



air conditioning for every environment

INSTALLATION & MAINTENANCE MANUAL

Condensers

C11HI - C90HI

11 - 90 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.

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.

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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Contents

General Statement	4
Warranty	5
General Description	6
Unit identification	6
Introduction	6
Standard Features	7
Optional Extras	7
Dimensional & Installation Data	8
Dimensions / Weights / Positioning - Horizontal	8
Dimensions / Weights / Positioning - Vertical	9
Unit Lifting	10
Siting Recommendations	10
Positioning	10
Pipework Connections	11
Holding Charge	11
Pipework Installation - Good Practices	11
Pressure Testing	13
Evacuation	13
Electrical Data	15
Electrical Data	15
Interconnecting Wiring	15
Commissioning Procedure	16
Pre Commissioning Checklist	16
Commissioning Checklist	16
Commissioning Data	17
Operating Limits	17
Control Devices – Adjustment	17
Troubleshooting	18
Maintenance	19

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 Installation, 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.

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.

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 LfNo	_____	CUST. OfrNo	_____
TYPE OF UNIT	_____	Ex Ofr No	_____
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	_____		
Airedale International Air Conditioning Limited Leeds Road, Rawdon, Leeds LS19 8JF Tel: 0113 239 1000 Fax: 0113 239 3219 700-086			CUSTOMER COPY

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

AIR COOLED CONDENSER UNIT	
C	Condenser
11-90	Model Size (Expressed as Total Heat Rejection in kW)
HI	Head Pressure Control & Mains Isolator Fitted
H	Horizontal Air Discharge
V	Vertical Air Discharge
Example:	Model C45HI-H

INTRODUCTION

This range of Air Cooled Condensers is available in 10 model sizes with heat of rejection 11 - 90kW.

Custom designed for a small footprint, low sound level, slimline and aesthetically pleasing appearance.

Available in either horizontal or vertical air discharge orientation, *please specify at order.*

Airedale has a comprehensive range of air cooled direct expansion indoor units available to provide a matched system, please contact Airedale for further details.

All units are despatched following extensive leak and pressure testing and carry a holding charge of inert gas.

The unit is designed for the use of R407C, please refer to *Optional Extras* for alternative refrigerants.

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.

General Description

CONSTRUCTION

Unit cabinets are manufactured from galvanised sheet steel coated with epoxy baked powder paint to provide a durable finish.

Standard unit colour is Light Grey (RAL 7035).

STANDARD FEATURES

The unit features as standard:

- Low noise Axial flow sickle bladed fan
- Mains Electric Isolator
- Condenser Coil
- Filter drier (loose)
- Head Pressure Control – On/Off
- Holding charge of Inert Gas

OPTIONAL EXTRAS

Factory Fitted

- Head Pressure Control - Variable Speed
- Epoxy Coated Coils
- Short Case Axial Fans
- Coil Guards (C50-90 Only)

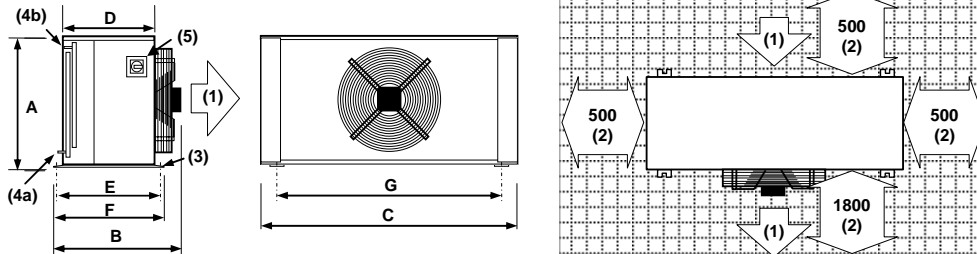
Loose

- Shut Off Valves
- Alternative Refrigerant (Outside EU) (supplied with holding charge of inert gas)

