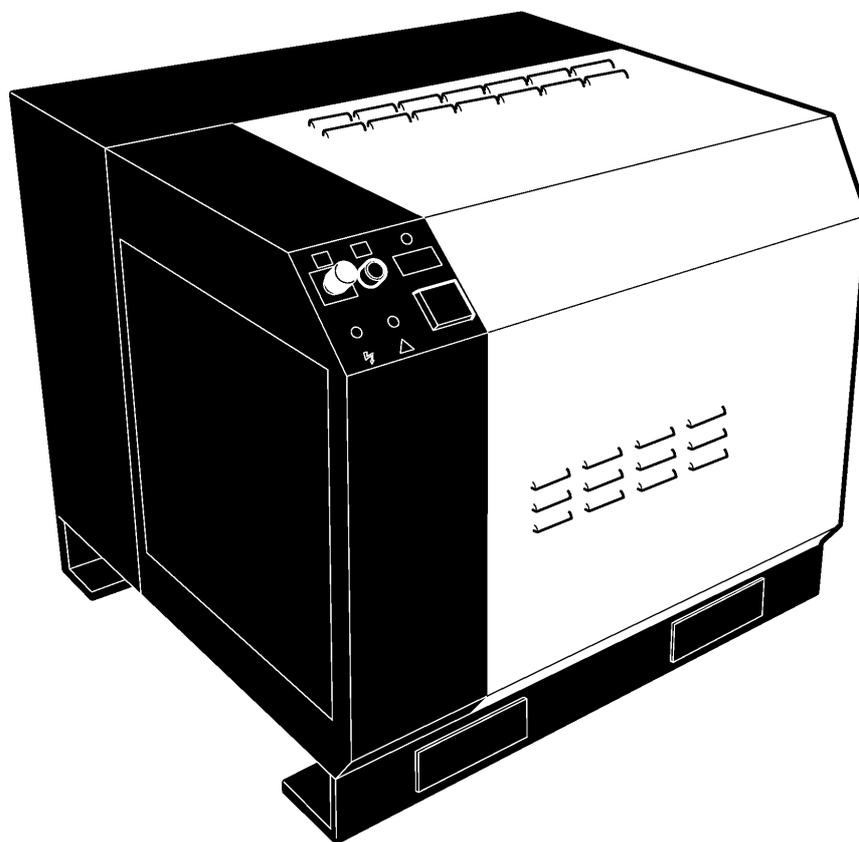




Ingersoll-Rand®

SSR M4 M5,5 M7,5 M11

OPERATION AND MAINTENANCE MANUAL



This manual contains important safety information and must be made available to personnel who operate and maintain this machine.

M4	SERIAL No :	2101200 ->
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M5,5	SERIAL No :	2121300 ->
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M7,5	SERIAL No :	2141800 ->
------	-------------	------------

M11	SERIAL No :	2161200 ->
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C.C.N. : 89270334 GB
DATE : NOVEMBER 2002

Machine models represented in this manual may be used in various locations world-wide. Machines sold and shipped into European Union Territories require that the machine display the EC Mark and conform to various directives. In such cases, the design specification of this machine has been certified as complying with EC directives. Any modification to any part is absolutely prohibited and would result in the CE Certification and marking being rendered invalid. A declaration of that conformity follows:



EC DECLARATION OF CONFORMITY WITH EC DIRECTIVES

98/37/EC, 93/68/EEC, 89/336/EEC

WE,

**INGERSOLL-RAND COMPANY LIMITED
SWAN LANE
HINDLEY GREEN
WIGAN WN2 4EZ
UNITED KINGDOM**

DECLARE THAT, UNDER OUR SOLE RESPONSIBILITY FOR MANUFACTURE AND SUPPLY,
THE PRODUCT(S)

M4 M5,5 M7,5 M11

TO WHICH THIS DECLARATION RELATES, IS (ARE) IN CONFORMITY WITH THE PROVISIONS
OF THE ABOVE DIRECTIVES USING THE FOLLOWING PRINCIPAL STANDARDS.

EN29001, EN292, EN60204-1, EN1012, EN50081, EN50082

ISSUED AT HINDLEY GREEN ON 01/01/2002 BY H.SEDDON, QUALITY ASSURANCE
MANAGER.


H. SEDDON

EC Pressure Equipment Directive and Related Regulations

We declare that this product has been assessed according to the Pressure Equipment Directive (97/23/EC) and, in accordance with the terms of this Directive, has been excluded from the scope of this Directive.

It may carry "CE" marking in compliance with other applicable EC Directives.

CONTENTS		ABBREVIATIONS & SYMBOLS	
1	CONTENTS	####	Contact Ingersoll–Rand for serial number
2	FOREWORD	->####	Up to Serial No.
		####->	From Serial No.
3	ISO SYMBOLS	*	Not illustrated
8	SAFETY	†	Option
10	GENERAL INFORMATION	NR	Not required
15	INSTALLATION / HANDLING	AR	As required
18	OPERATING INSTRUCTIONS	SM	Sitemaster/Sitepack
19	AIRCARE WARRANTY	HA	High ambient machine
20	MAINTENANCE	WC	Watercooled machine
25	FAULT FINDING	AC	Aircooled machine
26	OPTIONS	ERS	Energy recovery system
		T.E.F.C.	Totally enclosed fan cooled motor (IP54)
		O.D.P.	Open drip proof (motor)
		ppm	parts per million
		BR	Brazil
		CN	China
		DE	Germany
		DK	Denmark
		ES	Spain
		FI	Finland
		FR	France
		GB	Great Britain (English)
		IT	Italy
		NL	Holland
		NO	Norway
		PT	Portugal
		SE	Sweden
		US	United States

2 FOREWORD

The contents of this manual are considered to be proprietary and confidential to Ingersoll-Rand and should not be reproduced without the prior written permission of Ingersoll-Rand.

Nothing contained in this document is intended to extend any promise, warranty or representation, expressed or implied, regarding the Ingersoll-Rand products described herein. Any such warranties or other terms and conditions of sale of products shall be in accordance with the standard terms and conditions of sale for such products, which are available upon request.

This manual contains instructions and technical data to cover all routine operation and scheduled maintenance tasks by operation and maintenance staff. Major overhauls are outside the scope of this manual and should be referred to an authorised Ingersoll-Rand service department.

The design specification of this machine has been certified as complying with E.C. directives. Any modification to any part is absolutely prohibited and would result in the CE certification and marking being rendered invalid.

All components, accessories, pipes and connectors added to the compressed air system should be:

- of good quality, procured from a reputable manufacturer and, wherever possible, be of a type approved by Ingersoll-Rand.
- clearly rated for a pressure at least equal to the machine maximum allowable working pressure.
- compatible with the compressor lubricant/coolant.
- accompanied with instructions for safe installation, operation and maintenance.

Details of approved equipment are available from Ingersoll-Rand Service departments.

The use of repair parts other than those included within the Ingersoll-Rand approved parts list may create hazardous conditions over which Ingersoll-Rand has no control. Therefore Ingersoll-Rand cannot be held responsible for equipment in which non-approved repair parts are installed.

Ingersoll-Rand reserves the right to make changes and improvements to products without notice and without incurring any obligation to make such changes or add such improvements to products sold previously.

The intended uses of this machine are outlined below and examples of unapproved usage are also given, however Ingersoll-Rand cannot anticipate every application or work situation that may arise.

IF IN DOUBT CONSULT SUPERVISION.

This machine has been designed and supplied for use only in the following specified conditions and applications:

- Compression of normal ambient air containing no known or detectable additional gases, vapours, or particles
- Operation within the ambient temperature range specified in the *GENERAL INFORMATION* section of this manual.

The use of the machine in any of the situation types listed in table 1:-

- a) Is not approved by Ingersoll-Rand,**
- b) May impair the safety of users and other persons, and**
- c) May prejudice any claims made against Ingersoll-Rand.**

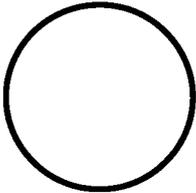
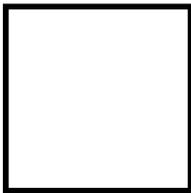
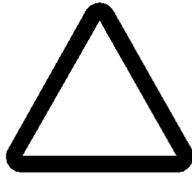
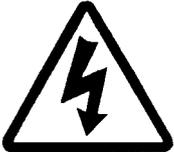
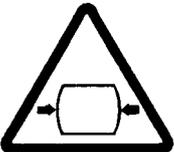
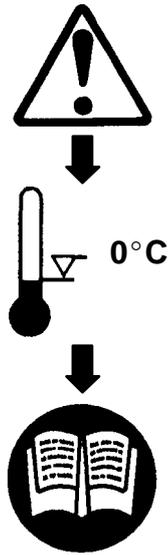
TABLE 1
Use of the machine to produce compressed air for: a) direct human consumption b) indirect human consumption, without suitable filtration and purity checks.
Use of the machine outside the ambient temperature range specified in the <i>GENERAL INFORMATION SECTION</i> of this manual.
Use of the machine where there is any actual or foreseeable risk of hazardous levels of flammable gases or vapours.
Use of the machine fitted with <i>non Ingersoll-Rand approved components</i> .
Use of the machine with safety or control components missing or disabled.

The company accepts no responsibility for errors in translation of this manual from the original English version.

SSR ULTRA COOLANT is a registered trademark of Ingersoll-Rand Company USA.

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INGERSOLL-RAND COMPANY

GRAPHIC FORM AND MEANING OF ISO SYMBOLS

		
Prohibition / Mandatory	Information / Instructions	Warning
 <p>WARNING: Electrical shock risk.</p>	 <p>WARNING – Pressurised vessel.</p>	 <p>WARNING – Hot surface.</p>
 <p>WARNING – Pressure control.</p>	 <p>WARNING – Corrosion risk.</p>	 <p>WARNING – Air/gas flow or Air discharge.</p>
 <p>WARNING – Pressurised component or system.</p>	 <p>WARNING – Hot and harmful exhaust gas.</p>	 <p>WARNING – Maintain correct tyre pressure. (Refer to the GENERAL INFORMATION section of this manual).</p>
 <p>WARNING – Flammable liquid.</p>	 <p>WARNING – Before connecting the tow bar or commencing to tow consult the operation and maintenance manual.</p>	 <p>WARNING – For operating temperature below 0°C, consult the operation and maintenance manual.</p>



WARNING – Do not undertake any maintenance on this machine until the electrical supply is disconnected and the air pressure is totally relieved.



