

# INSTALLATION & MAINTENANCE MANUAL

## Condensers

**CR12 - CR105**  
**12 kW - 105 kW**

**R410A**



## About Airedale Products & Customer Services

### WARRANTY, COMMISSIONING & MAINTENANCE

As standard, Airedale guarantees all non consumable **parts only** for a period of **12 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, Airedale Service 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 to maintenance being carried out in accordance with the recommendations provided during the warranty period. Failure to have the maintenance procedures carried out will invalidate the warranty and any liabilities by Airedale International Air Conditioning Ltd.**

### SPARES

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

### TRAINING

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

### CUSTOMER SERVICES

For further assistance, please e-mail: [enquiries@airedale.com](mailto:enquiries@airedale.com) or telephone:

|                                |                       |  |
|--------------------------------|-----------------------|--|
| <b>UK Sales Enquiries</b>      | + 44 (0) 113 238 7789 | <a href="mailto:uk.sales@airedale.com">uk.sales@airedale.com</a>         |
| <b>International Enquiries</b> | + 44 (0) 113 239 1000 | <a href="mailto:enquiries@airedale.com">enquiries@airedale.com</a>       |
| <b>Spares Hot Line</b>         | + 44 (0) 113 238 7878 | <a href="mailto:spares@airedale.com">spares@airedale.com</a>             |
| <b>Airedale Service</b>        | + 44 (0) 113 239 1000 | <a href="mailto:service@airedale.com">service@airedale.com</a>           |
| <b>Technical Support</b>       | + 44 (0) 113 239 1000 | <a href="mailto:tech.support@airedale.com">tech.support@airedale.com</a> |
| <b>Training Enquiries</b>      | + 44 (0) 113 239 1000 | <a href="mailto:marketing@airedale.com">marketing@airedale.com</a>       |

For information, visit us at our Web Site: [www.airedale.com](http://www.airedale.com)

AIAC Ltd endeavours to ensure that the information in this document is correct and fairly stated, but none of the statements are to be relied upon as a statement or representation of fact. AIAC Ltd does not accept liability for any error or omission, or for any reliance placed on the information contained in this document.

The development of Airedale products and services is continuous and the information in this document may not be up to date. It is important to check the current position with AIAC Ltd at the address stated. This document is not part of a contract or licence unless expressly agreed.

No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or information storage and retrieval systems, for any purpose other than the purchaser's personal use, without the express written permission of AIAC Ltd.

© 2015 Airedale International Air Conditioning Limited. All rights reserved. Printed in the UK.

## Contents

|   |           |
|---|-----------|
| <b>General Statement</b> .....                        | <b>4</b>  |
| <b>Warranty</b> .....                                 | <b>5</b>  |
| <b>General Description</b> .....                      | <b>6</b>  |
| Unit Identification .....                             | 6         |
| Introduction .....                                    | 6         |
| Construction.....                                     | 7         |
| Standard Features .....                               | 7         |
| Optional Extras .....                                 | 7         |
| <b>Installation Data</b> .....                        | <b>8</b>  |
| Dimensions / Weights / Positioning - Horizontal.....  | 8         |
| Dimensions / Weights / Positioning - Vertical.....    | 9         |
| Unit Lifting .....                                    | 10        |
| Re-orientation to Vertical Discharge .....            | 11        |
| Positioning .....                                     | 12        |
| Siting Recommendations .....                          | 12        |
| Pipework Connections .....                            | 12        |
| Holding Charge.....                                   | 12        |
| Pipework Installation - Good Practices.....           | 12        |
| Pressure Testing.....                                 | 14        |
| Evacuation .....                                      | 14        |
| <b>Electrical Data</b> .....                          | <b>15</b> |
| General .....   | 15        |
| Electrical Data.....                                  | 16        |
| Interconnecting Wiring .....                          | 16        |
| <b>Commissioning Procedure</b> .....                  | <b>18</b> |
| Pre Commissioning Checklist .....                     | 18        |
| Commissioning Checklist.....                          | 18        |
| <b>Commissioning Data</b> .....                       | <b>19</b> |
| Operating Limits.....                                 | 19        |
| Control Device Adjustment.....                        | 19        |
| Standard AC Type Fans.....                            | 19        |
| Optional EC Fans.....                                 | 20        |
| Refrigerant Charging.....                             | 21        |
| <b>Troubleshooting - Unmatched Units</b> .....        | <b>22</b> |
| <b>Troubleshooting - Airedale Matched Units</b> ..... | <b>23</b> |
| <b>Maintenance</b> .....                              | <b>24</b> |

## 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 The 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.

### SERIAL PLATE

The serial plate can be located in the isolator panel.

