	325 + 325	394 + 325	394 + 394	469 + 394
Type Of Start		Star / Delta				
QUIET DQ						
		UFC350DQ-12	UFC400DQ-12	UFC450DQ-14	UFC500DQ-14	UFC575DQ-16
All data as above except:						
Condenser Fan - Per Fan						
Full Load Amps	A	1.75	1.75	1.75	1.75	1.75
Locked Rotor Amps	A	6.20	6.20	6.20	6.20	6.20
Motor Rating	kW	0.98	0.98	0.98	0.98	0.98
SUPER QUIET DSQ						
		UFC350DSQ-14	UFC400DSQ-14	UFC450DSQ-16	UFC500DSQ-16	UFC575DSQ-18
All data as above except:						
Condenser Fan - Per Fan						
Full Load Amps	A	1.15	1.15	1.15	1.15	1.15
Locked Rotor Amps	A	2.10	2.10	2.10	2.10	2.10
Motor Rating	kW	0.70	0.70	0.70	0.70	0.70
OPTIONAL EXTRAS - Power Factor Correction						
Fitted to standard D models - for data on DQ & DSQ please refer to Airedale.						
Nominal Run Amps	(2) A	192	214	249	278	314
Maximum Start Amps	(3) A	432	456	531	564	643
Recommended Mains Fuse	A	315	315	355	400	400
Compressor Nominal Run Amps - Per Compressor	A	94 + 72	94 + 94	123 + 94	123 + 123	155 + 123
Closed Transition						
Nominal Run Amps	(2) A	212	236	275	308	347
Maximum Start Amps	A	432	456	531	564	643
Recommended Mains Fuse	A	315	355	400	400	450
Compressor Nominal Run Amps - Per Compressor	A	105 + 81	105 + 105	138 + 105	138 + 138	173 + 138

- (1) Refers to standard speed fans.
 (2) Based at 12/7°C water and 30°C ambient
 (3) Starting amps refers to the Star connection only.

Installation Data

ELECTRICAL DATA

Model		UFC650D-14	UFC700D-18	UFC750D-18																														
Unit Data (1)																																		
Nominal Run Amps	(2) A	382	416	439																														
Maximum Start Amps	A	678	758	781																														
Permanent Supply	VAC	230V 1PH 50Hz																																
Mains Supply	VAC	400V 3PH 50Hz																																
Rec Permanent Fuse Size	A	16	16	16																														
Rec Mains Fuse Size	A	500	560	560																														
Max Permanent Incoming Cable Size	mm ²	4mm ² Terminal																																
Max Mains Incoming Cable Size	mm ²	Direct to Bus Bar																																
Control Circuit	VAC	24V / 230VAC																																
Evaporator																																		
Trace Heater Rating	W	250	250	250																														
External Trace Heating																																		
Available (fitted by others)	W	500	500	500																														
Condenser Fan - Per Fan																																		
Full Load Amps	A	2.60	2.60	2.60																														
Locked Rotor Amps	A	15.00	15.00	15.00																														
Motor Rating	kW	1.70	1.70	1.70																														
Compressor - Per Compressor																																		
Motor Rating	kW	109	119 + 109	119																														
Nominal Run Amps	(2) A	173	196 + 173	196																														
Crankcase Heater Rating	W	150	150	150																														
Start Amps	(3)	469	538 + 469	538																														
Type Of Start		Star / Delta																																
QUIET DQ																																		
<table border="0" style="width:100%"> <tr> <td></td> <td></td> <td>UFC650DQ-16</td> <td>UFC700DQ-18</td> <td>UFC750DQ-18</td> </tr> <tr> <td colspan="5">All data as above except:</td> </tr> <tr> <td colspan="5">Condenser Fan - Per Fan</td> </tr> <tr> <td>Full Load Amps</td> <td>A</td> <td>1.75</td> <td>1.75</td> <td>1.75</td> </tr> <tr> <td>Locked Rotor Amps</td> <td>A</td> <td>6.20</td> <td>6.20</td> <td>6.20</td> </tr> <tr> <td>Motor Rating</td> <td>kW</td> <td>0.98</td> <td>0.98</td> <td>0.98</td> </tr> </table>							UFC650DQ-16	UFC700DQ-18	UFC750DQ-18	All data as above except:					Condenser Fan - Per Fan					Full Load Amps	A	1.75	1.75	1.75	Locked Rotor Amps	A	6.20	6.20	6.20	Motor Rating	kW	0.98	0.98	0.98
		UFC650DQ-16	UFC700DQ-18	UFC750DQ-18																														
All data as above except:																																		
Condenser Fan - Per Fan																																		
Full Load Amps	A	1.75	1.75	1.75																														
Locked Rotor Amps	A	6.20	6.20	6.20																														
Motor Rating	kW	0.98	0.98	0.98																														
SUPER QUIET DSQ																																		
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		UFC650DSQ-18	UFC700DSQ-20	UFC750DSQ-20																														
All data as above except:																																		
Condenser Fan - Per Fan																																		
Full Load Amps	A	1.15	1.15	1.15																														
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Motor Rating	kW	0.70	0.70	0.70																														
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Fitted to standard D models - for data on DQ & DSQ please refer to Airedale.																																		
Nominal Run Amps	(2) A	346	378	399																														
Maximum Start Amps	(3) A	678	758	781																														
Recommended Mains Fuse	A	450	500	500																														
Compressor Nominal Run Amps - Per Compressor	A	155	176 + 155	176																														
Closed Transition																																		
Nominal Run Amps	(2) A	382	416	439																														
Maximum Start Amps	A	678	758	781																														
Recommended Mains Fuse	A	500	560	560																														
Compressor Nominal Run Amps - Per Compressor	A	173	196 + 173	196																														

- (1) Refers to standard speed fans.
 (2) Based at 12/7°C water and 30°C ambient
 (3) Starting amps refers to the Star connection only.

Controls

CONTROL SCHEME FEATURES

Airedale recognises that all chiller applications are different but fall mainly into 2 application categories; Variable Supply Temperature and Constant Supply Temperature.

