

Condensing Units CUS5-12



TECHNICAL MANUAL



FM00542

EMS52086

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 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 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.

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

ChillerGuard

In addition to commissioning, a 24 hour, 7 days a week on-call service is available throughout the year to UK mainland sites. This service will enable customers to contact a duty engineer outside normal working hours and receive assistance over the telephone. The duty engineer can, if necessary, attend site, usually within 24 hours or less. Full details will be forwarded on acceptance of the maintenance agreement.

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.
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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) 113 239 1000	enquiries@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	training@airedale.com

For information, visit us at our web site: www.airedale.com

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General Description

Unit Identification

AIR COOLED CONDENSING UNIT & OUTDOOR HEAT PUMP RANGE	
CUS	Condensing Unit Cooling Only
CUHS	Outdoor Heat Pump
5-12	Model Size
e.g.	Model CUS 6

Introduction

This range of air cooled condensing units and heat pumps covers the 14-35kW requirement, in axial fan only.

The range is custom designed for use with Airedale's comprehensive range of close control units and Comfort Modular units. They can also be used in conjunction with other cooling applications, eg air handling units. All units are leak tested and carry a holding charge of inert gas.

CE Directive

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

Electromagnetic Compatibility Directive (EMC)	2014/30/EU
Low Voltage Directive (LVD)	2014/35/EU
Machinery Directive (MD)	89/392/EC in the version 2006/108/EC
Pressure Equipment Directive (PED)	2014/68/EU



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

Minimum and Maximum Operation Temperature (TS) and Pressure (PS) Refrigeration

Allowable Temperature Range (TS) = Min -20°C* to Max 120°C**
 Maximum Allowable Pressure (PS) = High Side 40.7 Barg, Low Side N/A Barg

*Based on the refrigerant temperature in the unit off state in the lowest permitted ambient temperature.

**Based on the maximum allowable super-heated refrigerant temperature.

Standard Features

Construction

The units are constructed of corrosion resistant pre-coated sheet steel. Standard unit colour is Light Grey (RAL 7035)

Condenser

Large surface area condenser coil(s) manufactured from refrigeration quality copper tubes, with mechanically bonded aluminium fins.

Fan

610mm diameter axial flow fan assembly(s) with low noise paddle type blades. The external rotor motor design allows the use of a low power output single phase speed controllable motor. The motor has inbuilt thermal overload protection, and the assembly is supplied complete with a finger guard for protection.

Compressor	All units utilise hermetic scroll compressors. The CUS7.5/10 and 12 models are fitted with a crankcase heater to guard against floodback and oil foaming on start up. Other features include internal motor protection.
Refrigeration Cooling Only	Each unit is fitted with a liquid and suction line shut off valve for ease of maintenance and installation. Factory set HP/LP pressure switches are fitted, with manual reset high pressure cut-out and automatic reset low pressure cut-out. A large capacity filter drier is supplied loose for on site installation.
Refrigeration Heat Pump	Each unit is fitted with a thermostatic expansion valve and a check valve assembly to prevent short circuiting of refrigerant, together with a large capacity suction accumulator and a reversing valve. A factory set defrost switch facilitates defrosting of the outside coil when in heat pump mode. All heat pump compressors are fitted with crankcase (oil sump) heaters. Factory set HP/LP pressure switches are fitted, with manual reset high pressure cut-out and automatic reset low pressure cut-out. A bi-directional filter drier is supplied loose for on site installation.
Electrical	Weatherproof control panels are accessed via a lockable panel and contain the necessary contactors, sub-circuit protection and terminals . All wiring is colour coded and numbered for identification. All units are wired in accordance with current local and European standards.
Head Pressure Control	Head pressure is maintained by a factory fitted, pressure actuated head pressure controller which varies the speed of the fan to provide optimum head pressure control under varying ambient conditions.
Mains Isolator OPTIONS	A weatherproof mains isolator is fitted to ensure mains isolation of the electrical panel.
Epoxy Coated Coils	In atmospheres where high corrosion is anticipated epoxy coated aluminium finned coils can be supplied.
Hot Gas Bypass (Cooling Only Units)	To achieve capacity control during low load conditions, a factory fitted hot gas bypass valve is fitted. This will modulate down to 40% of full capacity. A stub is provided for site connection of the hot gas line to the local expansion device.
Compressor Anti-Cycle Timer	To prevent short cycling and subsequent additional wear on the compressor, this option can be factory fitted to limit compressor starts to six per hour. Not required on Airedale equipment featuring start delay timers inbuilt into the Air Handling unit.
Defrost Drain Tray (Heat Pump Only)	An insulated and trace heated drain tray can be provided to collect condensate when units are used in the reverse cycle/defrost mode.

