

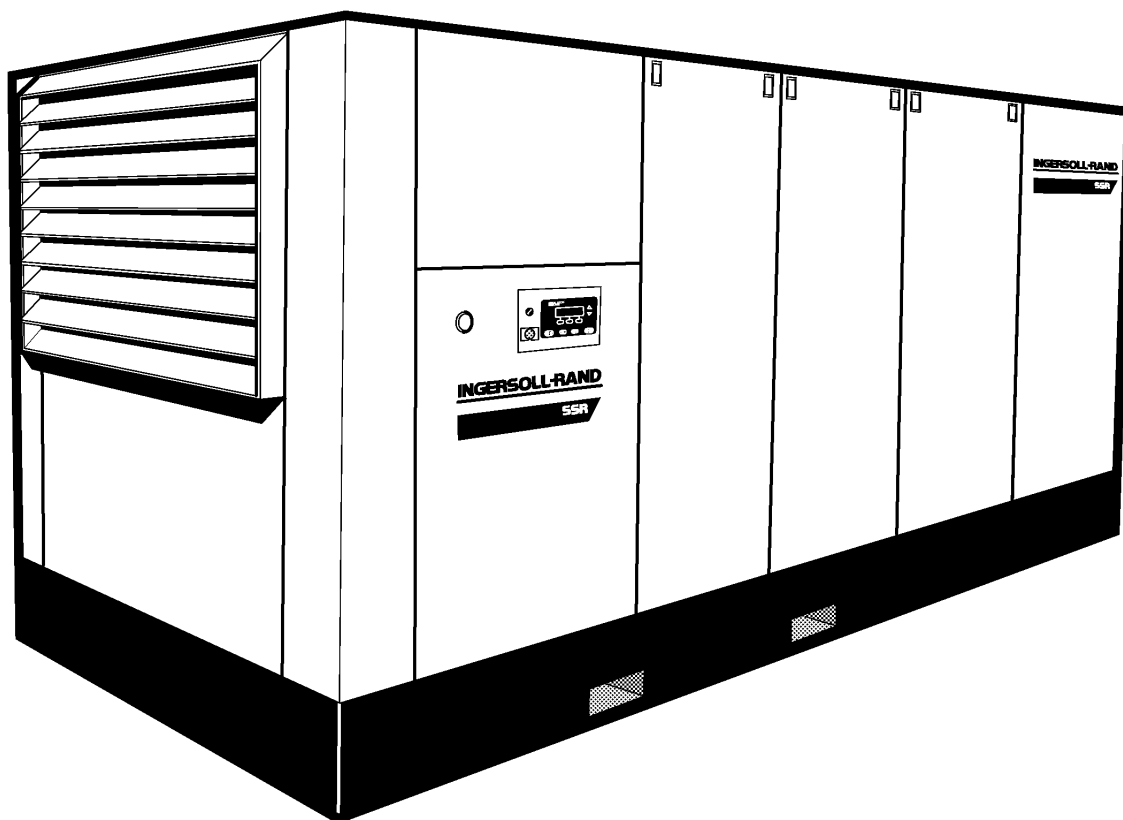


Manual Closed Out

Machine no longer in production

M200-2S
M250-2S

OPERATION AND MAINTENANCE MANUAL



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

M200-2S SERIAL No : 2550100 →

M250-2S SERIAL No : 2560030 →

C.C.N. : 89271001 GB
DATE : AUGUST 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)

M200-2S M250-2S

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
		→####	Up to Serial No.
2	FOREWORD	####→	From Serial No.
		*	Not illustrated
3	ISO SYMBOLS	†	Option
8	SAFETY	NR	Not required
		AR	As required
10	GENERAL INFORMATION	SM	Sitemaster/Sitepack
17	INSTALLATION / HANDLING	HA	High ambient machine
		WC	Watercooled machine
20	OPERATING INSTRUCTIONS	AC	Aircooled machine
		ERS	Energy recovery system
29	AIRCARE WARRANTY	T.E.F.C.	Totally enclosed fan cooled motor (IP54)
30	MAINTENANCE	O.D.P.	Open drip proof (motor)
33	FAULT FINDING	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.

No portable communication devices emitting more than 7,5 volts per metre in the frequency range from 250 MHz to 280 MHz should be operated within 5 metres of the unit.

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.
Connection to an electrical supply of incorrect voltage and/or frequency.

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

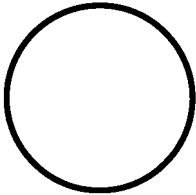
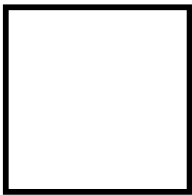







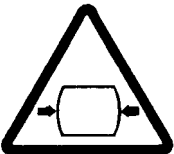




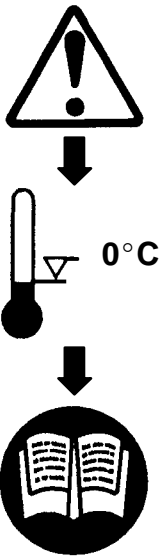
SSR ULTRA COOLANT is a registered trademark of Ingersoll–Rand Company USA.

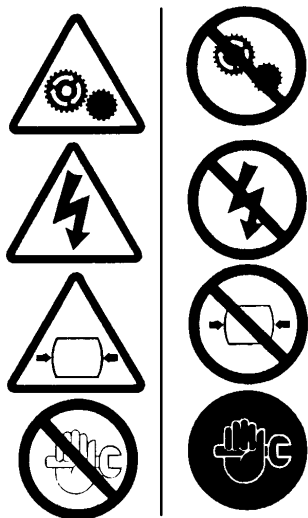
INTELLISYS is a registered trademark of Ingersoll–Rand Company USA.

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INGERSOLL–RAND COMPANY

GRAPHIC FORM AND MEANING OF ISO SYMBOLS

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



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.



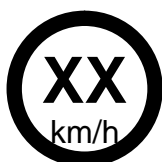
Do not stand on any service valve or other parts of the pressure system.



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.



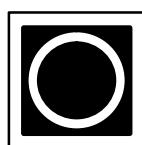
No naked lights.



Do not open the service valve before the air hose is attached.



Use fork lift truck from this side only.



Emergency stop.



Tie down point



Lifting point.



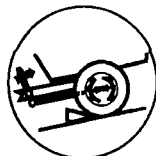
On (power).



Off (power).



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



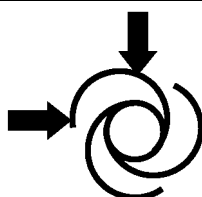
When parking use prop stand, handbrake and wheel chocks.



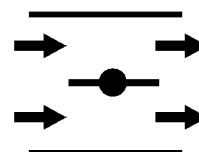
Contains asbestos.



SET



SEQUENCER STATUS



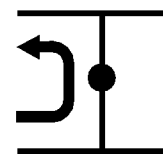
LOAD



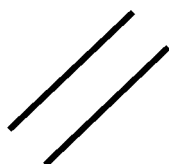
SEQUENCER (AUTOMATIC CONTROL)



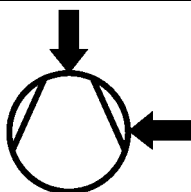
COMPRESSOR



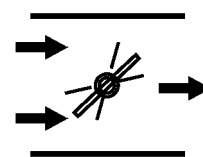
OFF LOAD (UNLOADED)



RESET



COMPRESSOR STATUS



MODULATE



MALFUNCTION



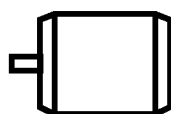
POWER



SOILED FILTER



POWER INLET

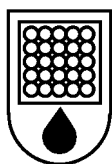


ELECTRIC MOTOR



HOURS

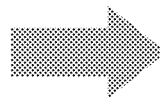
6 ISO SYMBOLS



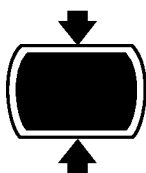
COOLANT SEPARATOR



PRESSURE



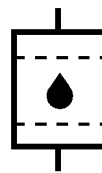
AIR DISCHARGE



PRESSURISED TANK



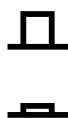
ON / OFF CYCLE



COOLANT FILTER



AIR FILTER



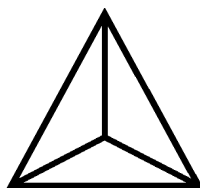
ON / OFF PUSH BUTTON



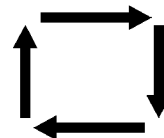
COOLANT PRESSURE



AIR PRESSURE



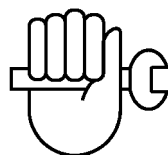
STAR DELTA IEC 617-7



AUTOMATIC RESTART



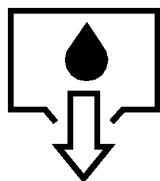
HEAT EXCHANGER



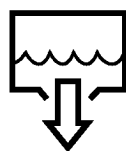
MAINTENANCE



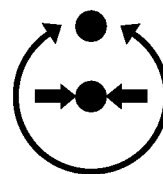
MAINTENANCE PROHIBITED



COOLANT DRAIN



CONDENSATE DRAIN



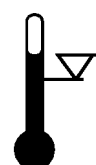
PRESSURE CONTROL



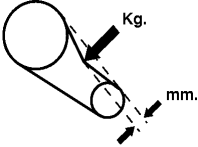
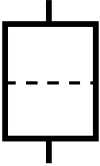

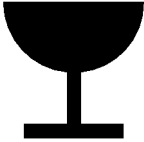

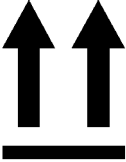




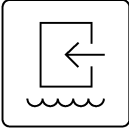
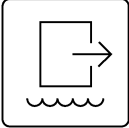
MANUAL (SELECT)



TEMPERATURE



HIGH TEMPERATURE

 <p>BELT TENSION</p>	 <p>FILTER</p>	 <p>MOTOR LUBRICATION</p>
 <p>FRAGILE</p>	 <p>KEEP DRY</p>	 <p>THIS WAY UP</p>
 <p>USE NO HOOKS</p>	 <p>NO SIDE CLAMPS</p>	 <p>ROTATION</p>
 <p>POWER INLET (AC)</p>	 <p>WATER IN</p>	 <p>WATER OUT</p>

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.

When refitting any enclosure panels or doors, it is essential to ensure that no persons or equipment remain inside the compressor.

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.