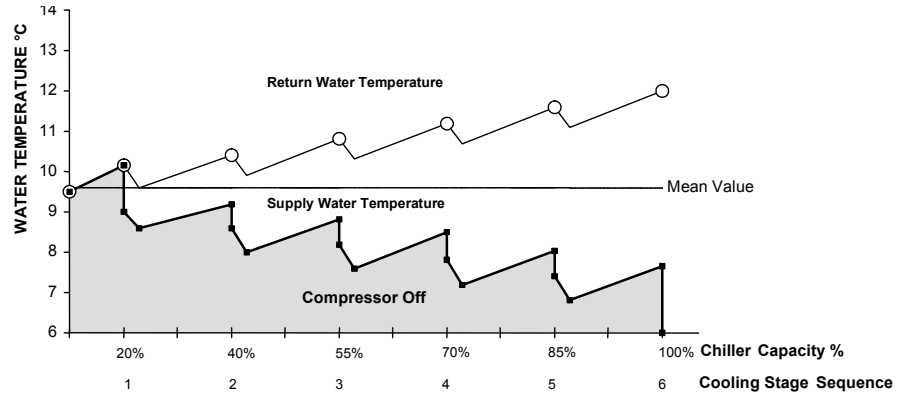
The onboard microprocessor has the capability of satisfying either control requirement as illustrated below. Using the Airedale Variable Supply Temperature control scheme, energy savings are available when compared with previous schemes and that of the Constant Supply Temperature application.

Variable Supply Temperature control schemes offer energy savings where the supply water temperature is not critical to its operation and is recommended for free-cooling applications.

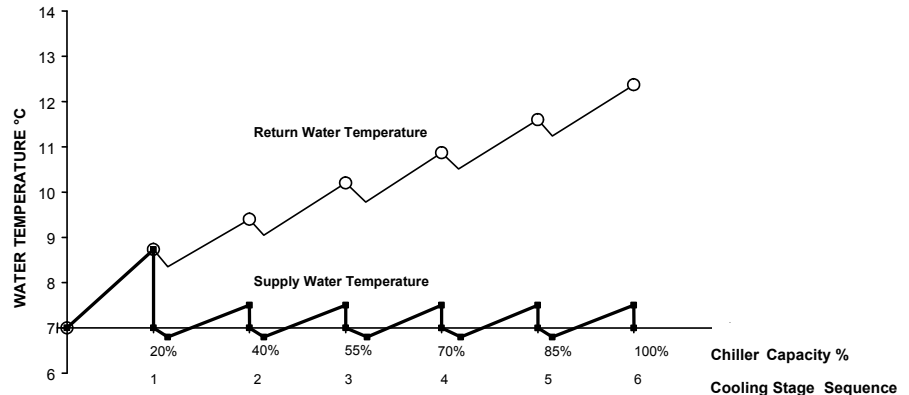
Selection of the best application control scheme can be made via a software switch in the microprocessor during initial commissioning.

Examples based on Models UFC250 to UFC650 having 6 Stages of Cooling

Variable Supply Temperature Control



Constant Supply Temperature Control



CAUTION Factory set to Variable Supply Temperature Control unless otherwise stated at order.

Only when the mode selection has been set can the unit be enabled.

Free-Cooling Operation

In high ambients where free-cooling is not available the fan speed modulates in the conventional manner to maintain a constant head pressure. Free-cooling is initiated wherever the outdoor ambient is 1°C less than the return water temperature.

When free cooling and DX cooling are operating simultaneously the condenser fan speed will operate at 100% maximising free cooling.

In ambients where the free cooling coil is capable of satisfying the full cooling demand, the condenser fans are modulated to provide the desired duty. The condenser fans are capable of being modulated between 25-100% of airflow to maintain the supply water temperature.

During periods where the condenser fan speed has been reduced to a minimum, the supply water temperature will then be controlled by the 3 way valve.

Controls

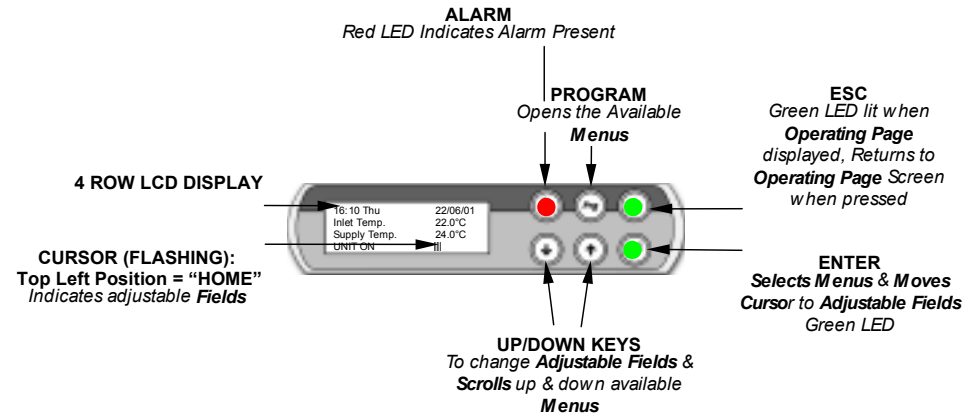
GENERAL

The **AIRETronix** microprocessor controller offers powerful analogue and digital control to meet a wide range of monitoring and control features including a real time clock and Industry standard communication port and network connections.

The controller's inbuilt display is used for viewing the unit operating status and making adjustments to control parameters and visual alarm by allowing the operator access to a series of display pages.

OPERATION

Standard Keypad /Display



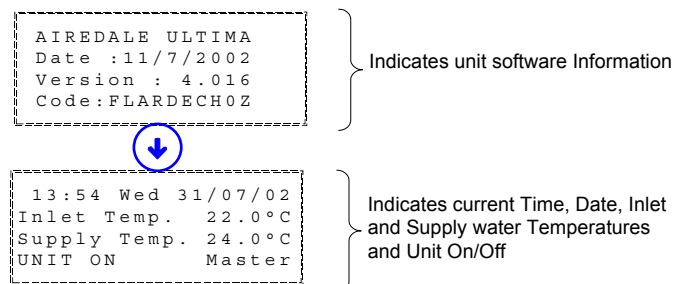
Navigation

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**.

- Initially, use the **Prog** key to **access Menus**, the symbol ← will appear top right and the first menu will appear in CAPITALS, these **indicators** shows which menu is selected.
- Use the **↓** **↑** keys to **move the indicator ←** to the desired menu and press **↵** to **open** the menu.
- 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 at **Home** either use the **↓** **↑** keys to scroll to next **sub-menu** or the **Esc** 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:



Controls

OPERATION (CONT..)

Standard Operating Page cont./

The following **Menus** can be accessed from the **Operating Page**, it is recommended that the display is always returned to the **Operating Page** by using the  key

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 is requested use the   keys to enter the number and  to access the page.

Menus (Listed in Sequence)

Menu	Description	Password
Service	Allows selection of setpoint limits, enables unit on/off from display, remote on/off and remote pump on/off.	Default 4648
Setpoint	Allows setpoint adjustment, includes supply temperature setpoint and unit temperature differential.	Default 4648
Status	Displays current status on digital and analogue inputs and outputs.	Open Access
Maintenance	Displays hours run for compressors and pumps (if fitted). Also includes Electronic Expansion Valves (if fitted).	Default 4648
Clock	Allows adjustment of real time clock, time zones	Default 4648
Alarm Log	Display last 100 alarms in chronological order.	Open Access
Manufacturer	Factory use only.	Airedale Only

SETTING UP

Unit ON/OFF

By pressing the  and  simultaneously for approximately 5 seconds, the unit operation will stop or start.