|   |  |   |                    |                         |
|---|--|---|--------------------|-------------------------|
| <b>AIREDALE</b>   |  | UK Office   | ☎ + 44 113 2391000 | ☎ + 44 113 2507219      |
| Unit / Gerät / Unite  |  |   |                    | <b>CR22</b>             |
| Serial / Serie / Serie  |  |   |                    | <b>81615721-001</b>     |
| M.O. N° / Herstellungsreihenfolge / ordre industriel                  |  |   |                    | <b>81615721</b>         |
| Sales Order N° / Bestell-Nummer / Numero de Commande                  |  |   |                    | <b>63106943</b>         |
| Manufactured / Hergestellt / Fabriqué                                 |  |   |                    | <b>05/10/2007</b>       |
| Supply / Spannung / Alimentation                                      |  |   |                    | <b>230 V 1 PH 50 HZ</b> |
| Fuse / Hauptsicherung / Fusibles                                      |  |   |                    | <b>10 A</b>             |
| Test Pressure / Prüfdruck / Pression D'Essai                          |  |   |                    | <b>45.0BAR</b>          |
| Refrigerant & Charge / Kältemittel und Füllung / Réfrigérant & Charge |  |   |                    | <b>R410A</b>            |
| Max Operating Pressure / Betriebsdruck (Maximal) / Pression de marché |  |   |                    | <b>40.0BAR</b>          |
| <a href="http://www.airedale.com">www.airedale.com</a>                |  | <br>N.B. N° 0086 |                    |                         |

## 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 & 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 UNO  | CUST. O/No                        | Ex G/G No | _____         |
| TYPE OF UNIT  | _____                             |           |               |
| COMPONENT DESCRIPTION   |                                   |           |               |
| _____   |                                   |           |               |
| SERIAL No (where applicable)  | _____                             |           |               |
| FAULTY DESCRIPTION (Faulty or Defective not sufficient)   |                                   |           |               |
| _____   |                                   |           |               |
| DATE OF INVOICE   | 1. Original Equipment _____       |           |               |
| DATE OF INSTALLATION  | 2. Component (if different) _____ |           |               |
| DATE OF FAILURE   | _____                             |           |               |
| Airedale International Air Conditioning Limited<br>Lands Road, Rastree, Leeds LS19 4JF<br>Tel: 0113 239 1800 Fax: 0113 239 7219 |                                   |           | CUSTOMER COPY |
| 706-006   |                                   |           |               |

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

|                 |  |           |           |          |
|-----------------|--|-----------|-----------|----------|
| <b>CR</b>       | Condenser - R410A                                    | <b>CR</b> | <b>12</b> | <b>H</b> |
| <b>12 - 105</b> | Model Size (Expressed as Total Heat Rejection in kW) |           |           |          |
| <b>H</b>        | Horizontal Air Discharge                             |           |           |          |
| <b>V</b>        | Vertical Air Discharge                               |           |           |          |

### INTRODUCTION

This range of Air Cooled Condensers is available in 8 model sizes with total heat rejection 12 - 105kW.

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

Available in either horizontal or vertical air discharge orientation.

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

The range has been designed and optimised for operation with ozone benign refrigerant **R410A**.

### CE DIRECTIVE



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

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

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

|  |                               |
|--|-------------------------------|
| Maximum and Minimum Operation Temperature (TS) and Pressure (PS) |                               |
| Operating Temperature (TS),                                      | TS = Min -20°C to Max 120°C * |
| Maximum Operating Pressure (PS)                                  | PS = High Side 26 Barg        |

\*Based upon the maximum machine running temperatures.


## 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).  
Dual position fixing legs are supplied attached to the unit via captive bolts and shake proof washers.

**Horizontal Air Discharge** As standard, unit legs are attached and delivered in the horizontal air discharge mode as are the isolator and fan speed controller.  
The legs attached to the top of the unit are for lifting and stacking and may be removed and stored safely if not required.

**IMPORTANT**  **Only 2 units may be stacked together.**

**Vertical Air Discharge** As standard, unit legs are attached and delivered in the horizontal air discharge mode and can be repositioned on site to offer vertical air discharge mode, refer to **Installation Data**, on page 8 for details.

**IMPORTANT**  **To ensure the unit isolator and fan speed controller are in the correct orientation, when vertical air discharge is required please specify at order.**

**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 (variable) (supplied with unmatched unit or supplied with matched Airedale indoor unit)
- Holding charge of inert gas

### OPTIONAL EXTRAS

**Factory Fitted**


- Electronically commutated (EC) fan
- Short case axial fans
- Head pressure control - On/Off
- Coil guards
- Corrosion resistant coated coils

**Loose**

- Shut off valves
- Fan guide vanes (ac fan only)

## Installation Data

### DIMENSIONS / WEIGHTS / POSITIONING - HORIZONTAL

**IMPORTANT**  The following information is for general guidance; refer to the certified drawings provided for installation.

The legs attached to the top of the unit are for lifting and stacking and may be removed and stored safely if not required.

Only 2 units may be stacked together.