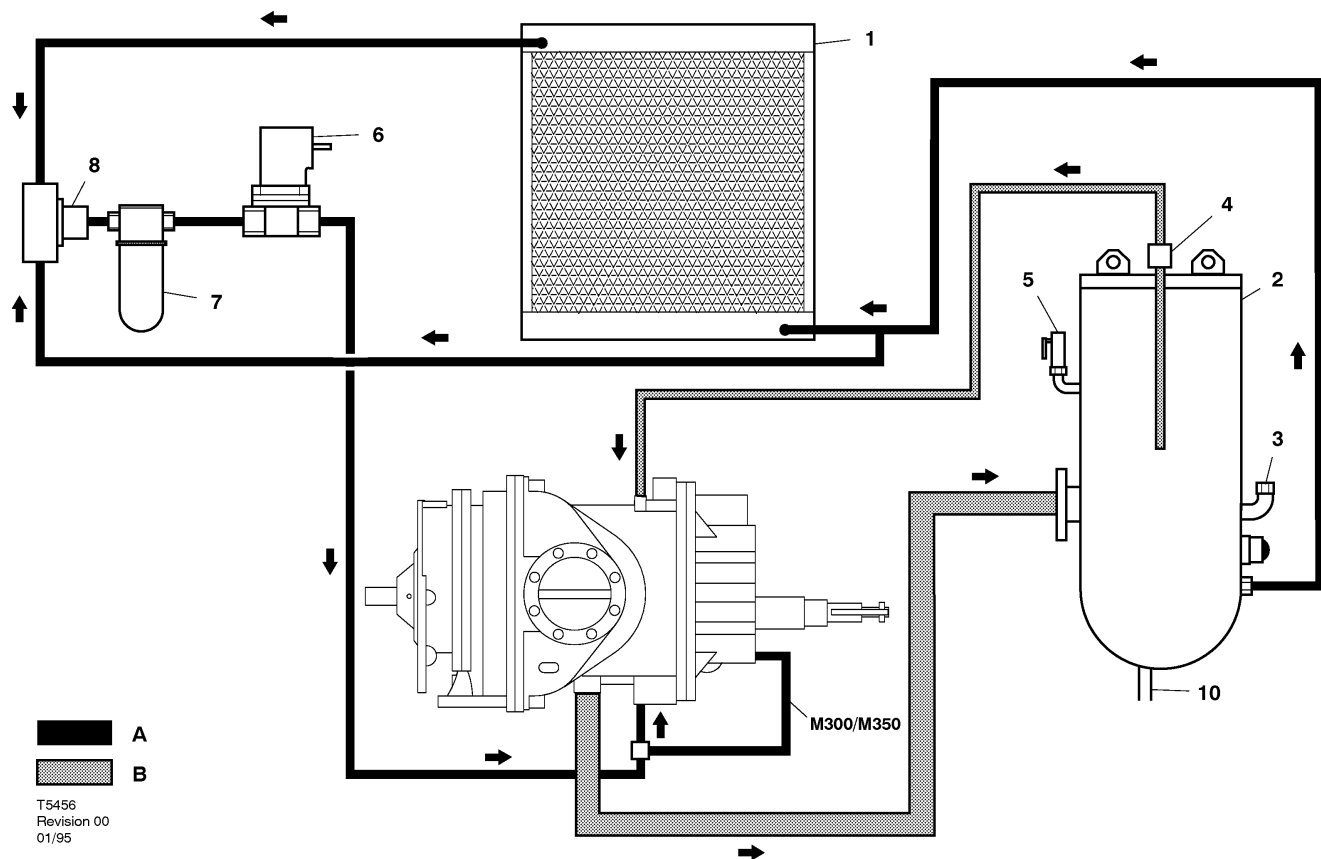
Coolant disposal

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).

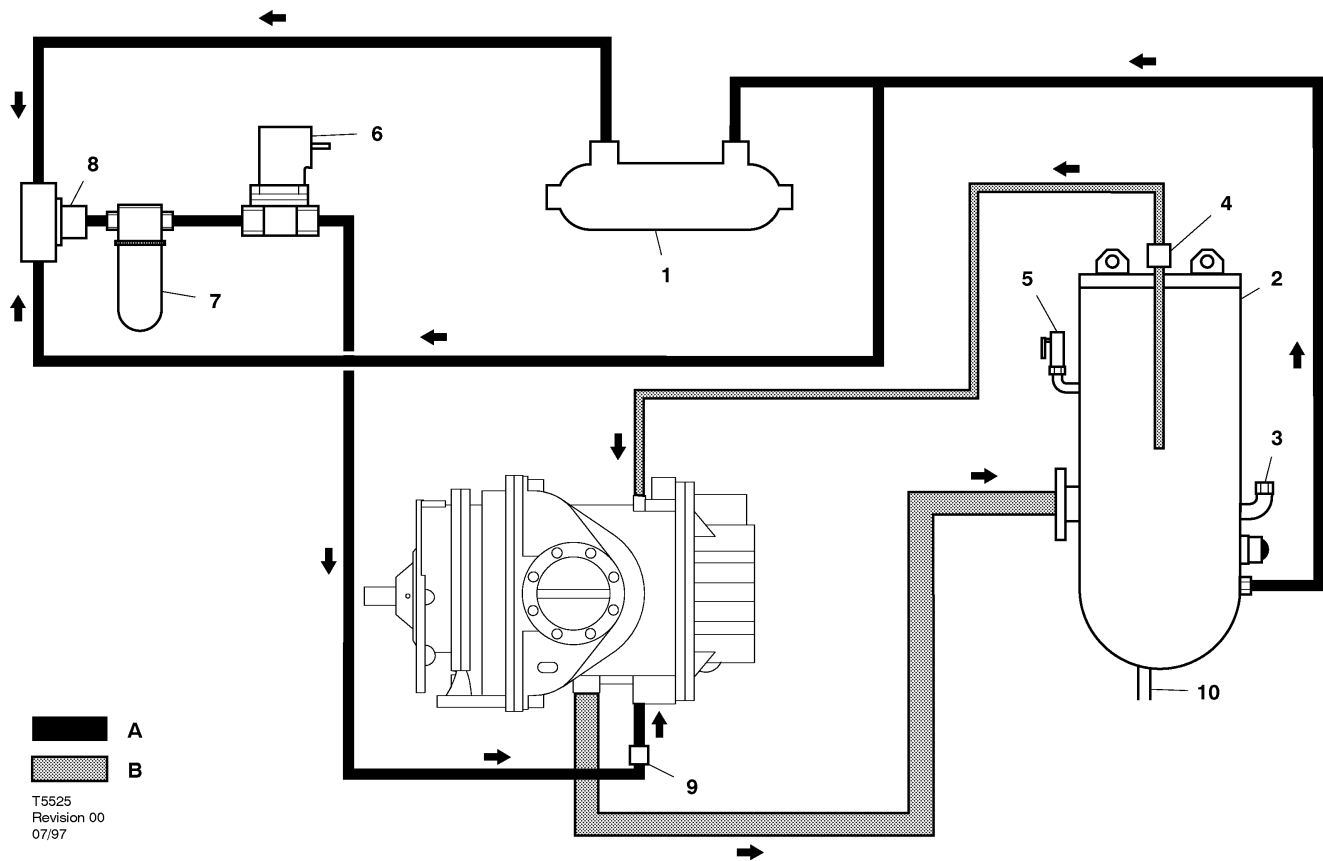
The above information contains data supplied in support of United Kingdom *Control of Substances Hazardous to Health* (C.O.S.H.H.) regulations.



LUBRICATION SYSTEM: AIR COOLED MACHINES

KEY

- | | |
|---------------------------|---------------------------------|
| A. LUBRICANT | 5 SAFETY VALVES |
| B. LUBRICANT / AIR | 6 COOLANT STOP VALVE (5SV) |
| 1 COOLER | 7 COOLANT FILTER |
| 2 SEPARATOR TANK | 8 THERMOSTATIC VALVE |
| 3 FILLER PLUG | 9 COOLANT DISTRIBUTION MANIFOLD |
| 4 ORIFICE & SCREEN | 10 TO DRAIN VALVE |



LUBRICATION SYSTEM: WATER COOLED MACHINES

KEY

A. LUBRICANT

B. LUBRICANT / AIR

1 COOLER

2 SEPARATOR TANK

3 FILLER PLUG

4 ORIFICE & SCREEN

5 SAFETY VALVES

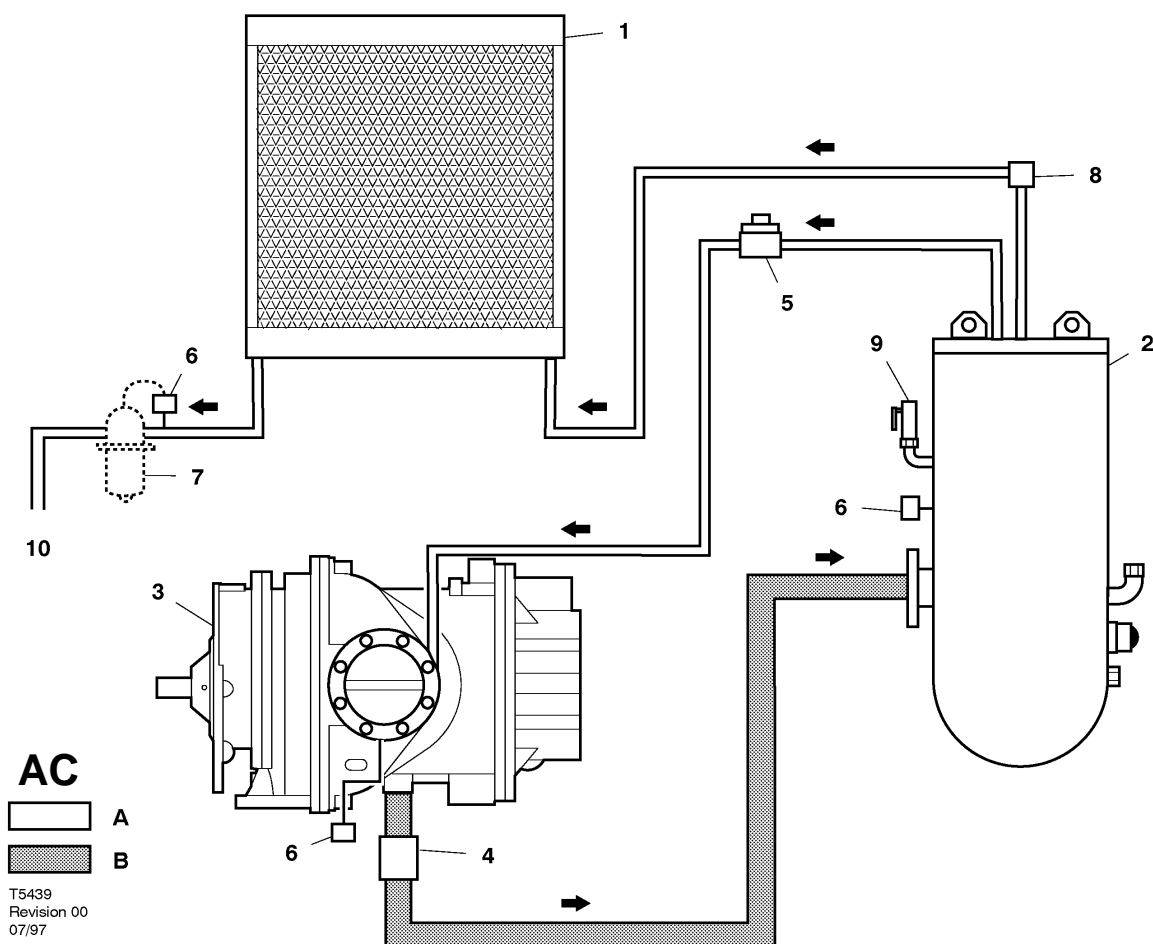
6 COOLANT STOP VALVE (5SV)