WARNING – Consult the operation and maintenance manual before commencing any maintenance.



Do not breathe the compressed air from this machine.



Do not remove the Operating and Maintenance manual and manual holder from this machine.



Do not stack.



Do not operate the machine without the guard being fitted.



Do not stand on any service valve or other parts of the pressure system.



Do not operate with the doors or enclosure open.



Do not use fork lift truck from this side.



Do not exceed the trailer speed limit.



No naked lights.



Do not open the service valve before the airhose is attached.



Use fork lift truck from this side only.



Emergency stop.



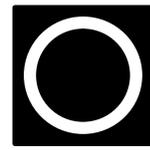
Tie down point



Lifting point.



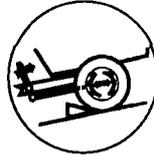
On (power).



Off (power).



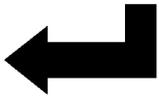
Read the Operation and Maintenance manual before operation or maintenance of this machine is undertaken.



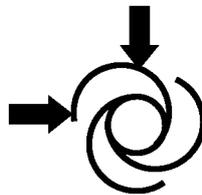
When parking use prop stand, handbrake and wheel chocks.



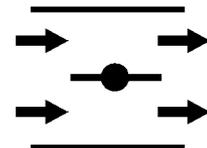
Contains asbestos.



SET



SEQUENCER STATUS



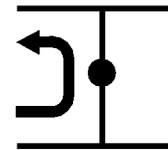
LOAD



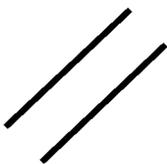
SEQUENCER (AUTOMATIC CONTROL)



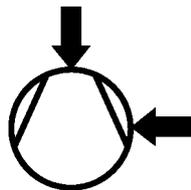
COMPRESSOR



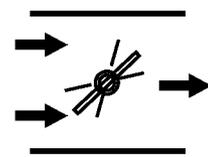
OFF LOAD (UNLOADED)



RESET



COMPRESSOR STATUS



MODULATE



MALFUNCTION



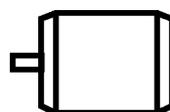
POWER



SOILED FILTER



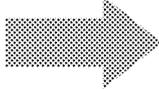
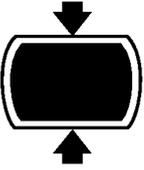
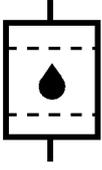
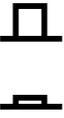
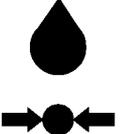
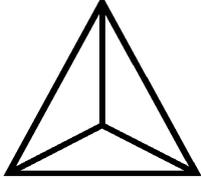
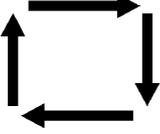
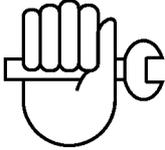
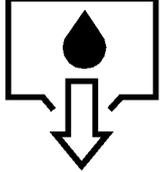
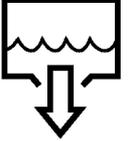
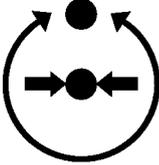
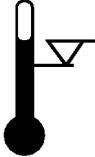
POWER INLET

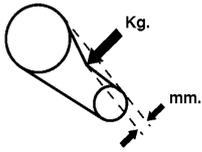


ELECTRIC MOTOR

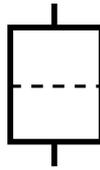


HOURS

 <p>COOLANT SEPARATOR</p>	 <p>PRESSURE</p>	 <p>AIR DISCHARGE</p>
 <p>PRESSURISED TANK</p>	 <p>ON / OFF CYCLE</p>	 <p>COOLANT FILTER</p>
 <p>AIR FILTER</p>	 <p>ON / OFF PUSH BUTTON</p>	 <p>COOLANT PRESSURE</p>
 <p>AIR PRESSURE</p>	 <p>STAR DELTA IEC 617-7</p>	 <p>AUTOMATIC RESTART</p>
 <p>HEAT EXCHANGER</p>	 <p>MAINTENANCE</p>	 <p>MAINTENANCE PROHIBITED</p>
 <p>COOLANT DRAIN</p>	 <p>CONDENSATE DRAIN</p>	 <p>PRESSURE CONTROL</p>
 <p>MANUAL (SELECT)</p>	 <p>TEMPERATURE</p>	 <p>HIGH TEMPERATURE</p>



BELT TENSION



FILTER



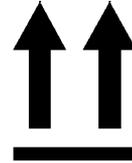
MOTOR LUBRICATION



FRAGILE



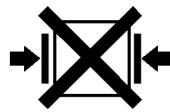
KEEP DRY



THIS WAY UP



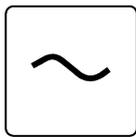
USE NO HOOKS



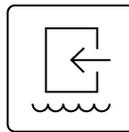
NO SIDE CLAMPS



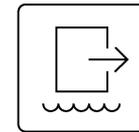
ROTATION



POWER INLET (AC)



WATER IN



WATER OUT

WARNINGS

Warnings call attention to instructions which must be followed precisely to avoid injury or death.

CAUTIONS

Cautions call attention to instructions which must be followed precisely to avoid damaging the product, process or its surroundings.

NOTES

Notes are used for supplementary information.

General Information

Ensure that the operator reads and *understands* the decals and consults the manuals before maintenance or operation.

Ensure that the Operation and Maintenance manual, and the manual holder, are not removed permanently from the machine.

Ensure that maintenance personnel are adequately trained, competent and have read the Maintenance Manuals.

Compressed air and electricity can be dangerous. Before undertaking any work on the compressor, ensure that the electrical supply has been isolated and the compressor has been relieved of all pressure.

Make sure that all protective covers are in place and that the canopy/doors are closed during operation.

Installation of this compressor must be in accordance with recognised electrical codes and any local Health and Safety Codes.

The use of plastic bowls on line filters without metal guards can be hazardous. Their safety can be affected by either synthetic lubricants, or the additives used in mineral oils. Metal bowls should be used on a pressurised system.

Compressed air can be dangerous if incorrectly handled. Before doing any work on the unit, ensure that all pressure is vented from the system and that the machine cannot be started accidentally.

Compressed air

Ensure that the machine is operating at the rated pressure and that the rated pressure is known to all relevant personnel.

All air pressure equipment installed in or connected to the machine must have safe working pressure ratings of at least the machine rated pressure.

If more than one compressor is connected to one common downstream plant, effective check valves and isolation valves must be fitted and controlled by work procedures, so that one machine cannot accidentally be pressurised / over pressurised by another.

Compressed air must not be used for a direct feed to any form of breathing apparatus or mask.

The discharged air contains a very small percentage of compressor lubricating oil and care should be taken to ensure that downstream equipment is compatible.

If the discharged air is to be ultimately released into a confined space, adequate ventilation must be provided.

When using compressed air always use appropriate personal protective equipment.

All pressure containing parts, especially flexible hoses and their couplings, must be regularly inspected, be free from defects and be replaced according to the Manual instructions.

Compressed air can be dangerous if incorrectly handled. Before doing any work on the unit, ensure that all pressure is vented from the system and that the machine cannot be started accidentally.

Avoid bodily contact with compressed air.

The safety valve located in the separator tank must be checked periodically for correct operation.

Materials

The following substances are used in the manufacture of this machine and *may* be hazardous to health if used incorrectly:

- . preservative grease
- . rust preventative
- . compressor coolant

AVOID INGESTION, SKIN CONTACT AND INHALATION OF FUMES

For further information, consult Material Data Sheets ACGP 011/96 (ULTRA COOLANT) and IRACA145 (food grade coolant).

Should compressor lubricant come into contact with the eyes, then irrigate with water for at least 5 minutes.

Should compressor lubricant come into contact with the skin, then wash off immediately.

Consult a physician if large amounts of compressor lubricant are ingested.

Consult a physician if compressor lubricant is inhaled.

Never give fluids or induce vomiting if the patient is unconscious or having convulsions.

Transport

When loading or transporting machines ensure that the specified lifting and tie down points are used.

Electrical

Keep all parts of the body and any hand-held tools or other conductive objects, away from exposed live parts of the compressor electrical system. Maintain dry footing, stand on insulating surfaces and do not contact any other portion of the compressor when making adjustments or repairs to exposed live parts of the compressor electrical system.

Close and lock all access doors when the compressor is left unattended.

Do not use extinguishers intended for Class A or Class B fires on electrical fires. Use only extinguishers suitable for class BC or class ABC fires.

Attempt repairs only in clean, dry, well lighted and ventilated areas.

Connect the compressor only to electrical systems that are compatible with its electrical characteristics and that are within its rated capacity.

Condensate disposal

Condensate cannot be discharged into fresh/surface water drains. In some regions compressor condensate containing ULTRA COOLANT can be fed directly into a drainage system that has downstream sewerage treatment.