Capacity Data

COOLING duty – Reverse cycle mode

	Evaporating Temperature °C	25°C		30°C		35°C		40°C		45°C	
		Output kW	Input kW	Output kW	Input kW	Output kW	Input kW	Output kW	Input kW	Output kW	Input kW
CUHS5	-5	10.40	2.54	9.80	2.95	9.23	3.35	8.70	3.75	8.06	4.16
	0	12.47	2.76	11.79	3.15	11.11	3.52	10.45	3.91	9.80	4.32
	5	14.65	3.00	13.90	3.37	13.18	3.73	12.43	4.10	11.68	4.53
	10	16.93	3.29	16.15	3.65	15.36	4.00	14.55	4.36	13.78	4.79
CUHS6	-5	13.74	3.84	13.06	4.36	12.36	4.87	11.67	5.39	10.76	5.96
	0	16.41	4.13	15.51	4.62	14.62	5.11	13.71	5.61	12.78	6.20
	5	19.07	4.42	18.12	4.91	17.18	5.40	16.17	5.93	14.95	6.48
	10	21.95	4.73	20.94	5.21	19.94	5.70	18.79	6.25	17.69	6.79
CUHS6.5	-5										
	0										
	5										
	10										
CUHS7.5	-5	16.00	4.62	15.16	5.25	14.27	5.88	13.40	6.50	12.46	7.19
	0	19.06	4.88	18.08	5.48	17.13	6.11	16.17	6.72	15.01	7.45
	5	22.45	5.17	19.40	5.76	20.20	6.34	19.02	6.97	17.83	7.67
	10	26.10	5.44	24.85	5.99	23.60	6.55	22.21	7.24	20.91	7.86
CUHS10	-5	21.29	5.06	20.06	5.97	18.89	6.86	17.69	7.76	16.50	8.66
	0	25.10	5.34	23.93	6.22	22.69	7.09	21.51	7.97	20.30	8.86
	5	32.60	5.71	29.46	6.47	26.34	7.23	23.20	7.98	20.94	8.81
	10	34.49	5.90	33.25	6.73	32.02	7.56	30.73	8.39	29.33	9.31
CUHS12	-5	27.15	7.51	25.75	8.49	24.36	9.48	23.01	10.47	21.51	11.50
	0	32.23	8.02	30.70	8.96	29.12	9.90	27.57	10.83	25.82	11.87
	5	37.77	8.50	36.06	9.44	34.34	10.37	32.59	11.32	30.62	12.39
	10	43.90	9.16	42.03	9.74	40.15	10.32	38.07	11.51	35.78	12.85

Notes:

- 1 Output kW refers to the compressor duty.
- 2 Input kW refers to the compressor input power only