#### Standard Condenser Fan (CR12 - CR30 Shown)

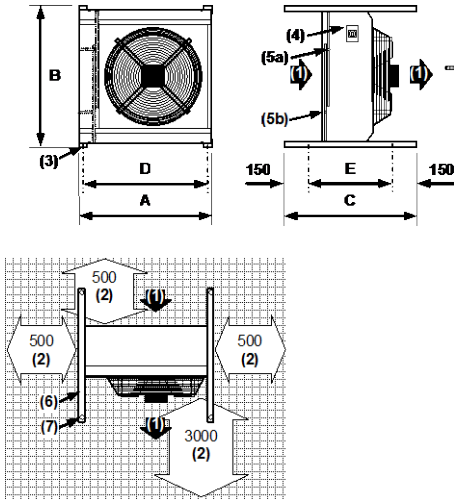


Diagram illustrated in mm

- (1) Airflow
- (2) Minimum clearances
- (3) 12.7mm fixing hole
- (4) Mains electric isolator
- (5) **Service connections to left hand side of the unit:**  
**a = Discharge gas inlet (ALWAYS above (b))**  
**b = Liquid outlet**
- (6) Top brackets may be used to secure unit of similar size on top, using, 2 x 12.7mm fixing holes
- (7) 40mm lifting holes

#### Optional Short Case Axial Fan (SCAF) (CR80 - CR105 Shown)

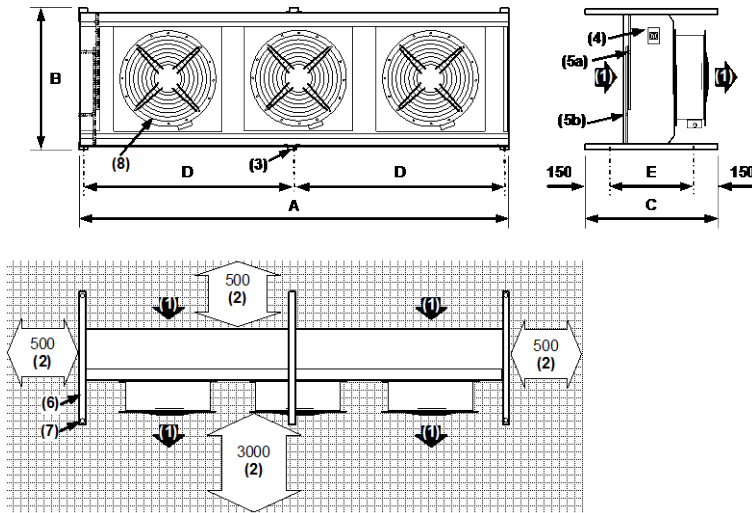


Diagram illustrated in mm

- (1) Airflow
- (2) Minimum clearances
- (3) 12.7mm fixing hole
- (4) Mains electric isolator
- (5) **Service connections to left hand side of the unit:**  
**a = Discharge gas inlet (ALWAYS above (b))**  
**b = Liquid outlet**
- (6) Top brackets may be used to secure unit of similar size on top, using, 2 x 12.7mm fixing holes
- (7) 40mm lifting holes
- (8) Optional Short Case Axial Fan with integral duct fixing holes


|       | DIMENSIONS (mm) |      |      |      |     | WEIGHTS (kg) |                 |               |
|-------|-----------------|------|------|------|-----|--------------|-----------------|---------------|
|       | Standard Fan    |      |      |      |     | Standard Fan | Optional EC Fan | Optional SCAF |
|       | A               | B    | C    | D    | E   |              |                 |               |
| CR12  | 907             | 972  | 1000 | 845  | 700 | 62           | 67              | 67            |
| CR16  | 907             | 972  | 1000 | 845  | 700 | 70           | 76              | 75            |
| CR22  | 1102            | 1167 | 1000 | 1040 | 700 | 77           | 83              | 88            |
| CR30  | 1102            | 1167 | 1000 | 1040 | 700 | 90           | 96              | 101           |
| CR50  | 2184            | 1167 | 1000 | 2121 | 700 | 132          | 145             | 154           |
| CR65  | 2184            | 1167 | 1000 | 2121 | 700 | 162          | 175             | 184           |
| CR80  | 3565            | 1167 | 1000 | 1752 | 700 | 208          | 228             | 242           |
| CR105 | 3565            | 1167 | 1000 | 1752 | 700 | 260          | 280             | 294           |

**CAUTION**  A vertical air discharge unit is recommended for installation in windy locations or wherever a horizontal airflow would be obstructed.



## Installation Data

### DIMENSIONS / WEIGHTS / POSITIONING - VERTICAL

**IMPORTANT**  The following information is for general guidance; refer to the certified drawings provided for installation.

The following illustrations show the unit following fixing leg re-orientation, instructions are provided for this at delivery.