7 COOLANT FILTER

8 THERMOSTATIC VALVE

9 COOLANT DISTRIBUTION MANIFOLD

10 TO DRAIN VALVE



DISCHARGE AIR PIPING: AIR COOLED MACHINES

KEY

A. AIR

B. LUBRICANT / AIR

1. AFTERCOOLER

2. SEPARATOR TANK

3. COMPRESSOR

4. CHECK VALVE

5. BLOWDOWN VALVE (3SV)

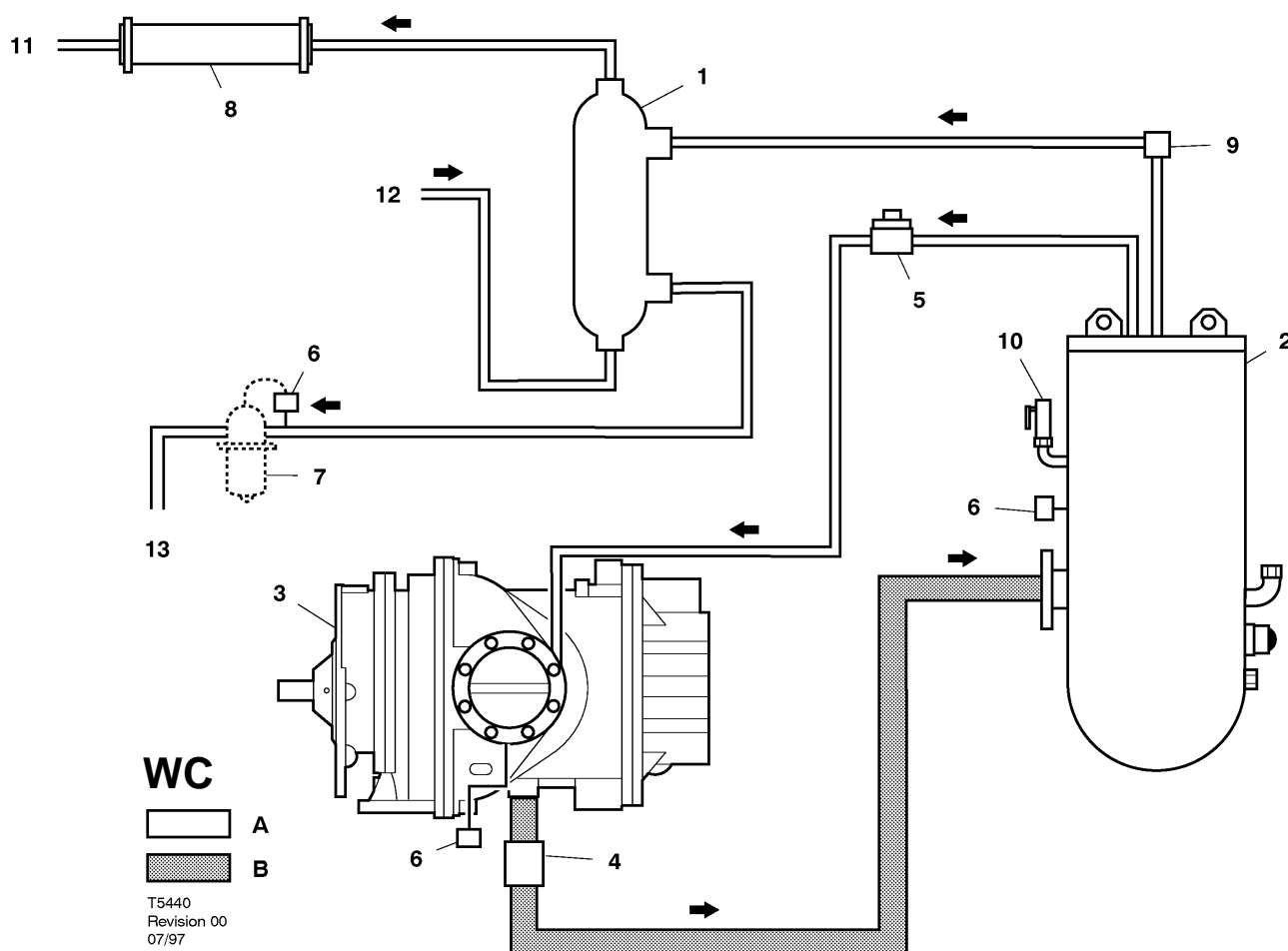
6. PRESSURE TRANSDUCER

7. MOISTURE SEPARATOR (OPTIONAL)

8. MINIMUM PRESSURE VALVE

9. SAFETY VALVE

10. TO AIR DISCHARGE SOCKET



AIR PIPING & WATER PIPING: WATER COOLED MACHINES

KEY

A. AIR

B. LUBRICANT / AIR

1. AFTERCOOLER
2. SEPARATOR TANK
3. COMPRESSOR
4. CHECK VALVE
5. BLOWDOWN VALVE (3SV)
6. PRESSURE TRANSDUCER
7. MOISTURE SEPARATOR (OPTIONAL)
8. COOLER
9. MINIMUM PRESSURE VALVE
10. SAFETY VALVE
11. TO WATER DISCHARGE SOCKET
12. FROM WATER INLET SOCKET
13. TO AIR DISCHARGE SOCKET

GENERAL OPERATION

The compressor is an electric motor driven, two stage screw compressor, complete with accessories piped, wired and baseplate 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 in-line pairs of helical rotors.

Air is drawn through the air inlet filter into the first stage where it is compressed to the interstage pressure. It then passes through a curtain of coolant on its way to the second stage, and through contact cooling significantly lowers the second stage inlet temperature. The compressed air enters the second stage to be compressed to the final discharge pressure, and exits the two stage air end through the discharge flange. The compressed air enters the separator where the coolant is separated from the air. Coolant is then cooled and returned to the compressor inlet. The air exits the separator, enters the aftercooler to be cooled down to final discharge temperature. Condensate is separated in the moisture separator and discharged through a drain. Quality air is discharged out of the package at the desired discharge pressure.

Air is pulled into the compressor by the cooling fan and is pushed through the coolers.

By cooling the discharge air and passing it through the separator, much of the water vapour which is naturally present in the air, can be removed.

14 GENERAL INFORMATION

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.

Panel instrumentation is provided to indicate the compressor operating conditions and general status.

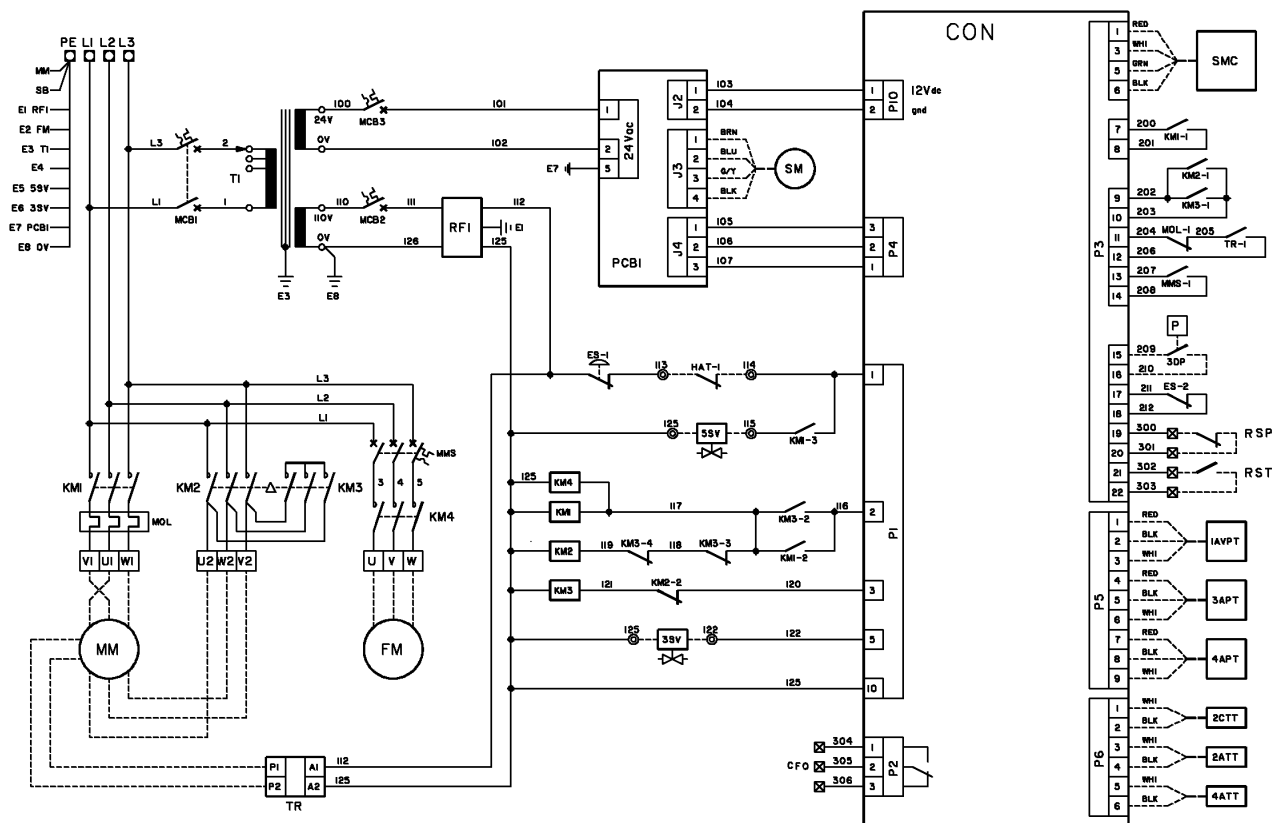
The modulation system extends the control types to Modulation (capacity control) and Automatic Control System when the compressor switches between 'On–Off line' and modulation as demand varies.

The electrical components are housed in a readily accessible sheet metal cabinet.

