

INSTALLATION & MAINTENANCE MANUAL

StoreMaster

Air Handling Unit - Free Cooling, Cooling & Heat Pump 50 kW - 77 kW

R410A



ISO 14001 EMS52085 (SØ 9001 FM00542

About Airedale Products & Customer Services

WARRANTY, COMMISSIONING & MAINTENANCE	As standard, Airedale guarantees all non variations tailored to suit product and appl terms and details.	consumable <i>parts only</i> for a ication are also available; p	a period of 12 months , lease contact Airedale for full			
	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 accord of water, associated with the risk of contained with the	All Airedale products are designed in accordance with EU Directives regarding prevention of build u of water, associated with the risk of contaminants such as Legionella.				
	/here applicable, effective removal of condensate is achieved by gradient drainage to outlets and here used, humidification systems produce sterile, non-toxic steam during normal operation.					
	For effective prevention of such risk it is n with Airedale recommendations.	ecessary that the equipmen	t is maintained in accordance			
CAUTION V	Warranty cover is not a substitute for M maintenance being carried out in acco warranty period. Failure to have the ma warranty and any liabilities by Airedale	Maintenance. Warranty co rdance with the recommen intenance procedures ca International Air Conditio	ver is conditional to Idations provided during the rried out will invalidate the ning 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:					
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General Statement

IMPORTANT		The information contained in this manual is critical to the correct operation and maintenance of the unit and should be read by all persons responsible for the installation, commissioning and maintenance of this Airedale unit.			
SAFETY		The equipment has been designed and manufactured to meet international safety standards but, like any mechanical/electrical equipment, care must be taken if you are to obtain the best results.			
CAUTION	V	1	Installation, service and maintenance of Airedale equipment should only be carried out by technically trained competent personnel.		
CAUTION	V	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 Workplace Exposure Levels (WEL) 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.		
GAS APPLIANCE		On coi loc	ly appropriately qualified and competent persons should carry out the mmissioning and testing of gas operated appliances, taking into consideration cal relevant standards and codes of practice.		
CERTIFICATION OF		The split system Evaporator section is suitable for both externally and internally located unit applications. For sealed plant room applications please refer to Airedale.			
FIRED HEATER		The units are designed and tested in accordance with the current European CE Standards.			
SPARES For ease of identification when ordering s please quote the unit type, unit serial num found on the unit serial plate.			ease of identification when ordering spares or contacting Airedale about your unit, ase quote the unit type, unit serial number and the date of manufacture, which can be nd on the unit serial plate.		
		A s our	pares list for 1, 3 and 5 years will be supplied with every unit and is also available from Spares department on request.		
SERIAL PLATE		The Ider	e serial plate can be located to the inside of the control panel door, refer to <i>Parts</i> ntification, on page 48.		
		0	IREDALE UK Office 🕿 + 44 113 2391000 🍵 + 44 113 2507219		
		Unit Seri M.O Sale Mar Sup Fusi Tesi Refr Max	// Gerät / Unite STMSOR-P al / Serie / Serie al / Serie / Serie so Order Nº / Bestell-NumNer / Mayero de Commonde so Order Nº / Bestell-NumNer / Mayero de Commonde 63106943 urfactured / Hergestell / Tatricke / Johanna / Alimentation / Johanna / Fusibles t Pressure / Prüldruck / Pression D'Essai igerant & Charge / Kältemittel und Fülling / Réfrigerant & herge R410A : Operating Pressure / Betribesdruck (Maximal) / Pression de marché		
		www	w.airedale.com		

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:	 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. Commissioning is carried out by Airedale or an approved Airedale company. Commissioning documents have been completed and returned to Airedale within 28 days of the date of commissioning. Replaced faulty parts have been returned to Airedale within 21days 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 • • • • • • • • • • • • • • • • • • •
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.

UNIT IDENTIFICATION

			STM	50	R	-	Ρ
STM	StoreMaster						
50 & 77	Model Size (Expressed as Nominal Cooling in	del Size (Expressed as Nominal Cooling in kW)					
R RHP	Cooling Cooling + Heat Pump						
P E C	Packaged (Evaporator + Condenser Sections) Evaporator Section Condenser Section)					1
INTRODUCTION	The Airedale range of StoreMaster fully packa pumps covers the nominal capacity range 50k	aged air cooled W and 77kW i	air conditi n 2 model	oners a sizes.	and he	eat	
	Attention has been placed on maximising the and footprint to an absolute minimum.	unit's performa	nce while	keepin	g the s	sou	nd
	The StoreMaster consists of 2 parts; an evaporand is offered fully packaged as standard.	orating section	¹ and a cor	ıdensin	g sec	tion	۱
	In applications where external space is restric be supplied optionally as a split system. The E internally and piped to an externally mounted	ted or sound le Evaporator sec Condenser sec	vels are c tion can th ction.	ritical, tl en be r	ne uni nounte	t ca ed	an
	Offering simultaneous DX Mechanical cooling and heating and Free-Cooling operation, the range utilises the latest technology to achieve a high level of energy efficient operation.					,	
	Airedale certify that the equipment detailed in EC Directives:	this manual co	nforms wit	h the fo	ollowir	ıg	
	Electromagnetic Compatibility Directive (EMC)2004/108/ECLow Voltage Directive (LVD)2006/95/ECMachinery Directive (MD)89/392/EEC in the ver2006/37/EC				sion		
	Pressure Equipment Directive (PED)	97/23	/EC				
	To comply with these directives appropriate national & harmonised standards have applied. These are listed on the Declaration of Conformity, supplied with each pro-					bee Jct.	ən
	Maximum and Minimum Operation Temperatu Operating Temperature (TS), Maximum Operating Pressure (PS)	ure (TS) and Pr TS = Min - PS = High	essure (P 20°C to M Side 26 B	S) ax 120° arg	°C *		
	*Based upon the maximum machine running t	emperatures.					

¹ Description relates to the heat exchangers function in cooling mode. When operating in heating on the heat pump model the operation of the evaporator and condenser coils is reversed.

FEATURES			COOLING ONLY	COOLING & HEAT PUMP		
Standard	 Optional Extra 	- Not available				
Construction						
Weatherproof Louvre To Fresh Air Intake And F	Exhaust Air (Packaged Unit Or	nlv)	•	•		
Fresh Air Free Cooling Economiser - Outside A	vir Damper		•	•		
Split Delivery - Condensing Section And Evano	rator Section		0	0		
Return Air Fans (AC) - Voltage Regulated Spee	ed Control		•	•		
Return Air Fans (AC) - Inverter Speed Control			0	0		
Supply Air Fans- Electronically Commutated (F	с)		•	•		
Constant Supply Air Volume Control			•	•		
Return Air Velocity & Volume Measurement			ô	õ		
Filters - 97mm Pleated Disposable BS EN 779-	64		•	Č		
Condenser	-04		•	•		
Condenser						
Condenser Colls - Hydrophilic Coated			•	•		
Coll Guards		-	0	0		
Condenser Fans For Head Pressure Modulatio	n - Voltage Regulated Speed	Control	•	•		
Condenser Fans For Head Pressure Modulatio	n - Inverter Speed Control		0	0		
Integrated Maintenance Friendly Drain Pan Wit	h Pad Heating		-	•		
Refrigeration						
Full Operating Charge Of R410A			•	•		
Suction Gas Cooled Tandem Scroll Compresso	or With Internal Motor Protection	on, Pressure Relief, & Sump Heater	•	-		
Suction Gas Cooled Scroll Compressor With In	ternal Motor Protection, Press	ure Relief, Oil Sight Glass &	_	•		
Sump Heater			-	·		
Number Of Independent Refrigeration Circuits			1	2		
Electronic Expansion Valve (EEV) - Evaporator	-		•	•		
Thermostatic Expansion Valve (TEV) - Conden	ser		-	•		
Liquid Line Sight Glass			•	•		
Liquid Line Ball Valves			•	•		
Liquid Receiver			-	•		
Discharge Line Ball Valves			•	•		
4 Way Reversing Valve			-	•		
Suction Accumulator			-	•		
Non-Return Valve			-	•		
Manual Reset HP/LP Switch (LP Via Microproc	essor)		•	•		
Suction And Liquid Pressure Transducers	,		•	•		
Leak Detection System			0	0		
Heating						
Indirect Gas Fired Heating			0	0		
Electric Heating			0	0		
Low Pressure Hot Water			0	-		
Electrical			°			
			•	•		
Interleaking Mains Deer Isolator			•	•		
Fan Speed Centrallers And Value Drivers				•		
Fail Speed Controllers And Valve Drivers			•	•		
Meintenance Friendly 124 Double 2 Din Dlug S	aakat		0	0		
Maintenance Friendly 13A Double 3 Pin Plug S	ocket		0	0		
				V		
Controis	Jontrols					
AINE I FORIX Microprocessor Controller			•	•		
Remote Display			0	0		
Inverter Drive Interface Display			0	0		
Enthalpy Controls			0	0		
Energy Manager			0	0		
Air Quality Monitoring			0	0		
BMS Interface Card			0	0		