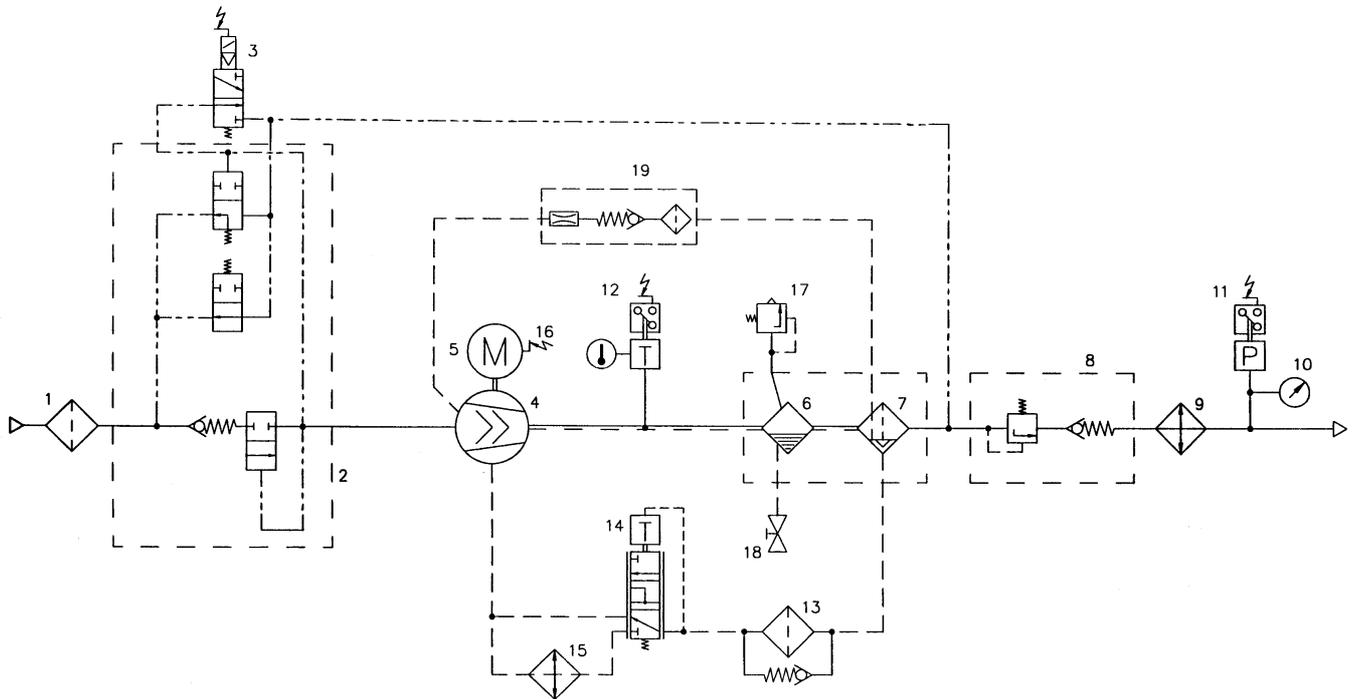
As waste water regulations vary by country and region it is the responsibility of the user to establish the limitations and regulations in their particular area. Ingersoll-Rand and its associated distributors are happy to advise and assist in these matters.

Coolant disposal

Steps to be taken in the case of spillage: Soak up with a suitable absorbent material, then sweep into a plastic bag for disposal.

Burn in an approved incinerator, or according to local area or country regulations.

For further information, consult Material Data Sheets ACGP 011/96 (ULTRA COOLANT) and IRACA145 (food grade coolant).



Revision 00
11/97

KEY

- 1 Filter, air
- 2 Regulator
- 3 Valve, solenoid
- 4 Airend assembly
- 5 Motor
- 6 Tank, separator
Coarse
- 7 Tank, separator
Fine
- 8 Valve, minimum pressure
- 9 Aftercooler
- 10 Gauge, pressure
- 11 Switch
Discharge pressure
- 12 Switch, temperature
- 13 Filter, coolant
- 14 Thermostat
- 15 Cooler
- 16 Relay, overload
Motor
- 17 Valve, safety
- 18 Valve, drain
- 19 Screen, scavenge

KEY

- Condensate
- ==== Air/Coolant
- Air
- Water
- — — — Regulation
- Coolant

GENERAL OPERATION

The compressor is an electric motor driven, single stage screw compressor, complete with accessories piped, wired and baseplate or receiver mounted. It is a totally self contained air compressor package.

The standard compressor is designed to operate in an ambient range of 1,7°C to 46°C. The standard maximum temperature of 46°C is applicable up to an elevation of 1000m (3280ft) above sea level. Above this altitude significant reductions in ambient temperature are required if a standard motor is to be used.

Compression in the screw type air compressor is created by the meshing of two (male & female) helical rotors.

The air/coolant mixture discharges from the compressor into the separation system. This system removes all but a few PPM of the coolant from the discharge air. The coolant is returned to the cooling system and the air passes through the aftercooler and out of the compressor.

Air is pulled through the coolers by the cooling fans and discharged on the underside of the machine.

The power transmission from the drive motor to the airend male rotor is by pulley and V-belts. The constant auto tensioning system, using motor mass and torque, ensures that the belts are always under the correct tension, eliminating the need for adjustment and maximising the life of the belts.

By cooling the discharge air, much of the water vapour naturally contained in the air is condensed and may be drained from the downstream piping and equipment.

The coolant system consists of a sump, cooler, thermostatic valve and a filter. When the unit is operating, the coolant is pressurised and forced to the compressor bearings.

The compressor load control system is automatic 'On-Off line'. The compressor will operate to maintain a set discharge line pressure and is provided with an autorestart system for use in plants where the air demand varies widely.

Safety of operation is provided for as the compressor will shut down if excessive temperatures or electrical overload conditions should occur.

	M4				M5,5				M7,5				M11			
COMPRESSOR																
Maximum operating pressure	7,5 bar	8,5 bar	10,0 bar	13,0 bar	7,5 bar	8,5 bar	10,0 bar	13,0 bar	7,5 bar	8,5 bar	10,0 bar	13,0 bar	7,5 bar	8,5 bar	10,0 bar	13,0 bar
Normal operating pressure	7,0 bar	8,0 bar	9,5 bar	12,5 bar	7,0 bar	8,0 bar	9,5 bar	12,5 bar	7,0 bar	8,0 bar	9,5 bar	12,5 bar	7,0 bar	8,0 bar	9,5 bar	12,5 bar
Maximum Pressure ratio	8,5 :1	9,5 :1	11,0 :1	14,0 :1	8,5 :1	9,5 :1	11,0 :1	14,0 :1	8,5 :1	9,5 :1	11,0 :1	14,0 :1	8,5 :1	9,5 :1	11,0 :1	14,0 :1
Maximum airend discharge temperature	109 °C															
Ambient operating temperature	+2°C → +46°C															
MOTOR																
Nominal power	4,0 kW				5,5 kW				7,5 kW				11,0 kW			
Speed	2880 RPM															
IP rating	55 IP															
Frame	B3															
Insulation class	F				F				F				F			
COOLING SYSTEM																
Air cooled																
Cooling air flow	660 m ³ /H				1320 m ³ /H				1320 m ³ /H				1980 m ³ /H			
Maximum ΔP in air ducts	3 Pa/mm WG															
Compressed air outlet ΔT	8°C															
GENERAL DATA																
Residual coolant content	2–3 mg/m ³															
Separator vessel capacity	8 l				8 l				8 l				8 l			
Coolant capacity	7 l				7 l				7 l				7 l			
Sound pressure level to CAGI-PNEUPROP	73 dB (A)															
Weight	212kg 398kg (500l) 303kg (272l)															
Discharge connection	G ³ / ₄															
Dimensions (L x W x H)	935mm x 732mm x 755mm 2080mm x 732mm x 1436mm (500l) 1406mm x 732mm x 1415mm (272l)				935mm x 732mm x 755mm 2080mm x 732mm x 1436mm (500l) 1406mm x 732mm x 1415mm (272l)				935mm x 732mm x 755mm 2080mm x 732mm x 1436mm (500l) 1406mm x 732mm x 1415mm (272l)				935mm x 732mm x 755mm 2080mm x 732mm x 1436mm (500l) 1406mm x 732mm x 1415mm (272l)			

12 GENERAL INFORMATION

	M4	M5,5	M7,5	M11
ELECTRICAL DATA				
Standard voltage	3 ~ 400V	3 ~ 400V	3 ~ 400V	3 ~ 400V
Drive motor				
Power	4,0 kW	5,5 kW	7,5 kW	11,0 kW
Full load current (maximum)	8,1 A	11,3 A	15,3 A	23,0 A
Starting current (approx.)	28,3 A	39,5 A	53,5 A	80,5 A
Starting time	6 S	6 S	6 S	6 S
Starts per hour	20 IP23/54	20 IP23/54	20 IP23/54	10 IP23/54
Fan motor				
Power	80 W	160 W	160 W	240 kW
Control voltage				
Control	110 VAC	110 VAC	110 VAC	110 VAC
Mains supply cable (cross section) ¹ PVC/PVC	4 mm ² Cu	4 mm ² Cu	4 mm ² Cu	6 mm ² Cu
Fuse rating ²	16 A	16 A	20 A	32 A

¹ Local Regulations apply if stricter than above.

² gG

The voltage drop must not exceed 5% of the nominal voltage.

NOTE

All data applies to standard product only.

It may be necessary to use cables with a larger section than those stated to comply with this requirement.

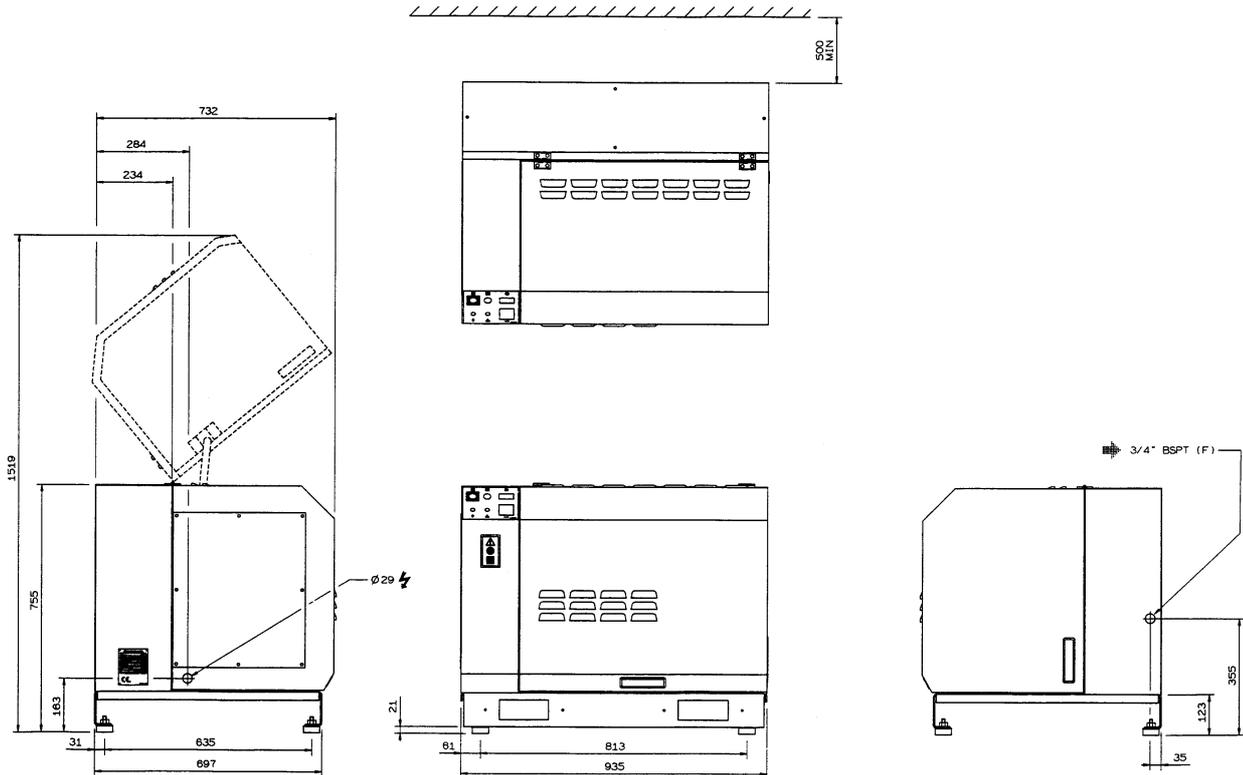
14 GENERAL INFORMATION

KEY

CABLE

PE Supply earth
L1–L3 Mains terminals
B Earth point, Sub-base
KM1 Main contactor
KM2 Delta contactor
KM3 Star contactor
MM Main motor
F1 Fuse, fan motor
FM Fan motor
CB1–5 Circuit breaker
T1 Transformer, control supply
T2 Transformer, dryer supply
MAXT Temperature switch
MOL Motor overload