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

	M200AC λ Δ				M200WC λ Δ			
PRESSURE	7,0 bar (L)	8,0 bar (M)	9,5 bar (H)	13,8 bar (XU)	7,0 bar (L)	8,0 bar (M)	9,5 bar (H)	13,8 bar (XU)
CAPACITY	41,23 m³/min	38,86 m³/min	36,08 m³/min	29,60 m³/min	41,23 m³/min	38,86 m³/min	36,08 m³/min	29,60 m³/min
	1456ft³/min.	1408 ft³/min.	1274 ft³/min.	1045 ft³/min.	1456ft³/min.	1408 ft³/min.	1274 ft³/min.	1045 ft³/min.
FULL LOAD CURRENT (MAXIMUM) 380V	452 A				433 A			
FULL LOAD CURRENT (MAXIMUM) 400V	441 A				423 A			
FULL LOAD CURRENT (MAXIMUM) 415V	442 A				424 A			
STARTING CURRENT (MAXIMUM) 380V	1040 A				885 A			
STARTING CURRENT (MAXIMUM) 400V	1080 A				940 A			
STARTING CURRENT (MAXIMUM) 415V	1110 A				966 A			
*NOISE LEVEL CAGI PNEUROP 1m	82± 3 dB(A)				82± 3 dB(A)			
* Equivalent continuous sound pressure level (workstation) (rated load)								
WEIGHT O.D.P.	6060 kg				6060 kg			
WEIGHT T.E.F.C.	6583 kg				6583 kg			

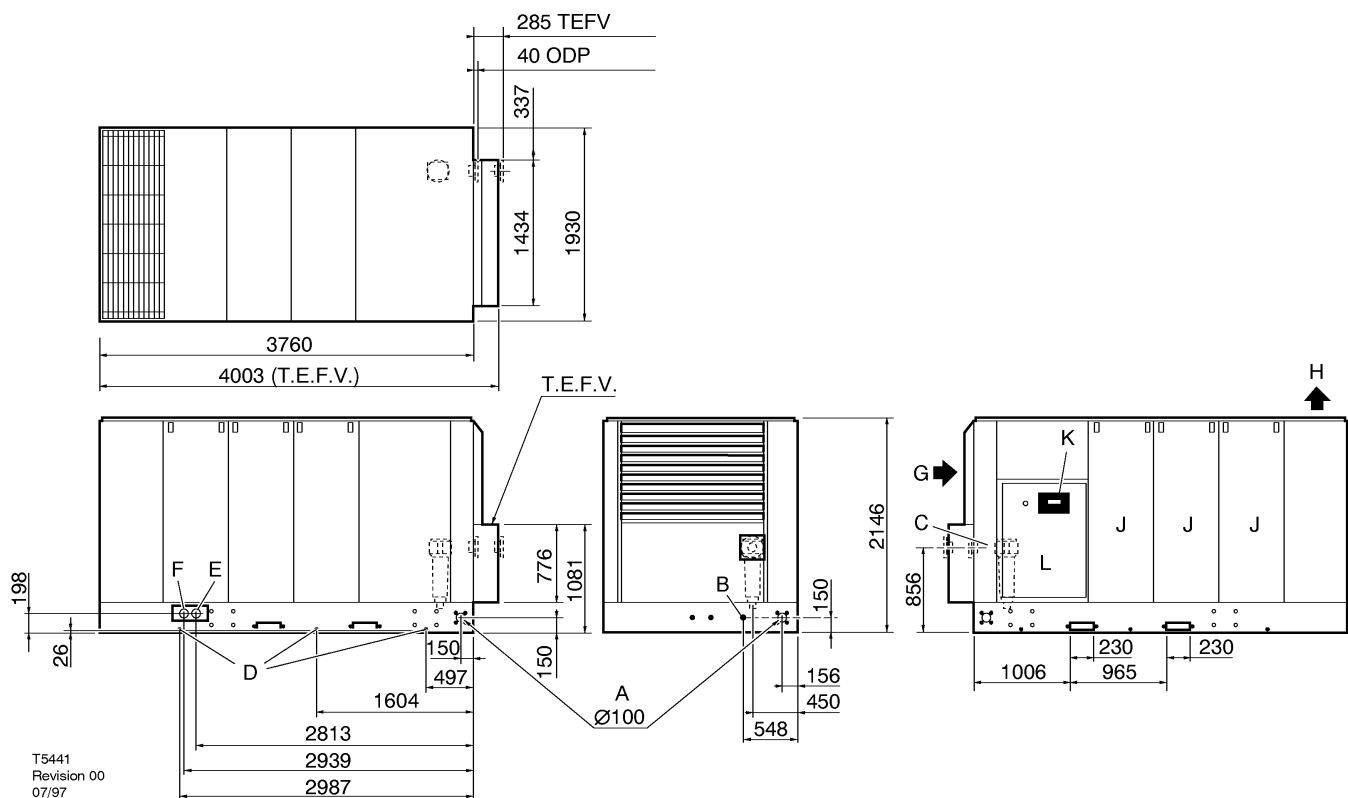
	M250AC λ Δ				M250WC λ Δ			
PRESSURE	7,0 bar (L)	8,0 bar (M)	9,5 bar (H)	13,8 bar (XU)	7,0 bar (L)	8,0 bar (M)	9,5 bar (H)	13,8 bar (XU)
CAPACITY	50,46 m³/min	47,10 m³/min	44,05 m³/min	36,35 m³/min	50,46 m³/min	47,10 m³/min	44,05 m³/min	36,35 m³/min
	1782ft³/min.	1663 ft³/min.	1555 ft³/min.	1284 ft³/min.	1782ft³/min.	1663 ft³/min.	1555 ft³/min.	1284 ft³/min.
FULL LOAD CURRENT (MAXIMUM) 380V	557 A				538 A			
FULL LOAD CURRENT (MAXIMUM) 400V	535 A				517 A			
FULL LOAD CURRENT (MAXIMUM) 415V	537 A				519 A			
STARTING CURRENT (MAXIMUM) 380V	1190 A				1045 A			
STARTING CURRENT (MAXIMUM) 400V	1250 A				1107 A			
STARTING CURRENT (MAXIMUM) 415V	1285 A				1138 A			
*NOISE LEVEL CAGI PNEUROP 1m	82± 3 dB(A)				82± 3 dB(A)			
* Equivalent continuous sound pressure level (workstation) (rated load)								
WEIGHT O.D.P.	6136 kg				6136 kg			
WEIGHT T.E.F.C.	6659 kg				6659 kg			



88142773
Revision B

KEY

PE	Main earth	TR	Thermistor relay, motor windings
ES	Earth lead, sub-base	MOL	Main motor overload relay
E1	Earth lead, RFI filter	RFI	RFI filter
E2	Earth lead, Fan motor	PCB1	Printed circuit board, Power supply unit
E3	Earth lead, Control transformers	HAT-1	Switch, high air temperature (discharge air)
E4	Earth lead, Instrument panel	ES	Emergency stop
E5	Earth lead, 5SV	SMC	Stepper motor controller
E6	Earth lead, 3SV	SM	Stepper motor
E7	Earth lead, PCB1	5SV	Coolant stop valve
E8	Earth lead, 0V	3SV	Blowdown valve
L1-L3	Mains terminals	CON	Intellisys controller
MMS	Miniature circuit breaker, fan motor	3DP	Pressure switch (Fouled coolant filter)
MCB1	Miniature circuit breaker, transformer T1 supply	3APT	Pressure transducer, separator pressure
MCB2	Miniature circuit breaker, 110V control circuits	1AVPT	Pressure transducer, inlet vacuum
MCB3	Miniature circuit breaker, 24V control circuits	4APT	Pressure transducer, package discharge pressure
KM1	Main contactor	2ATT	Temperature sensor, airend discharge
KM2	Delta contactor	4ATT	Temperature sensor, package discharge
KM3	Star contactor	2CTT	Temperature sensor, injected coolant
KM4	Fan motor contactor	CFO	Common fault output
MM	Main motor	RSP	Remote stop
FM	Fan motor	RST	Remote start



KEY

A	Electrical cable entry	G	Cooling air intake
B 1/2" BSPP	Condensate drain	H	Cooling air exhaust
C 3" BSPP	Air discharge	J	Access panels
D 1/4"BSPP	Coolant drain	K	Control panel
E 2" BSPP	Water in (WC)	L	Control cabinet door
F 2" BSPP	Water out (WC)		

NOTE

All dimensions are in millimetres unless otherwise stated.

UNPACKING

The compressor will normally be delivered with a polythene cover. If a knife has to be used to remove this cover ensure that the exterior paintwork of the compressor is not damaged.

Incorporated within the base of the compressor are slots to enable a fork lift truck (5,000 kg minimum) to move the machine. Alternatively a special lifting frame can be supplied to enable a crane or hoist to move the compressor.

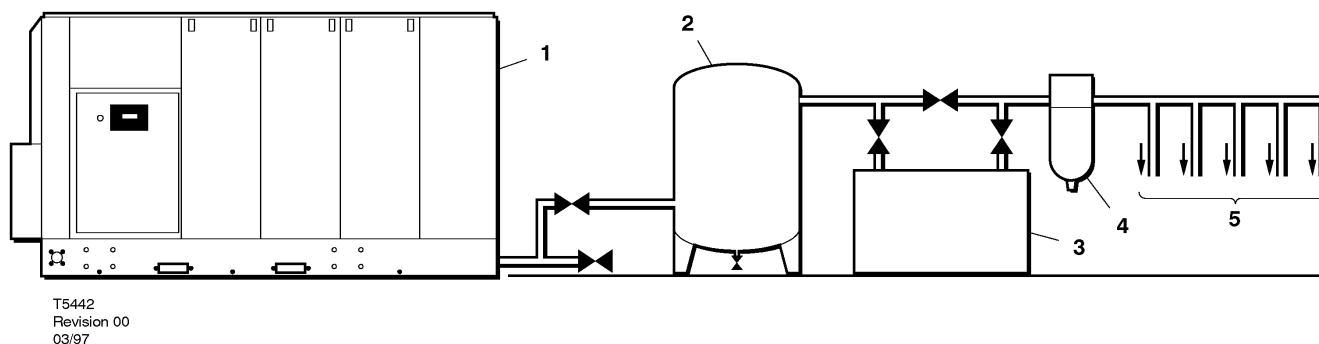
LOCATION IN THE PLANT

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.

Sufficient space all round and above the compressor must be allowed, to enable the effective removal of the cooling air which, in turn, will reduce the risk of re-circulating the cooling air back through the compressor.

CAUTION: A minimum of 1 metre all round the compressor is recommended. If headroom is restricted, then the exhaust should be ducted or deflected away from the machine.

No portable communication devices emitting more than 7,5 volts per metre in the frequency range from 250 MHz to 280 MHz should be operated within 5 metres of this unit.



NOTE

Items [2] to [5] are optional or may be existing items of plant. Refer to your Ingersoll-Rand distributor / representative for specific recommendations.

Hard surfaces may reflect noise with an apparent increase in the decibel level. When sound transmission is important, a sheet of rubber or cork can be installed beneath the machine to reduce noise.

It is recommended that provision be made for lifting heavy components during major overhaul.

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.

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.

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

After the machine has been sited, remove the four transportation bolts and spacers which are marked with fluorescent tags. Two are situated on the airend support and the other two on the motor support.

M200-2S
M250-2S

WATER COOLED UNITS

Cooling Water Piping

Water piping to and from the compressor package must be 2" diameter or larger. Isolation valves with side drains should be installed on both the inlet and outlet lines. Also a strainer of 3mm-mesh size should be installed on the inlet line. Strainers are available from Ingersoll-Rand. Ingersoll-Rand CPN 54690060.

It is recommended that a normally closed solenoid valve be fitted to the water outlet side of the compressor package. This is to be wired into the compressor control circuit. This option detail is available from Ingersoll-Rand.

Carefully inspect your water system before installing the compressor package. Ensure that the piping is free of scale and deposits that may restrict water flow to the compressor package.