#### Standard Condenser Fan (CR12 - CR30 Shown)

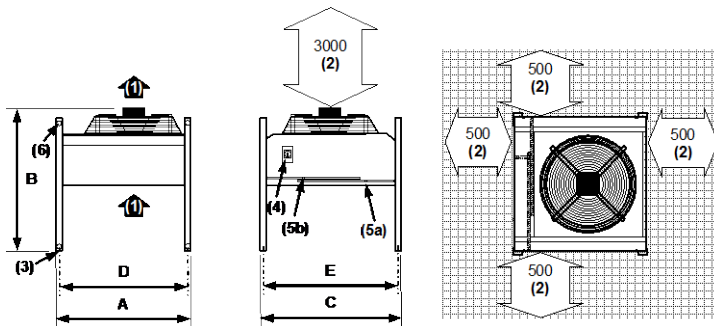


Diagram illustrated in mm

- (1) Airflow
- (2) Minimum clearances
- (3) 12.7mm fixing hole
- (4) Mains electric isolator
- (5) Service connections to left hand side of the unit:  
a = Liquid outlet  
b = Discharge gas inlet
- (6) 40mm lifting holes

#### Optional Short Case Axial Fan (SCAF) (CR80 - CR105 Shown)

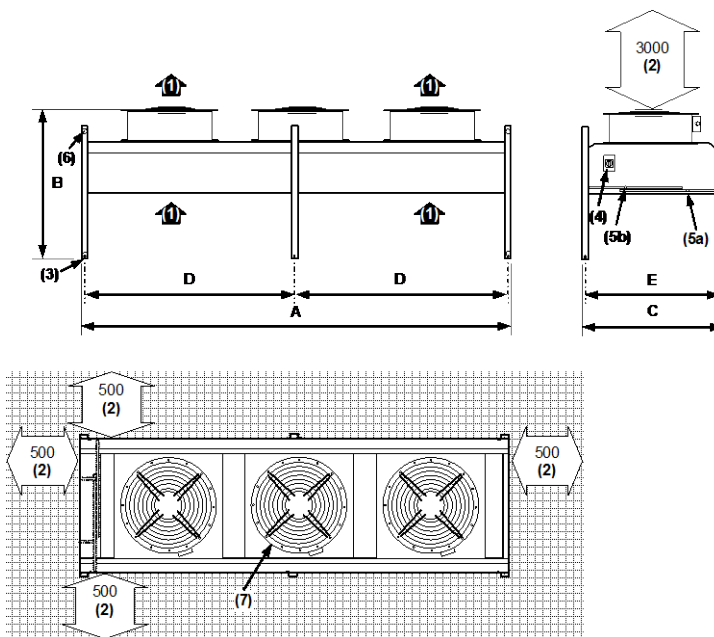


Diagram illustrated in mm

- (1) Airflow
- (2) Minimum clearances
- (3) 12.7mm fixing hole
- (4) Mains electric isolator
- (5) Service connections to left hand side of the unit:  
a = Liquid outlet  
b = Discharge gas inlet
- (6) 40mm lifting holes
- (7) Optional short case axial fan with integral duct fixing holes

|       | DIMENSIONS (mm) |      |      |      |      | WEIGHTS (kg) |      |                 |                 |               |
|-------|-----------------|------|------|------|------|--------------|------|-----------------|-----------------|---------------|
|       | Standard Fan    |      |      |      |      | Fan Options  |      | Standard ac Fan | Optional EC Fan | Optional SCAF |
|       |                 |      |      |      |      | SCAF         | EC   |                 |                 |               |
|       | A               | B    | C    | D    | E    | B            | B    |                 |                 |               |
| CR12  | 907             | 1076 | 972  | 847  | 912  | 1080         | 1065 | 62              | 67              | 67            |
| CR16  | 907             | 1076 | 972  | 847  | 912  | 1080         | 1065 | 70              | 76              | 75            |
| CR22  | 1102            | 1090 | 1167 | 1042 | 1107 | 1130         | 1127 | 77              | 83              | 88            |
| CR30  | 1102            | 1090 | 1167 | 1042 | 1107 | 1130         | 1127 | 90              | 96              | 101           |
| CR50  | 2184            | 1090 | 1167 | 2124 | 1107 | 1130         | 1127 | 132             | 145             | 154           |
| CR65  | 2184            | 1090 | 1167 | 2124 | 1107 | 1130         | 1127 | 162             | 175             | 184           |
| CR80  | 3565            | 1090 | 1167 | 1753 | 1107 | 1130         | 1127 | 208             | 228             | 242           |
| CR105 | 3565            | 1090 | 1167 | 1753 | 1107 | 1130         | 1127 | 260             | 280             | 294           |

## Installation Data

### UNIT LIFTING

#### General

- **Employ lifting specialists**
- Local codes and regulations relating to the lifting of this type of equipment should be observed
- Each chain/sling must be capable of lifting the whole unit
- Lift the unit slowly and evenly

#### IMPORTANT

**Only use lifting points provided.**

**Do not use 1 chain between 2 lifting points to avoid load shift.**

**Ensure that chains/slugs DO NOT crush the casework, coil or fan assemblies.**

**If the unit is dropped it should immediately be checked for damage and reported to Airedale.**

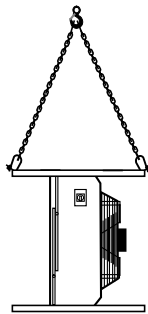
**Airedale will accept no responsibility for mishandling during the positioning of the equipment.**

#### CAUTION

**Check the unit is as ordered, discrepancies or transit damage should be reported to Airedale immediately.**

#### Horizontal Air Discharge

The unit is delivered in horizontal air discharge configuration secured to a pallet. Where possible the unit should be moved with the pallet in place.