ES Switch, emergency stop
1SV Load solenoid
P Pressure switch
TM Star Delta Timer
TM1 Run-on Timer
HR Hourmeter
R1–R2 Relay, control
⊙ Terminal, control
– – – Option
S1 Pushbutton, start
S2 Pushbutton, dryer on
S3 Pushbutton, dryer off
DR1 Supply to dryer (supply has neutral) (Option)
DR2 Supply to dryer (supply has no neutral) (Option)



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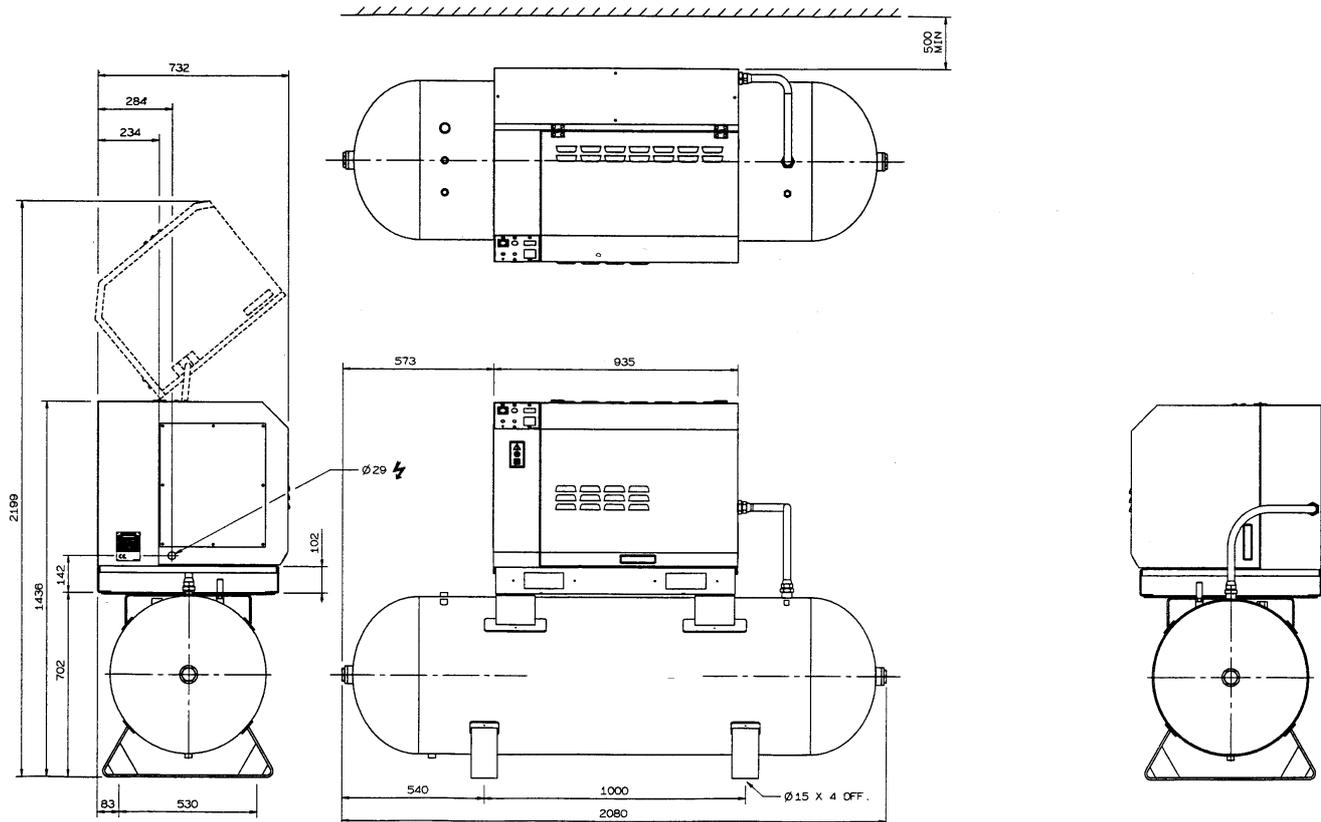
NOTE
 All dimensions are in millimetres unless otherwise stated.

LOCATION IN PLANT

The compressor can be installed on any level floor capable of supporting it. A dry, well ventilated area where the atmosphere is as clean as possible is recommended. A minimum of 0,5m should be left around all sides of the machine for adequate service access and ventilation.

Ensure that the correct fork lift truck slots or marked lifting / tie down points are used whenever the machine is lifted or transported.

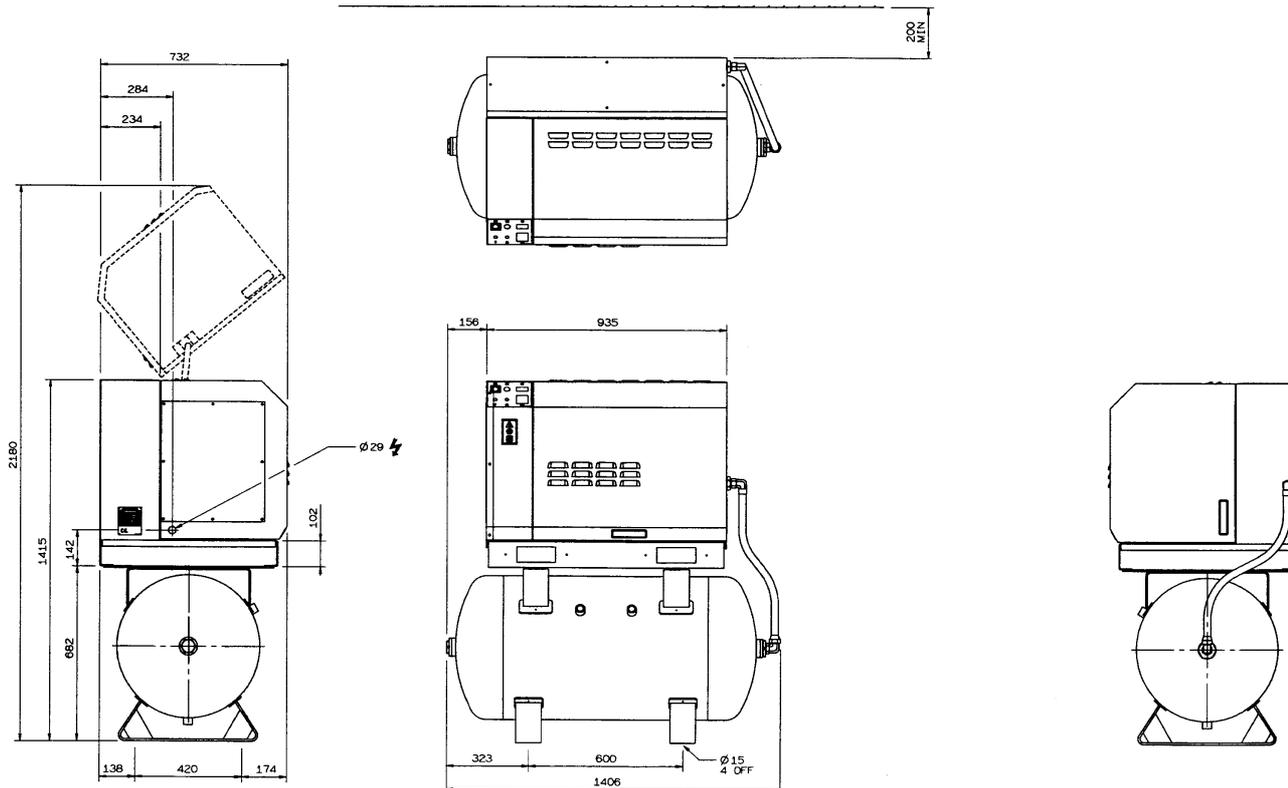
CAUTION
 Screw type compressors [1] should not be installed in air systems with reciprocating compressors without means of isolation such as a common receiver tank. It is recommended that both types of compressor be piped to a common receiver using individual air lines.



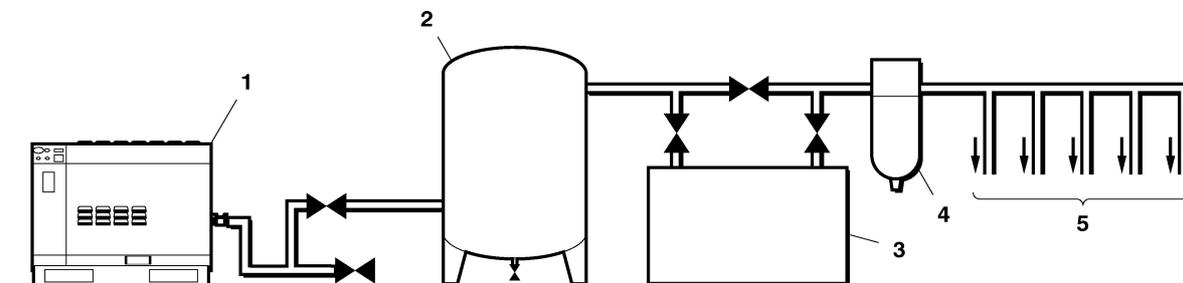
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CAUTION

The use of plastic bowls on line filters and other plastic air line components without metal guards can be hazardous. Their safety can be affected by either synthetic coolants or the additives used in mineral oils. From a safety standpoint, metal bowls should be used on any pressurised system.