Proper operation of your compressor requires that the water flow listed below be provided at a maximum supply temperature of 46°C

Model Range	Minimum cooling water requirement at ambient temperatures, in litres per minute (UK gallons per minute)			
	50°F / 10°C	70°F / 21°C	90°F / 32°C	115°F / 46°C
M200-2s	95(21)	130(29)	200(44)	300(66)
M250-2s	114(25)	158(35)	246(54)	350(77)

Water temperature and pressure gauges should be installed in the water piping for use in any fault finding of the water system. Water pressure should ideally be between 3 and 5 bar.

Water cleanliness is also extremely important. Cleaning of coolers as a result of fouling is a customer responsibility. Therefore, it is highly recommended that proper water quality must meet the requirements listed in WATER QUALITY RECOMMENDATIONS later in this section.

Venting the water system

At the initial installation or for start-up after draining the water system proceed to vent the system as follows

- 1 Locate the water system vent cocks on top of the aftercooler and lubricant cooler.
- 2 Open the water valve(s) allowing water to flow to the package.
- 3 Open the vent cocks and allow all air to escape from the system. When water is observed at the vent cocks, close them

The system is now vented.

Draining the water system

Should it become necessary to completely drain the water system, proceed as follows.

- 1 Disconnect the inlet and discharge water lines from the connections located at the rear of the unit.
- 2 Locate the aftercooler and lubricant cooler. Remove the drain plugs located at the bottom of the coolers. Allow the system to completely drain.

Water quality recommendations

Water quality is often overlooked when the cooling system of a water-cooled air compressor is examined. Water quality determines how effective the heat transfer rate, as well as the flow rate will remain during the operation life of the unit. It should be noted that the quality of water used in any cooling system does not remain constant during the operation of the system. Evaporation, corrosion, chemical and temperature changes, aeration, scale and biological formations effect the water makeup. Most problems in a cooling system show up first in a reduction in the heat transfer rate, then in a reduced flow rate and finally with damage to the system.

Scale: Scale formation inhibits effective heat transfer, yet it does help prevent corrosion. Therefore, a thin uniform coating of calcium carbonate is desired on the inner surface. Perhaps the largest contributor to scale formation is the precipitation of calcium carbonate out of the water. This is dependent on temperature and pH. The higher the pH value, the greater the chance of scale formation. Scale can be controlled with water treatment.

Corrosion: In contrast to scale formation is the problem of corrosion. Chlorides cause problems because of their size and conductivity. Low pH levels promote corrosion, as well as high levels of dissolved oxygen.

Fouling: Biological and organic substances (slime) can also cause problems, but in elevated temperature environments such as cooling processes they are not a major concern. If they create problems with clogging, commercial shock treatment are available.

To ensure good operation life and performance of the compressor cooling system, the recommended acceptable ranges for different water constituents are included below:

Cooling Water Analyses Chart

Substances	Test interval	Acceptable concentration
Corrosivity (Hardness, pH, Total Dissolved Solids, Temperature at inlet Alkalinity)	Monthly — if stable for 3 to 4 months, analyse quarterly.	Langelier Index 0 to 1
Iron	Monthly	<2 ppm
Sulphate	Monthly	<50 ppm
Chloride	Monthly	<50 ppm
Nitrate	Monthly	<2 ppm
Silica	Monthly	< 100 ppm
Desolated Oxygen	Daily — if stable, analyse weekly	0 ppm (as low as possible)
Oil & Grease	Monthly	<5 ppm
Ammonia	Monthly	<1 ppm

The Ingersoll–Rand Hydro-check cooling water analysis kit CPN89223481 provides a sample bottle and pre-addressed return tube to our laboratory, where a full report on water quality will be issued.

SEA WATER COOLED UNITS

Sea Water Pressure in Bars	Orifice diameter in mm to give a maximum sea water flow of 340l/min
3 bar	23
4 bar	21
5 bar	20
6 bar	19
7 bar	18
8 bar	17
9 bar	17
10 bar	16

Water cleanliness is also extremely important. Strainers are available from Ingersoll–Rand. Cleaning of coolers as a result of fouling is a customer responsibility.

Isolation valves with side drains should be installed on both the inlet and outlet lines.

It is recommended that a normally closed solenoid valve be fitted to the water outlet side of the compressor package.

ELECTRICAL DATA

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

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.

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.

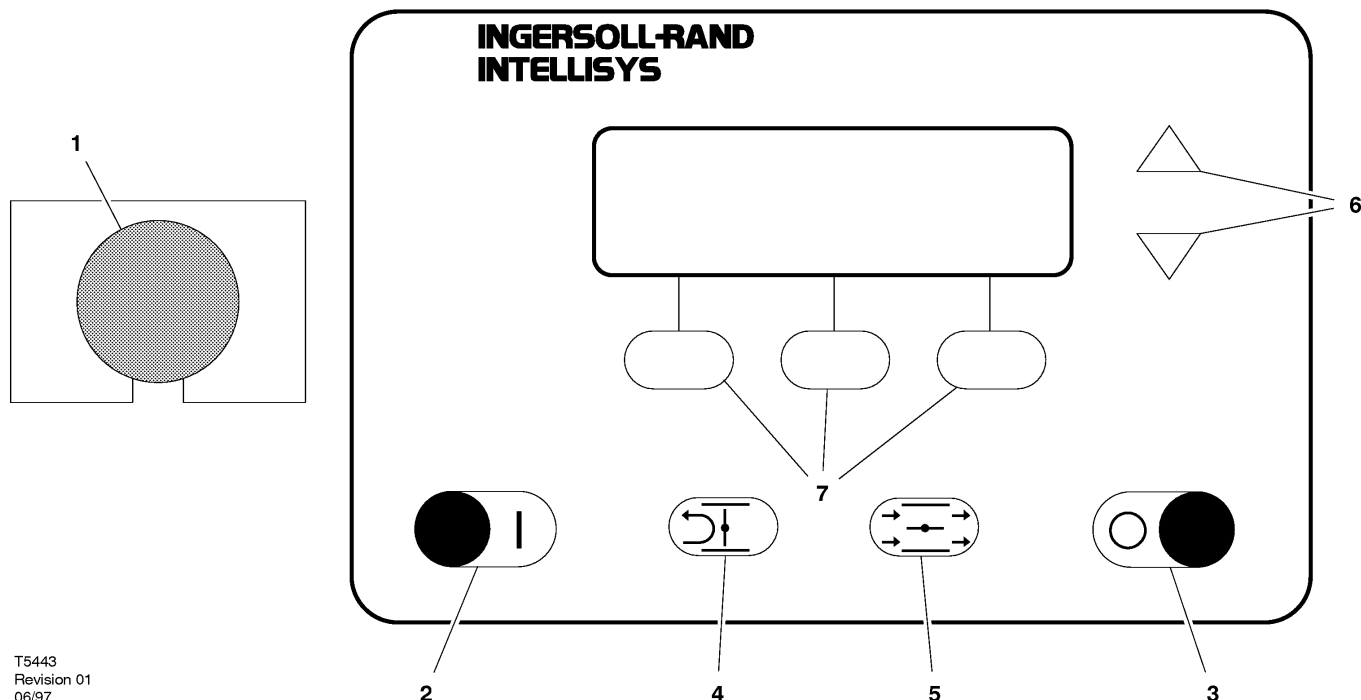
The control circuit transformer has different voltage tapings. Ensure that these are set for the specific applied voltage prior to starting.

CAUTION

Never test the insulation resistance of any part of the machines electrical circuits, including the motor without completely disconnecting the intellisys controller.

NOTICE

Fuses F1 and F2 are supplied loose in the starter cabinet. Do not install until all electrical testing has been completed.



INTELLISYS CONTROLS

1. EMERGENCY STOP

Pressing this switch stops the compressor immediately. The compressor can not be restarted until the switch is manually reset. Turn the switch knob clockwise to reset.

The controller display will illuminate, indicating that the line and control voltages are available.

2. START

Pressing this button will start the compressor if the display shows *READY TO START*. the compressor will start and load if there is sufficient demand for air.

3. STOP

Pressing this button will activate the unloaded stop sequence. If the compressor is running loaded, it will unload and continue to run unloaded for an adjustable 10 to 30 seconds and then stop. If the compressor is running unloaded, it will stop immediately.

4. UNLOAD

Pressing this button will cause the compressor to unload and remain unloaded. The display will indicate that the machine is *RUNNING UNLOADED* and *MODE:UNLOAD*.

5. LOAD

Pressing this button will cause the compressor to load if the compressor is running and if the *DISCHARGE PRESSURE* is less than the *ONLINE PRESSURE*. This also returns the machine to the operating mode that is specified by the *MODE OF OPERATION* set point.

The other five buttons provide access to various operator-selectable functions and machine operating conditions. The purpose of each of these buttons is defined by the display screen and the particular function being performed at that time.

6. ARROWS

These up and down buttons have multiple functions relating to the right half of the display screen. When lists are presented, the buttons are used to move up or down through the items on the list. The small arrow(s) displayed in the upper right hand corner of the display screen indicate when you can move up (designated by arrow head pointing up) and/or down (designated by arrow head pointing down) through the list.

When the value of a specific machine operating parameter is highlighted on the display screen for the purpose of changing that value, the buttons are used to change the value itself.

7. DISPLAY BUTTONS

The functions of the three buttons below the display screen change and are defined by the words immediately above them in the bottom line of the screen. Each function, such as *MAIN MENU*, *STATUS*, etc., is described in appropriate sections in this manual.

<div data-bbox="475 226 660 306">7,0</div> barg RUNNING LOADED MODE: MOD/ACS	–CURRENT STATUS– PACKAGE DISCHARGE TEMP 39°C AIREND DISCHARGE TEMP 89°C
	MAIN MENU

DISPLAY SCREEN

The display screen is divided into three functional areas, as seen in the typical CURRENT STATUS screen shown here.

The left side continuously shows the package discharge pressure in large numbers showing the running condition of the machine and the line below that showing the present mode of operation.

The right side shows various items or lists such as the machine's CURRENT STATUS readings, the MAIN MENU, the OPERATOR SETPOINTS list, etc. Any of the lists can be moved up or down by pressing the arrow buttons to the right of the screen. The small arrow(s) displayed in the upper right corner of the screen indicate when you can move up and/or down through a list. The arrow buttons are also used to change an individual item's value. At certain times, items and/or their values are "highlighted". This means that they are displayed as light characters on a dark background.

<div data-bbox="475 1090 660 1171">7,0</div> barg RUNNING LOADED MODE: MOD/ACS	–CURRENT STATUS– PACKAGE DISCHARGE TEMP 39°C AIREND DISCHARGE TEMP 89°C
	MAIN MENU

The bottom of the screen is divided into thirds with the words in each small box showing the function of the button directly beneath it. The words will change in these boxes depending on what actions are permitted at any particular time. The action resulting from pressing each of these buttons is indicated in the Operator Panel Flow Diagram later in this section. This can be used as a quick reference of how to step the controller screen through any desired function.