Capacity Data

HEATING duty - Reverse cycle mode

	Outdoor Unit Evaporator Air On Temperature °C/ RH %	Indoor Unit Condensing Temperature					
		30°C	35°C	40°C	45°C	50°C	55°C
		Output kW	Output kW	Output kW	Output kW	Output kW	Output kW
CUHS5	5 / 85	14.24	14.07	14.01	13.93	13.84	13.75
	7 / 85	15.30	15.07	14.98	14.88	14.71	14.58
	10 / 80	16.40	16.30	16.09	15.90	15.70	15.55
CUHS 6	5 / 85	18.65	18.60	18.64	18.61	18.57	18.49
	7 / 85	19.78	19.71	19.69	19.58	19.49	19.31
	10 / 80	21.40	21.17	21.14	20.93	20.65	20.41
CUHS 6.5							
CUHS 7.5	5 / 85	22.16	22.01	21.94	21.89	21.75	21.69
	7 / 85	23.45	23.24	23.20	23.02	22.95	22.90
	10 / 80	25.38	25.24	25.15	24.93	24.74	24.58
CUHS 10	5 / 85	25.66	25.40	25.15	24.90	24.65	24.40
	7 / 85	27.19	26.92	26.65	26.38	26.12	25.86
	10 / 80	29.37	29.08	28.79	28.50	28.21	27.93
CUHS 12	5 / 85	29.16	28.87	28.58	28.29	28.01	27.73
	7 / 85	30.90	30.59	30.29	29.98	29.68	29.39
	10 / 80	33.38	33.05	32.72	32.39	32.06	31.74

Notes:

- 1 Output kW refers to the compressor duty.
- 2 Indoor ambient at 20°C

CUS/CUHS		A	B	C	D	E	F	G	H	J	K
5	mm	865	1148	699	550	16	1181	1213	195	457	213
5.5	mm	865	1148	699	550	16	1181	1213	195	457	213
6	mm	865	1148	699	550	16	1181	1213	195	457	213
6.5	mm	996	1376	699	550	16	1409	1441	193	610	193
7.5	mm	996	1376	699	550	16	1409	1441	193	610	193

CUS/CUHS		A	B	C	D	E	F	G	H	J	K
10	mm	866	1705	953	810	16	1738	1770	204	457	204
12	mm	866	1705	953	810	16	1738	1770	204	457	204

Technical Data

Mechanical

CUS/CUHS		5	5.5	6	6.5	7.5	10	12
Nominal Capacity (1)	kW	13.7	15.2	17.9	19.3	21.0	27.4	35.7
Nominal Input (1)	kW	5.1	5.2	6.4	6.6	6.6	10.0	11.5
Capacity Steps	%	0-100	0-100	0-100	0-100	0-100	0-100	0-100
Construction								
Material		Pre Coated Sheet Steel						
Colour		Light Grey (RAL 7035)						
Condenser								
Type		Air Cooled						
Quantity		2	2	2	3	3	2	2
Face Area	m ²	0.69	0.69	0.69	1.03	1.03	1.37	1.37
Nominal Airflow	m ³ /s	2.00	2.00	2.00	2.225	2.25	4.45	4.45
Coil Volume (2)	l	8.0	8.0	8.0	12.0	12.0	15.7	15.7
Discharge		Vertical						
Fan								
Type		Axial						
Quantity		1	1	1	1	1	2	2
Diameter	mm	630	630	630	630	630	630	630
Maximum Speed	rpm	930	930	930	930	930	930	930
Compressor								
Type		Hermetic Scroll						
Quantity		1	1	1	1	1	1	1
Oil Charge Volume	L	1.55	1.65	1.65	4.10	3.25	3.80	4.00
Refrigeration								
Number of Circuits		1	1	1		1	1	1
Refrigerant Type		R407C						
Refrigeration Control (CUH only)		Thermostatic Expansion Valve						
Unit Refrigerant Charge	kg	2.4	2.4	2.4	3.6	3.63	4.76	4.76
Dimensions								
Height	mm	699	699	699	699	699	953	953
Width	mm	1148	1148	1148	1376	1376	1705	1705
Depth	mm	865	865	865	996	996	866	866
Weights CUS Units								
Machine Weight (nom)	kg	138	140	141	236.5	203.5	242	247
Operating Weight (nom)	kg	141	143	144	241.5	208.5	261	266
Weights CUHS Units								
Machine Weight (nom)	kg	164	166?	167	261.5?	216.5	267	272
Operating Weight (nom)	kg	168	170?	171	242.5?	222.5	272	277
Connections								
Liquid Line	in	Flare 1/2	Flare 5/8	Flare 5/8	Flare 5/8	Flare 5/8	Sweat 7/8	Sweat 7/8
Suction Line	in	Sweat 7/8	Sweat 7/8	Sweat 7/8	Sweat 1 1/8	Sweat 1 1/8	Sweat 1 1/8	Sweat 1 3/8
Hot Gas Stub	in	5/8	5/8	5/8	5/8	5/8	7/8	7/8

(1) Nominal cooling capacity based on 5°C evaporating temperature and a 35°C ambient.