Use 4 lifting eyes attached to 4 individual slings/chains (supplied by others) and attach 2 to each top leg using the holes provided as illustrated.

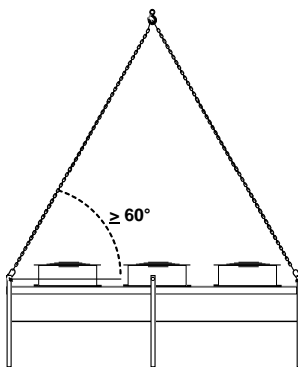
#### Vertical Air Discharge

The unit is delivered in horizontal air discharge configuration (with the mains isolator and fan speed controller already configured for vertical air discharge) secured to a pallet. Where possible the unit should be moved with the pallet in place.

Before lifting into final position, the unit legs should be re-orientated, refer to **Re-orientation to Vertical Discharge**, on page 11

#### CAUTION

**Care should be taken to ensure the unit does not sustain damage before it is lifted into final position.**



Use 4 lifting eyes attached to 4 individual slings/chains (supplied by others) and attach 1 to the top of each of the 4 corner legs using the holes provided as illustrated.

## Installation Data

### RE-ORIENTATION TO VERTICAL DISCHARGE

- 1 Remove the fixings securing the unit to the pallet.
- 2 In line with horizontal discharge lifting instructions, lift the unit sufficiently to gain access to the lower leg fixings as shown in Fig 1.

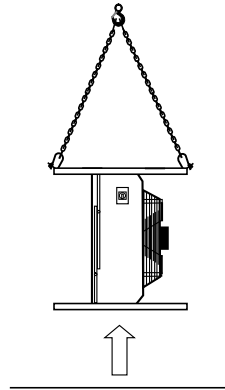


Fig 1

- 3 Reposition and secure the lower 2 legs to the corner of the unit using the fixings and hole positions provided to both faces, as Fig 2.

**Note, model sizes CR80 & CR105 have an additional mid support leg, this should also be adjusted and secured.**

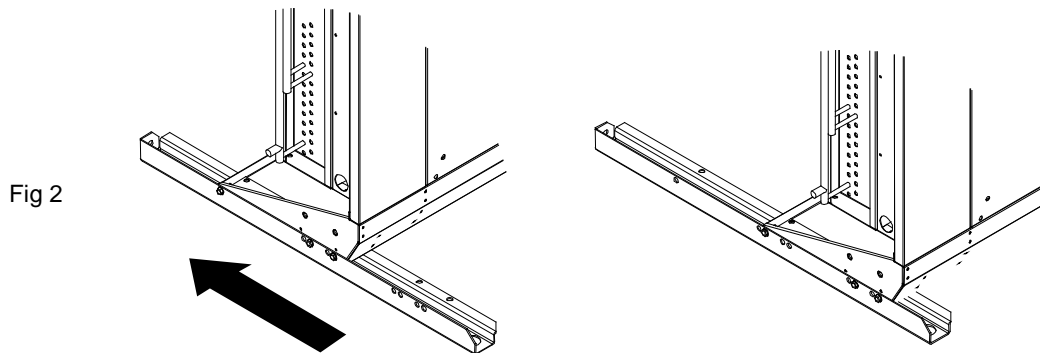
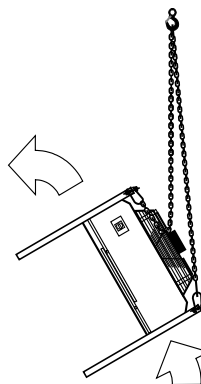


Fig 2

- 4 Lower and rest the unit down to floor and reposition and secure the upper legs as described in Step 3.
- 5 In line with vertical discharge lifting instructions lift the unit slowly into vertical orientation as Fig 3.

Fig 3



**Care should be taken to ensure the unit does not drop into position and that damage is not sustained prior to lifting the unit into final position.**

- 6 The unit may be lifted into its final position.

## Installation Data

### POSITIONING

- Unit must be positioned on an even base to ensure correct operation
- Observe airflow and maintenance clearances
- 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
- Check all services are present and accessible

### MOUNTING

Fix the condenser down using the appropriate bolt holes in unit fixing legs.