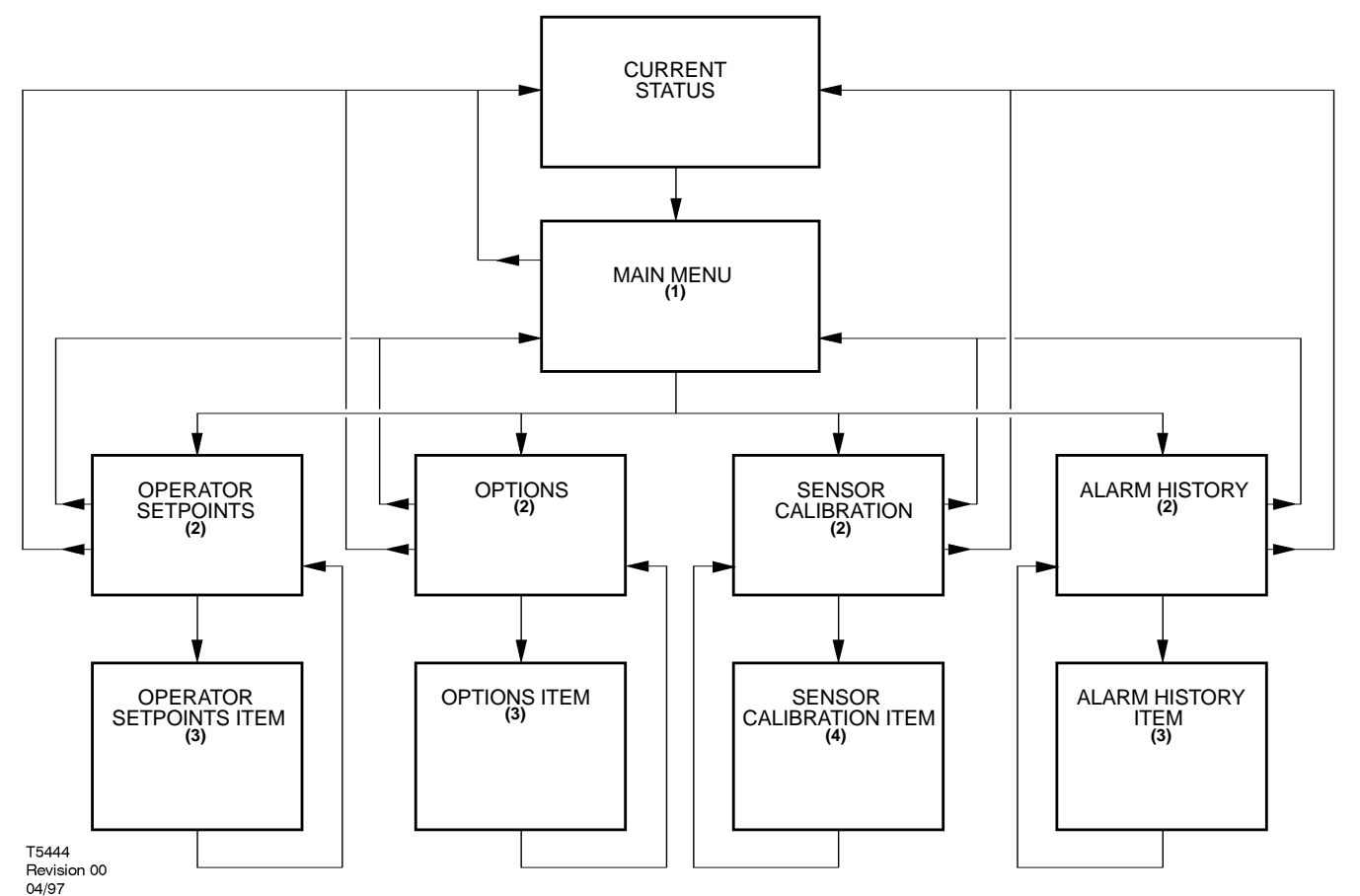
CURRENT STATUS

The CURRENT STATUS screen is considered to be the "normal" display that the controller shows.

The following items and their present values can be displayed on the right side of the screen by pressing the up and down arrow buttons.

CURRENT STATUS items

Package Discharge Temperature
Airend Discharge Temperature
Injected Temperature
Sump Pressure
Separator Pressure Drop
Coolant Filter
Inlet Vacuum
Inlet Filter
Total Hours
Loaded Hours
% Load Modulation
Software Title and Version



The controller automatically returns the display to this CURRENT STATUS screen from other screens if no buttons are pressed within 30 seconds.

The MAIN MENU screen can be accessed from the CURRENT STATUS screen by pressing the MAIN MENU button, identified by the words “MAIN MENU” in the bottom line of the screen directly above the centre button.

NOTE: Use the UP and DOWN arrows to move between selections. Items will be highlighted in inverse display mode.

(1) Selecting the highlighted item will display the corresponding menu.

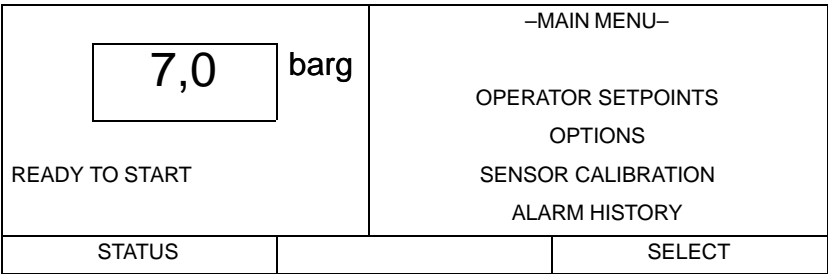
(2) Selecting the highlighted item will place the value in edit mode. This is indicated by only the value being displayed in inverse display mode.

(3) The UP and DOWN arrows will alter the value.
Depressing “Cancel” will exit the edit mode and leave the value unchanged.
Depressing “Set” will save the new value and flash the value to indicate acceptance.

(4) Depressing “Cancel” will exit the calibration mode.
Depressing “Calibrate” will calibrate the selected sensor.

Ensure that the unit is stopped and fully depressurised first.

(5) Use the UP and DOWN arrows to scroll through the list of status items.



MAIN MENU

The MAIN MENU screen is the point from which various operator functions can be accessed. Refer to the Operator Panel Flow Diagram.

Each of the functions can be chosen by using the up and down arrows to highlight it on the screen.

The controller will go to the highlighted function if the SELECT button is pressed or will return to the CURRENT STATUS screen if the STATUS button is pressed.

OPERATOR SETPOINTS

Setpoints are user-adjustable variables in the controller logic that can be set using the OPERATOR SETPOINTS screen.

The name and value of each of the setpoints listed below can be seen on the screen by moving the list up and down using the arrow buttons.

OPERATOR SETPOINTS	RANGE	STEP	UNIT
Offline Pressure	75 to RATED +3	1	PSIG
Online Pressure	65 to OFFLINE – 10	1	PSIG
Mode of Operation	MOD/ACS, ON/OFF LINE, MODULATION ONLY		
Load Delay Time	0 to 60	1	SEC
Stop Delay Time	10 to 30	1	SEC
Star-Delta Time*	10 to 20	1	SEC
(Screen) Contrast	0 to 10	1	—

*Does not apply to automatic across the line starters.

<div> <div>7,0 barg</div> <div>READY TO START</div> </div>			<div>–OPERATOR SETPOINTS–</div> <div>OFFLINE PRESSURE</div> <div>7,1 barg</div> <div>ONLINE PRESSURE</div> <div>6,4 barg</div>		
STATUS		MAIN MENU		SELECT	

Setpoints associated with options are described in the OPTIONS sections.

A setpoint's value can be changed by first highlighting the item and its value and pressing the SELECT button to highlight just the value. When the value line is highlighted by itself, the value can be adjusted using the up and down arrow buttons. The CANCEL and SET buttons appear at this time. Press the SET button to enter the new value or press the CANCEL button to return the value of the setpoint prior to using the arrows. The displayed value will flash twice to indicate that it has been entered into the setpoint and the pair of setpoint item and value display lines will again be highlighted together.

Operator set points can be exited by pressing the STATUS or MAIN MENU buttons. If no buttons are pressed within 30 seconds, the display will return to the CURRENT STATUS screen.

<div> <div>7,0 barg</div> <div>READY TO START</div> </div>			<div>–OPTIONS–</div> <div>AUTO RESTART</div> <div>Off</div> <div>AUTO RESTART TIME</div> <div>10 MINUTES</div>		
STATUS		MAIN MENU		SELECT	

24

OPERATING INSTRUCTIONS

OPTIONS

Options are turned on or off and their associated values are set using the OPTION screen.

Some options require additional machine hardware and the correct "Option Module" to plug into the Intellisys controller. Descriptions of the options operations can be found later in this section. The name and value of each of the following options can be seen by moving the list up and down using the arrow buttons.

OPTIONS Items	Range	Step	Unit
Power Out Restart	ON/OFF	–	–
Power Out Restart Time	10 to 120	1	SEC
Low Ambient	ON/OFF	–	–
Min. Cooler Out Temp.	30 to 150	1	Deg.F

An Option item's value can be changed the same way that OPERATOR SETPOINTS values are changed.

<div>7,0 barg</div> <div>READY TO START</div>		–SENSOR CALIBRATION– SENSOR 1AVPT CALIBRATE SENSOR 3APT CALIBRATE	
STATUS		MAIN MENU	SELECT

SENSOR CALIBRATION

Pressure sensor calibration is done through the SENSOR CALIBRATION screen. Sensor calibration can only take place when the machine is stopped. Calibration needs to be done only after a sensor has been replaced or the Intellisys controller has been replaced.

Each of the sensors listed below can be chosen by using the up and down arrow buttons to highlight it on the screen.

SENSOR CALIBRATION Items

Sensor 1AVPT
Sensor 3APT
Sensor 4APT

Select the highlighted sensor by pressing the SELECT button. Press the CALIBRATE button to start the automatic calibration procedure, or press the CANCEL button to not calibrate it and return to the sensor list.

The calibration screen can be exited by pressing either the STATUS or MAIN MENU buttons. If no buttons are pressed within 30 seconds, the display will return to the CURRENT STATUS screen.

<div>7,0 barg</div> <p>READY TO START</p>		<p>–ALARM HISTORY–</p> <p>ALARM HISTORY 1 MAIN MOTOR OVERLOAD</p> <p>ALARM HISTORY 2 HIGH AIREND DISCH TEMP</p>
STATUS	MAIN MENU	SELECT

ALARM HISTORY

Alarm History displays each of the Alarm messages for the last 15 Alarms experienced by the machine. It also gives access to displaying the machine operating conditions that existed at the time of each Alarm. The first one shown, “Alarm History 1”, was the most recent Alarm to occur. Note that multiple, consecutive EMERGENCY STOP Alarms are not recorded as separate Alarms, only the first one will be shown.

Each of the last 15 Alarm messages can be seen by moving the Alarm History list up and down using the arrow buttons. Pressing the SELECT button when one of the Alarms is highlighted will display the list of machine values that existed at the time that particular Alarm occurred.