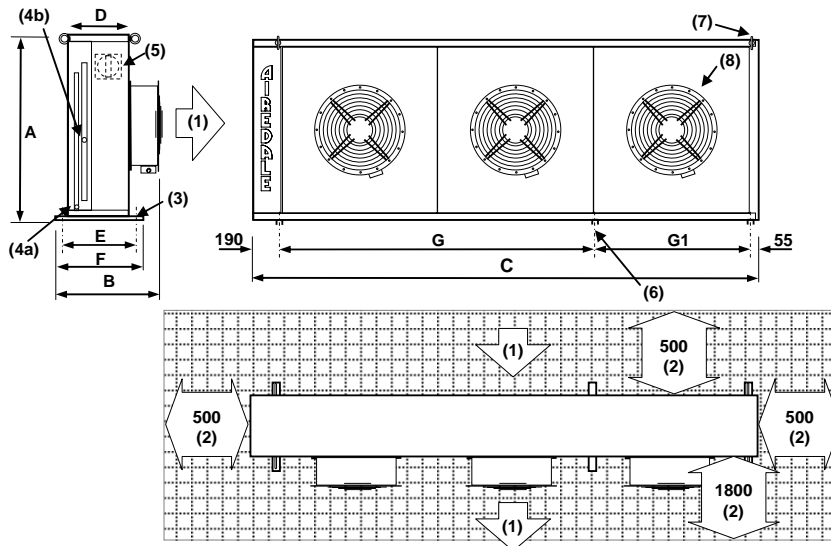
Dimensional & Installation Data

DIMENSIONS / WEIGHTS / POSITIONING - HORIZONTAL

Standard Condenser Fan (mm) (C11 Shown)



Optional Short Case Axial Fan (mm) (SCAF) (C75 Shown)



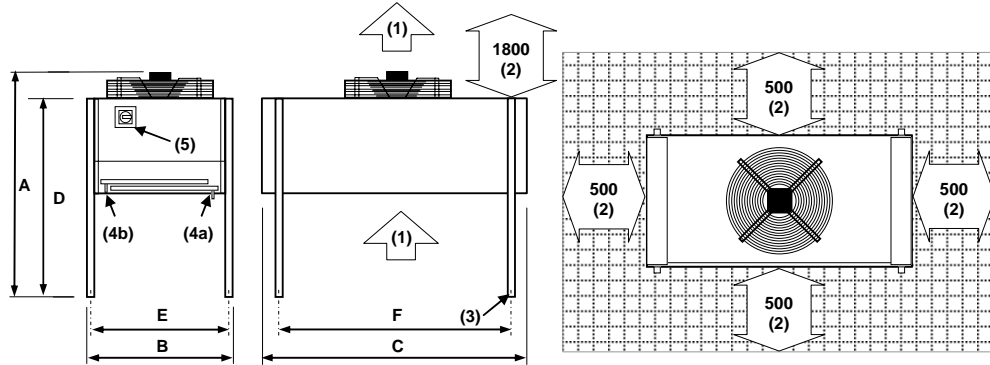
	DIMENSIONS (MM)										WEIGHTS (KG)	
	Standard Fan								Optional SCAF		Standard Fan	Optional SCAF
	A	B	C	D	E	F	G	G1 ⁽⁶⁾	B	F		
C11HI-H	648	550	1275	455	530	550	1118	N/A	675	640	51	61
C15HI-H	648	550	1275	455	530	550	1118	N/A	675	640	63	73
C20HI-H	848	645	1100	455	530	550	944	N/A	735	640	58	70
C25HI-H	848	645	1100	455	530	550	944	N/A	735	640	65	77
C35HI-H	1048	645	1650	455	530	550	1494	N/A	711	640	97	109
C45HI-H	1048	645	1650	455	530	550	1494	N/A	711	640	110	134
C50HI-H	1118	666	2470	420	520	620	2225	N/A	731	620	188	212
C60HI-H	1308	666	2470	420	520	620	2225	N/A	730	620	258	282
C75HI-H	1118	666	3570	420	520	620	2225	1110	730	620	287	323
C90HI-H	1308	666	3570	420	520	620	2225	1110	730	620	374	410