Real Time Clock

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

Time Zones

The programme provides 3 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.

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:

Digital Inputs

ID1	Phase Rotation
ID2	Emergency Stop
ID3	Evaporator Flow Switch
ID4	Remote On/Off (Optional)
ID5	Compressor 1 Contactor Status
ID6	Circuit 1 Low Pressure Switch
ID7	Compressor 1 Overload
ID8	Circuit 1 Isolator Status
ID9	Circuit 1 Discharge Gas Thermostat
ID10	Compressor 2 Contactor Status
ID11	Circuit 2 Low Pressure Switch
ID12	Compressor 2 Overload
ID13	Circuit 2 Isolator Status
ID14	Circuit 2 Discharge Gas Thermostat
ID15	Remote Pump Interlock or Pump 1 Contactor Status (Optional)
ID16	Pump 2 Contactor Status (Optional)
ID17	Remote Pump Enable
ID18	Summer / Winter Setpoint Enable

Digital Outputs

NO1	Compressor 1 Contactor
NO2	Compressor 1 12% Solenoid Valve
NO3	Compressor 1 25% Solenoid Valve (Dependant on unit size)
NO4	Compressor 1 40% Solenoid Valve
NO5	Compressor 1 70% Solenoid Valve
NO6	Circuit 1 Condenser by-pass solenoid 1
NO7	Circuit 1 Condenser by-pass solenoid 2
NO8	Circuit 1 Condenser by-pass solenoid 3
NO9	Compressor 2 Contactor
NO10	Compressor 2 12% Solenoid Valve
NO11	Compressor 2 25% Solenoid Valve (Dependant on unit size)
NO12	Compressor 2 40% Solenoid Valve
NO13	Compressor 2 70% Solenoid Valve
NO14	Circuit 1 Alarm
NO15	Circuit 2 Alarm
NO16	Circuit 2 Condenser by-pass solenoid 1
NO17	Circuit 2 Condenser by-pass solenoid 2
NO18	Circuit 2 Condenser by-pass solenoid 3

Analogue Inputs

B1	Not Used
B2	Circuit 1 Liquid Pressure
B3	Leak Detector (Optional)
B4	Return Water Temperature
B5	Supply Water Temperature
B6	Circuit 2 Liquid Pressure
B7	Chilled Water Pressure Differential (Optional)
B8	Remote Setpoint Adjustment (Optional)
B9	Evaporator Inlet Water Temperature
B10	Ambient Temperature

Analogue Outputs

Y1	Free Cooling Valve
Y2	Circuit 1 Condenser Fan Speed Controller
Y3	Not Used
Y4	Pump 1 Contactor (Optional)
Y5	Pump 2 Contactor (Optional)
Y6	Not Used

Controls








ALARMS

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

```

13/05/02      11:32
Event number   001
Alarm Active
37-Diff Pressr Evap
    
```

Alarm Handling

- 1 A **Red LED** behind the **Alarm**  key will light in the event of an alarm. To view the 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.

COMMON ALARMS

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

Phase Rotation

A normally closed contact. When Phase Rotation is incorrect all controller outputs are de-activated.

Emergency Stop

A normally open contact. On closing, all controller outputs are de-activated.

Evaporator Flow Failure

A normally closed contact. On opening, all controller outputs are de-activated.

Low Supply Temperature

Supply Water Temperature Low Limit alarm is generated when the supply water temperature falls below the low limit value set. All controller outputs are de-activated.

INDIVIDUAL CIRCUIT ALARMS

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

Electronic Expansion Valve Failure

This indicates that the electronic expansion valve controller has detected an operating problem.

Low Suction Pressure

When the suction pressure sensor value falls below the value set by the low suction level for a period exceeding 1 minute (or 3 minutes on compressor start-up), a visual alarm will be generated at the in-built display and the relevant compressor will be de-activated.

High Liquid Pressure

When the liquid pressure reaches 23BarG, the relevant compressor will unload its final stage and will only reset when it drops below 21BarG.

When the liquid pressure reaches 25 BarG, the relevant circuit will be switched off and an alarm activated, this can only be rectified by manual reset via the microprocessor.

Compressor Overload

A normally closed contact when the compressor is operating. If this contact remains open for a period of 3 seconds during operation of the compressor, a visual alarm is generated and the relevant compressor will be de-activated. This alarm comprises of compressor motor protection module, discharge gas thermostat and safety high pressure switch.

High Discharge

A normally closed contact. On closing circuit 1/2 controller outputs are de-activated.

Circuit Isolator

A normally closed contact. On closing circuit 1/2 controller outputs are de-activated.

Commissioning Data

GENERAL DATA

Operating Limits

Unit with Electronic Fan Speed HP Control (-20°C)	
Minimum Ambient Air DB °C	-20°C
Maximum Ambient Air DB °C	Refer to Technical Manual - Performance Data
Minimum Leaving Water Temperature °C	+5°C
Maximum Return Water Temperature °C	+20°C

For conditions outside those quoted, please refer to Airedale.

MECHANICAL DATA

Oil & Refrigerant Charges

STANDARD D	UFC200D-8	UFC225D-8	UFC250D-8	UFC275D-8	UFC300D-8
Compressor	Screw - Semi Hermetic				
Quantity	2	2	2	2	2
Oil Charge Volume (Total) l	5.5 + 5.5	5.5 + 5.5	5.5 + 5.5	7.5 + 5.5	7.5 + 7.5
Oil Type	Polyol Ester				
Refrigeration	Dual Circuit				
Refrigerant Control	Electronic Expansion Valve				
Refrigerant Precharged Charge (Total) kg	40 + 40	45 + 40	45 + 45	50 + 45	50 + 50
	R407C				
QUIET DQ	UFC200DQ-8	UFC225DQ-8	UFC250DQ-8	UFC275DQ-8	UFC300DQ-8
Refrigerant Charge/Circuit kg	40 + 40	45 + 40	45 + 45	50 + 45	50 + 50
SUPER QUIET DSQ	UFC200DSQ-8	UFC225DSQ-8	UFC250DSQ-8	UFC275DSQ-10	UFC300DSQ-10
Refrigerant Charge/Circuit kg	40 + 40	45 + 40	45 + 45	60 + 55	60 + 60