<div>7,0 barg</div> <p>READY TO START</p>		<p>–ALARM HISTORY 1–</p> <p>PACKAGE DISCH PRESSURE 13,7 barg</p> <p>PACKAGE DISCHARGE TEMP 54°C</p>
STATUS	MAIN MENU	ALARM HIST.

The name and value of each of the items listed below can be seen by moving the list up and down using the arrow buttons. Pressing the ALARM HIST. button will return the display to the ALARM HISTORY screen.

ALARM HISTORY Items

Package Discharge Pressure
Coolant Filter
Package Discharge Temperature
Inlet Vacuum
Airend Discharge Temperature

Inlet Filter
Injected Temperature
Total Hours
Sump Pressure
Loaded Hours
Separator Press. Drop
% Load Modulation

Alarm histories can be exited by pressing either the STATUS or MAIN MENU buttons. If no buttons are pressed within 30 seconds, the display will return to the CURRENT STATUS screen.

<div>7,0 barg</div> <p>RUNNING UNLOADED MODE: MOD/ACS</p>		<p>WARNING</p> <p>CHANGE INLET FILTER</p> <p>PRESS RESET TWICE</p>
STATUS	MAIN MENU	RESET

When a Warning occurs, the word WARNING will flash on the display screen and appear in large letters as shown above. The display message will indicate what caused the warning.

If multiple Warnings exist, the small up/down arrows will appear in the upper right corner of the display screen. The multiple Warnings can be seen by pressing the up and down arrow buttons. Pressing the STATUS button will display the CURRENT STATUS screen with the WARNING button indicating that a Warning still exists.

<div>7,0 barg</div>		–CURRENT STATUS–	
RUNNING UNLOADED MODE: MOD/ACS		PACKAGE DISCHARGE TEMP 39,4°C AIREND DISCHARGE TEMP 89,4°C	
WARNING		MAIN MENU	

Pressing the WARNING button will return the display to the WARNING screen and the RESET button.

A Warning needs to be reset by the operator by pressing the RESET button twice.

The possible Warning messages are as follows;

AIREND DISCHARGE TEMP – This will occur if the Airend Discharge (2ATT) exceeds 97% of the alarm limit, 228°F (109°C) and is not adjustable.

CHANGE COOLANT FILTER – This warning will occur if the high side pressure is 20 psig (1,4 bar) greater than the low side pressure of 1 DPS and the Injected Coolant temperature (2CTT) is greater than 120°F (49°C).

CHANGE INLET FILTER – This will occur if the Inlet Vacuum (1AVPT) is greater than 0,7 psig (0,05 bar) and the machine is fully loaded (inlet valve is completely open).

CHANGE SEPR ELEMENT – This warning will occur if the pressure on the Separator (3APT) is 15 psig (1,0 bar) greater than the pressure at the Package Discharge (4APT) and the machine is fully loaded.

<div>7,0 barg</div>		ALARM	
STOPPED BY ALARM MODE: MOD/ACS		HIGH AIREND DISCH TEMP 109,4°C PRESS RESET TWICE	
STATUS		MAIN MENU	
		RESET	

HIGH DISCHARGE PRESS – This can occur if the machine's loading function is being controlled by a host device such as a sequencer or an ISC. This warning will occur when the package discharge pressure is above the maximum offline pressure (rated pressure plus 3 psig (0,2 bar)) for more than 3 seconds. This warning will cause the compressor to unload. The host device will not be able to load the compressor until the package discharge pressure falls to the rated pressure of the machine.

SENSOR FAILURE 4ATT – This will occur if the Package Discharge Temperature Sensor (4ATT) is missing or broken.

ALARMS

When an Alarm occurs, the word ALARM will flash on the display screen and appear in large letters as shown above. The display message will indicate what caused the Alarm.

Pressing the STATUS button will display the STATUS screen. The presence of the ALARM button indicates that an Alarm condition still exists. Alarm Status is the list of machine operating conditions that existed at the time of the Alarm.

<div>7,0 barg</div>		–ALARM STATUS–	
STOPPED BY ALARM MODE: MOD/ACS		PACKAGE DISCH PRESSURE 7,0 barg PACKAGE DISCHARGE TEMP 39,4°C	
ALARM		MAIN MENU	

The name and value of each of the items listed can be seen by moving the list up and down using the arrow buttons. Pressing the ALARM button will return the display to the Alarm screen and the RESET button.

The Alarm needs to be reset by the operator by pressing the RESET button twice. Any exceptions to this are explained in the alarm descriptions.

The possible Alarm messages are as follows;

CHECK INLET CONTROL – This will occur if the machine is unloaded and the inlet vacuum is less than 3 psig (0,2 bar).

CHECK INLET CTRL SYS – This will occur if the inlet butterfly valve is in an incorrect position.

CHECK MOTOR ROTATION – This will occur if the machine is started and the compressor has incorrect rotation.

CONTROL POWER LOSS – This will occur if the controller detects a loss of the 110 VAC control power.

EMERGENCY STOP– This will occur if the Emergency Stop button is engaged. The button must be disengaged before the alarm can be cleared.

FAN MOTOR OVERLOAD– This will occur if a fan motor overload is sensed.

HIGH AIREND DISCH TEMP– This will occur if the airend discharge temperature is greater than 228°F (109°C).

LOW SUMP AIR PRESSURE– This will occur if the machine is running fully loaded and the sump pressure drops below 20 psig (1,4 bar).

LOW UNLOAD SUMP PRESS– This will occur if the machine is running unloaded and the sump pressure is less than 15 psig (1,0 bar) for 15 seconds.

MAIN MOTOR OVERLOAD– This will occur if a drive motor overload is sensed.

MEMORY FAULT– This will occur if the controller has determined some of the data stored in memory contains unacceptable values. When this occurs, the sensors should be calibrated and all the set points checked. It is normal for this alarm to occur after changing controller software.

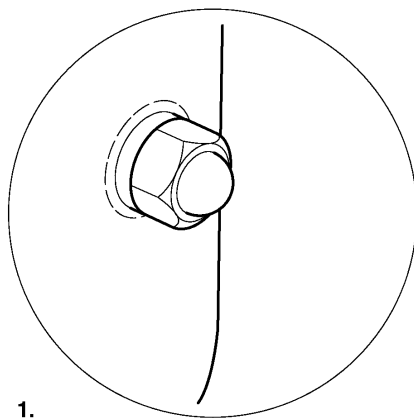
REMOTE START FAILURE– This will occur if the Remote Start button is pressed after the machine is running or if the Remote Start button remains closed.

REMOTE STOP FAILURE– This will occur if the Remote Stop button remains open and either Start button is pressed.

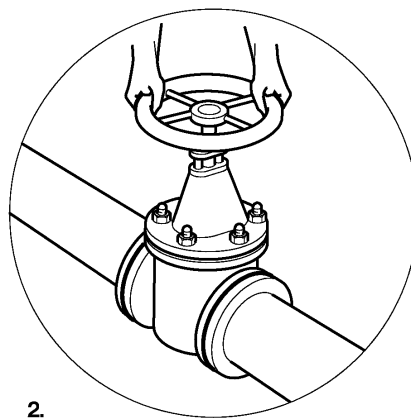
SENSOR FAILURE 1AVPT (or 3APT, 4APT, 2CCT, 2ATT)– This will occur if a sensor is recognised as missing or broken. This does not apply to sensor 4ATT.

STARTER FAULT– This will occur if the starter contacts open while the machine is running. It will occur if the machine is given the stop command and the starter contacts do not open.

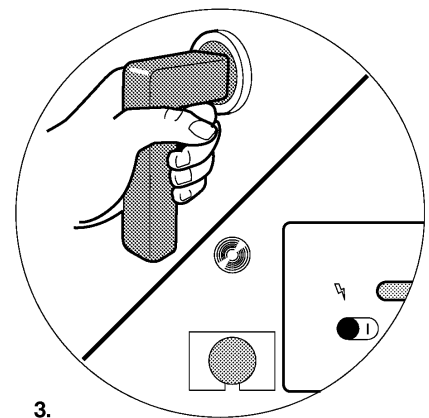
STEPPER LIMIT SWITCH– This will occur if both limit switches are activated at the same time.



1.



2.



3.

T5461
Revision 00
12/94

28 OPERATING INSTRUCTIONS

PRIOR TO STARTING

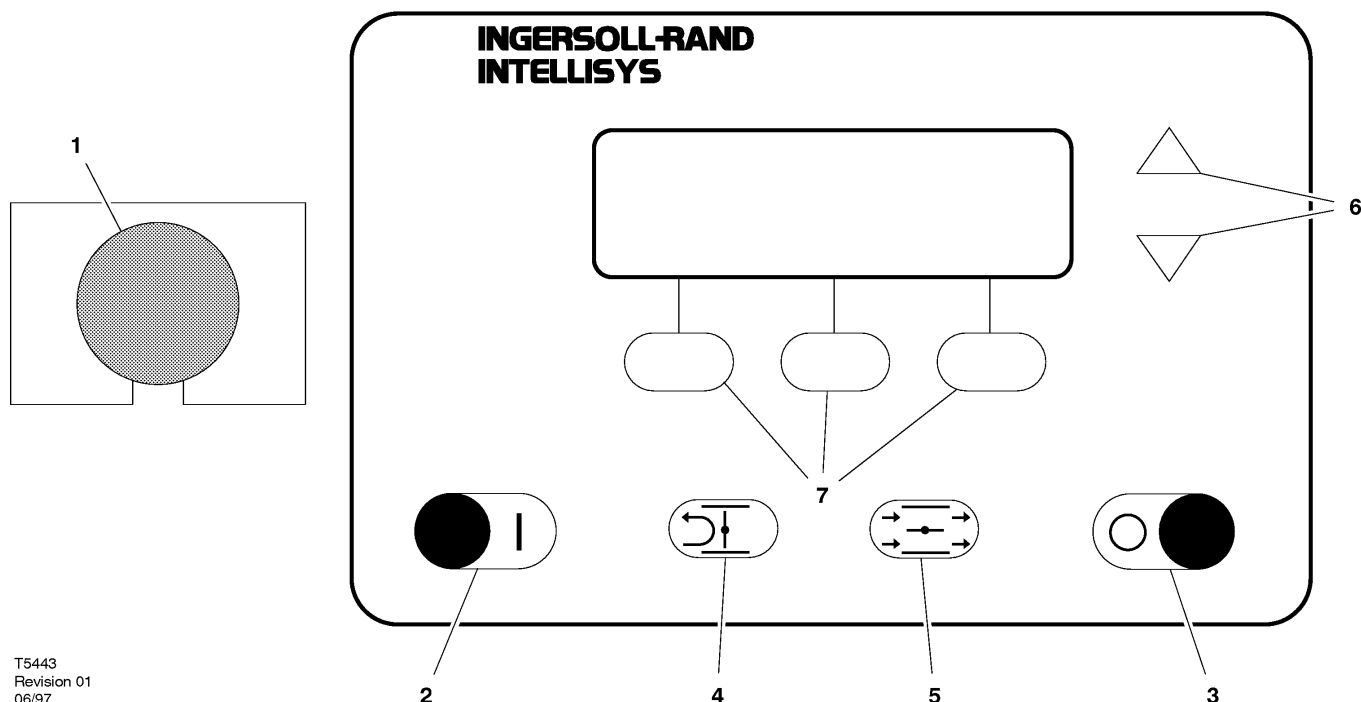
Refer to the diagram T5461

WARNING: Ensure that all protective covers/guards are in place before attempting to start the machine.