- (1) Airflow
- (2) Minimum clearances in mm
- (3) 8mm fixing points
- (4) Service connections to left hand side of the unit: a = Liquid Outlet, b = Discharge Gas Inlet
- (5) Mains Electric Isolator, (C50 - C90 located behind open side panel)
- (6) Additional support to sizes C75 - C90
- (7) 4 lifting eye bolts to unit top, sizes C50 - C90
- (8) Optional Short Case Axial Fan with integral duct fixing holes

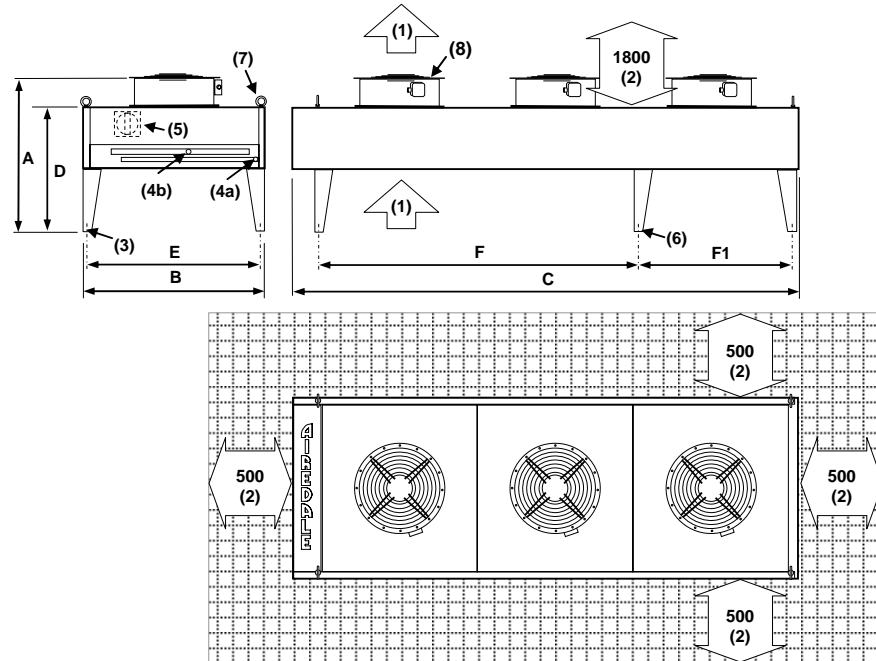
Dimensional & Installation Data

DIMENSIONS / WEIGHTS / POSITIONING - VERTICAL

Standard Condenser Fan (mm) (C11 Shown)



Optional Short Case Axial Fan (mm) (SCAF) (C75 Shown)




	DIMENSIONS (MM)							WEIGHTS (KG)		
	Standard Fan							Optional SCAF	Standard Fan	Optional SCAF
	A	B	C	D	E	F	F1(6)	A		
C11HI-V	997	700	1275	952	630	1118	N/A	1112	51	61
C15HI-V	997	700	1275	952	630	1118	N/A	1112	63	73
C20HI-V	1092	900	1100	952	830	944	N/A	1162	58	70
C25HI-V	1092	900	1100	952	830	944	N/A	1162	65	77
C35HI-V	1092	1100	1650	952	1030	1494	N/A	1162	97	109
C45HI-V	1092	1100	1650	952	1030	1494	N/A	1162	110	134
C50HI-V	1017	1090	2470	872	1030	2230	N/A	1082	188	212
C60HI-V	1017	1281	2470	872	1220	2230	N/A	1082	258	282
C75HI-V	1017	1090	3570	872	1030	2250	1080	1082	287	323
C90HI-V	1017	1281	3570	872	1220	2250	1080	1082	374	410