STOREMASTER

STANDARD FEATURES

Construction	The base is fabricated from galvanised steel to ensure a tough, durable, weatherproof construction.
	Unit support can be provided by concrete/steel pillars to each corner of the rigid steel base.
	The superstructure is manufactured from galvanised sheet steel coated with epoxy baked powder paint to provide a durable and weatherproof finish.
	Standard unit colour is Light Grey (RAL 7035).
	Compressors are mounted on a rigid galvanised heavy-duty sub frame. Fully weatherproofed electrical panels are situated at one side of the unit. Access to all major components sections of the unit are via either hinged or removable panels.
	Construction includes duct flanges/mounts to accept self support ducting of up to 4m.
	A set of removable 4 M24 collared lifting eye bolts to BS4278 are supplied.
	Refer to <i>Dimensional</i> Data, on page 12 for unit layout.
Weather Louvres - Packaged	A weatherproof louvre is fitted to the fresh air intake and exhaust air as standard, to protect internal components, complete with bird mesh.
	For Split Systems, an optional weather louvre is recommended.
Refrigeration	As standard the packaged unit is supplied with a full operating charge of R410A refrigerant.
	As standard the split unit is supplied with sufficient charge of R410A refrigerant to cover 5m of interconnecting pipe work. Refer to <i>Split Delivery</i> , on page 10 for split case arrangement.
	The cooling only unit has a single refrigeration circuit.
	The Heat Pump unit has a 2 independent refrigeration circuits.
	For further details, refer to System Pipework Schematic, on page 18
Cooling Only Unit	EVAPORATOR SECTION INCLUDES:
	 Electronic expansion valve (EEV) Liquid line sight glass Discharge line ball valve Large capacity filter drier Low pressure switch with manual reset via microprocessor controller High pressure switch with manual reset Suction and liquid pressure transducers
	CONDENSING SECTION INCLUDES:
	Liquid line ball valve

• 5/16" Schrader for gauge connection

Refrid	peration

Heat Pump Unit

EVAPORATOR SECTION INCLUDES:

- Electronic expansion valve (EEV)
- Liquid line sight glass
- Discharge line ball valve
- Large capacity filter drier
- Low pressure switch with manual reset via microprocessor controller
- High pressure switch with manual reset
- Suction and liquid pressure transducers
- Liquid Receiver
- 4 Way Reversing Valve
- Suction Accumulator
- Non-return valve

CONDENSING SECTION INCLUDES:

- Thermostatic expansion valve (TEV) with external equaliser
- Liquid line ball valve
- Non-return valve
- 5/16" Schrader for gauge connection
- Solenoid valve

Electrical	 Dedicated weatherproof electrical power and controls panels are situated at the side of the unit and contain: Door locking electrical isolation for mains compartment Separate, fully accessible, controls compartment, allowing adjustment of control set points whilst the unit is operational Circuit breakers for protection of all major unit components Fan speed controllers and valve drivers 			
	The electrical power and control panel is wired to the latest European standards and codes of practice.			
Controls	Units are fitted with the diretronix microprocessor controller which offers powerful analogue and digital control to meet a wide range of monitoring and control features including a real time clock and a communication port plus networking and BMS connections.			
	A keypad/display assembly is used to view the unit status and allow operator adjustment.			

For full details, please refer to the Controls, on page 27.

OPTIONAL EXTRAS

Split Delivery The evaporator section and condensing section can be delivered separately. **Cooling Only Unit EVAPORATOR SECTION INCLUDES:** Holding Charge of Inert Gas . Sub Fusing for Condenser . Interconnecting sweat copper pipe connections • Shut Off Ball Valves **CONDENSING SECTION INCLUDES:** Precharged with R410A for approximately 5m of interconnecting pipework Door Interlocking Isolator Shut Off Ball Valves Interconnecting sweat copper pipe connections • **EVAPORATOR SECTION INCLUDES: Heat Pump Unit** Precharged with R410A Sub Fusing for Condenser Interconnecting sweat copper pipe connections Shut Off Ball Valves **CONDENSING SECTION INCLUDES:** Precharged with R410A for approximately 5m of interconnecting pipework • Door Interlocking Isolator Interconnecting sweat copper pipe connections Shut Off Ball Valves The refrigeration pipework for split heat pump applications is based on a 3 pipe system. A

The refrigeration pipework for split heat pump applications is based on a 3 pipe system. A 3 pipe system relies on the following refrigeration pipes between indoor and outdoor sections

- 1 Liquid feed to TEV for evaporator coil in heat pump mode **or**; Liquid feed to EEV for evaporator coil in cooling mode
- 2 Suction from evaporator coil in heat pump mode
- 3 Discharge from compressor in cooling mode

OPTIONAL EXTRAS

General Options

- Inverter driven Fans Condenser & Return air fan section
- Coil Guards Condenser
- Electronic Soft Start
- Emergency Stop
- Return Air Fan (Short Case Axial)
- Constant Supply Air Volume Supply Air Fan
- Air Volume Adjustment Return Air Fan
- Inverter Driven Fan Condenser Section
- Weather Louvre with bird mesh Split System
- R410A Leak Detection System
- Maintenance 13A Socket (Double)
- Heating Options:
 - Electric Heating or
 - LPHW Coil and bypass valve (Cooling only units)
 - Indirect Gas Heating including separate instructions for:
 - Commissioning
 - Outdoor to Indoor Conversion
 - Phase Monitoring Relay
- Phase Rotation Protection
- Enthalpy Controls

•

- Energy Manager
- Air Quality Monitoring

Controls Options

- Remote Display Keypad
- BMS Interface Card
- GSM Modem Kit

Dimensional Data

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

PACKAGED UNIT (MM)



- Exhaust Air Outlet with Weather Louvre
- 10 Return Air Fan (Option) & Duct Flange 11
- Return Air Fan & Damper Actuator Access 12
- 13
 - Mixed Air Chamber & Damper Actuator Access
- 26 Condenser Fan - Control Panel 27 Heat Pump Units ONLY: Condenser Coil section full width pull out condensate drain trays with central drain stub 28
 - Airflow



STOREMASTER

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Comfort Range Installation & Maintenance : 6718290 08/2014

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Installation Data

GENERAL	Systems can be supplied in 2 options:		
	 Packaged Split System - Evaporator Section and Condenser Section 		
Unpacking	Remove the polythene cover and corner post protection once the unit has been installed in its final position.		
Inspection	The unit should be thoroughly inspected on receipt and any damage reported immediately and confirmed in writing within 7 days.		
	It is advisable to use the polythene cover as protection throughout the installation period if building or other construction work is in progress.		
POSITIONING	The installation position should be selected with the following points in mind:		
	 Position on a stable and even base, levelled to ensure that the compressor operates correctly The minimum unit support can be provided by concrete/steel blocks of 300 x 300 wide by 150mm deep to each corner of the rigid steel base Levelling should be to +/- 5mm Observe airflow and maintenance clearances Pipework and electrical connections are readily accessible Where multiple units are installed, due care should be taken to avoid the discharge air from each unit adversely affecting other units in the vicinity Within a side enclosed installation, the Condenser fan MUST be higher than the enclosing structure Ensure there are no obstructions directly above the fans Allow free space above the fans to prevent air recirculation Take particular care to ensure sufficient air circulation is available for units fitted with optional Indirect Gas Fired Heating 		
	Indirect Gas Fired Heating Option - As standard, configured suitable for outdoor application only, UNLESS otherwise stated at time of order. The unit MUST be checked prior to installation to ensure that it is correctly		
	configured for the application. If necessary, instructions for conversion are supplied separately with the unit.		
CAUTION	Prior to connecting services, ensure that the equipment is installed and completely level.		