1: Check the coolant level in the sight tube/glass. Add coolant if necessary.

2: Ensure that the discharge air isolation valve is open.

3: Switch on the main electrical isolation switch. The *power on* indicator will illuminate, indicating that the line and control voltages are available.



STARTING THE MACHINE

Refer to the diagram T5443

Upon power up, the Intellisys will carry out a series of checks, and the message CHECKING MACHINE will show on the display. If all the check parameters are satisfactory, the display will then show READY TO START.

Depress the start button (2) on the Intellisys unit. The machine will start and automatically load.

STOPPING THE MACHINE

Refer to the diagram T5443

Depress the STOP button (3) which will automatically unload the compressor for 10 seconds before stopping.

Switch off the main electrical isolation switch.

STOPPING THE MACHINE IN AN EMERGENCY

Refer to the diagram T5443

If the machine has to be stopped in an emergency **DEPRESS THE EMERGENCY STOP BUTTON (1) LOCATED ON THE INSTRUMENT PANEL.**

This will over-ride the normal unload/stop button and will immediately stop the machine without the 10 second delay.

CAUTION: Never allow the machine to stand idle with pressure in the system.

RE-STARTING AFTER AN EMERGENCY

If the unit has been switched off because of a machine malfunction, then identify and correct the fault before attempting to re-start.

If the unit has been switched off for reasons of safety, then ensure that the machine can be operated safely before re-starting.

Refer to the *PRIOR TO STARTING* and *STARTING THE MACHINE* instructions earlier in this section before re-starting the machine.



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.
When the separator element warning is displayed.	Check the pressure differential. Change the separator element if the pressure drop is zero or exceeds 1 bar (15 p.s.i.g.)
First 150 hours	Change the coolant filter.
1 month	Check the operation of the high temperature protection switch(es) (109°C standard).
1 month	Check the operation of the discharge temperature sensor (109°C standard). The sensor should alert at 106°C.
1 month	Check the cooler(s) for build up of foreign matter. Clean if necessary by blowing out with air or by pressure washing.
1 month	Check the operation of the float mechanism in the moisture separator and clean if necessary.
Each 3 months	Check all hoses for signs of deterioration, cracks, hardening etc.
Each 2000 hours	Change the coolant filter.
1 year	Change the air filter element. Replace the element sooner if the indicator light flashes.
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.

4000 hours / 6 months	Check the operation of the blow down solenoid valve for signs of fatigue. Renew the seals if necessary.
4000 hours / 6 months O.D.P.	Lubricate the main motor <i>drive end</i> bearing. Quantity of grease required: 40g Lubricate the main motor <i>non-drive end</i> bearing. Quantity of grease required: 20g
2000 hours / 3–4 months T.E.F.C.	Lubricate the main motor <i>drive end</i> bearing. Quantity of grease required: 60g
4000 hours / 6 months T.E.F.C.	Lubricate the main motor <i>non-drive end</i> bearing. Quantity of grease required: 30g
8000 hours / 1 year	Check the scavenge screen for blockage, clean if required.
8000 hours / 2 years	Replace the ULTRA COOLANT at which-ever interval occurs first. Also replace the separator element and coolant filter.
4 years	Replace all hoses.
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.
1 monthly intervals.	On water cooled and sea water cooled models check the water input line strainer for build up of foreign matter, clean if required

Note:

On some sea water cooled models the oil cooler and after cooler are fitted with sacrificial zinc anodes (pencils) that are located in the end bonnets of the coolers. These sacrificial zinc anodes should be checked after the **first 50 hours** of operation to determine if corrosive conditions exist. If satisfactory this interval may be extended to 500 hours.

NOTE:

- 1 If sacrificial zinc anode is 50% corroded it should be replaced.
- 2 Coastal/harbour waters can contain corrosive chemicals from pollution and may reduce anode/cooler life.
- 3 Effects of corrosion or erosion are specifically excluded from warranty considerations.

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.

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 LEVEL CHECKING PROCEDURE

The coolant level should be checked daily. Located on the side of the separator is a coolant level sight tube/glass. Whilst the compressor is running under load and the coolant is at normal operating temperature, the coolant level should be between the middle and the top of the sight glass.

COOLERS

Once a month, the coolers should be checked for coolant and dirt accumulation on the exterior surfaces. Clean the coolers by directing compressed air carrying, if possible, a non-flammable safety solvent through the core of the cooler.

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.
- Check the coolant level, refilling if necessary.
- Start the compressor and check for leaks.

COOLANT CHANGE PROCEDURE

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.

WARNING:

Extreme care should be taken when draining hot lubricant.

To enable the coolant to be drained, a valve is located under the separator tank. This in turn feeds a flexible hose to enable direct discharge to suitable containers for coolant removal.

Open the valve and completely drain the coolant into a suitable container.

Close the valve and refill the compressor.

CAUTION – DO NOT MIX OILS WITH SSR ULTRA COOLANT.

- Start the compressor and check for leaks.
- Check the coolant level, refilling if necessary.
- Dispose of waste coolant in accordance with local and governmental regulations.

NOTE

Shorter coolant drain intervals may be necessary if the compressor is operated in adverse conditions.

AIR FILTER CHANGE PROCEDURE

Removal

WARNING: Do not remove the filter(s) without first making sure that the machine is stopped and the system has been completely relieved of all air pressure. (Refer to *STOPPING THE MACHINE* in the *OPERATING INSTRUCTIONS* section of this manual).

Remove the wing-nuts securing the filter cover and remove the housing lid.

Fit the new element(s) and re-assemble the components in reverse order.

SEPARATOR ELEMENT CHANGE PROCEDURE

Remove the roof panel to gain access to the top of the separator tank.

Disconnect the scavenge tube from the airend and loosen the fitting that secures the scavenge tube to the separator tank cover and then remove the scavenge tube.

Disconnect the blowdown system hose assembly and the minimum pressure valve.

Remove the setscrews securing the cover to the tank and remove the complete cover assembly.

Withdraw the used element, place it in a sealed bag and dispose of it safely.

Clean the gasket surface on both the tank and the cover.

CAUTION

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

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.

- Install the replacement element.
- Re-assemble the components in reverse order.
- Start the compressor and check for leaks.

AIREND BEARINGS

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

MOTOR BEARINGS

Clean the area around the grease nipple and remove the protective cover. Add the correct amount of grease (refer to the *SERVICE/MAINTENANCE CHART* earlier in this section). Replace the protective cover and clean the area of surplus grease.

MOTOR BEARING LUBRICANT SPECIFICATION

Use *ESSO UNIREX N3 grease or equivalent*.

CAUTION:

Do not over pack the motor bearings with grease as this may lead to motor failure.

CAUTION:

Ensure dirt and/or other contaminants are not introduced into the bearing during the greasing process.

H.A.T. SWITCH CHECKING PROCEDURE

It is recommended that the discharge temperature sensor is checked regularly as follows:

Air cooled machines

Stop the cooling fan by opening the fan motor circuit breaker.

Water cooled machines

Shut off the cooling water.

The machine should trip at 109°C standard.

CAUTION:

Under no circumstances should these discharge temperatures be exceeded. If the machine fails to trip A FAULT EXISTS. Investigate immediately.

The temperature at which the machine stops should be recorded for comparison with future results.

FAULT	CAUSE	REMEDY
'Power on'. L.E.D. does not illuminate.	CONTROL VOLTAGE NOT AVAILABLE	Check the control fuses.
		Check the transformer secondary windings for the control voltage.
Controller indicates trip condition.	CONTROL CIRCUIT INTERRUPTED BY A SAFETY DEVICE	Check machine for indicated fault. Attempt to 'reset' the controller. If the fault persists investigate further.
Compressor trips indicating a high compressor temperature.	INSUFFICIENT COOLANT CIRCULATION	Check the coolant level.
		Check that the coolers are clean.
		Check the coolant system for blockages.
		Check the operation of thermostatic valve.
	POOR ELECTRICAL CONNECTION	H.A.T. thermistors fail-safe. The unit will trip due to open or short circuit.
	INSUFFICIENT COOLING TAKING PLACE	Check that the cooling air flow is not obstructed at: . The inlet grille . The cooler matrix . The exhaust vents
		Check that the ducting (if fitted) is the correct size.
	EXCESSIVELY HIGH AMBIENT TEMPERATURE (i.e. greater than 46°C (115°F)).	Improve the ventilation to the compressor room.
Compressor trips and indicates motor overload.	EXCESSIVE CURRENT HAS CAUSED THE THERMAL OVERLOAD (MOL) TO TRIP	Check the actual operating pressure and lower the setting if it is too high. Isolate the electrical supply and check that the airend and motor rotate freely. Check the separator element for excessive pressure drop.
		Check that the mains voltage is not below the specified value.
Compressor shutdown. Display shows OVERPRESSURE.	ISOLATION VALVE CLOSED.	Open the valve and restart.
	BLOWDOWN SYSTEM INEFFECTIVE.	Check the operation of the load solenoid.
		Check the operation of the unloader valve – strip and clean if necessary.
Compressor will not build up rated pressure.	DEMAND TOO HIGH	Check for leaks, open service valves or exceptionally high demand.
	OFFLINE PRESSURE SET TOO LOW	Check the offline pressure setting.
Compressor will not load.	INLET VALVE NOT OPENING	Ensuring that all power to the machine is switched off, check that the valve is free to open.
		Check the operation of the stepper motor.
Compressor fails to deliver rated capacity.	–	Check the operation of the inlet valve.
		Check the operation of the stepper motor.
		Check the offline/online pressure setting.
		Check the inlet filter for contamination. The L.E.D. should indicate if it is blocked.
Excessive coolant consumption.	BLOCKED SCAVENGE LINE	Clear the blockage.
	RUPTURED OR FOULED SEPARATOR ELEMENT	Change the element.
Rapid cycling or receiver will not blow-down to unloaded running pressure.	RAPID LOAD/UNLOAD CYCLING	Duty cycle too rapid – Increase system capacity.
		Change the Intellisys controller to show modulation operation.
	MINIMUM PRESSURE VALVE (MPV) STUCK OPEN	Strip the MPV, examine and repair if necessary.
Safety valve blows when compressor goes on load.	MPV STUCK CLOSED	Strip MPV, examine and repair if necessary.
	SAFETY VALVE FAULTY	Check the setting of the safety valve and the rated pressure.
Compressor trips indicating a high compressor temperature.	INSUFFICIENT COOLING TAKING PLACE	If machine is water cooled or seawater cooled, check that the cooling water is flowing. Check that there is no air in the water cooling system. Check that the strainer is not blocked.