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DISCHARGE PIPING

Discharge piping should be at least as large as the discharge connection of the compressor. All piping and fittings should be suitably rated for the discharge pressure.

It is essential when installing a new compressor [1], to review the total air system. This is to ensure a safe and effective total system. One item which should be considered is liquid carryover. Installation of air dryers [3] is always good practice since properly selected and installed they can reduce any liquid carryover to zero.

It is good practice to locate an isolation valve close to the compressor and to install line filters [4].

NOTE

The machine is shipped with the automatic belt tension system locked. remove the bolt which clamps the pivoted table to the main chassis before running the compressor.

ELECTRICAL DATA

An independent electrical isolator should be installed adjacent to the compressor.

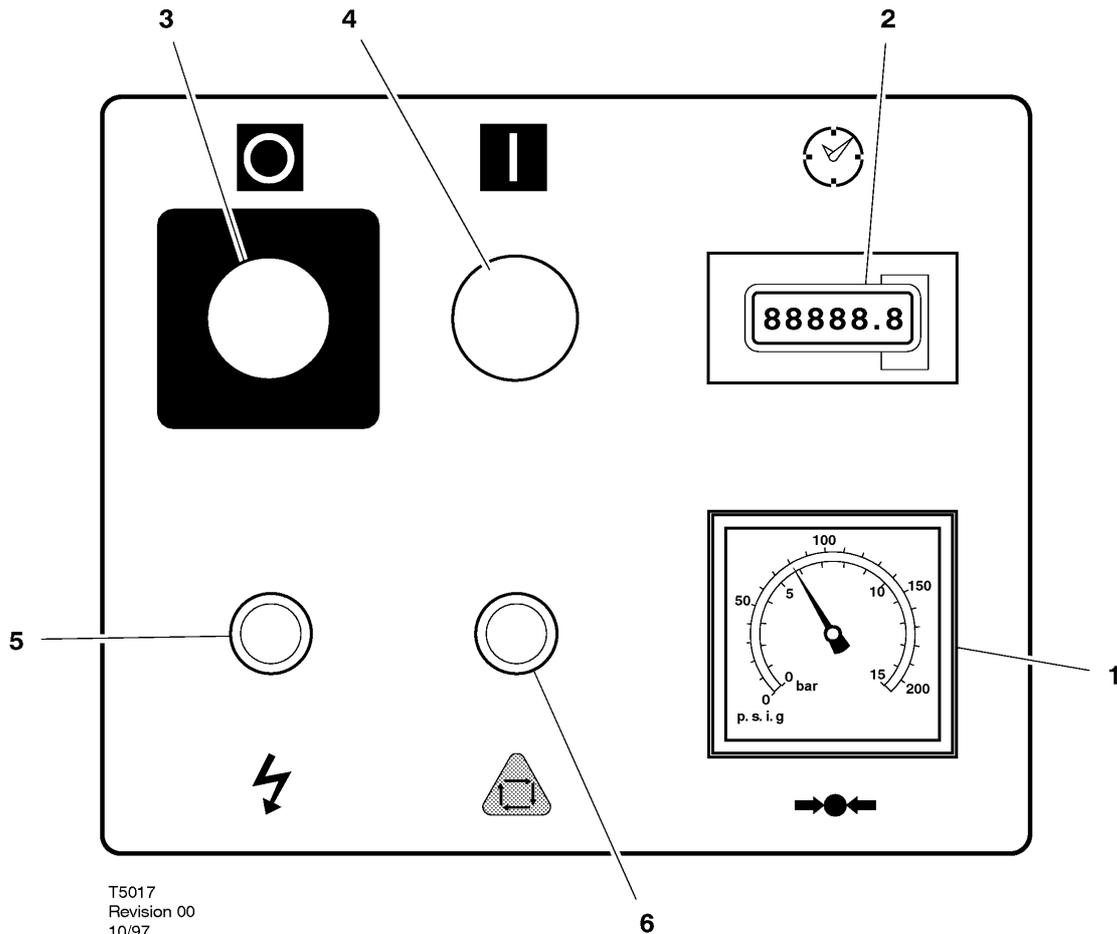
CAUTION: Do not remove the motor table transit bolt until the electrical connection and correct rotation have been completed.

Feeder cables should be sized by the customer/electrical contractor to ensure that the circuit is balanced and not overloaded by other electrical equipment. The length of wiring from a suitable electrical feed point is critical as voltage drops may impair the performance of the compressor. **Cable sizes may vary considerably so the mains terminals will accept up to 16mm² cable.**

Feeder cable connections to studs L1-L2-L3 on isolator should be tight and clean.

The applied voltage must be compatible with the motor and compressor data plate ratings.

The control circuit transformer has different voltage tapings. Ensure that these are set for the specific applied voltage prior to starting.



PRIOR TO STARTING

1. Check coolant level. Add if necessary.

The reservoir is designed to prevent overflow. With warm unit stopped in the normal way, the sight tube level should be within 15mm of the top of the green strip. The level should not drop beyond the bottom of the sight tube when running with a steady load.

2. Make sure main discharge valve is open.
3. Turn on electrical isolator. The 'Power On' (5) L.E.D. will light, indicating that line and control voltages are available.

WARNING

Make sure that all protective covers are in place.

STARTING

Press 'Start' (4). The compressor will start and then load automatically.

NORMAL/EMERGENCY STOPPING

1. Press 'Emergency stop/Stop button' (3) and the compressor will stop.
2. Turn off electrical isolator.

CAUTION

After shutdown never allow unit to stand idle with pressure in receiver/separator system.

KEY

1: PRESSURE GAUGE

Indicates the pressure immediately after the aftercooler. **DO NOT** operate the compressor at discharge pressures over the rated pressure.

2: HOURMETER

Records the total running time of the compressor.

3: EMERGENCY STOP/STOP

When depressed will stop the compressor immediately. The 'Power on' L.E.D. will remain illuminated. The emergency stop button must be released before the compressor can be restarted.

4: START

When depressed will cause the unit to start and run in a loaded condition if there is a demand for air. If there is no demand, the machine will run unloaded.

5: POWER ON (Green)

Indicates the presence of control voltage at the controller.

6: AUTO RESTART (Amber)

Will illuminate when the machine has shut-down due to low air demand. The machine will restart and load automatically as soon as the demand for air returns.



AirCare
Superior Service Solutions for Air Systems

AirCare is a responsive and flexible contract maintenance program custom designed for the owner who requires planned maintenance for increased system reliability.

The AirCare program provides you with reduced maintenance costs, reduced energy usage through optimization and efficiency, and reduced production losses through fewer unexpected maintenance requirements and downtime. An optional feature, Intelliguard is used to reduce downtime by remote monitoring.

Air Care Options		
Unit Status	Coverage	Service Level
Sign up for AirCare within the warranty period	Five Year Drivetrain or Package coverage	Inspection and diagnostic service only or Preventative maintenance and diagnostic service

To enroll in AirCare or Intelliguard, contact your local Ingersoll–Rand representative today.

PERIOD	MAINTENANCE
Daily	Check the coolant level and replenish if necessary.
Each week	Check that the safety valve easing gear moves freely.
First 150 hours	Change the coolant filter.
Each 3 months	Check all hoses for signs of deterioration, cracks, hardening etc.
Each 2000 hours	Change the coolant filter.
2000 hours / 6 months	Check the operation of the high temperature protection switch.
1 year	Remove the safety valve from the compressor, inspect and re-calibrate.
1 year/1000 hours or as defined by local or national legislation.	<i>Separator tank.</i> Fully inspect all external surfaces, welds and fittings. Report any excessive corrosion, mechanical or impact damage, leakage or other deterioration.
1 year / 4000 hours	Change the air filter element.
4000 hours	Change the separator element.
8000 hours / 2 years	Replace the ULTRA COOLANT at whichever interval occurs first. Also replace the separator element and coolant filter.
Each 8000 hours	Change the drive belts.
6 years/6000 hours or as defined by local or national legislation.	<i>Separator tank.</i> Remove the cover plate and any necessary fittings. Clean the interior thoroughly and inspect all internal surfaces and welds.

ROUTINE MAINTENANCE

This section refers to the various components which require periodic maintenance and replacement.

The *SERVICE/MAINTENANCE CHART* indicates the various components' descriptions and the intervals when maintenance has to take place. Coolant capacities, etc., can be found in the *GENERAL INFORMATION* section of this manual.

CAUTION: Before beginning any work on the compressor, open, lock and tag the main electrical disconnect and close the isolation valve on the compressor discharge. Vent pressure from the unit by slowly unscrewing the coolant fill cap one turn. Unscrewing the fill cap opens a vent hole, drilled in the cap, allowing pressure to release to atmosphere. Do not remove the fill cap until all pressure has vented from the unit. Also vent piping by slightly opening the drain valve. When opening the drain valve or the coolant fill cap, stand clear of the valve discharge and wear appropriate eye protection.

Compressed air can be dangerous if incorrectly handled. Before doing any work on the unit, ensure that all pressure is vented from the system and that the machine cannot be started accidentally.

Ensure that maintenance personnel are adequately trained, competent and have read the Maintenance Manuals.

Prior to attempting any maintenance work, ensure that:–

· all air pressure is fully discharged and isolated from the system. If the automatic blowdown valve is used for this purpose, then allow enough time for it to complete the operation.

· the machine cannot be started accidentally or otherwise, by posting warning signs and/or fitting appropriate anti-start devices.

· all residual electrical power sources (mains and battery) are isolated.

Prior to opening or removing panels or covers to work inside a machine, ensure that:–

· anyone entering the machine is aware of the reduced level of protection and the additional hazards, including hot surfaces and intermittently moving parts.

· the machine cannot be started accidentally or otherwise, by posting warning signs and/or fitting appropriate anti-start devices.

Prior to attempting any maintenance work on a running machine, ensure that:–

· the work carried out is limited to only those tasks which require the machine to run.

· the work carried out with safety protection devices disabled or removed is limited to only those tasks which require the machine to be running with safety protection devices disabled or removed.