POSITIONING

Packaged (mm)

(1) Service area require for removal of coil



Split System (mm)

(1) Service area require for removal of coil

Evaporator Section



Condenser Section



UNIT LIFTING **Employ lifting specialists** Local codes and regulations relating to the lifting of this type of equipment should be observed Use the appropriate spreader bars/lifting slings (provided by others) with the holes/lugs provided Attach individual lifting chains to each of the lifting eye bolts/lifting lugs provided; each individual chain must be capable of lifting the whole unit Do not use 1 chain between 2 lifting points to avoid load shift. IMPORTANT Only use lifting points provided. A set of removable 4 M24 collared lifting eye bolts to BS4278 are supplied Chains/slings MUST NOT interfere with the casing or fan assembly to avoid damage Lift the unit slowly and evenly If the unit is dropped, it should immediately be checked for damage and reported IMPORTANT to Airedale. LIFTING DIMENSIONS Packaged Unit (mm) 2100 A = 3.5m Minimum Split System (mm) **Evaporator Section Condenser Section** 2100 A = 3m Minimum 2100 600

WEIGHTS

		Packaged (No Options)	Evaporator Section	Condenser Section
STM50R	kg	1987	1605	382
STM77R	kg	2003	1617	386
STM50RHP	kg	2146	1740	406
STM77RHP	kg	2150	1742	408

CONDENSATE DRAIN (Evaportor & Condenser¹)

On the heat pump models both the evaporator and condenser have drip trays with integral drain channels.

The connection on the evaporator is a 1" BSP threaded connection. The final drain diameter should be 28mm and should be piped as shown below.

The connection on the condenser (heat pump only) is a 22mm stub. The final drain diameter should be 22mm and should be piped as shown below.

Condensate can be carried to waste in copper tubing to BS EN 1057-R250. It should be supported at regular intervals to avoid bowing and have a slope of at least 1 in 50. If the run is long and has a number of bends the size of tube should be increased and suitable cleaning eyes installed at the bends. Insulation should be to class 'O' Armaflex or equivalent specification.





Heat Pump (Condenser¹) Large double drain pan for heat pump operation condensate removal. Pans include integrated trace heating and can be removed from the left hand or right hand side for maintenance or inspection, refer to Maintenance, on page 44.



Stub Connection 1

3

4

- 2 Pull out tray (800mm) to LH
 - and RH sides Heating under tray
 - Access to heating from side

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DUCTWORK

Drain Detail

The supply and return ductwork should be designed and sized in accordance with good practice. Ductwork air velocity should not exceed the guidelines for the particular installation.

External ductwork MUST be insulated to prevent excessive heat gains or losses. The insulation should be weather sealed to prevent rainwater from entering the system.

StoreMaster construction includes duct flanges/mounts to accept self support ducting of up to 4m.

Description relates to the heat exchangers function in cooling mode. When operating in heating on the heat pump model the operation of the evaporator and condenser coils is reversed.

SYSTEM PIPEWORK SCHEMATIC

Cooling Only



- 1 Evaporator Section¹
- 2 Condenser Section¹
- 3 4 Scroll Compressor - Tandem Set
- Temperature Sensor
- 5 High Pressure Switch
- 6a Ball Valve
- Ball Valve Split Delivery Only 6b
- 7 Condenser Section Coil & Fan
- 8 Head Pressure Transducer
- Filter Drier 9
- Sight Glass 10
- Electronic Expansion valve (EEV) 11
- Evaporator Section Coil & Fan 12
- Temperature Transmitter 13
- Low Pressure Transducer 14
- 15 Low Pressure Switch

¹ Description relates to the heat exchangers function in cooling mode. When operating in heating on the heat pump model the operation of the evaporator and condenser coils is reversed.

SYSTEM PIPEWORK SCHEMATIC

Cooling & Heat Pump Unit

The following illustrates the 2 circuit heat pump system with a 3 pipe connection (per circuit) (if supplied split delivery) on each circuit.



Pipework			Diameter	
	Cooling	Heating	STM50RHP	STM77RHP
Α	Common	Discharge	1 1/8"	1 1/8"
В	Discharge	Suction	1 1/8"	1 1/8"
С	Liquid Drain	Not used	5/8"	5/8"
D	Common Liquid		5/8"	5/8"
Ε	Liquid	Not used	5/8"	5/8"
F	Liquid Expansion	Not used	7/8"	7/8"
G	Suction	Discharge	1 1/8"	1 1/8"
Н	Common Suction		1 1/8"	1 1/8"
1	Not Used	Liquid	5/8"	5/8"
J	Not Used	Liquid Drain	5/8"	5/8"

- Evaporator Section¹ in Cooling Mode Evaporator Section¹ in Heat Pump Mode Condenser Section¹ in Cooling Mode 1a
- 1b
- 2a
- Condenser Section¹ in Heat Pump Mode 2b
- 4 Interlaced Evaporator Section Coil and airflow direction
- Electronic Expansion valve (EEV) 5
- 6 Sight Glass
- 7 Filter Drier
- 9a Ball Valve
- 9b Ball Valve - Split Delivery Only
- Condenser Section Coil and airflow direction 10 **High Pressure Switch**
- 11 Scroll Compressor - Tandem Set 13
- Low Pressure Switch 14
- 16 Solenoid Valve
- Check Valve 17
- Thermostatic Expansion Valve (TEV) 18
- 19 Liquid Receiver
- 20a Reversing Valve in Cooling Mode
- 20b Reversing Valve in Heat Pump Mode
- 21 Accumulators

¹ Description relates to the heat exchangers function in cooling mode. When operating in heating on the heat pump model the operation of the evaporator and condenser coils is reversed.

SPLIT SYSTEM

Connecting Refrigerant Pipework Sizing Guide

Evaporator Section	Condenser Section	Equivalent Pipe Lengths with R410A In Cooling or Heat Pump Mode		
		Equivalent Length	Liquid	Discharge
STMEOD E	STMEOD C	0-15m	3/4"	1 1/8"
STWSUR-E	STMOUR-C	15-40m	7/8"	1 3/8"
STM77D E	STM77P.C	0-15m	7/8"	1 3/8"
STWITK-E	3111/11/11	15-40m	7/8"	1 3/8"
		0-15m	5/8"	1 1/8"
STWOURF-E	STWOURHF-C	15-40m	5/8"	1 1/8"
	STM77DHD.C	0-15m	5/8"	1 1/8"
STW//REF-E	STWITTER-C	15-40m	3/4"	1 1/8"

The following table identifies the maximum

distance between pipe supports on vertical

and horizontal pipe runs.

IMPORTANT

V Liquid Line - The figures quoted are the recommended size for both cooling and heating mode liquid lines, refer to *System Pipework Schematic*, on page 18.

Discharge Line - The discharge sizing recommendations quoted are also valid in heating mode when this line becomes the suction line.

The heat pump units are 3 pipe systems (per circuit) and as such have 2 liquid lines and a common discharge/suction line, refer to *System Pipework Schematic*, on page 18.

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 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



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

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 Evaporator Section





Condenser below Evaporator Section

Pipe O/D (inches)

3/8 - 7/8

1 1/8 - 2 1/8

Support distance (m)

1.0

SPLIT SYSTEM

Pipework Installation - Good Practices

IMPORTANT 👽

The pipe sizes (refer to *Connecting Refrigerant Pipework Sizing Guide*, on page 20) and refrigerant charges (refer to *Refrigerant charging Guide*, on page 35) quoted are for guidance only. 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, ensure the oil sight glass indicates half level when the compressor is not running, refer to *Oil Charging Guide* on page 35.

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.

IMPORTANT V 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 As standard the equipment is designed for 400V, 3 phase, 3 wire 50Hz and a • separate permanent 230V, 1 phase, 50Hz supply, to all relevant IEE regulations, British standards and IEC requirements The control voltage to the interlocks is 24V, always size the low voltage interlock and protection cabling for a maximum voltage drop of 2V Avoid large voltage drops on cable runs, particularly low voltage wiring CAUTION V A fused and isolated electrical supply of the appropriate phase, frequency and voltage should be installed. Wires should be capable of carrying the maximum load current under non-fault conditions at the stipulated voltage.

A separately fused, locally isolated, permanent single phase and neutral supply <u>MUST BE FITTED</u> for the compressor oil heater, evaporator trace heating and control circuits, <u>FAILURE to do so will INVALIDATE WARRANTY</u>.