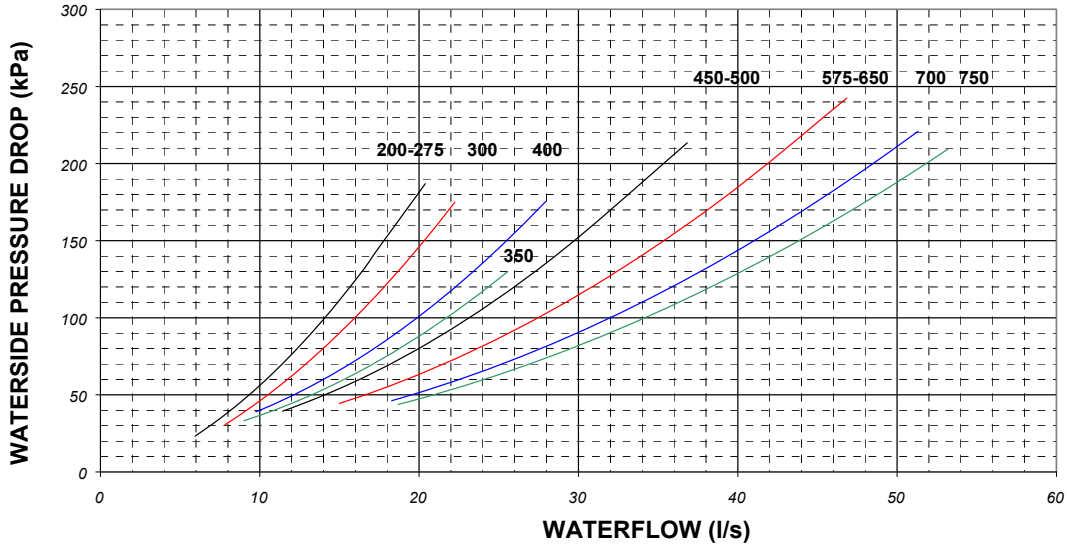
STANDARD D	UFC350D-10	UFC400D-10	UFC450D-12	UFC500D-12	UFC575D-14
Compressor	Screw - Semi Hermetic				
Quantity	2	2	2	2	2
Oil Charge Volume (Total) l	7.5 + 7.5	7.5 + 7.5	10 + 7.5	10 + 10	10 + 10
Oil Type	Polyol Ester				
Refrigeration	Dual Circuit				
Refrigerant Control	Electronic Expansion Valve				
Refrigerant Precharged Charge (Total) kg	75 + 70	75 + 75	90 + 85	90 + 90	105 + 100
	R407C				
QUIET DQ	UFC350DQ-12	UFC400DQ-12	UFC450DQ-14	UFC500DQ-14	UFC575DQ-16
Refrigerant Charge/Circuit kg	85 + 80	85 + 85	100 + 95	100 + 100	115 + 110
SUPER QUIET DSQ	UFC350DSQ-14	UFC400DSQ-14	UFC450DSQ-16	UFC500DSQ-16	UFC575DSQ-18
Refrigerant Charge/Circuit kg	95 + 90	95 + 95	110 + 105	110 + 110	125 + 120

STANDARD D	UFC650D-14	UFC700D-18	UFC750D-18
Compressor	Screw - Semi Hermetic		
Quantity	2	2	2
Oil Charge Volume (Total) l	10 + 10	14 + 10	14 + 14
Oil Type	Polyol Ester		
Refrigeration	Dual Circuit		
Refrigerant Control	Electronic Expansion Valve		
Refrigerant Precharged Charge (Total) kg	105 + 105	130 + 125	130 + 130
	R407C		
QUIET DQ	UFC650DQ-16	UFC700DQ-18	UFC750DQ-18
Refrigerant Charge/Circuit kg	115 + 115	130 + 125	130 + 130
SUPER QUIET DSQ	UFC650DSQ-18	UFC700DSQ-20	UFC750DSQ-20
Refrigerant Charge/Circuit kg	125 + 125	140 + 135	140 + 140

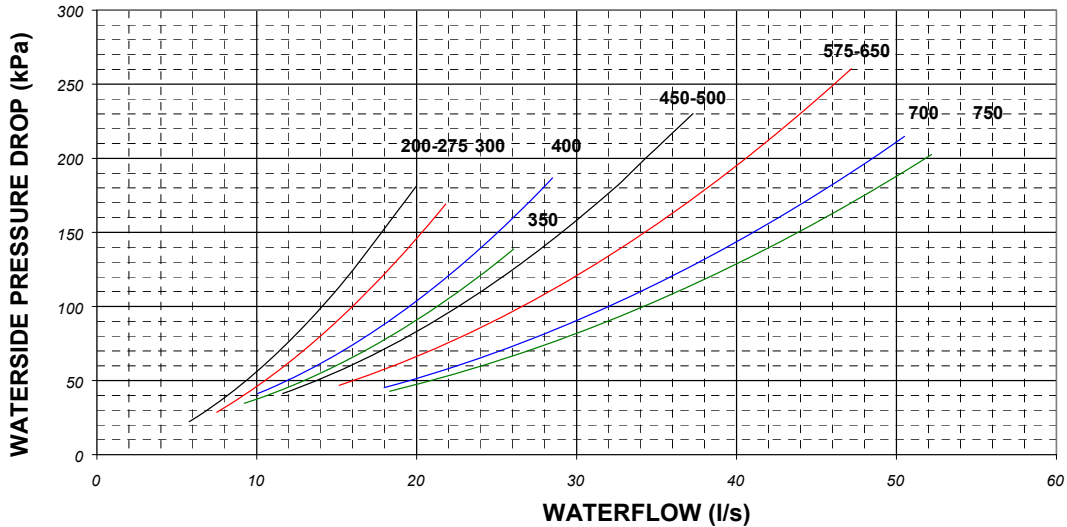
Commissioning Data

WATERSIDE PRESSURE DROPS
(20% Ethylene Glycol Concentration)