(2) Figures for guidance.

Technical Data

Electrical Data

CUS/CUHS		5	5.5	6	6.5	7.5	10	12
Unit Data								
Nominal Run Amps (1)	A	11.1	11.9	13.5	15.7	15.2	21.1	26.6
Maximum Start Amps	A	71.1	76.1	100.8	104.6	103.8	131.6	146.6
Control Circuit CUS	VAC	230	230	230	230	230	230	230
Control Circuit CUHS	VAC	24	24	24	24	24	24	24
Mains Supply	V				400/3/50			
Rec. Mains Fuse	A	20	20	25	25	32	40	40
Max Incoming Mains	mm ²	10	10	10	10	10	10	10
Compressor - Per Compressor								
Motor Rating	kW	4.45	5.3	5.9	6.65	6.9	8.9	11.6
Nominal Run Amps (1)	A	8.3	9.1	11.0	12.9	12.7	16.1	21.6
Locked Rotor Amps	A	65.5	70.5	95.0	99.0	98.0	120.0	135.0
Crankcase Heater Rating	W	65 ⁽²⁾	65 ⁽²⁾	65 ⁽²⁾	65 ⁽²⁾	50	50	50
Type of Start					Direct on Line			
Condenser Fan - Per Fan								
Motor Rating	kW	0.55	0.55	0.55	0.55	0.55	0.55	0.55
Full Load Amps	A	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Locked Rotor Amps	A	5.80	5.80	5.80	5.80	5.80	5.80	5.80

- (1) Nominal data based on 5C evaporating temperature and a 35C ambient.
- (2) Heat pumps only.

Sound Data

Method of Sound Measurement

Measurement of Sound Data All sound data quoted has been measured in the third-octave band limited values, using a Real Time Analyser calibrated sound intensity meter in accordance with BS EN ISO9614 Part 1 : 2009.

All Sound Power Levels quoted are calculated from measured sound intensity according to BS EN ISO9614 Part 1 : 2009.

Semi Hemispherical

CUS 5 - 12

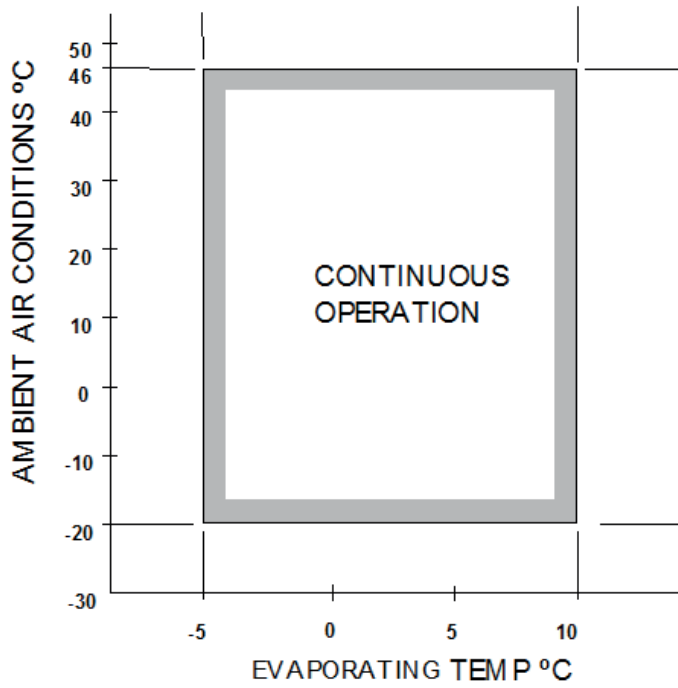
Sound Pressure Levels are calculated from sound power using the semi-hemispherical method where the noise source is in junction with 2 boundaries i.e. the floor and 1 wall.