· all hazards present are known (e.g. pressurised components, electrically live components, removed panels, covers and guards, extreme temperatures, inflow and outflow of air, intermittently moving parts, safety valve discharge etc.).

· appropriate personal protective equipment is worn.

· loose clothing, jewellery, long hair etc. is made safe.

· warning signs indicating that *Maintenance Work is in Progress* are posted in a position that can be clearly seen.

Upon completion of maintenance tasks and prior to returning the machine into service, ensure that:–

· the machine is suitably tested.

· all guards and safety protection devices are refitted.

· all panels are replaced, canopy and doors closed.

· hazardous materials are effectively contained and disposed of.

WARNING

Do not under any circumstances open any drain valve or remove components from the compressor without first ensuring that the compressor is FULLY SHUT-DOWN, power isolated and all air pressure relieved from the system.

COOLANT CHANGE PROCEDURE

The compressor features a 'no drip' coolant drain feature which requires no special tools and minimises the risk of coolant spillage.

It is better to drain the coolant immediately after the compressor has been operating as the liquid will drain more easily and any contaminant will still be in suspension.

1. Remove the cap from the drain valve located at the front of the separator vessel.

2. Place a suitable container close to the drain valve.
3. Screw the coolant drain hose onto the drain valve. As the threads engage, the valve will automatically open and the coolant will drain.
4. Remove the drain hose. The valve will automatically close and seal.
5. Replace the cap on the drain valve.

COOLANT FILTER CHANGE PROCEDURE

- . Loosen filter element with the correct tool.
- . Remove the element from the housing.
- . Place the old element in a sealed bag and dispose of in a safe way.
- . Clean the mating face of the housing.
- . Remove the new Ingersoll-Rand replacement element from its protective package.
- . Apply a small amount of lubricant to the element seal.
- . Screw the new element down until the seal makes contact with the housing, then hand tighten a further half turn.
- . Start the compressor and check for leaks.

AIR FILTER CHANGE PROCEDURE

1. Unscrew the retaining cap and withdraw the old element.
2. Fit the new element ensuring that the retaining nut is secured.

SEPARATOR ELEMENT CHANGE PROCEDURE

1. Disconnect the hose at the top of the separator tank.
2. Disconnect the blow-down tube.
3. Remove the setscrews securing the cover to the tank and remove the complete cover assembly.
4. Withdraw the used element, place it in a sealed bag and dispose of it safely.
5. Clean the gasket surface on both the tank and the cover.
6. Install the replacement element.

CAUTION

Do not use any form of sealant on either the separator tank or the separator tank cover faces.

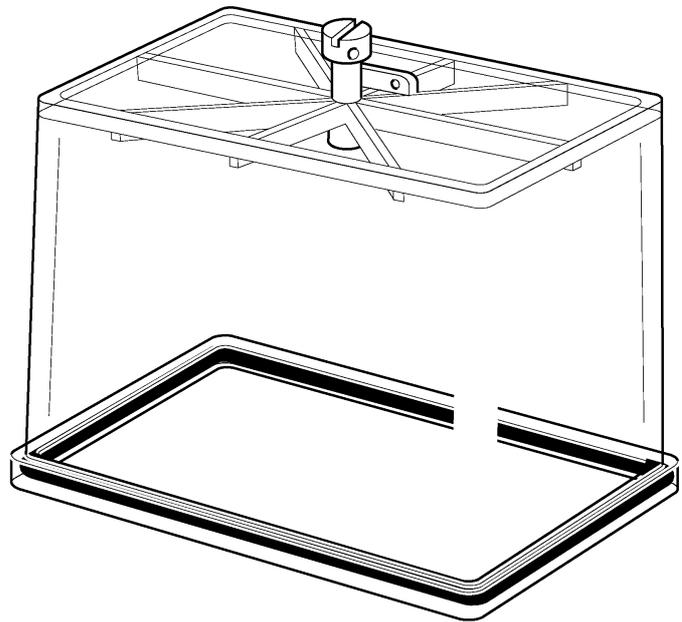
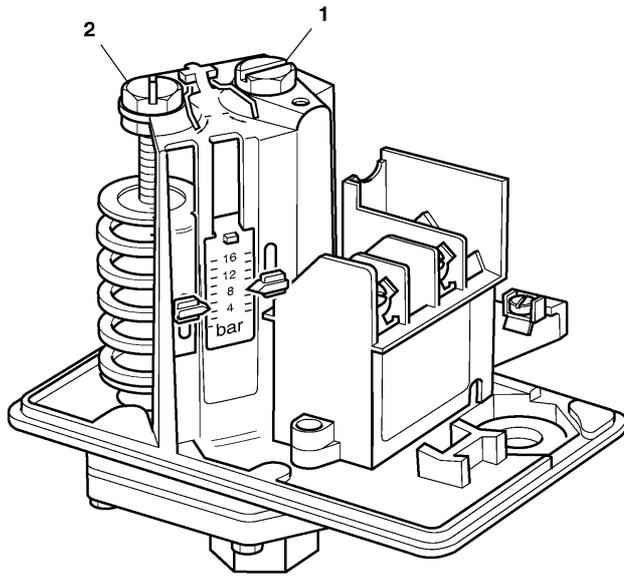
7. Re-assemble the components in reverse order.

The maximum torque for the tank cover bolts is 60Nm (43 ft.lb).

8. Start the compressor and check for leaks.

WARNING

Do not remove the staple from the anti-static gasket on the separator element since it serves to ground any possible static build-up.



T6

SETTING THE PRESSURE SWITCH (1PS)

TO CHECK THE MAXIMUM DISCHARGE PRESSURE

(Pressure switch upper trip point)

Slowly close the isolation valve located adjacent to the compressor. Observe the rise in pressure and ensure that the pressure switch opens (and unloads the compressor) at the correct Maximum discharge pressure.

The maximum discharge pressure is shown on the machine data plate.

DO NOT exceed these figures.

TO CHECK THE LOWER SET POINT

Observe the line pressure fall and note the point at which the pressure switch closes (and loads the compressor).

The lower set point is factory set 0.85 bar (12psig) below the upper set point to suit the average application.

TO ADJUST THE UPPER SET POINT

Remove the transparent cover and turn the adjuster [1]. The red pointer will move. Turn the adjuster anti-clockwise to increase the set point or clockwise to decrease it.

TO ADJUST THE LOWER SET POINT

Remove the transparent cover and turn the adjuster [2]. The green pointer will move. Turn the adjuster anti-clockwise to increase the set point or clockwise to decrease it.

NOTE

The pressure switch scale is a guide only. Use the machine pressure gauge to verify the upper and lower set points.

CAUTION

Before working on the belt drive system, ensure that the machine has been stopped and the electrical power supply isolated, as rotating equipment can be dangerous. Replace all guards before restarting the compressor. (Do not allow the belt to become contaminated with coolant or debris).

CAUTION: Before beginning any work on the compressor, open, lock and tag the main electrical disconnect and close the isolation valve on the compressor discharge. Vent pressure from the unit by slowly unscrewing the coolant fill cap one turn. Unscrewing the fill cap opens a vent hole, drilled in the cap, allowing pressure to release to atmosphere. Do not remove the fill cap until all pressure has vented from the unit. Also vent piping by slightly opening the drain valve. When opening the drain valve or the coolant fill cap, stand clear of the valve discharge and wear appropriate eye protection.

PULLEY ALIGNMENT

Any degree of pulley misalignment will result in a reduction of belt life. Misalignment of the belt drive should not exceed $\frac{1}{16}$ ".

Parallel misalignment occurs when the driven shafts are parallel, but the two pulleys lie in different planes.

Angular misalignment occurs when the two shafts are not parallel.

ALIGNING THE PULLEYS

An easy and effective method of checking alignment in both directions between the driver and driven pulleys utilises an accurate straight edge.

Lay the straight edge across the face of the driver (motor) pulley and check alignment of the driven (airend) pulley. Then lay the straight edge across the driven pulley and check that the driver pulley is aligned.

Misalignment should not exceed $\frac{1}{16}$ " when measuring the gap between the straight edge and the rim of the opposite pulley in each direction.

This alignment is factory set and should only require resetting if the drive motor or airend is removed. The following steps should be taken to ensure proper alignment of all components.

The drive belt must be removed to verify alignment.

Holding the straightedge against the back of the airend pulley, measure the amount of misalignment seen on the motor pulley. If this is more than $\frac{1}{16}$ ", the motor sheave must be removed for repositioning.

To remove the pulley:

1. First, mark the position of the pulley bush on the motor shaft.
2. Remove the two allen headed screws that hold the motor pulley and pulley bush.
3. Oil the thread and point of the screw.
4. Re-install one of the screws in the hole that has threads on the bushing side.
5. Slowly tighten the screw until the pulley is pressed from the bush (Lightly tapping the bush may assist removal).
6. Remove the screw from the hole.

7. Move the bush either in or out on the motor shaft depending upon the measurement taken earlier.

8. Taking care not to move the bush on the shaft, align the pulley so that two half holes make complete holes with threads on the pulley side.

9. Oil the threads and points of the screws.

10. Insert the screws into the holes with threads on the pulley side.

11. Slowly and evenly tighten all pulley retaining screws. Torque to 175 lb.in.

12. Hammer against the large end of the bush using a hammer and block or sleeve to avoid damage. Continue to torque screws until the specified wrench torque no longer turns the screw after hammering. Fill the other holes with grease to exclude dirt.

13. Re-check for correct alignment.

14. Re-fit the drive belt as described below.

DRIVE BELT

CAUTION: Ensure that the compressor is isolated from the compressor air system by closing the isolation valve and bleeding pressure from the drain valve.

CAUTION: Ensure that the main power disconnect switch is locked open and tagged.

If installing or removing the belt on a new unit at start-up, the motor support shipping bolt must first be removed. This bolt is only used to brace the motor during shipment and will not be reinstalled once the belt is put into place.

Use only genuine Ingersoll-Rand replacement parts to ensure the correct belt size and length. Incorrectly sized belts can lead to overloading of bearings and eventual airend or motor failure.

DISASSEMBLY

Belt tension is maintained due to a cantilevered motor support. The weight of the motor holds the belt tight.

1. Remove the front of the belt/fan guard on the back of the unit by removing the six retaining screws.
2. Carefully lift the back of the motor support bracket and place a block of wood underneath.
3. Remove the belt from the airend pulley and the motor pulley.