Standard – D Models



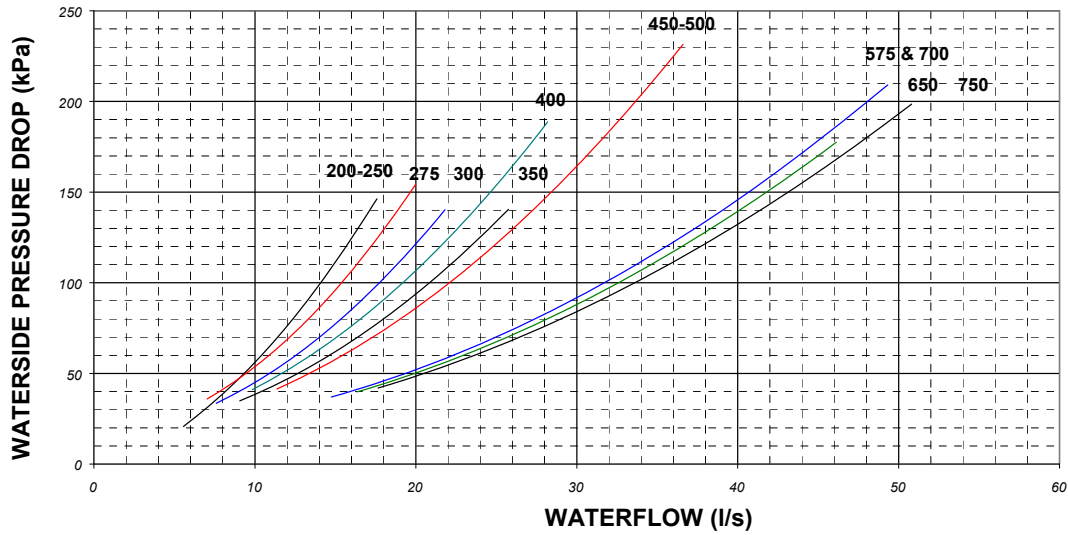
Quiet– DQ Models



Commissioning Data

WATERSIDE PRESSURE DROPS
(20% Ethylene Glycol Concentration)

Super Quiet– DSQ Models

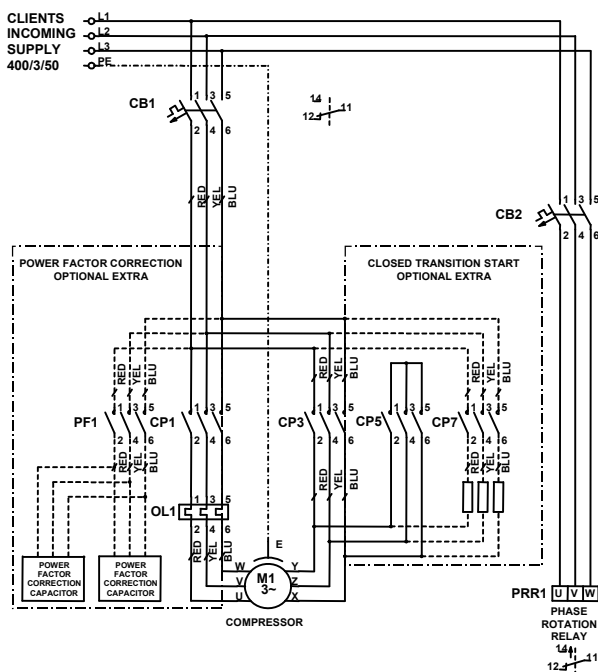


1 For glycol solutions, please refer to **Glycol Data**.

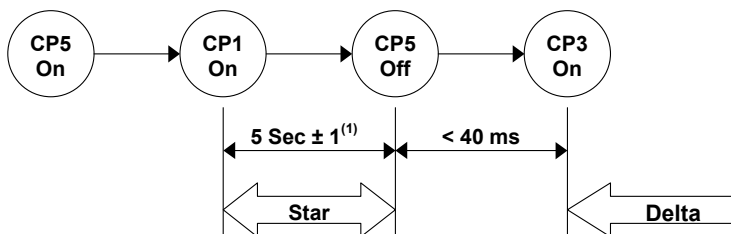
Commissioning Data

ELECTRICAL DATA

Compressor Start-Up Information



Starting Sequence (Star-Delta Starting)



(1) 0.7 seconds when Closed Transition optional extra selected.


OPERATIONAL SEQUENCE

Refrigerant Charge

Liquid refrigerant should be charged into the condenser before compressor starting to ensure that refrigerant is present at compressor start-up.

Crankcase Heater

The mains supply to the crankcase (oil) heater should be switched on at least 8 hours prior to compressor starting to avoid refrigerant migration.


CAUTION  A separately fused, locally isolated, permanent single phase and neutral supply **MUST BE FITTED** for the compressor sump heater, evaporator trace heating and control circuits, **FAILURE to do so could INVALIDATE WARRANTY.**

Pre-Start-Up Check

Before compressor start-up, make sure that an oil level is showing in the compressor sight glass, and that all refrigerant ball valves are opened.

Checks at Compressor Start-up

As soon as the compressor starts, make sure that the solenoid valve for liquid injection opens, and that the suction and liquid/discharge pressure gauges are showing low and high pressures respectively.

CAUTION  If there is no liquid present or no differential pressure occurs, isolate immediately. Check phase rotation by connecting pressure gauges to the suction and discharge ports.

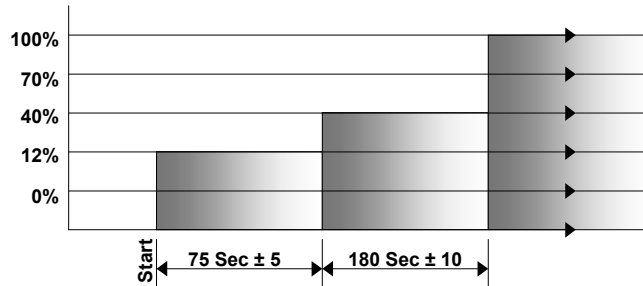
Liquid Injection - Never shut down the liquid injection circuit whilst the compressor is still running, at any loading condition as this may permanently damage the compressor.

Commissioning Data

ELECTRICAL DATA

Capacity Control

The following staggered timings are recommended on compressor start-up:



- 12% load (starting position) should be used only at start-up, never as a stage of capacity control.
- 12% load at start-up should be maintained for 70 - 80 seconds to avoid liquid compression.
- The first stage of capacity control (either 25 or 40% depending on compressor size) should be maintained for at least 170 - 190 seconds before further loading.

Adding Refrigerant

Additional refrigerant should be added to the system via 1/4" schrader connection on the expansion line.

Pump Down

Never shut the liquid injection solenoid valve during or before pump down.

Never pump down without the low pressure trip and high discharge temperature switches being operative.

UNLOADING PROTECTION

Head Pressure

The microprocessor has inbuilt protection against nuisance trips. If the head pressure rises above 23BarG the compressor will unload to 70% and remain unloaded until the head pressure drops below 21BarG.


Low Pressure

If low pressure drops below the microprocessor setting, the compressor will unload to 70%, if low pressure persists for 1 minute, the circuit will be switched off and sound an alarm.

Commissioning Procedure

GENERAL

To be read in conjunction with the commissioning sheets provided, items highlighted should be recorded.

CAUTION  Please ensure all documents have been completed correctly and return to Airedale Service immediately to validate warranty.

PRE COMMISSIONING CHECKLIST

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.

Prior to carrying out the following, in order to prevent liquid entering the compressor whilst the mains MCCB are in the OFF position, isolate the liquid injection and liquid line solenoid valves at the terminal blocks.