Sound Pressure Measurement		Frequency (Hz)								
		dBa	63	125	250	500	1000	2000	4000	8000
CUS/CUHS 5 - 6	@1m	71	72	73	71	70	68	60	53	46
	@10m	51	52	53	51	50	48	40	33	26
CUS/CUHS 6.5 - 7.5	@1m	81	81	79	82	79	77	72	65	58
	@10m	53	53	51	54	51	49	44	37	30
CUS/CUHS 10-12	@1m	73	80	77	73	72	69	63	56	47
	@10m	53	60	57	53	52	49	43	36	27

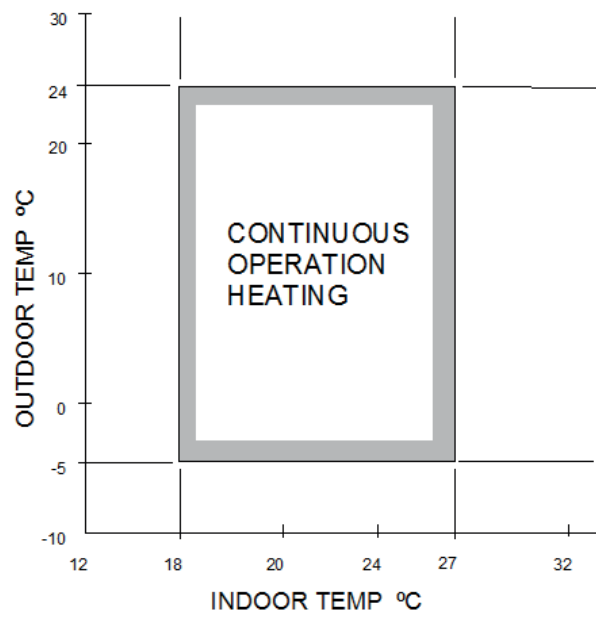
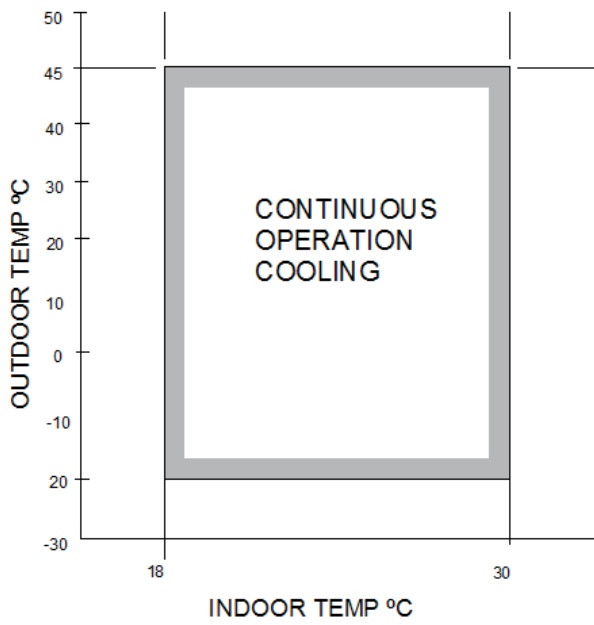
Note: Above noise levels are with the condenser fan running at full speed. Under normal operating conditions (ambients up to 35°C) noise levels will be reduced by 3 - 4 dB.