INSTALLATION / INSPECTION

Inspect the pulley grooves for foreign material or rubber build-up. Clean and degrease the pulleys before installing the drive belt to ensure long belt life.

1. Carefully lift the back of the motor support bracket and place a block of wood underneath.
2. Install the belt on the airend pulley and the motor pulley. When installing a new belt, do not force the belt over the pulley grooves.
3. Remove the block of wood from under the bracket.

BELT TENSION

This unit has been designed with a unique self tensioning system, therefore, the drive belt requires no manual adjustment. Use only genuine Ingersoll–Rand replacement parts to ensure the correct belt tension.

AIREND BEARINGS

Airend bearings are lubricated by the compressor coolant and require no maintenance.

MOTOR BEARINGS

Motor bearings are sealed for life and require no maintenance.

FAULT	CAUSE
Compressor fails to start	Control voltage not available. Defective starter.
Machine shutdown periodically	Defective starter. Motor overload. Line voltage variation.
High current draw	Compressor operating above rated pressure. Separator filter element contaminated. Low voltage. Unbalanced voltage.
Low current draw	Air filter contaminated. Compressor operating unloaded. High voltage.
High discharge pressure	Incorrect pressure switch setting. Load solenoid valve defective. Blowdown valve defective. Inlet valve malfunction.
Low system air pressure	Separator filter element contaminated. Incorrect pressure switch setting. Minimum pressure valve malfunction. Load solenoid valve defective. Drive belt slipping. Air system leaks. Inlet valve malfunction. System demand exceeds compressor delivery. Low coolant level.
Compressor overheats	Compressor operating above rated pressure. Cooler blocked. Low coolant level. High ambient temperature. Restricted cooling air flow.
Excessive coolant consumption	Separator element leak. Blocked separator element drain. Compressor operating below rated pressure. Coolant system leak.
Excessive noise level	Air system leaks. Airend defective. Motor defective. Loose components.
Shaft seal leaking	Defective shaft seal.
Pressure relief valve opens	Compressor operating above rated pressure. Incorrect pressure switch setting. Minimum pressure valve malfunction. Load solenoid valve defective. Blowdown valve defective. Inlet valve malfunction.
Black residue on belt guard/cooler box	Drive belt slipping. Pulleys misaligned. Worn pulleys.

SERIAL NO. VALIDITY

Refrigerant Compressed Air Dryers covered by this manual:

BI-1
BI-2
BI-3
BI-4
BI-5

Serial number
M4 : all serial numbers,
M5.5 : 2122032 onwards,
M7.5 : 2143905 onwards,
M11 : 2163617 onwards.

PURPOSE OF THIS DRYER

The compressed air refrigerant dryer condensates water and oil vapours in the compressed air by cooling it to close to the point of freezing.

The water and oil condensate is drained automatically.

This dryer is designed for industrial use indoors.

FUNCTION

See the flow diagram on page 30

Compressed air circuit

The warm and moist compressed air first flows through the evaporator in which refrigerant evaporates, thus removing heat from the compressed air.

The compressed air cools down and the water and oil vapours in it condensate.

Next, the cold air flows through a water separator, where the condensate is separated from the compressed air.

Finally, the dried compressed air leaves the dryer.

Refrigerant circuit

The refrigerant that is evaporated in the evaporator is sucked in by the compressor and compressed.

The compressed refrigerant vapour condensates in a compressed air cooled condenser where the refrigerant releases the remaining part of the absorbed energy to the cold dried compressed air.

The liquid refrigerant flows through the liquid receiver and the filter/dryer to the constant pressure valve.

The constant pressure valve regulates the refrigerant flow to the evaporator such, that the dryer can not freeze up and a constant dew point is maintained, independent of the compressed air load.

Installation

Do not block the ventilation grills of the dryer.

Start

Wait for 2 hours before switching on the dryer so refrigerant and lubricants can settle in the dryer.

Start the compressed air compressor.

The dryer starts with the compressor.

An acceptable air quality will be reached within minutes.

During operation

Regularly check the position of the dew point indicator. The pointer has to be in the green zone. If it is in the red zone, see the trouble shooting section on page 27

Shut-down

The dryer is stopped by shutting down the compressor.

Wait a minimum of 10 minutes before switching on the dryer again.

Maintenance and repair, particularly of the refrigerant circuits, is only to be performed by authorised, trained and skilled employees.

MAINTENANCE

1. Use only the appropriate tools for maintenance and repair.
2. Use **genuine spare parts** only.
3. Maintenance is only to be performed when the air dryer is shut down and depressurized and when the main power is turned off.
4. Only use a damp cloth to clean the parts.
5. Proceed carefully during maintenance and repair. Prevent dirt from entering by covering parts and openings with a clean cloth, paper or tape.
6. Never leave tools, loose parts or cleaning rags in or on the air dryer.
7. Use a pressure gauge without hose to measure suction pressure to prevent unnecessary loss of refrigerant

Refrigerant loss may adversely influence the dryers performance.

USER MAINTENANCE

1. Brush or blow the condenser clean as soon as you notice any deposit of dust.
2. Keep the dryer clean.
3. Check and clean the internal parts of the water separator.

With very dirty and unfiltered compressed air systems the necessary cleaning interval may increase to twice per month.

With a time or level controlled condensate drain, first remove the piping at the bottom of the water separator.

Remove the bowl of the water separator by removing the retaining screws.

Clean the inside with tap water to remove dirt that may be stuck.

Note: With a time or level controlled condensate drain, the float drain is not fitted.

Check the trouble–shooting list on page 27 when maintenance shows any irregularities.

TROUBLE SHOOTING

Before starting maintenance or repair on the dryer, the mains switch and the on/off switch must be turned off. Also, the compressed air must be vented from the system.

Complaint	Cause	Corrective action
The dryer is switched on, but does not start.	Mains power is missing	Check and remedy when necessary.
	The on/off switch is defective	
	The internal thermal protection of the compressor motor has changed–over	Check for undervoltage. The compressor will restart automatically after 30 – 60 minutes when it has cooled down.
The pressure dew point is too high.	The air inlet temperature is too high.	Check and remedy. Install a receiver or a pre–cooler when necessary.
	The ambient temperature is too high.	Check and remedy. Move the dryer if required or move the cooling air suction pipe to a cooler location.
	The air inlet pressure is too low.	Increase the air inlet pressure.
	The dryer’s capacity is exceeded.	Reduce the air inlet flow. When this is not possible, reduce the air inlet pressure. Consider purchasing a second or a larger dryer as a final solution.
The condenser pressure is too high or too low.	The fan or the fan motor is defective.	Check and contact the service department.
	The ambient temperature is too high.	Check and remedy. Move the dryer if required or move the cooling air suction pipe to a cooler location.
	The condenser is dirty on the outside.	Clean the condenser as described in the maintenance section on page 26
	The internal thermal protection of the fan motor has changed–over.	The fan motor will restart automatically when the windings have cooled down after 30 – 60 minutes.
The pressure drop over the dryer is too high.	The compressed air system is obstructed.	Contact the service department.
The water separator does not function or continuously discharges water and air.	The electronic drain system is plugged.	Clean the water separator as described in the maintenance section on page 26
	The electronic drain system is defective.	Contact the service department.

Note: The dew point will deviate from the nominal value when nominal conditions are exceeded. Ex.: a dew point of 7°C is considered to be normal when the flow, the compressed air inlet pressure, the air inlet temperature or the ambient temperature are above the nominal value or the pressure is below the nominal value.

Contact the service department when the problem can not be solved on the basis of this trouble–shooting list.

RETIREMENT

At the end of the life cycle of the refrigerant compressed air dryer, there are some points that deserve special attention:

1. The refrigerant is to be pumped from the refrigerant system.

When pumped, the refrigerant can be regenerated and reused when observing local regulations.

2. The compressor contains oil.

This oil is to be removed from the compressor and can be disposed of when observing local regulations.

3. Piping and heat exchanger are made of copper.

Copper can be reused when observing local regulations.

4. The (white) isolating foam and (black) armaflex isolation is produced environmentally friendly.

The isolating material can be disposed of when observing local regulations.

The remaining part of the dryer can be disposed of, observing local regulations.

Specifications of the dryer					
Model	4kW	5,5kW	7,5kW	11kW	
Pressure drop over dryer	0,22	0,18	0,20	0,25	bar
Compressor current	1,3	3,1	3,1	3,1	A
Current per fan motor	0,1	0,2	0,2	0,2	A
Total current	1,4	3,3	3,3	3,3	A
Starting current	8,2	18,0	18,0	18,0	A
Recommended fuse	16	16	16	16	A
Compressor power	0,23	0,51	0,51	0,51	kW
Fan motor power	0,02	0,04	0,04	0,04	kW
Total power	0,25	0,55	0,55	0,55	kW
The above data is quoted at reference conditions as follows:					
Ambient					
Temperature			25	°C	
Pressure			1	bar (a)	
Relative humidity			60	%	
Compressed air inlet					
Temperature			35	°C	
Pressure			7	bar (g)	
Relative humidity			100	%	
Compressed air outlet					
Pressure dew point			3	°C	

Factory set controls

The constant pressure valve and the fan thermostat are factory set to ensure the optimum performance of the dryer. These devices need to be replaced when faulty.

AIR COOLED	4kW	5,5kW	7,5kW	11kW	
Constant Pressure Valve suction pressure at zero load at the moment of fan motor switch-off.	2,05	2,05	2,05	2,05	bar (g)
Fan thermostat – out	39	39	39	39	°C
Fan thermostat – in	56	56	56	56	°C
Refrigerant	R134a	R134a	R134a	R134a	
Weight	290	420	420	420	g

Dangerous Substances

The information below is copied completely from DuPonts Material Datasheet in February 1998.

1. Identification of the substance and of the company

Product name: SUVA* R-134a Refrigerant

* DuPont's registered trade mark

Supplier:

Du Pont (U.K.) Limited
Wedgwood Way, GB-Stevenage,
Herts. SG1 4QN

Emergency phone number: (+44) 1504 – 861 313

2. Composition / information on ingredients

Substance / preparation:

1,1,1,2-Tetrafluoroethane(R134a) *Weight (%)*: 100 *CAS Nr*:811–97–2
EEC Nr: 212–377–0

3. Hazards identification

Most important hazards: Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.