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

INTERCONNECTING WIRING

Cooling Only - Typical Example

Packaged U &

Packaged Unit & Split System Evaporator Section		L1 0 € L2 0 € € L3 0 € € PE 0 € € N 0 € €	Mains incoming supply 400V / 3 PH / 50Hz Neutral only used if using common supply (No single phase L4 separate supply)
		L4 ○ ← N1 ○ ← PE ○ ←	Separate Permanent Supply 230V / 1 PH +N / 50Hz (Option)
	6	502 ○ 505 ○	Unit Remote On/Off 24VAC
	[502 ○ 507 ○	Fire Shutdown
	STMR-P	565 ○ 564 ○ 563 ○	Volt Free Common Alarm Volt Free Alarm N/O Volt Free Alarm N/C
	51MR-E	562 ○ ← 561 ○ → 560 ○ →	Volt Free Common Alarm Volt Free Alarm N/O Volt Free Alarm N/C
		500 ○ ← 502 ○ → 858 ○ ←	Return Air Velocity (Option)
	[860 ○ ← 861 ○ ←	Space Sensor 1 (Option)
	[862 ○ ← 853 ○ ←	Space Sensor 2 (Option)
		RX-/Tx- ○ ←→ RX+/Tx+ ○ ←→ GND ○ ←→	AIRELan Network Connections
Split System Interconnecting Wiring		216 ○ 217 ○ 218 ○ PE ○	Outgoing supply 400V/3PH/50Hz Connection to Condenser Fan 1
	STMR-C & STMR-E	222 ○ → 223 ○ → 224 ○ → PE ○ →	Outgoing supply 400V/3PH/50Hz Connection to Condenser Fan 2 (Inverter Control only)
		527 ○ ← 502 ○ → 528 ○ ←	Outdoor Fan status



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

INTERCONNECTING WIRING

Heat Pump - Typical Example

Packaged Unit & **Split System Evaporator** Section

	L1 0 ¢ L2 0 ¢ L3 0 ¢ PE 0 ¢ N 0 ¢	Mains incoming supply 400V / 3 PH / 50Hz Neutral only used if using common supply (No single phase L4 separate supply)
	L4 0 (N1 0 (PE 0 (Separate Permanent Supply 230V / 1 PH +N / 50Hz (Option)
	502 ○ → 505 ○ ←	Unit Remote On/Off 24VAC
	502 ○ → 507 ○ ←	Fire Shutdown
STMRHP-P	$\begin{array}{c c} 565 & \bigcirc \\ 564 & \bigcirc \\ 563 & \bigcirc \end{array}$	Volt Free Common Alarm Volt Free Alarm N/O Volt Free Alarm N/C
& STMRHP-E	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Volt Free Common Alarm Volt Free Alarm N/O Volt Free Alarm N/C
	500 ○ ← 502 ○ → 858 ○ ←	Return Air Velocity (Option)
	801 ○ 852 ○ 853 ○	Remote Outdoor Temp/Hum Sensors (Option)
	860 ○ ← 861 ○ ←	Space Sensor 1 (Option)
	862 ○ ← 853 ○ ←	Space Sensor 2 (Option)
	RX-/Tx- ○ RX+/Tx+ ○ GND ○	AIRELan Network Connections
	3 ○ → N ○ ←	Outdoor Drip Tray Heaters
	$\begin{array}{c c} 216 & \bigcirc \\ \hline 217 & \bigcirc \\ \hline 218 & \bigcirc \\ \hline PE & \bigcirc \end{array}$	Outgoing supply 400V/3PH/50Hz Connection to Condenser Fan 1
STMRHP-C & STMRHP-E	222 ○ → 223 ○ → 224 ○ → PE ○ →	Outgoing supply 400V/3PH/50Hz Connection to Condenser Fan 2
	527 ○ ← 502 ○ → 528 ○ ←	Outdoor Fan status
	840 ○ ← 841 ○ ← 842 ○ ←	Circuit 1 Outdoor Coil Temperature
	842 0 € 843 ○ €	Circuit 2 Outdoor Coil Temperature

Split System Interconnecting Wiring

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

ELECTRICAL DATA - COOLING ONLY

	(1)		STM50R	STM77R
Electrical Supply Data				
Mains supply	(2)	V	400)V / 3 PH / 50Hz
Permanent supply	()	Vac	230V	/ 1 PH + N / 50Hz
Control circuit		V		24vac/230vac
Recommended mains fuse		Ă	50	80
Recommended permanent mains	(3)	A	16	16
fuse	(-)			
Max mains incoming cable size		mm ²	35mm ² (direct to isolator)	35mm ² (direct to isolator)
Max permanent incoming cable size		mm ²		mm ² terminals
Nominal run amps	(4)	Δ	39.5	56.4
Maximum start amps	(5)	A	180.5	193.8
Evanorator Ean - Per Ean	(0)		100.0	100.0
Quantity			2	2
Motor size				26
Full load amps			3.1	5.0
Full load amps		A	J. I N/A	0.9 N/A
Locked rotor amps		A	IN/A	N/A
Type of start	(0)		Electro	nically Commutated
Condensing Unit Fans - Per Fan	(6)		0	0
Quantity			2	2
Motor size		KVV	0.88	0.88
Full load amps		A	1.65	1.65
Locked rotor amps		A	6.10	6.10
Type of start				Direct on line
Compressors - Per Compressor				
Quantity			2	2
Motor size		kW	8.4	12.15
Nominal run amps	(4)	A	15.0	20.66
Start amps		А	156	158
Oil heater rating		W	80	80
Type of start				Direct on line
OPTIONAL EXTRAS				
Return air fan	(7)			
Quantity	. ,		1	1
Plug fan motor		kW	1.4	2.1
Nominal run amps		А	2.7	5.8
Start amps		А	9.8	24
Electronic compressor soft start				
Nominal run amps	(4)	А	15.0	20.66
Maximum start amps	(5)	A	93.6	94.80
Recommended mains fuse	(0)	A	50	80
Electric heating	(8)			
Stage of reheat	(-)		3	4
Number of elements			18	21
Rating of electric heating		kW	72	
Recommended mains fuse		A	125	160
Max mains incoming cable size		mm ²	120mm ² (direct to isolator)	120mm ² (direct to isolator)
Current ner nhase		Δ	104	1201111 (direct to isolator)
our on pridoo		<i>/</i> \		127

Packaged Unit - P - Basic Unit (No Options) When a common supply is used, a neutral is required. Recommended permanent mains fuse is 32A when either a gas burner or power socket is fitted to the unit. (1)
(2)
(3)
(4)
(5)
(6)
(7)
(8) Based on 7.2°C evaporating and 54.4°C condensing.

Starting Amps refers to direct on line connections.

Sub fused when the unit is supplied split.

For units with options, unit fuse size needs to be calculated from information provided. Sizes given relate to basic units.

For units with the electric heating option a separate 3 phase fused supply is required.

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

ELECTRICAL DATA - HEAT PUMP

	(1)		STM50RHP	STM77RHP
Electrical Supply Data				
Mains supply	(2)	V	4	00V / 3 PH / 50Hz
Permanent supply	. ,	Vac	230	V / 1 PH + N / 50Hz
Control circuit		V		24vac/230vac
Recommended mains fuse		Å	50	80
Recommended permanent mains	(3)	Δ	16	16
fuse	(0)		10	10
Max mains incoming cable size		mm ²	35mm ² (direct to isolator)	35mm ² (direct to isolator)
Max marins incoming cable size		mm ²		Amm ² terminals
Nominal run amps	(4)	Δ	43.0	50.0
Maximum start amps	(4)	^	194	107.3
Evenerator Fan Bor Fan	(3)	<u>A</u>	104	197.5
			2	2
Quantity		144/	2	2
		KVV	1.9	3.0
Full load amps		A	3.1	5.9
Locked rotor amps		A	N/A	N/A
I ype of start	(-)		Elect	ronically Commutated
Condensing Unit Fans - Per Fan	(6)			
Quantity			2	2
Motor size		kW	0.88	0.88
Full load amps		A	1.65	1.65
Locked rotor amps		A	6.1	6.1
Type of start				Direct on line
Compressors - Per Compressor				
Quantity			2	2
Motor size		kW	8.4	12.15
Nominal run amps	(4)	A	15.0	20.66
Start amps		A	156	158
Oil heater rating		W	80	80
Type of start				Direct on line
OPTIONAL EXTRAS				
Return air fan	(7)			
Quantity	(.)		1	1
Plug fan motor		kW	14	21
Nominal run amos		Δ	27	58
Start amps		Δ	9.8	24
Electronic compressor soft start		7	5.0	27
Nominal run amps	(4)	۸	15.0	20.66
Maximum start amps	(4)	^	03.6	20.00
Recommended mains fues	(5)	A ^	50.0	94.00
Electric heating	(8)	A	50	OU
Electric neating	(0)		2	· · · · · ·
Stage of refleat			2	3
Number of elements		1.3.47	6	9
Rating of electric neating		KVV	24	36
Current per phase		A	34.7	52

Packaged Unit - P - Basic Unit (No Options)

(1)
(2)
(2)
(3)
(4)
(5)
(6)
(7)

When a common supply is used, a neutral is required. Recommended permanent mains fuse is 32A when either a gas burner or power socket is fitted to the unit.