Operating Data

Operating Limits - Cooling Only

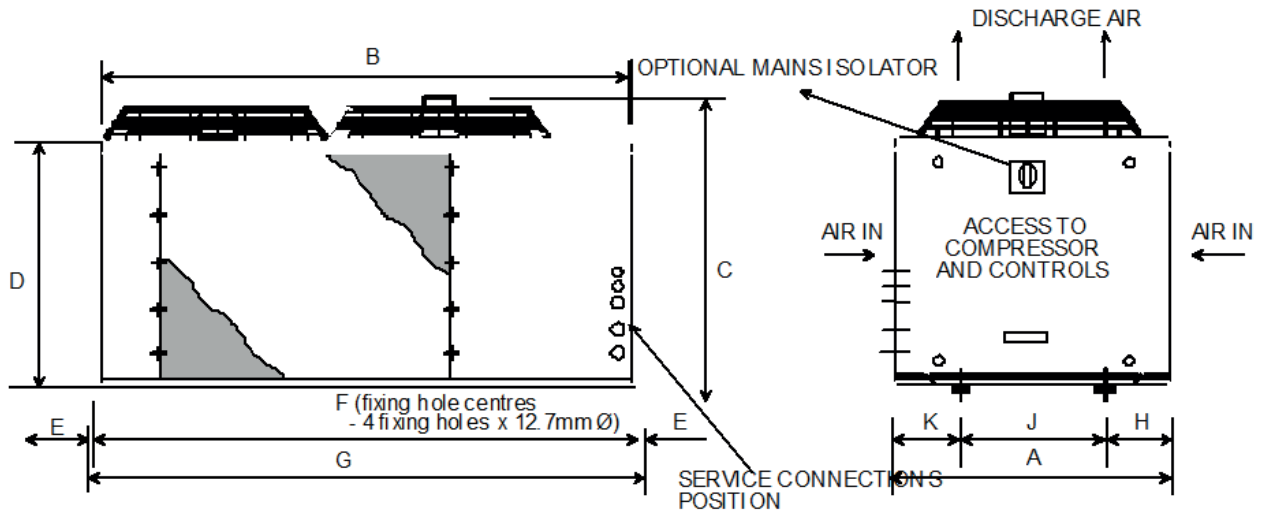


Operating Limits - HEAT PUMP



Installation

Dimensions: CUS/CUHS 10 - 12



CUS/CUHS		A	B	C	D	E	F	G	H	J	K
10	mm	866	1705	953	810	16	1738	1770	204	457	204
12	mm	866	1705	953	810	16	1738	1770	204	457	204

Notes:

- 1 Incoming Services: Connections to left hand side of unit compressor compartment.
- 2 Airflow and Maintenance Clearance: Please allow 500mm around the unit for airflow and maintenance purpose.

Field Connections

CUS 5-12		L1
		L2
		L3
		N
		E
		576
		577
		589
	502	

Mains Incoming 400/3/50

576/577 Cooling Signal from AHU (24vac)

589/502 Volt Free Contacts For Trip Indication

CUHS 5-12		L1
		L2
		L3
		N
		E
		504
		502
		523
		517
		515
		500
		589
	590	

Mains Incoming 400/3/50

504 Cooling Signal from AHU (24vac)
24vac

Defrost Signal to AHU

AHU Fan running

Heating signal from AHU

0vac

589/5590 Volt Free Contacts For Trip Indication

After Sales

Warranty

All Airedale products or parts (non consumable) supplied for installation within the UK mainland and commissioned by an Airedale engineer, carry a full Parts & Labour warranty for a period of 12 months from the date of commissioning or 18 months from the date of despatch, whichever is the sooner.

Parts or Equipment supplied by Airedale for installation within the UK or for Export that are properly commissioned in accordance with Airedale standards and specification, not commissioned by an Airedale engineer; carry a 12 month warranty on non consumable Parts only from the date of commissioning or 18 months from the date of despatch, whichever is the sooner.

Parts or equipment installed or commissioned not to acceptable Airedale standards or specification invalidate all warranty.

Warranty is only valid in the event that

In the period between delivery and commissioning the equipment:

- is properly protected & serviced as per the Airedale installation & maintenance manual provided
- where applicable the glycol content is maintained to the correct level.

In the event of a problem being reported and once warranty is confirmed* as valid under the given installation and operating conditions, the Company will provide the appropriate warranty coverage (as detailed above) attributable to the rectification of any affected Airedale equipment supplied (excluding costs for any specialist access or lifting equipment that must be ordered by the customer).

*Once warranty is confirmed, maintenance must be continued to validate the warranty period.

Any spare part supplied by Airedale under warranty shall be warranted for the unexpired period of the warranty or 3 months from delivery, whichever period is the longer. To be read in conjunction with the Airedale Conditions of Sale - Warranty and Warranty Procedure, available upon request.

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.

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.