Specific hazards: Rapid evaporation of the liquid may cause frostbite.

4. First aid measures

General advice: Never give anything by mouth to an unconscious person.

Inhalation: Move to fresh air. Oxygen or artificial respiration if needed. Do not give adrenaline or similar drugs.

Eye contact: Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

Skin contact: Wash off immediately with plenty of water. Take off all contaminated clothing immediately.

5. Fire fighting measures:

Suitable extinguishing media: any

Specific hazards: Pressure build-up

Specific methods: Cool containers / tanks with spray water.

6. Accidental release measures

Personal precautions: Evacuate personnel to safe areas. Ensure adequate ventilation. Use personal protective equipment.

Environmental precautions: Evaporates.

Methods for cleaning up: Evaporates.

7. Handling and storage

Handling: *Technical measures / precautions:* Provide sufficient air exchange and/or exhaust in work rooms. *Safe handling advice:* Use only in well-ventilated areas. Do not breath vapours or spray mist. *System leak testing:* Do not pressure test any system with air/HFC-134a mixtures. Can form a combustible mixture with air at pressures above atmospheric when air concentration exceeds 60% by volume.

Storage: *Technical measures/Storage conditions:* Keep tightly closed in a dry, cool and well-ventilated place. *Incompatible products:* Explosive, flammable materials. Organic peroxide. *Packaging material:* Store in original container.

8. Exposure controls / personal protection

Engineering measures: Ensure adequate ventilation, especially in confined areas.

Control parameters: DuPont's acceptable exposure limit: AEL(8-h and 12-h TWA) = 1000 ml/m³; DuPont (1995).

Personal protection equipment: *Respiratory protection:* For rescue and maintenance work in CFC-tanks use self-contained breathing apparatus. Vapours are heavier than air and can cause suffocation by reducing available for breathing. *Eye protection:* safety glasses. *Hand protection:* rubber gloves. *Hygiene measures:* Do not smoke.

9. Physical and chemical properties

Form: liquefied gas
 Colour: colourless
 Odour: ether-like

pH (°C) (at g/l H₂O): neutral

Boiling point/range (1 bar): -26.5°C

Melting point/range (1 bar): -101.0°C

Flash point: does not flash

Autoignition temperature: >750°C

Explosive properties:

Vapour pressure (25°C): 666.1 kPa
 (50°C): 1319 kPa

Relative density (25°C): 1.21 kg/l (liquid)
 (1 bar)

Solubility (water) (25°C) (1 bar): 0.15 wt %

Viscosity (25°C) (1 bar): 0.205 mPa.s (liquid)

10. Stability and reactivity

Stability: No decomposition if used as directed.

Materials to avoid: Alkali metals, alkaline earth metals, powdered metal salts, powdered Al, Zn, Be, etc.

Hazardous composition products: hydrogen halides, traces of carbonyl halides.

11. Toxicological information

Acute toxicity: ALC/inhalation/4h/rat = 567 ml/l.

Local effects: Concentrations substantially above the OEL value may cause narcotic effects. Inhalation of decomposition products in high concentration may cause shortness of breath (lung oedema).

Long term toxicity: Did not show carcinogenic, teratogenic or mutagenic effects in animal experiments.

Special effects: Rapid evaporation of the liquid may cause frostbite.

12. Ecological information

Exotoxicity effects: Halocarbon global warming potential; HGWP; (R-11 = 1) = 0.28. Ozone depletion potential; ODP; (R11 = 1) = 0.

13. Disposal considerations

Waste from residues / unused products: Can be used after reconditioning.

Contaminated packaging: Empty pressure vessels should be returned to the supplier.

14. Transport information

ADR/RID Class: 2 **Item:** 3(a) **ADR/RID labels:** 2 **TREM-CARD:** R-20G08 **HI/UN No:** 20/3159 **Proper shipping name:** 1,1,1,2-Tetrafluoroethane(R134a), 2, 3(a), ADR

ICAO UN/ID No: 3159 **Class:** 2.2 **Subrisks:** n.a. **Packaging group:** n.a. **ICAO-Labels:** Non-flammable compressed gas **Proper shipping name:** 1,1,1,2-Tetrafluoroethane (R134a)

IMO Class: 2.2 **IDMG Page:** 2181 **Subrisks:** n.a. **Packaging group:** n.a. **IMO-Labels:** Non-flammable compressed gas **EmS:** 2-09 **MFAG:** 350 **Proper shipping name:** 1,1,1,2-Tetrafluoroethane (R134a)

n.a. = not applicable

15. Regulatory information

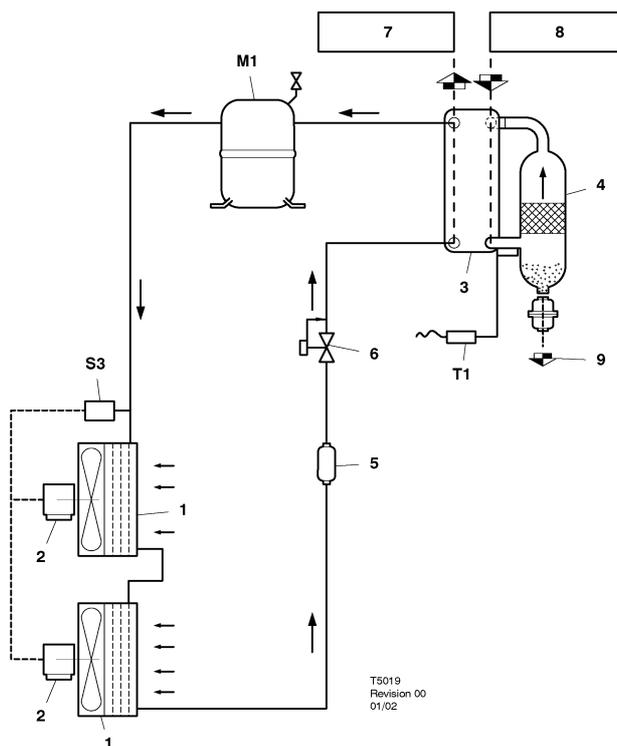
According to Regulation 5 of the CHIP Regs 1993, the product is not classified as dangerous for supply.

16. Other information

Recommended use: refrigerant.

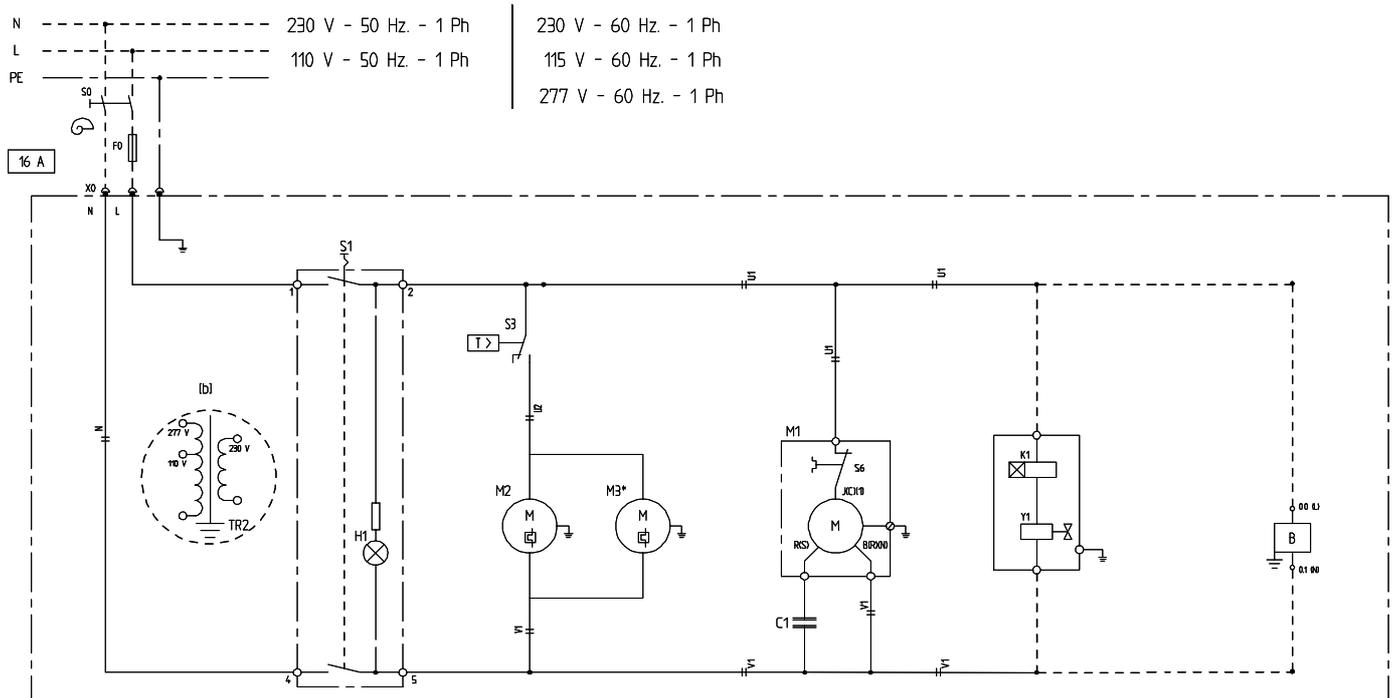
Further information: For further information contact the local DuPont office or DuPont's nominated distributors.

The information in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.



KEY

<p>1 Condenser</p> <p>2 Motor, fan</p> <p>3 Exchanger and evaporator</p> <p>4 Separator, water</p> <p>5 Filter, refrigerant</p> <p>6 Valve, constant pressure</p>	<p>7 Dry air (out)</p> <p>8 Wet air (in)</p> <p>9 Condensate drain</p> <p>M1 Compressor</p> <p>S3 Thermostat, fan</p> <p>T1 Indicator, dew point</p>
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KEY

- C1** Capacitor compressor
- F0** Fuse 16A
Customer installation
- H1** Light 'dryer on'
- L** Main power, live
- N** Main power, neutral
- M1** Compressor
- M2** Fan
- M3** Fan
- PE** Main power, earthing
- S0** Mains switch
Customer installation
- S1** On/off switch
- S3** Temperature switch fan
- S6** Thermal overload switch compressor

Options

- B** Level controlled electronic drain
- K1 & Y1** Time controlled electronic drain
- TR2** Transformer
110V/115V/277V – 230V