Based on 7.2°C evaporating and 54.4°C condensing.

Starting Amps refers to direct on line connections.

Sub fused when the unit is supplied split.

For units with options, unit fuse size needs to be calculated from information provided. Sizes given relate to basic units. Electric heating to Heat Pumps is only supplementary.

GENERAL

DESCRIPTION

AIRETronix Controls

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

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

Optionally a remote mounted display keypad is available.

Also featured are a visual alarm and the facility to adjust and display control settings by local operator for information and control.

DISPLAY/KEYPAD



- 1 UP/DOWN KEYS To change Adjustable Fields & Scrolls up & down available Menus
- 2 ENTER -Selects Menus & Moves Cursor to Adjustable Fields Green LED
- 3 ESC Green LED lit when Operating Page displayed, Returns to Operating Page Screen when pressed
- 4 PROGRAM Opens the Available Menus
- 5 ALARM Red LED Indicates Alarm Present
- 6 4 ROW LCD DISPLAY
- 7 CURSOR (FLASHING) Top Left Position = "HOME" Indicates adjustable Fields

TEMPERATURE CONTROL

The unit has been designed to provide the cooling load required whilst optimising energy efficiency **at all times** and as such will take advantage of **free cooling** whenever available. If the free cooling available cannot satisfy the required full cooling load, DX (mechanical) cooling is used to supplement the output.

The **direction** microprocessor maintains the return air temperature set-point temperature by sensing the return and outdoor air temperatures. The Economiser damper positions are modulated as necessary to optimise fresh air free cooling operation.

The units have modulated free cooling and either 2 stages of indirect gas fired heating or 4 stages of electric heating or modulating low pressure hot water and 2 stages of DX cooling.

OPERATION

COOLING ONLY



- (1) In Free Cooling, if Supply Air Temperature falls below 10°C, Free Cooling demand reduces proportionally over a 1°C dead band (down to 9°C) & prevents low supply air temperatures.
- (2) In Heating operation, if temperature difference between return air and outside air is greater than 10°C, Free Cooling damper CLOSES PERIODICALLY to prevent low outside temperatures effecting the heating performance and control of the room temperature.
- (3) Heating Options:
 - Gas Heating offers 2 Stages of Heating or;
 - LPHW Heating is 1 stage 0-100% modulating or;
 - Electric Heating option offers up to:
 - 3 Stages of Heating (STM50)/
 - 4 Stages of Heating (STM77)



- proportionally over a 1°C dead band (down to 9°C) & prevents low supply air temperatures.
 In Heating operation, if temperature difference between return air and outside air is greater
- than 10°C, Free Cooling damper CLOSES PERIODICALLY to prevent low outside temperatures effecting the heating performance and control of the room temperature.
- (3) Heating Options:
 - Gas Heating offers 2 Stages of Heating or;
 - Electric Heating option offers up to:
 - 3 Stages of Heating (STM50)/
 - 4 Stages of Heating (STM77)

Factory Settings

The control strategy has been programmed with the following default settings:

Temperature Setpoint	= 20.0°C	Cooling Band = 3°C
Temperature Dead band	= 2°C	Heating Band = 3°C
Free Cooling Band	= 1°C	

OPERATION Navigation The display is used for Viewing Unit Operating Status and Adjusting Customer Control Settings by allowing the operator access to a series of Menus & sub-menus. Viewing information is unrestricted, however set up and adjustment requires password entry, refer to Password Protection, below. Initially, use the key to **access Menus**, the symbol **<** will appear top right and the first menu will appear in CAPITALS, these **indicators** shows which menu is selected.) keys to **move** the **indicator** \leftarrow to the desired menu and press \leftarrow to Use the 🖖 1 open the menu. Use the event the flashing cursor li to adjustable fields and the keys to change the values. Press the event the cursor to the next field or Home. When the cursor is **Home** either use the keys to scroll to next sub-menu or to exit and return to the Standard Operating page. **OPERATION** Standard Operating The **Operating Page** will appear and remain present following start up of the controller as illustrated: Page Indicates current time, date, return air temperature 08:36 17/03/04 M0 and humidity and unit status. Return Temp . 21.3°C Return Hum. 44.8% Unit ON U:01 The following Menus can be accessed from the Operating Page, it is recommended that the display is always returned to the Operating Page by using the set key **Password Protection** To guard against unauthorised adjustments, a password is required to gain access to certain menus as defined below. FACTORY SET PASSWORD PIN NUMBER: 4648 (or Customer chosen number). When a password is requested use the (1 keys to enter the number and 🛃 to access the page. Description Menu Password Menus Displays hours run for compressors and fans. Also includes (Listed in Sequence) Default 4648 Maintenance Electronic Expansion Valve. Alarm Log **Open Access** Display last 100 alarms in chronological order. Displays current status of digital and analogue inputs and Input/Output **Open Access** outputs. Clock Default 4648 Allows adjustment of real time clock and time zones. Setpoint Allows temperature setpoint adjustment. Default 4648 Allows selection of setpoint limits, enables unit on/off from User **Open Access** display and remote on/off. Manufacturer Airedale Only Factory use only. **Airedale Only** Manufacturer Factory use only.

SETTING UP	
Unit ON/OFF	By pressing the and simultaneously for approximately 5 seconds, the unit operation will stop or start. The unit can also be enabled through the Switch On/Off menu.
Real Time Clock	The units leave the factory set, however follow the Navigation instructions if necessary.
Time Zones	The programme provides 3 On/Off periods per day, 7 days per week. The unit is factory set for continuous operation.
Technical Support	For further details, please contact Airedale.
Networking	A Local Area Network (AIRELan) can be used to connect upto 6 units to offer intercommunication and Duty/Standby control. This also allows the connection of computers, printers and modems on the same communications ring. For further details, please contact Airedale Controls.
CAUTION V	When adding to an existing network, please consult Airedale to ensure strategy compatibility.

VIEWING UNIT OPERATING STATUS

Status Menu

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

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

	Cooling Only Unit	Heat Pump Unit
Digital	Inputs	
ID1	Remote On/Off	Remote On/Off
ID2	Leak Detector	Leak Detector (Optional Extra)
ID3	Filter Change	Filter Change
ID4	Phase Failure	Phase Failure
ID5	Emergency Stop	Emergency Stop
ID6	Fire/Smoke Alarm	Fire/Smoke Alarm
ID7	Circuit 1 Low Pressure Safety Switch	Circuit 1 Low Pressure Safety Switch
ID8	Not Used	Circuit 2 Low Pressure Safety Switch
ID9	Compressor 1 Contactor Status	Compressor 1 Contactor Status
ID10	Compressor 2 Contactor Status	Compressor 2 Contactor Status
ID11	Supply Fan 1 Fault	Supply Fan 1 Fault
ID12	Supply Fan 2 Fault	Supply Fan 2 Fault
ID13	Gas Burner Fault	Gas Burner Fault
ID14	Overheat Cut-out (Optional Extra)	Overheat Cut-out/Gas Burner Run Signal (Optional Extra)
ID15	Outdoor Fans Thermal Trip / Inverter Fault (Optional Extra)	Outdoor Fan 1 Thermal Trip / Inverter Fault (Optional Extra)
ID16	Not Used	Outdoor Fan 2 Thermal Trip / Inverter Fault (Optional Extra)
ID17	Return Fan Thermal Trip / Inverter Fault	Return Fan Thermal Trip / Inverter Fault
	Airflow Switch (Electric Heat and Non constant air volume)	Airflow Switch (Electric Heat and Non constant air volume)
ID18	(Optional Extra)	(Optional Extra)
_		
Analog	gue Inputs	
B1	Return Air Humidity	Return Air Humidity
B2	Supply Fan Differential Air Pressure (Constant Air Volume)	Supply Fan Differential Air Pressure (Constant Air Volume)
B3	Return Fan Differential Air Velocity	Return Fan Differential Air Velocity (Optional Extra)
B4	Return Air Temperature	Return Air Temperature
B5	Supply Air Temperature	Supply Air Temperature
B6	Outdoor Air Temperature	Outdoor Air Temperature
B7	Outdoor Air Humidity	Outdoor Air Humidity
B8	Air Quality Sensor (Optional Extra)	Air Quality Sensor
B9	Not Used	Circuit 1 Outdoor Coil Temperature (Optional Extra)
B10	Not Used	Circuit 2 Outdoor Coil Temperature (Optional Extra)
Digital	Outputo	
	Outputs	Commence 1
NOT		
NO2	Compressor 2 Outdoor Air Domnor Opon	Compressor 2 Outdoor Air Dompor Open
NO3	Outdoor Air Damper Open	Outdoor Air Damper Open
NO4	Deturn Air Damper Close	Dutudor Ali Damper Close
NOS	Return Air Damper Open	Return Air Damper Open
NUO	Return Air Damper Close	Cos Burner Store 1 / Lesting Store 1 / L BLW Open
NO7	Gas Burner Stage 1 / Heating Stage 1 / LPHW Open	Gas burner Stage 1 / Heating Stage 1 / LPHW Open
		(Optional Extra)
NO8	Gas Burner Stage 2 / Heating Stage 2 / LPHW Close	(Ontional Extra)
NOO	Netlleed	(Optional Extra)
NO9	Not Used	Not Used
NO10	Exhaust Air Damper Open	Exhaust Air Damper Open
NO12	Cos Durner Deset (Useting Stage 2 (Optional Extra)	Cas Burner Beset / Lesting Stage 2 (Ontional Extra)
NO12	Gas burner Resel / Healing Stage 5 (Optional Extra)	Gas burner Resel / Healing Stage 3 (Optional Extra)
NO14	Nen Critical Alarm	Nen Critical Alerma
NO14	Critical Alarm	Critical Alarm
NO15	Not Llood	Circuit 1 Powereing Velve (Ontional Extra)
NO17	Not Used	Circuit 2 Reversing Valve (Optional Extra)
NO19	Not Llead	Outdoor Coil Drin Tray Heater (Optional Extra)
11010	NULUSED	
Analog	que Outputs	
Y1	Supply Fan Speed	Supply Fan Speed
Y2	Return Fan Inverter	Return Fan Inverter (Optional Extra)
Y3	Circuit 1 Outdoor Fan Inverter	Circuit 1 Outdoor Fan Inverter (Optional Extra)
Y4	Not Used	Circuit 2 Outdoor Fan Inverter (Optional Extra)
Y5	Not Used	Not Used
Y6	Not Used	Not Used