The door interlocking MCCB should be in the OFF position and the auxiliary alarm contact from the MCCB should be linked out.






Ensure all items listed in the Pre commissioning section are complete.

RECORD

- The unit should be visually inspected and any damage noted.
- Secure commissioning gauges to the high side of the system, check for a positive charge.
- Check tightness of electrical components.
- Check that the remote on/off switch (if fitted) is in the off position.
- With the MCBs in the off position measure the incoming voltage.
- Check Phase Rotation.
- Check voltage at permanent supply.
- Measure and record the primary (230V) and secondary (24V) voltages at each of the transformers and record on the commissioning document.
- Check all timer settings are correct.
- Check Sump Heater.
- Check oil level.
- Check design water flow is available.
- Check pump interlocks are fitted to the water system and wired directly to the chiller.
- Switch on the controls and individual circuits, primary and secondary, MCBs to the ON position. At this stage the control display panel should be illuminated.
- Record Optional Extras.
- Record Controller Data.


CAUTION  Disable remote ON/OFF to ensure the unit does not start unintentionally.

The chiller will not start until microprocessor control SWITCH 1 is in the ON position. DO NOT SWITCH TO ON AT THIS STAGE

- Adjust the water temperature supply and return set points (if necessary) to call for 100% cooling (refer to the **Controls** section).
- Ensure all parameters are adjusted to suit the design requirements (refer to the **Controls** section).
- To switch the unit ON, use the microprocessor keypad as follows:
Press , press , press , press  & finally .

CAUTION  There will always be a delay between the enabling of the unit and the energising of the compressor contactors, anything up to 10 minutes. Be patient.

- Check that there is a 5 seconds delay between the Star and Delta contactor energising on each circuit.

CAUTION  This delay period would be 0.7 seconds in Closed Transition Starting.

- Check capacity control solenoid is 12% energised (red).
- Check that each circuit trips on low pressure. The alarm should appear within 3 minutes.
- The alarm will be recognised at the display circuit trip, to clear the alarms refer to **Alarm Handling**.

Commissioning Procedure

PRE COMMISSIONING CHECKLIST (CONT..)






Waterflow Commissioning

- Drive the 3-way valve fully open by raising the return water temperature above the ambient and measure the pressure drop across the free cooling coils.
- Lower the return water temperature to below the ambient to close the valve fully.
- Adjust the bypass DRV to achieve equivalent pressure drop as across the coils.
- Recheck again during valve fully open and closed checking pressure drop across the unit to ensure equal pressure drops are achieved.

RECORD ▼

- Reduce the flow rate to 75% of design and ensure that the evaporator flow switch trips at this flow rate, adjust as necessary.
- Ensure this alarm is recognised as **"Water Flow Fail"** at the display and disengages the circuits operation immediately. Restore flow rate to the design and check the alarm has self-cleared.

- **To switch the unit OFF**, use the microprocessor keypad as follows:

Press , press , press , press  & finally .

Fully open all liquid line and discharge service ball valves on each circuit.

CAUTION ▼






Re-instate both the liquid injection and liquid line solenoid valves.


Remove the link from the MCCB for the auxiliary alarm contact.

Commissioning Procedure

COMMISSIONING CHECKLIST

The following should be carried out with a load on the system, otherwise the unit is likely to short cycle. The following tests are to be carried out on 1 circuit at a time.


- Switch the door interlocking MCCB to the ON position but again only on the circuit which is to be tested.
- Adjust the water temperature supply and return set points to match the system requirements.
- **To switch the unit ON**, use the microprocessor keypad as follows:
Press , press , press , press  & finally .
- Check liquid injection solenoid valve is energised and sight glass is clear.
- Check pressures at suction and discharge ports for correct phase rotation.

CAUTION  **If there is no liquid present or no differential pressure occurs, isolate immediately.**

RECORD








- Check the unloading solenoids operate in the correct sequence - refer to **Capacity Control**.
- Measure and record the compressor amps once the compressor is fully loaded and at each stage of unloading.
- Measure and record full speed amps of each condenser.
- Ensure that the refrigeration safety cut outs trip at the following settings:
LP micro - adjustable – refer to **Controls** section
LP safety 0.6 +/- 0.1 BarG - fixed
HP safety 24.5 +/- 0.7 BarG - fixed
Clear the alarm as detailed in the **Controls** section

CAUTION  **The microprocessor LP setting is adjustable via the micro display. The standard setting is 3.2BarG. This can be altered to suit the medium, however this MUST NOT be lower than the medium's freezing point.**

- Ensure that the low water temperature safety cuts out at the correct setting +/- 0.5°C, to clear the alarms refer to **Alarm Handling**.
For water (no glycol) application the recommended setting is 3°C or 3°C below the design supply water temperature.

RECORD



- Check the liquid line sight glass is clear and dry.
- Check the superheat setting adjust the expansion valve to maintain a superheat setting of 5 – 8°C at all operating loads.
- Check and record the following:
Suction and discharge pressures
Liquid, discharge and suction line temperature
Water inlet and outlet temperature across the evaporator
- Ensure the above are all within the design parameters.
- Repeat as follows for each circuit:
- **To switch the unit OFF**, use the microprocessor keypad as follows:
Press , press , press , press  & finally .
- **To switch the unit ON**, repeat above.
- Restart remote ON/OFF if required.

The unit is now commissioned and will provide many years of trouble free operation providing the maintenance schedule is followed.

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.

3 MONTHS	ACTION	NOTES
REFRIGERATION	Check the following and compare results with commissioning records. <ul style="list-style-type: none"> • Suction and discharge readings. • Head pressure control is maintained. • Pressure relief indicator gauge. • Liquid injection solenoid valve and sight glass. • Check each circuit sight glass for dryness and bubbles for indication of leaks. • Check compressor oil level and shell/sump temperature. 	Investigate and rectify variations. Remember to re-cap the Schrader connections!
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%. • Concurrently ensure chilled water pump and flow switch operate efficiently, and that interlocks function correctly. • Operation of waterflow switch and pump interlock. 	Investigate and adjust as necessary.
Finally!	Record operating conditions.	
FABRIC	Visually inspect the unit for general wear and tear, treat metalwork. Visually inspect pipe and pipework insulation. Clean water strainer.	Rust should be inhibited, primed and touched up with matching paint (available from Airedale or your Distributor). Repair/rectify as necessary. At first maintenance visit and then as frequently as necessary (12 months).
	A 20mm spacing between condenser and free-cooling coils is provided for cleaning maintenance along with top access holes and drain holes to the base. Clean condenser coils. Do not steam clean use detergent and stiff bristled brush. For heavy dirt, use either a high pressure water or chemical hose.	Do not damage fins and comb out if necessary.
	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). 	Secure/tighten as necessary.
Finally!	Ensure control panel lids and access panels have been correctly replaced and securely fastened in position.	