### 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

### 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


|                        |    | CR12 | CR16 | CR22 | CR30 |
|------------------------|----|------|------|------|------|
| <b>Connections</b>     |    |      |      |      |      |
| Liquid Line - Sweat    | in | 5/8  | 5/8  | 5/8  | 3/4  |
| Discharge Line - Sweat | in | 5/8  | 5/8  | 5/8  | 3/4  |


|                        |    | CR50  | CR65  | CR80  | CR105 |
|------------------------|----|-------|-------|-------|-------|
| <b>Connections</b>     |    |       |       |       |       |
| Liquid Line - Sweat    | in | 3/4   | 3/4   | 7/8   | 7/8   |
| Discharge Line - Sweat | in | 1 1/8 | 1 1/8 | 1 3/8 | 1 3/8 |

### 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 R410A.

#### 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 discharge lines, it is essential that oil traps are located every 4m 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                  |

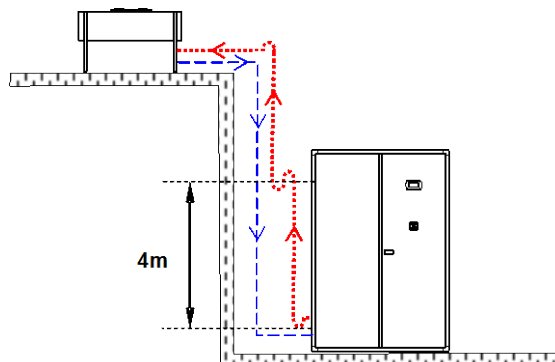
**CAUTION**  All pipework should be clamped prior to insulation being applied.

#### Pipe lengths

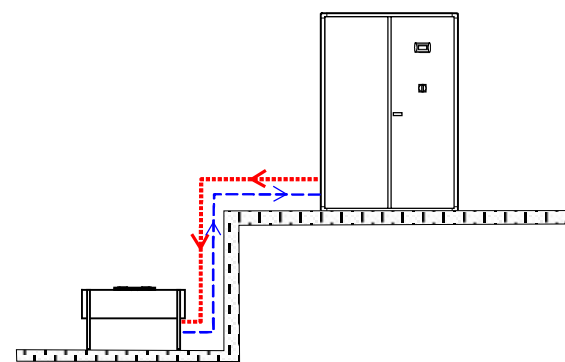
**CAUTION**  **DISCHARGE LINE:**  
 Maximum pressure loss for discharge pipework 42 kPa.  
 Minimum velocity for discharge risers 5 m/s, to ensure good oil return.

**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.


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 pressure 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.

**REMEMBER** excessive pressure loss in interconnecting pipework will impair system performance; this should be factored in during the design of the system and where necessary oil traps employed.


---

## 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 pressure 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(s) and compressor(s).**

**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 on R410A refrigerant should be carried out as follows (for other refrigerants refer to Airedale for advice):

- 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 1.5 Torr (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 0.5 Torr absolute pressure

## Electrical Data

**IMPORTANT**  The following information is for general guidance; refer to the certified drawings provided for installation.

**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

- Once the refrigeration pipework is complete the electrical supply can be connected by routing the cables 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

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

## Electrical Data

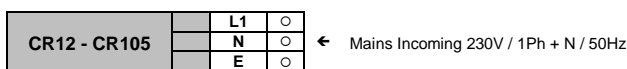
### ELECTRICAL DATA

|                                       |                 | CR12                  | CR16 | CR22 | CR30 |
|---------------------------------------|-----------------|-----------------------|------|------|------|
| <b>Unit Data</b> (1)                  |                 |                       |      |      |      |
| Nominal Run Amps                      | A               | 1.1                   | 1.1  | 2.9  | 2.9  |
| Maximum Start Amps                    | A               | 2.8                   | 2.8  | 5.6  | 5.6  |
| Recommended Mains Fuse                | A               | 10                    | 10   | 10   | 10   |
| Max Mains Cable Incoming              | mm <sup>2</sup> | 6                     | 6    | 6    | 6    |
| Mains Supply                          |                 | 230V / 1Ph + N / 50Hz |      |      |      |
| <b>Fan - Per Fan</b>                  |                 |                       |      |      |      |
| Quantity                              |                 | 1                     | 1    | 1    | 1    |
| Motor Size                            | kW              | 0.24                  | 0.24 | 0.63 | 0.63 |
| Full Load Amps                        | A               | 1.10                  | 1.10 | 2.90 | 2.90 |
| Locked Rotor Amps                     | A               | 2.80                  | 2.80 | 5.60 | 5.60 |
| <b>OPTIONAL EXTRAS</b>                |                 |                       |      |      |      |
| <b>Short Case Axial Fan - Per Fan</b> |                 |                       |      |      |      |
| Quantity                              |                 | 1                     | 1    | 1    | 1    |
| Motor Size                            | kW              | 0.61                  | 0.61 | 1.15 | 1.15 |
| Full Load Amps                        | A               | 2.80                  | 2.80 | 8.6  | 8.6  |
| Locked Rotor Amps                     | A               | 7.00                  | 7.00 | 25.8 | 25.8 |
| <b>EC Condenser Fan - Per Fan</b>     |                 |                       |      |      |      |
| Quantity                              |                 | 1                     | 1    | 1    | 1    |
| Motor Size                            | kW              | 0.7                   | 0.7  | 0.77 | 0.77 |
| Full Load Amps                        | A               | 3.1                   | 3.1  | 3.30 | 3.30 |