- (1) Airflow
- (2) Minimum clearances in mm
- (3) 8mm fixing points
- (4) Service connections to left hand side of the unit: a = Liquid Outlet, b = Discharge Gas Inlet
- (5) Mains Electric Isolator, (C50 - C90 located behind open side panel)
- (6) Additional support to sizes C75 - C90
- (7) 4 lifting eye bolts to unit top, sizes C50 - C90
- (8) Optional Short Case Axial Fan with integral duct fixing holes

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 lifting eye bolts/lifting lugs provided.
- Attach lifting chains to the 4 lifting eye bolts/lifting lugs provided; each chain and eye bolt must be capable of lifting the whole unit.
- Use the appropriate spreader bars/lifting slings with the holes/lugs provided.
- 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.

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.

CAUTION  Keep all pipes capped during installation to prevent pipework contamination.

SITING RECOMMENDATIONS

- Horizontal Air Discharge**
- Avoid where possible siting the unit where wind and air re-circulation may interfere with the fan operation.
 - A vertical air discharge unit is recommended for installation in windy locations or wherever a horizontal airflow would be obstructed.

POSITIONING

- Unit must be positioned on an even base to ensure correct operation.
- 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.
- When mounting the units adjacent to a wall or other vertical surface the condenser should be positioned with the coil side facing the wall.

MOUNTING

Fix the condenser down using the appropriate bolt holes in the base (horizontal air discharge) or in the bottoms of the legs (vertical air discharge).

Installation Data

PIPEWORK CONNECTIONS


CAUTION  Take care that the service connections are correctly made and in particular do not invert the inlet and outlet connections.

PIPEWORK CONNECTIONS SIZES


		C11HI	C15HI	C20HI	C25HI	C35HI
Connections						
Liquid Line - Sweat	in	1/2	1/2	5/8	5/8	7/8
Discharge Line - Sweat	in	5/8	5/8	7/8	7/8	7/8

		C45HI	C50HI	C60HI	C75HI	C90HI
Connections						
Liquid Line - Sweat	in	7/8	1 1/8	1 1/8	1 3/8	1 3/8
Discharge Line - Sweat	in	7/8	1 3/8	1 3/8	1 5/8	1 5/8

HOLDING CHARGE The units are shipped with a holding charge of inert gas to guard against contamination or moisture during shipping and storage.

CAUTION  The charge should be checked to indicate if leaks are present prior to evacuation. If the charge appears to be either partially or totally lost, then the unit should be carefully checked for signs of physical damage.

PIPEWORK INSTALLATION - GOOD PRACTICES

CAUTION  The following information is based on a complete matched Airedale system using R407C.

CAUTION  References to Suction Line not applicable to this system.

General

Run the refrigeration lines taking care to ensure the following:

- Use straight line routes where ever possible.
- Refrigerant lines should be insulated in areas of high/low temperature or when exposed to direct sunlight.
- When insulating refrigerant lines, cut approximately 30 - 50cm longer than the distance between the units to ensure the insulation goes right upto the unit. Leave connections uncovered for leak testing.
- Remove burrs to the ends of the copper tube, holding the tube downward to avoid allowing dirt to contaminate the tube.
- Avoid any contact between the discharge line and the liquid line.

Installation Data

PIPEWORK INSTALLATION - GOOD PRACTICES


Oil Traps

For long vertical rises in both suction and discharge lines, it is essential that oil traps are located every 6m to ensure proper oil movement / entrapment. In addition there should be an oil trap at the exit of the air handling unit before a vertical riser is applied (refer to example below).


Pipe Supports

The following table identifies the maximum distance between pipe supports on vertical and horizontal pipe runs.

Pipe O/D (inches)	Support distance (m)
3/8 - 7/8	1.0
1 1/8 - 2 1/8	2.0

CAUTION  All pipework should be clamped prior to insulation being applied (Suction Line). Clamping over insulation is not acceptable.