Maintenance

GENERAL MAINTENANCE

6 MONTHS	ACTION	NOTES
	Repeat 3 month checks plus the following:	
SYSTEM	Check evaporator trace heating and low ambient thermostat are set to activate at 4.0°C.	Remember to re-cap the Schraeder connections!
12 MONTHS	ACTION	NOTES
	Repeat 6 month checks plus the following:	
SYSTEM	Check safety devices cut out the compressor at the correct settings.	
REFRIGERATION	Check glycol concentration.	Adjust as necessary.
	Leak test all R407C joints and inspect all water connections.	Rectify as necessary.
	Record superheats with chiller running on full load and minimum load (the height of summer is recommended). Recheck the charge following major adjustment of the superheats.	
	Check flow rate and evaporator pressure drop.	If lower than commissioning data, check water filter and clean if necessary.
	Check 3 port valve by driving fully open and closed.	
ELECTRICAL	Tighten all electrical terminals.	

COMPRESSOR MAINTENANCE

Periodic maintenance and inspection of this equipment is necessary to prevent premature failure, the following periodic inspections should be carried out by period or hourly use which ever is sooner.

1 Year	Measure compressor motor insulation.
7,500 Hours or 4 Years	Inspect compressor oil.
20,000 Hours or 4 Years	Inspect oil filter, gate rotor & suction filter.

SHUT DOWN PERIODS

For periods of winter shut down the following precautions are recommended:

- Close the liquid and discharge ball valve
- Cap service ports
- Turn off electrical circuits
- Drain the water from the chiller evaporator coil and pipework via the drain plugs.

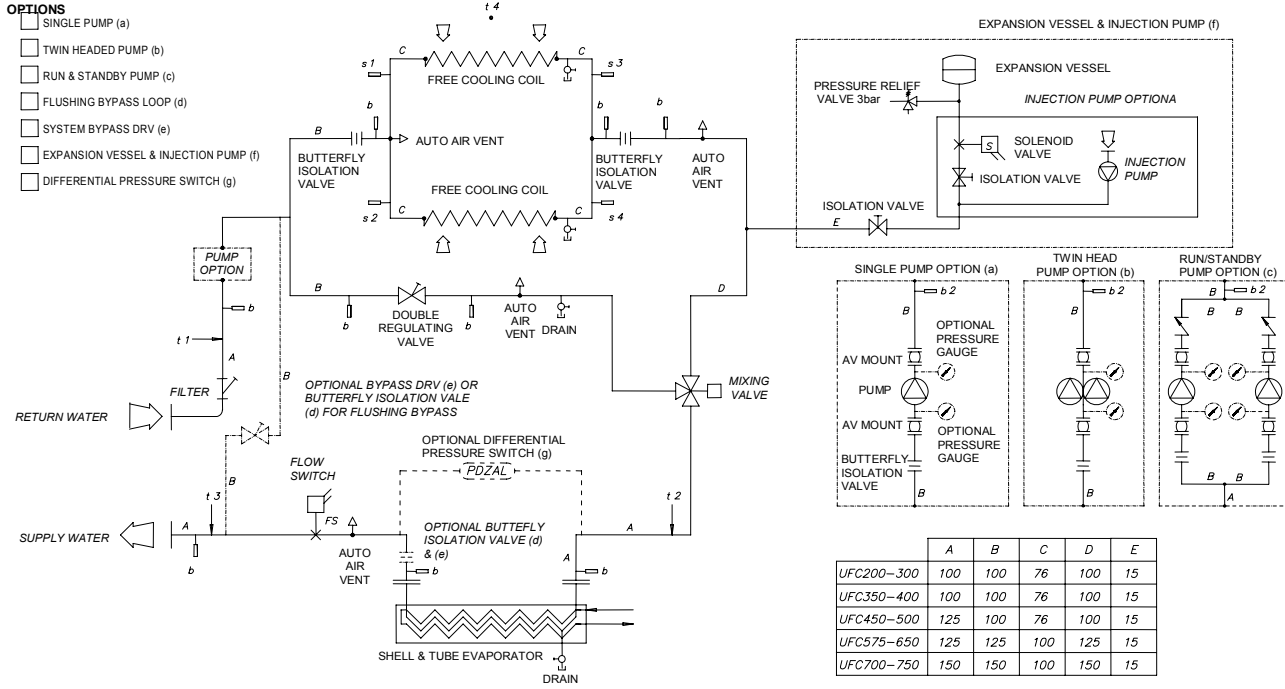
ELECTRONIC EXPANSION VALVE (OPTION)

Units fitted with the EEV option and EEV back up Battery only.

Note: The battery is a consumable part with a life expectancy of 2-5 years.

Maintenance

UNIT SCHEMATIC



NOTE: Auto Air Vents to be fitted at all High Point Traps
 NOTE: Drain Points to be fitted at lowest adjacent point on system

t = temperature sensors
 b = binder points
 s = schrader gas test points

Notes:

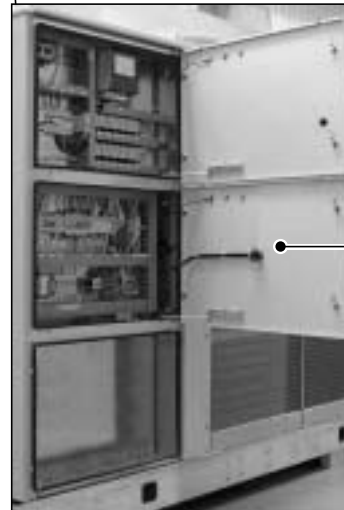
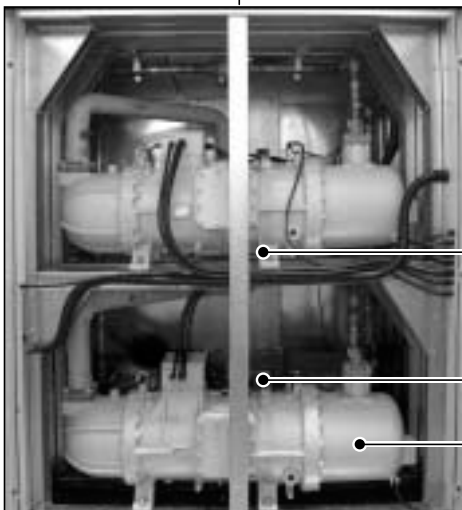
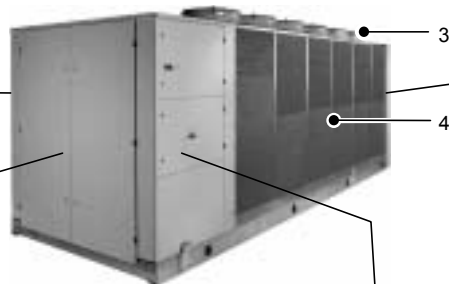
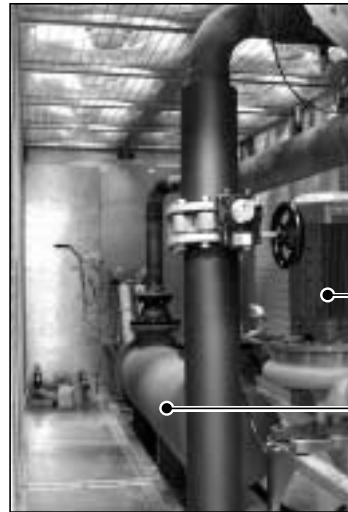
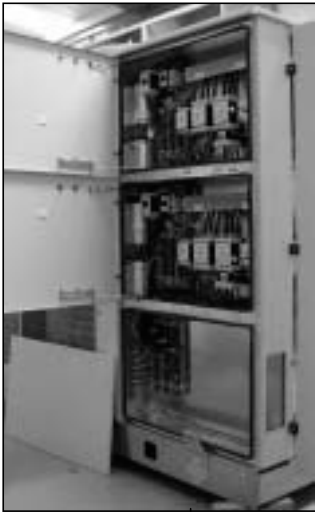
Parts Identification