ALARMS	The controller logs and allows viewing of the last 100 conditions recorded in descending chronological order.	
	1Alarm LogH00141Alarm Status: Alarm Active or Alarm Cleared2Outdoor Hum. Fault Alarm Active 10:4117/03/0451Alarm Cleared310:4117/03/04571Alarm Cleared410:4117/03/04511Alarm Cleared5001 - 1005Date of Alarm	
Alarm Handling	1 A Red LED behind the Alarm key will light in the event of an alarm. To view the	
	alarms, simply press the 🀱 key and the 👻 🖤 keys to scroll through.	
	2 Auto reset alarms will clear following this first depression of the Alarm () key. If	
	however the Red LED behind the Alarm	
	3 For manual reset alarms, isolate the affected circuits before further investigation.	
	4 To reset or delete the alarms displayed in the alarm screen, simply press $\textcircled{1}{2}$ again.	
ALARMS	Outlined below is a selection of Common Alarms, a full list is available, please contact Airedale.	
Phase Rotation	A normally closed contact. When Phase Rotation is incorrect all controller outputs are de-activated.	
Emergency Stop	A normally open contact. On closing, all controller outputs are de-activated.	
Fire / Smoke	A normally closed contact. On opening, all controller outputs are de-activated.	
Filter Change	A normally closed contact. On opening and after a 5 minute delay a filter change alarm will be generated	
Electronic Expansion Valve Failure	This indicates that the electronic expansion valve controller has detected an operating problem.	
High Liquid Pressure	When the liquid pressure reaches 25 barg, the relevant circuit will be switched off and an alarm activated, this can only be rectified by manual reset via the microprocessor.	
Compressor Status	A normally closed contact when the compressor is operating. If this contact remains open for a period of 3 seconds during operation of the compressor, a visual alarm is generated and the relevant compressor will be de-activated. This alarm comprises of compressor motor protection module, discharge gas thermostat and safety high pressure switch.	

Commissioning Data - Split System

HOLDING CHARGE The split system Evaporator section is shipped with a holding charge of inert gas. This is to ensure that there is no risk of internal contamination or moisture entering the units during shipping or storage. Before installation the unit should be checked to see that the holding charge has been retained. If it appears to be either partially or totally lost, then the unit concerned should be carefully checked for signs of physical damage. 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 V 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 W 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 **RECORD W** Record on commissioning sheet provided once completed. **EVACUATION** The Condenser section is pre-charged. Only the Evaporator section and interconnecting pipework requires evacuation. Evacuation for systems operating on R410A refrigerant should be carried out as follows (for other refrigerants refer to Airedale for advice): 1 The procedure should be carried out using a high vacuum pump. The pump should be connected 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. 2 Triple evacuation should be used to ensure that all contaminants are removed or at least reduced to significantly low proportions. The vacuum pump should be operated until a pressure of 1.5 Torr (200 Pa) absolute 3 pressure is reached, at which time the vacuum pump should be stopped and the vacuum broken with oxygen free Nitrogen until the pressure rises above zero. 4 The above operation should be repeated a second time. 5 The system should then be evacuated a third time but this time to 0.5 Torr absolute pressure and broken with the correct refrigerant, until pressures equalise between the charging bottle and the System. Record on commissioning sheet provided once completed. RECORD V

Commissioning Data - Split System

REFRIGERANT CHARGING GUIDE

Unit Refrigerant Charge

The **system** refrigerant charge is supplied in the **Condensing section** and is sufficient for approximately 5m of interconnecting pipework.

	1	
		R410A Pre charge in Condensing Section
STM50R-C	kg	23.8
STM77R-C	kg	27.7
STM50RHP-C	kg	2 x 17.7
STM77RHP-C	kg	2 x 19.0

For information, the amount of system charge required by the Evaporator section is:

	Γ	Evaporator Section
STM50R-E	kg	14.0
STM77R-E	kg	16.8
STM50RHP-E	kg	2 x 11.1
STM77RHP-E	kg	2 x 12.4

CAUTION

Liquid Line Refrigerant

Charge (kg/m)

For every metre thereafter, the following table indicates the approximate additional refrigerant required, using R410A and assuming a liquid line temperature of 40°C.

Liquid Line (m)	kg/m
3/8"	0.05
1/2"	0.09
5/8"	0.15
3/4"	0.21
7/8"	0.30
1 1/8"	0.53

Example: STM50R

Liquid Line length 15m(-5m) = 10mLiquid Line diameter = 3/4" Addition Refrigerant per metre = 0.21kg

ie: 10 x 0.21 = 2.1kg of additional refrigerant / per circuit.

System refrigerant is R410A

- Oil type is Danfoss POE 160Z
 - Ensure evacuation has been carried out as detailed *Evacuation*, on page 34
 - Charge system using liquid only, DO NOT TOP UP WITH VAPOUR
 - System should be charged to a clear sight glass, checking system pressures and temperatures for superheat and sub-cooling settings
- System sub-cooling should not be greater than 10°C

IMPORTANT Follow the charging guidelines above when charging both the cooling only and heat pump units. For heat pump models, ensure the refrigerant charge delivers stable operation in both cooling and heating modes. Also check oil return in both cooling and heating operation modes.

OIL CHARGING GUIDE In installations with good oil return and line runs up to 5m, no additional oil is required. If installation lines exceed 5m, additional oil may be needed. 1 or 2% of the total system refrigerant charge (in weight) can be used to roughly define the required oil top up quantity but in any case the oil charge has to be adjusted base don the oil level in the compressor sight glass.

When the compressor is running under stabilized conditions the oil level must be visible in the sigh glass.

The presence of foam filling in the sight glass indicates large concentration of refrigerant in the oil and / or presence of liquid returning to the compressor.

The oil level can also be checked a few minutes after the compressor stops, the level must be between 1/4 and 3/4 of sight glass.

When the compressor is off, the level in the sigh glass can be influenced by the presence of refrigerant in the oil.

Always use original Danfoss POE oil 160SZ from new cans.

Top up the oil while the compressor is idle. Use the Schrader connector or any other accessible connector on the compressor suction line and suitable pump.