Pipe lengths

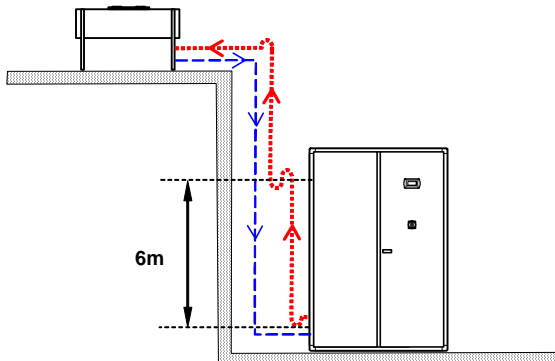
CAUTION  **DISCHARGE LINE:**
 Maximum pressure loss for discharge pipework 42 kPa.
 Minimum velocity for discharge risers 5 m/s, to ensure good oil return.

LIQUID LINE:
 Maximum pressure loss for liquid line pipework 21 kPa.
 Minimum velocity for liquid line 1.5 m/s, to ensure good oil return.

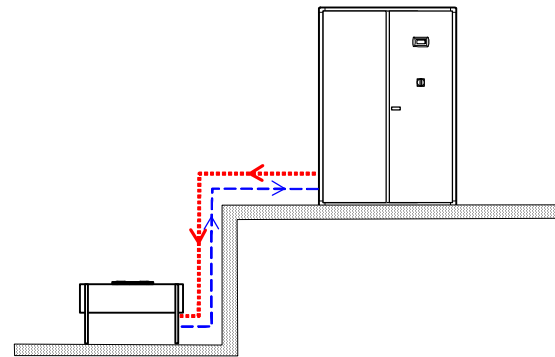
Horizontal Sections

It is good practice to ensure a slight gradient toward the compressor in the direction of the refrigerant flow for suction lines running horizontal. This assists oil return to the compressor. A gradient of approximately 1:200 (0.5%) shall be used.


Condenser above Air Handling Unit



Condenser below Air Handling Unit



..... Discharge Line Liquid

IMPORTANT  It is the responsibility of the installing contractor/site engineer to check the pipe size/refrigerant charge is correct for each system installation and application.

Split systems may require additional oil which should be added to the low side of each compressor.


Design should be in accordance with accepted refrigeration practice to ensure good oil return to the compressor(s) under all normal operating conditions.

Installation Data

PRESSURE TESTING

In accordance with PED 97/23/EC, a strength test should be carried out in order to ensure that all interconnecting joints, pipework and components are sufficiently strong to cater for maximum permissible operating pressures.

Once installation is completed, the high side of the system should be strength tested with dry nitrogen.

CAUTION  To comply with the PED directive, the unit is factory pressure tested and recorded on the Test Certificate provided.

SPLIT SYSTEMS: Ensure additional in line system components will withstand the intended SYSTEM PED recommendation test pressure. If not, we recommend isolation where possible, eg in line HP/LP switches, pressure transducer and compressor.

CAUTION  Pressure testing can be dangerous if not properly conducted, personnel undertaking pressure testing **MUST** be technically competent and suitably qualified.

- Record the pressure over a minimum of 60 minutes to detect major leaks (a 24 hour period should preferably be allowed), on the Commissioning Sheet provided.
- If a reduction in pressure is detected, trace the leak and repair before conducting a further pressure test and charging.

EVACUATION

Evacuation for systems operating with R407C refrigerant to be carried out as follows (for alternative refrigerants please refer to Airedale).