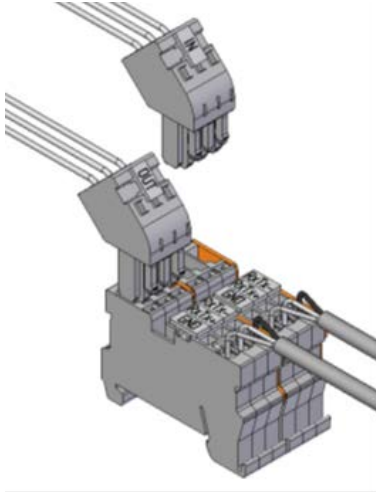
|                                       |                 | CR50                  | CR65 | CR80 | CR105 |
|---------------------------------------|-----------------|-----------------------|------|------|-------|
| <b>Unit Data</b> (1)                  |                 |                       |      |      |       |
| Nominal Run Amps                      | A               | 5.8                   | 5.8  | 8.7  | 8.7   |
| Maximum Start Amps                    | A               | 11.2                  | 11.2 | 16.8 | 16.8  |
| Recommended Mains Fuse                | A               | 10                    | 10   | 16   | 16    |
| Max Mains Cable Incoming              | mm <sup>2</sup> | 6                     | 6    | 6    | 6     |
| Mains Supply                          |                 | 230V / 1Ph + N / 50Hz |      |      |       |
| <b>Fan - Per Fan</b>                  |                 |                       |      |      |       |
| Quantity                              |                 | 2                     | 2    | 3    | 3     |
| Motor Size                            | kW              | 0.63                  | 0.63 | 0.63 | 0.63  |
| Full Load Amps                        | A               | 2.90                  | 2.90 | 2.90 | 2.90  |
| Locked Rotor Amps                     | A               | 5.60                  | 5.60 | 5.60 | 5.60  |
| <b>OPTIONAL EXTRAS</b>                |                 |                       |      |      |       |
| <b>Short Case Axial Fan - Per Fan</b> |                 |                       |      |      |       |
| Quantity                              |                 | 2                     | 2    | 3    | 3     |
| Motor Size                            | kW              | 1.15                  | 1.15 | 1.15 | 1.15  |
| Full Load Amps                        | A               | 8.6                   | 8.6  | 8.6  | 8.6   |
| Locked Rotor Amps                     | A               | 25.8                  | 25.8 | 25.8 | 25.8  |
| <b>EC Condenser Fan - Per Fan</b>     |                 |                       |      |      |       |
| Quantity                              |                 | 2                     | 2    | 3    | 3     |
| Motor Size                            | kW              | 0.77                  | 0.77 | 0.77 | 0.77  |
| Full Load Amps                        | A               | 3.30                  | 3.30 | 3.30 | 3.30  |

(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 R410A.

### START-UP

Switch on the power supply to the condenser and switch the isolator to the on position.

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 Device Adjustment**, on page 19.

#### 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.
- 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 40 to 41°C with an external ambient temperature of 30°C (condensing is normally 10°C above ambient) at full fan speed.

#### 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 Variable Speed Head Pressure Control |       |
|---|-------|
| Minimum Ambient Air DB °C                     | -20°C |
| Maximum Ambient Air DB °C                     | +48   |

| Optional On/Off Head Pressure Control |      |
|---------------------------------------|------|
| Minimum Ambient Air DB °C             | -0°C |
| Maximum Ambient Air DB °C             | +48  |

- (1) For conditions outside those quoted, please contact Airedale.  
 (2) **Low ambient kits are available for applications with ambient temperatures below those quoted, please contact Airedale.**

### CONTROL DEVICE ADJUSTMENT

#### STANDARD AC TYPE FANS

When the condenser is matched to an Airedale indoor unit, head pressure control is provided by the indoor unit.

Unmatched condensers are supplied with a head pressure control device which can be either:

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

The control device is factory pre-set.

To check the setting connect a pressure gauge with scale reading up to at least 45bar to the pressure tapping located in the outlet 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.**

#### 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.

#### Sizes CR12 - CR30

Factory setting: Set = 26 barg - Standard Thermostatic Expansion Valve  
 = 22 barg - Optional Electronic Expansion Valve

#### Sizes CR50 - CR105

Factory setting: Set = 26 barg (58%) - Standard Thermostatic Expansion Valve  
 = 22 barg (49%) - Optional Electronic Expansion Valve  
 Differential = 5 barg (11%)

To adjust the set points, find the required setting below and adjust the relevant potentiometer:

|                   |      | SET POINT Potentiometer position (%) |      |    |      |    |      |    |      |    |     |
|-------------------|------|--------------------------------------|------|----|------|----|------|----|------|----|-----|
|                   |      | %                                    | 20   | 30 | 40   | 50 | 60   | 70 | 80   | 90 | 100 |
| Range 0 - 45 barg | barg | 9                                    | 13.5 | 18 | 22.5 | 27 | 31.5 | 36 | 40.5 | 45 |     |

|                   |      | DIFF Pot position (%) |     |     |     |    |
|-------------------|------|-----------------------|-----|-----|-----|----|
|                   |      | %                     | 5   | 10  | 15  | 20 |
| Range 0 - 45 barg | barg | 2.3                   | 4.5 | 6.8 | 9.0 |    |

Minimum Speed = 40%  
 Maximum Speed = 100%

---

## Commissioning Data

### CONTROL DEVICE ADJUSTMENT

- 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 (29 barg)
  - Opens when the pressure falls to a level equal to the set point value, minus the differential pressure pre-set (23 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               = 26 barg  
                          Differential = 6 barg

**OPTIONAL EC FANS** When the condenser is matched to an Airedale indoor unit, head pressure control is provided by the indoor unit.