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.

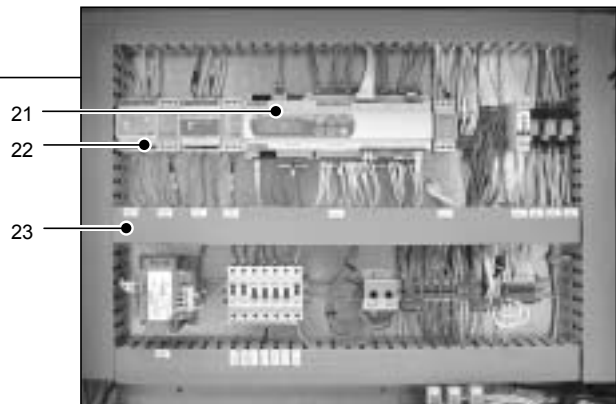
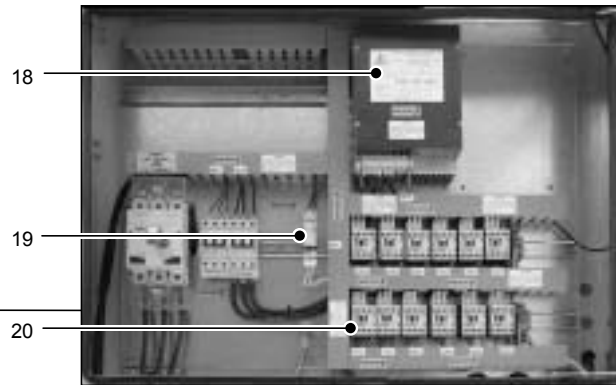
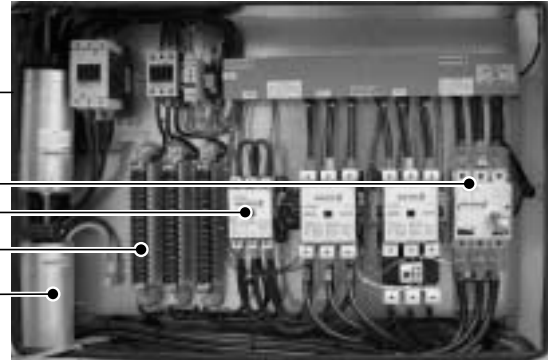
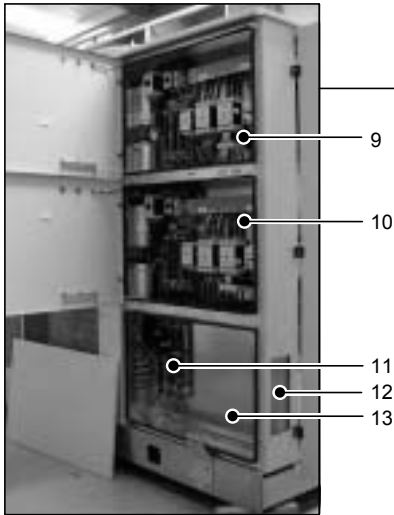
A spares list for 1, 3 and 5 years will be supplied with every unit and is also available from our Spares department on request.

The serial plate can be located inside the Controls Panel labelled 13



Parts Identification

- | | | | |
|----|---------------------------------------|----|--|
| 1 | Pump | 13 | Bus bar Chamber 3 phase Mains Incoming |
| 2 | Evaporator | 14 | Door Interlocking isolator |
| 3 | Fan and Motor Assemblies | 15 | Star Delta Contactors |
| 4 | Free Cooling Condensing Coils | 16 | Closed Transition Connection |
| 5 | Compressor Feet/Resilient Pads | 17 | Power Factor Correction |
| 6 | Unloading Solenoid Valves | 18 | Modulating Head Pressure Controller |
| 7 | Compressor | 19 | Phase Rotation Relay |
| 8 | Serial Plate Location | 20 | Condenser Fan Contactors |
| 9 | Mains Panel Circuit 1 | 21 | AIRETronix Microprocessor Controller |
| 10 | Mains Panel Circuit 2 | 22 | Electronic Expansion Valve Controller |
| 11 | Incoming Customer Terminals | 23 | Control Panel |
| 12 | Incoming Customer Mains Access Points | | |



Notes:

Notes:



Head Office:

Airedale International Air Conditioning Ltd
Leeds Road
Rawdon
Leeds LS19 6JY
United Kingdom

Tel: +44 (0) 113 239 1000
Fax: +44 (0) 113 250 7219

e-mail: enquiries@airedale.com
website: www.airedale.com



PART NO:	ISSUE	DATE
903-125 IM E	A	01/05/04

Airedale Departmental Contact Details:

CUSTOMER SERVICES For further assistance, please e-mail: enquiries@airedale.com or telephone:

UK Sales Enquiries	+ 44 (0) 113 238 7789	uk.sales@airedale.com
International Enquiries	+ 44 (0) 113 239 1000	enquiries@airedale.com
Spares Hot Line	+ 44 (0) 113 238 7878	spares@airedale.com
Airedale Service	+ 44 (0) 113 239 1000	service@airedale.com
Technical Support	+ 44 (0) 113 239 1000	tech.support@airedale.com
Training Enquiries	+ 44 (0) 113 239 1000	marketing@airedale.com

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