- Use a high vacuum pump and connect to the high and low pressure sides of the system via a gauge manifold fitted with compound gauges. A high vacuum gauge should be fitted to the system at the furthest point from the vacuum pump.
- The system should be evacuated to 0.5 Torr and if achieved no further evacuation steps are required.
- Triple evacuation should be used to ensure that all contaminants are removed if initially 0.5 Torr could not be achieved.
- Operate the vacuum pump until a pressure of 1.5torr (200 Pa) absolute pressure is reached, then stop the vacuum pump to break the vacuum using oxygen free Nitrogen until the pressure rises above zero.
- The above operation should be repeated a second time.
- The system should then be evacuated a third time but this time to 0.5torr absolute pressure.

Installation Data

REFRIGERANT CHARGING

It is important that the system is charged with the correct amount of refrigerant. Remember, a seriously over or undercharged system may lead to major component failure.

The final refrigerant charge level should be set by the design evaporating and condensing pressures, together with a full or nearly full sight glass.

The suction and discharge pressures should be constantly monitored whilst charging is in progress.

To calculate the system refrigeration charge, please refer to the indoor unit data.

		C11HI	C15HI	C20HI	C25HI	C35HI
Refrigeration		Single Circuit				
Refrigerant Type		R407C (Optional R22)				
Coil Volume	L	5.3	5.3	6.1	8.1	15.7
Refrigerant Charge	(1) kg	2.1	2.1	2.3	3.1	6.1

		C45HI	C50HI	C60HI	C75HI	C90HI
Refrigeration		Single Circuit				
Refrigerant Type		R407C (Optional R22)				
Coil Volume	L	15.7	25.6	40.2	38.0	59.6
Refrigerant Charge	(1) kg	6.1	10.0	15.8	14.9	23.4

(1) For guidance only.

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.
- **Each unit requires an independently fused and isolated power supply.**

caution 

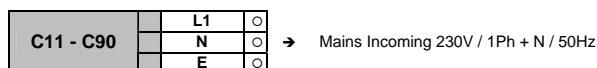
ELECTRICAL DATA

		C11HI	C15HI	C20HI	C25HI	C35HI
Unit Data (1)						
Nominal Run Amps	A	0.65	1.30	2.80	2.80	2.80
Maximum Start Amps	A	2.60	5.20	5.60	5.60	5.60
Recommended Mains Fuse	A	10	10	10	10	10
Max Mains Cable Incoming	mm ²	10	10	10	10	10
Mains Supply		230V / 1Ph + N / 50Hz				
Fan - Per Fan						
Quantity		1	2	1	1	1
Motor Size	kW	0.15	0.15	0.59	0.59	0.59
Full Load Amps	A	0.65	0.65	2.80	2.80	2.80
Locked Rotor Amps	A	2.60	2.60	5.60	5.60	5.60
OPTIONAL EXTRAS						
Short Case Axial Fan - Per Fan						
Quantity		1	2	1	1	1
Motor Size	kW	0.61	0.61	1.40	1.40	1.40
Full Load Amps	A	2.80	2.80	6.00	6.00	6.00
Locked Rotor Amps	A	7.00	7.00	18.00	18.00	18.00

		C45HI	C50HI	C60HI	C75HI	C90HI
Unit Data (1)						
Nominal Run Amps	A	5.60	5.60	5.60	8.40	8.40
Maximum Start Amps	A	11.20	11.20	11.20	16.80	16.80
Recommended Mains Fuse	A	10	10	10	16	16
Max Mains Cable Incoming	mm ²	10	10	10	10	10
Mains Supply		230V / 1Ph + N / 50Hz				
Fan - Per Fan						
Quantity		2	2	2	3	3
Motor Size	kW	0.59	0.59	0.59	0.59	0.59
Full Load Amps	A	2.80	2.80	2.80	2.80	2.80
Locked Rotor Amps	A	5.60	5.60	5.60	5.60	5.60
OPTIONAL EXTRAS						
Short Case Axial Fan - Per Fan						
Quantity	kW	2	2	2	3	3
Motor Size	kW	1.40	1.40	1.40	1.40	1.40
Full Load Amps	A	6.00	6.00	6.00	6.00	6.00
Locked Rotor Amps	A	18.00	18.00	18.00	18.00	18.00

(1) Nominal data based on 35°C ambient and a 50°C mean condensing temperature and using standard fan.