The fan speed of unmatched condensers is controlled by the onboard EC fan electronics connected to a pressure transducer on the outlet manifold.

**CAUTION**  **All fans are supplied pre-programmed to a head pressure setpoint of 26 barg and proportional band setpoint of 5 barg *unless otherwise specified at order.***

## Commissioning 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.

|                      |        | CR12 | CR16           | CR22 | CR30 |
|----------------------|--------|------|----------------|------|------|
| <b>Refrigeration</b> |        |      | Single Circuit |      |      |
| Refrigerant Type     |        |      | R410A          |      |      |
| Coil Volume          | l      | 3.0  | 6.0            | 4.7  | 9.3  |
| Refrigerant Charge   | (1) kg | 1.4  | 2.7            | 2.2  | 4.3  |

|                      |        | CR50 | CR65           | CR80 | CR105 |
|----------------------|--------|------|----------------|------|-------|
| <b>Refrigeration</b> |        |      | Single Circuit |      |       |
| Refrigerant Type     |        |      | R410A          |      |       |
| Coil Volume          | l      | 10.7 | 21.4           | 18.3 | 36.6  |
| Refrigerant Charge   | (1) kg | 4.9  | 9.8            | 8.4  | 16.7  |

(1) For guidance only.

## Troubleshooting - Unmatched Units

| <b>FAULT</b>                                  | <b>POSSIBLE CAUSE</b>   | <b>REMEDY/ACTION</b>   |
|---|---|--|
| <b>Unit will not start</b>                    | 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  |
| <b>Head pressure too high</b>                 | Condenser coil clogged or dirty   | Clean condenser  |
|   | Overcharge of refrigerant, normally troublesome in warm weather                 | Reclaim 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  |
| <b>Head pressure too low</b>                  | Fan operating too fast in low ambient conditions                                | Check fan speed controller adjustment - if faulty - replace  |
| <b>Condenser fan not operating - power on</b> | 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   |
| <b>Condenser fan runs too fast</b>            | 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)   |
| <b>Condenser fans runs only slowly</b>        | Incorrect pressure 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)   |
|   | Motor/capacitor faulty  | Replace  |

## Troubleshooting - Airedale Matched Units

| <b>FAULT</b>                                  | <b>POSSIBLE CAUSE</b>   | <b>REMEDY/ACTION</b>   |
|---|---|--|
| <b>Unit will not start</b>                    | 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  |
| <b>Head pressure too high</b>                 | Condenser coil clogged or dirty   | Clean condenser  |
|   | Overcharge of refrigerant, normally troublesome in warm weather                 | Reclaim excess refrigerant from system   |
|   | Air or other non-condensable gas in system                                      | Evacuate system and re-charge with new refrigerant   |
|   | Head pressure controller faulty   | Refer to Indoor unit   |
|   | Fan not operating or operating inefficiently                                    | Refer to Indoor unit   |
| <b>Head pressure too low</b>                  | Fan operating too fast in low ambient conditions                                | Refer to Indoor unit   |
| <b>Condenser fan not operating - power on</b> | 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   | Refer to Indoor unit   |
|   | 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   | Refer to Indoor unit   |
| <b>Condenser fan runs too fast</b>            | 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   | Refer to Indoor unit   |
|   | Faulty pressure sensor  | Refer to Indoor unit   |
| <b>Condenser fans runs only slowly</b>        | Incorrect pressure setting  | Adjust sensor screw as necessary   |
|   | Faulty fan speed controller   | Refer to Indoor unit   |
|   | Faulty pressure sensor  | Refer to Indoor unit   |
|   | 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.

**IMPORTANT**  Ensure relevant F-Gas Regulation checks are carried out at the appropriate period.

### 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 Examine the fan and motor assemblies for lateral and end play in the bearings.
- 2 Ensure that no water is entering the motor via the electrical gland plate.
- 3 Check 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 the coil is 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**

#### Electrical

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

#### Cabinet

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

### 12 MONTHS

**As per 3 months plus the following:**

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







**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](mailto:enquiries@airedale.com)  
**website:** [www.airedale.com](http://www.airedale.com)



| <b>PART NO:</b>       | <b>ISSUE</b> | <b>DATE</b> |
|-----------------------|--------------|-------------|
| <b>6680953 (IM E)</b> | A            | 01/03/2008  |
|                       | 1.1.0 (B)    | 01/2012     |
|                       | V1.2.0       | 02/2013     |
|                       | V1.4.0       | 10/2014     |
|                       |              |             |