Commissioning Data - Split System

COMPRESSORS	The compressor oil sight glass (where fitted) should indicate a level of between 1/4 and 3/4 to ensure correct operation.	
	Run the compressor(s) for a minimum of 1 hour to check oil return and motor function. For tandem or trio sets, checks should be performed in part load operation.	
	 Use a temperature metering device on each circuit: Check operation and super heat readings are within acceptable limits. Check suction and discharge pressure are within acceptable limits. Check there is NO foaming in the compressor sight glass. This would indicate the presence of liquid returning to the compressor. Check sight glass following commissioning and top oil up if level has fallen below minimum; refer to <i>Oil Charging Guide</i>, on page 35. 	
IMPORTANT V	For applications with pipework in excess of 5m, long vertical runs, special operating conditions etc, ensure good oil return is guaranteed AND add sufficient oil to the system.	
	REMEMBER, TOO MUCH or TOO LITTLE OIL can cause compressor damage. As a rule NO MORE than 10% additional oil should be added to any system.	
	ALWAYS use the oil specified by the compressor manufacturer.	
OPERATIONAL SEQUEN	CE	
Refrigerant Charge	Check for the presence of a refrigerant charge in the condenser side.	
Compressor Oil Heater	The mains supply to the oil heater should be switched on at least 8 hours prior to compressor starting to avoid refrigerant migration.	
CAUTION	A separately fused, locally isolated, permanent single phase and neutral supply <u>MUST BE FITTED</u> for the compressor oil heater, evaporator trace heating and control circuits, <u>FAILURE to do so will INVALIDATE WARRANTY</u> .	
Des Oferst Har Oberste	Defense commencements we made our that an all local is showing in the commencem	
Pre-Start-Up Check	sight glass, and that all refrigerant ball valves are opened.	
CAUTION 🐺	Check phase rotation by connecting pressure gauges to the suction and discharge ports, if no differential pressure occurs, isolate immediately.	
Adding Refrigerant	The unit is supplied with a full refrigerant charge, additional refrigerant should be added to the system via 5/16" Schrader connection on the expansion line if required.	
Pump Down	Never pump down without the low pressure trip and high discharge temperature switches being operative.	

FAN PERFORMANCE - SUPPLY AIR

Input voltage signal The input voltage signal to the fan speed controller from the unit microprocessor (Vdc) sets the fan speed for design performance.

The voltage can be determined from the graphs at design air volume using the Total Static Pressure:

TP = ISP + ESP

STM50R

TP = Total static pressure

ISP = Internal Unit static pressure at 0Pa ESP

ESP = External static pressure at design conditions

Internal static pressure The IP at 0Pa ESP can be determined at design air volume using the system lines provided on the graphs. 3 lines are shown on the graph representing the different internal system pressure characteristics for each heating option:

- 1 = 0Pa ESP with gas fired heating
- 2 = 0Pa ESP with LPHW/Electric heating

Where:

3 = 0Pa ESP cooling only

Select the correct internal system line for the chosen design.

Example

Air volume, design = 3.0 m³/s External static pressure, design = 120 Pa Internal static pressure, from graph = 138 Pa with gas fired heating Total static pressure, calculate = 120 + 138 = 358 Pa Input signal voltage, from graph = 1030 rpm (7.8 V) STM50 800 1320 rpm (10V) 700 (8 Pa) 400 358 Pa 30 1 750 rpm (5. 138 Pa 2.75 3.25 3.50 3.75

IMPORTANT

The control voltage set point should be used for guidance only. The supply air fans on this unit are EC and as such have internal mechanisms to protect from abnormal operation. Fan speed should always be checked to ensure the proper operating set point is achieved.

FAN PERFORMANCE - SUPPLY AIR



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FAN PERFORMANCE - RETURN AIR

Input voltage signal

The input voltage signal to the fan speed controller from the unit microprocessor (Vdc) sets the fan speed for design performance.

The voltage can be determined from the graphs at design air volume using the Total Static Pressure:

TP = IP + ESP

Where:

TP = Total static pressure

IP = Internal unit static pressure at 0Pa ESP

ESP = External static pressure at design conditions

Internal static pressure The IP at 0Pa ESP can be determined at design air volume using the system lines provided on the graphs:

1 = 0 Pa ESP - 100% Free Cooling 2 = 0 Pa ESP - 0% Free Cooling

Select the correct internal system line for the chosen design, (recommended design set up at 100% free cooling operation).

Example

STM50





Design Return Air Volume In line with current building guidelines on air quality, the return air volume has been designed to provide a maximum of 90% of the supply air volume, thus ensuring a constant 10% fresh air demand.

FAN PERFORMANCE - RETURN AIR





Commissioning Procedure

GENERAL

CAUTION

To be read in conjunction with the commissioning sheets provided.

Please ensure all documents have been completed correctly and returned to Airedale Technical Support immediately to validate warranty.

AIRFLOW

To enable the equipment to work to its design the airflow must be correctly set.

The most accurate method of measuring airflow is with an inclined manometer and pitot tube, positioned in an adequate straight section of ductwork. If this is not possible then an anemometer should be used on the face of a room return air grille.

Airflow = Average Velocity x Grille Free Area.

An anemometer is not an accurate method when used in this application and additional checks should be made.

INDIRECT GAS HEATING OPTION

IMPORTANT W Only appropriately qualified and competent persons should carry out the commissioning and testing of gas operated appliances, taking into consideration local relevant standards and codes of practice.

> Configured as standard suitable for outdoor application only, UNLESS otherwise stated at time of order.

IT IS ESSENTIAL, that the unit is checked prior to installation to ensure that it is correctly configured for the application.

If necessary, conversion from Outdoor to Indoor application instructions is supplied with the unit.

Commissioning instructions for the Indirect Gas Heating unit are SUPPLIED SEPARATELY and should be read in conjunction with this manual.

PRE COMMISSIONING CHECKLIST

CAUTION V ALL work MUST be carried out by technically trained competent personnel.



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

PRE-START CHECKS

Before switching on the electrical supply, the following checks should be made if applicable:

- The unit is exactly as ordered. 1
- 2 All the switches are in the OFF position.
- 3 The electrical terminals are tight both in the control panel and condensing units.
- 4 The overloads are set to the wiring diagram.
- The mains are available to the unit isolator and at correct voltage. 5
- The transformer is on correct tapping. 6
- 7 Filters are of correct size and efficiency and seated properly.
- 8 The drain line is connected and water flows away freely.
- 9 The drain line has a suitable trap.
- 10 Optional Gas flue pipe fitted correctly.

Commissioning Procedure

START-UP

- 1 Check holding charge in refrigeration lines is to the same pressure temperature relationship as left by the installation team. If there is a leak, further checks and re-evacuation should be carried out.
- 2 Check that pressure switches and power for compressor No. 1 operate when contactor No. 1 is switched manually.
- 3 With compressor MCB made, turn on sump heater and ensure that they are on for approximately 8 hours before compressor start-up to allow liquid refrigerant to be "boiled off" from the compressor sump.
- 4 Remake fan MCB and switch on fans.
- 5 Check motor amps and fan direction.
- 6 Check airflow.

CAUTION 7 Adjust fan speed to obtain correct airflow. The airflow should be between design and +5% of rated airflow - NEVER BELOW.

8 Check electric heater battery elements (if fitted) take the correct current and that the safety thermostats cut out the elements.

Watts/Phase Phase Voltage = Current

CAUTION **W** All heaters are rated at 240V. For 220V multiply by 0.84.

- 9 Head pressure control is factory set at:
 22 Bar Cooling Only Unit
 35 Bar Heat Pump unit
- 10 Check superheats is factory set at 6°C.
- 11 Check that the high and low pressure switches are cutting out the compressors at the correct settings.

High pressure switch cut-out	40.3 bar	(583psi)
High pressure switch cut-in	30.0 bar	(435psi)
High pressure switch differential	10.3 bar	(148psi)
Low pressure switch cut-out	1.0 bar	(14psi)
Low pressure cut-in	3.0 bar	(43psi)
Low pressure differential	2.0 bar	(29psi)

- 12 Set control to maintain the design temperatures.
- 13 Record Commissioning Data.

OPERATING LIMITS

Unit with Electronic Fan Speed HP Control (-20°C)	
Minimum Ambient Air DB°C	-20°C
Maximum Ambient Air DB°C	+40°C

For applications outside of these conditions, please refer to Airedale.

STOREMASTER

Maintenance

CAUTION TALL work MUST be carried out by technically trained competent personnel.