INTERCONNECTING WIRING



Commissioning Procedure

GENERAL


To be read in conjunction with the commissioning sheets provided.

CAUTION  Please ensure all documents have been completed correctly and return to Airedale Technical Support 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.

CAUTION  The following commissioning information is based on a complete matched Airedale system using R407C.

START-UP

Switch on the power supply to the condenser and close the isolator.

The fan motor starts automatically when the refrigerant condensing pressure reaches the pre-set value of the pressure regulator (factory set). Therefore to check operation of the condenser the indoor unit to which it is linked must be running. Refer to **Control Devices – Adjustment**.

General

- 1 The unit condition is satisfactory.
- 2 All pipework is complete and insulated where necessary.
- 3 All fans are able to rotate freely.

Electrical

- 1 All electrical connections (both mains and control) are properly terminated.
- 2 The power supply is of the correct voltage and frequency.
- 3 External fuses/circuit breakers are of the correct rating.
- 4 The units are properly earthed in accordance with current regulations.
- 5 All pipework is earth bonded as required.

Refrigeration

- 1 Check for the presence of a refrigerant charge in the condenser side.
- 2 The system has been evacuated correctly.

COMMISSIONING CHECKLIST

System Readings

Condensing temperature (as read on the discharge gauge) should be in the region of 45 to 46°C with an external ambient temperature of 30°C (Condensing is normally 15°C above ambient).

Running Checks

Once the system has been charged, the following running checks should be carried out:

Check the operation of the fan speed controller by observing an increase in fan speed if the outdoor coil is temporarily partially blocked.

Commissioning Data

OPERATING LIMITS

Standard On/Off Head Pressure Control	
Minimum Ambient Air DB °C	-0°C
Maximum Ambient Air DB °C	+48
Optional Variable Speed Head Pressure Control	
Minimum Ambient Air DB °C	-20°C
Maximum Ambient Air DB °C	+48

CONTROL DEVICES – ADJUSTMENT

The condenser is fitted with a head pressure control device which can be either:

- 1 On/Off pressure switch (standard)
- 2 Variable speed control (option)

The control device is factory pre-set.

To check the setting connect a pressure gauge with scale reading up to at least 30bar to the pressure tapping located in the inlet manifold of the condenser and watch the operation of the fan as the pressure changes. If the settings require adjustment, follow the instructions set out below and check new settings as explained above.

CAUTION  **Before carrying out any work, ensure that the isolator is switched off.**

On-Off Pressure Switch

The control device comprises a pressure switch with on/off contact which cycles operation of the fan as a function of the pressure; the contact:

- Closes and feeds the fan motor when the pressure rises and reaches the set point (18 Barg).
- Opens when the pressure falls to a level equal to the set point value, minus the differential pressure pre-set (14 Barg).

This type of control system is suitable where ambient temperatures seldom fall below 0°C.

In cold climates it could cause excessive hunting of the system.

The values of Set and Differential are adjusted by means of the adjusting screws which are accessed by removing the external casing of the pressure switch.

Factory setting: Set = 18 Barg
 Differential = 4 Barg

Variable Speed Control

The fan speed is controlled via alteration of the supply voltage which corresponds to a particular condensing pressure. The output voltage from the controller varies between a maximum of 95% and a minimum of 40% of the mains voltage (ie 220 Volts down to approximately 90 Volts on a 230 Volt supply) as the condensing pressure varies within a band of 5 Bar.

The control system is suitable for temperatures down to -20°C.

The pressure set point corresponding to the maximum output voltage can be adjusted by means of a potentiometer internal to the case of the controller.

Factory setting: Set = 18 Barg

Troubleshooting

FAULT	POSSIBLE CAUSE	REMEDY/ACTION
Unit Will Not Start	No power.	Check power supply to the controller.
	Wired incorrectly.	Check wire connections in accordance with wiring diagram on control box lid.
	Loose wires.	Check all wires, connections, terminals etc.
Head Pressure too High	Condenser coil clogged or dirty.	Clean condenser.
	Overcharge of refrigerant. Normally troublesome in warm weather.	Remove excess refrigerant from system.
	Air or other non-condensable gas in system.	Evacuate system and re-charge with new refrigerant.
	Head pressure controller faulty.	Check fan speed controller - if faulty - replace.
	Fan not operating or operating inefficiently.	Check motor - if faulty - replace.
Head Pressure Too Low	Fan operating too fast in low ambient conditions.	Check fan speed controller adjustment - if faulty - replace.
Condenser Fan Not Operating - Power On	Power supply failure.	Check power supply at circuit breaker.
	Wiring to motor.	Check voltage at motor terminals.
	Motor / fan assembly jammed.	Isolate unit and check free rotation of motor/fan assembly. If faulty - replace.
	Motor internal overheat protector tripped.	Carry out continuity check at terminals "TK" in motor terminal box. If tripped and motor hot - check bearings. If tripped and motor cold - replace motor.
	Faulty motor windings/capacitor.	Motor humming would indicate fault in motor or capacitor. Check windings for continuity and if OK replace capacitor.
	Minimum speed set too low.	Adjust head pressure controller to suit.
	Faulty pressure sensor.	Check electrical connections are secure at controller and pressure sensor. Replace controller and sensor (as they are matched sets).
	Faulty Fan Speed Controller.	Link wires "line" and "load" to bypass controller. If motor runs full speed - replace unit.
Condenser Fan Runs Too Fast	High ambient condition or excessive re-circulation of air around condenser coil.	Check installation against design.
	Minimum set speed setting incorrect.	Adjust as necessary.
	Incorrect pressure sensor setting.	Adjust sensor screw as necessary.
	Faulty Fan Speed Controller.	Replace controller and sensor (as they are matched sets).
	Faulty pressure sensor.	Replace controller and sensor (as they are matched sets).
Condenser Fans Runs Only Slowly	Incorrect pressure setting.	Adjust sensor screw as necessary.
	Faulty Controller.	Replace controller and sensor (as they are matched sets).
	Faulty Pressure sensor.	Replace controller and sensor (as they are matched sets).
	Motor/capacitor faulty.	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 operations.

3 Months

At every service visit the following checks should be carried out:

Fan & Motor Assembly

- 1 Fan and motor assembly for lateral and end play in the bearings.
- 2 Electrical gland plate to ensure that no water is entering the motor.
- 3 Fan blades for damage and corrosion.

Refrigeration Circuits


- 1 Visually examine pipework and components for damage, wear and tear and oil patches, the latter being indicative of a system leak.
- 2 Ensure the fan head pressure controller is controlling the head pressure at the required setting as indicated on the commissioning sheets provided.

The gauges can then be removed from the system. Do not forget to replace the security caps on the Schrader valves.

Condenser Coil

Clean the condenser coil with a stiff bristled hand brush. If dirt has accumulated over a long period, or tends to be greasy or sticky, then it may be necessary to use a water hose or chemical pressure hose. Take care not to damage the fins and comb out if they have become damaged in any way.

For epoxy coated coils use a suitable cleaning fluid and soft bristle brush.

CAUTION  **Do not use steam for cleaning condenser coils otherwise damage or danger may result from excessive internal pressures**

Cabinet

- 1 Clean the cabinets using a mild detergent.
- 2 Treat any paint damage or rust as necessary.

Electrical

- 1 Check all electrical connections for signs of overheating or arcing.
- 2 Check all cables for signs of chafing or physical damage.

12 months

As per 3 months plus:

- 1 Check all electrical connections for security.
- 2 Check all refrigeration connections with a leak detector.



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