WARNING

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	ACTION	NOTES
REFRIGERATION	Check the following and compare results with commissioning records.	Investigate and rectify variations.
	 Suction, discharge and liquid readings Head pressure control is maintained Check each circuit sight glass for dryness and bubbles for indication of leaks Check compressor oil level and shell/sump temperature Check oil return and refrigerant charge in both cooling and heating for Heat Pump models Visually inspect the unit for oil patches 	System operating data can be viewed via the microprocessor display. Remember to re-cap the Schrader connections! Investigate and repair possible leaks
SYSTEM	Check the following against the commissioning records.Control settingsAlarm log for unusual occurrences	Investigate and adjust as necessary.
Finally!	Record operating conditions.	
FABRIC	Visually inspect the unit for general wear and tear, treat metalwork.	Rust should be inhibited, primed and touched up with matching paint (available from Airedale or your Distributor).
	Visually inspect pipe and pipework insulation.	Repair/rectify as necessary.
	Check airside filters.	Replace if dirty.
	Check evaporator ¹ and condenser condensate drain tray for blockage via inspection cover, (condenser drain pan on Heat Pump model only) refer to <i>Condensate Drain</i> , on page 17 for further information.	Unblock / clean as necessary.
	Heat Pump units : the condenser ¹ condensate drain pan should be opened up for inspection. The pan itself should be free of debris or ice build up and the trace heating should operate in low ambient conditions, refer to <i>Condensate Drain</i> , on page 17 for further information.	
	Clean coils. Do not steam clean use detergent and stiff bristled brush. For heavy dirt, use either a high pressure water or chemical hose.	Do not damage fins and comb out if necessary.
	Visually check the following:Pipework clamps are secureTightness and condition of fan and compressor mounts	Secure/tighten as necessary.
Finally!	Ensure control panel lids and access panels have been correctly replaced and securely fastened in position.	

¹ Description relates to the heat exchangers function in cooling mode. When operating in heating on the heat pump model the operation of the evaporator and condenser coils is reversed.

Maintenance

6 & 9 MONTHS	ACTION	NOTES
	Repeat 3 month checks:	
12 MONTHS	ACTION	NOTES
	Repeat 3 month checks plus the following:	
SYSTEM	Check safety devices cut out the compressor at the correct settings.	
	Check cooling and heating (if appropriate) functionality.	
REFRIGERATION	Leak test all refrigeration joints.	Rectify as necessary.
	Using calibrated gauges, check superheats with UNIT running on full load (the height of summer is recommended). Recheck the charge following major adjustment of the superheats.	Adjust as necessary. A period of 30 minutes should be allowed between each resetting of the valve to allow pressures to stabilise. Thermostatic expansion valve only.
ELECTRICAL	Tighten all electrical terminals.	

Troubleshooting

CAUTION TALL work MUST be carried out by technically trained competent personnel.

WARNING

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

FAULT	POSSIBLE CAUSE	REMEDY / ACTION
Compressor not operating.	No power to compressor.	Check isolator, fuses, MCBs, contactor and control circuit wiring
	Seized compressor, possibly due to lack of oil, broken valve.	Replace compressor - investigate oil trapping and general installation.
	Defective compressor motor.	Check winding resistances - replace compressor. If burnt out follow burn out procedure using suction line burn-out drier.
	Compressor phase loss.	Check 3 phase supply to compressor.
	Klixon out and does not reset.	Sometimes it takes up to 4 hours to reset. Replace compressor if necessary.
	Low pressure switch operated (large or complete loss of refrigerant charge).	Repair leak and recharge system - if completely out evacuate before charging.
	Condenser fan motor thermal trip open circuit	Investigate and correct.
Noisy compressor.	Lack of oil.	Repair leaks if any, add oil if required but not too much - remember too much is as bad as too little. Investigate pipe system and trapping.
		Best method to pump down to see if oil can be encouraged back. If no oil still, drain compressor and measure in correct quantity.
	Expansion valve stuck in open position (abnormally cold suction line).	Ensure bulb is tight on suction and superheat is correct (normally 5 to 6°C).
		Replace power assembly or valve as necessary.
	Damaged or worn compressor bearing (excessive knocking).	Replace compressor.
Head pressure too high.	Condenser coil clogged or dirty.	Clean condenser coil.
	Air or other non-condensable gas in system.	Evacuate system and re-charge with new refrigerant.
	Overcharge of refrigerant.	Always install new drier before evacuating.
		Reclaim excess refrigerant from system (liquid only).
	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.
	Operating set point low.	
Compressor short cycles or LP	Dirty filters.	Replace.
cut-out operated.	Dirty or icing evaporator (reduced airflow).	Defrost and/or clean. Check gas charge and expansion valve.
	Lack of refrigerant (bubbles in sight glass only as indication).	Check for leaks - repair and recharge system.
	Clogged filter drier (pressure / temperature drop across it).	Replace.
	Start up problems in very low ambients.	Check for low suction pressures on start-up and fit a low ambient start kit if required, or check operation of system if already fitted.

Troubleshooting

CAUTION W ALL work MUST be carried out by technically trained competent personnel.

WARNING

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

FAULT	POSSIBLE CAUSE	REMEDY / ACTION
Suction pressure too low.	Low evaporator airflow.	Check fan motor speed set point.
	Flash gas (bubbles in sight glass) at expansion valve.	Investigate for refrigerant leaks, repair and re- charge system.
	Clogged filter drier (pressure / temperature drop across it).	Replace.
	Obstruction in expansion valve.	Inspect, clean or replace.
	Obstruction in solenoid valve.	Pump down and clean.
	Erratic expansion valve (hunting).	Check bulb - replace valve if no improvement.
	Clogged or icing coil.	Defrost and clean - investigate reason for icing.
	Superheat too high.	Check and reset.
		Check position and operation of coil defrost sensor.
Condenser fan not operating - power on.	Motor / fan assembly jammed.	Isolate unit and check free rotation of motor / fan assembly. If faulty - replace.
	Fault at motor terminal box supply terminals.	Isolate and check electrical connections are secure.
	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.
	Power supply failure.	Check power supply at circuit breaker.
	Wiring to motor.	Check voltage at motor terminals.
	Faulty motor windings / capacitor.	Motor humming would indicate fault in motor or 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 or inverter.	Link wires "line" and "load" to bypass controller. If motor runs full speed - replace unit.
Condenser fan runs too fast. Condenser fans runs only slowly.	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 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 wired incorrectly.	Check against wiring diagram - correct as required.
	Motor / capacitor faulty.	Replace.

Parts Identification



Parts Identification

SPARES

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

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

The serial plate can be located inside Item 21.

- 1 Condensing Section Cooling Only Unit
- 2 Condenser Fans
- 3 Condenser Coil & Optional Guards
- 4 Condenser Fan MCCBs (Isolator Supplied when Split Delivery)
- 5 Liquid Line & Discharge Line Shut off Valves (panel removed)
- 6 Filter Access Panel Cooling Only Unit & Heat Pump Unit
- 7 Supply Air Sensor
- 8 Supply Air Fan
- 9 Evaporator Section Cooling Only Unit & Heat Pump Unit
- 10 Return Air Fan (Optional)
- 11 Damper Actuator
- 12 Return Air Turning Vanes
- 13 Exhaust Air Louvre
- 14 Fresh Air Louvre
- 15 Return Air Sensor
- 16 Fresh Air Damper
- 17 Exhaust Air Damper
- 18 Mixing Air Damper
- 19 Ambient Sensor
- 20 Door Interlocking Mains Isolator
- 21 Controls Panel & Electrical Control Panel Cooling Only Unit & Heat Pump Unit
- 22 EEV Driver(s)
- 23 Filter Differential Pressure Switch
- 24 AIRETronix Microprocessor
- 25 Constant Air Volume Pressure Monitoring Switch (Optional)
- 26 Transformer
- 27 Terminal Rail
- 28 Fan Inverter Drive(s)
- 29 MCBs
- 30 Contactors
- 31 Customer Mains Incoming Cable Access
- 32 Compressor Compartment Cooling Only Unit Single Circuit
- 33 Evaporator Coil, EEV & Sight Glass
- 34 Compressor Discharge Thermostat
- 35 Tandem Scroll Compressor Set
- 36 Compressor Oil Sight Glass
- 37 Liquid & Discharge Line Shut Off Valves
- 38 Filter Drier
- 39 Compressor Compartment Heat Pump Unit Dual Circuit
- 40 Electronic Expansion Valve (EEV)
- 41 Double Suction Accumulator per circuit
- 42 Sight Glass per circuit
- 43 Pressure Transducer per circuit
- 44 Reversing Valve per circuit
- 45 Compressor 1 Circuit 1
- 46 Compressor 2 Circuit 2
- 47 Compressor Sump Heater Belt per circuit
- 48 Liquid Line Solenoid Valve per circuit
- 49 Liquid Receiver per circuit

Notes:

Notes:



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PART NO:	DATE
6718290 (IM E)	01/07/2008
	01/2010
	10/2012
V1.3.0	02/2013
V1.4.0	10/2013